Conscious and Nonconscious Components of Superstitious Beliefs in Judgment and Decision Making

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Despite the large impact that superstitious beliefs have on the marketplace, we currently know very little about their implications for consumer judgment and decision making. We document the existence of the influence of superstitious beliefs on consumer behavior and specify their conscious and nonconscious underlying properties. In particular, we show that superstitious beliefs have a robust influence on product satisfaction and decision making under risk. However, these effects are only observed when superstitious beliefs are allowed to work nonconsciously. Using a process-dissociation task, we further demonstrate the distinct conscious versus nonconscious components of the effect of superstition on decision making under risk.

$888 to Beijing. Lucky You.

This recent Continental Airlines ad, prominently featuring a number that is perceived to be lucky in Chinese cultures, exemplifies the use of cultural superstitious beliefs in marketing practice. Although academic research has recognized the importance of other various elements of the social and cultural environments in marketing, such as values (Han and Shavitt 1994), goals (Aaker and Lee 2001), or language (Luna and Peracchio 2005), individuals' superstitious beliefs and their impact on consumer judgments and decision making have received surprisingly little attention. This lack of investigation into superstitious beliefs is all the more surprising given their strong impact on the marketplace. For example, between $800 and $900 million is lost in business in the United States each Friday the thirteenth because people do not want to go to work or tend to

business in general that day (Palazzolo 2005). Furthermore, a recent newspaper article noted that a young businessman in Guangzhou, China, bid 54,000 yuan (almost seven times the country's per capita annual income) for lucky license plate APY888; a man in Hangzhou offered to sell his license plate A88888 on the Internet for 1.12 million yuan; and a Chinese airline paid 2.4 million yuan for the telephone number 8888 8888 (Yardley 2006). It is hardly surprising that the Beijing Summer Olympics are scheduled to open on August 8, 2008, at 8 p.m.

In addition, an increasing number of U.S. companies are adopting the principles of feng shui, often hiring feng shui experts who apply these superstitious Chinese practices to offices in esteemed companies such as Smith Barney and Morgan Stanley (Tsang 2004). Consider the following passage describing a corporate executive reported in *Fortune* (Gunn 1997, 64): "Twelve softball-sized stones sit on his windowsill to guard against negative forces from surrounding buildings. Another 69 small pieces run along the ledge of an internal window to deflect the heat and bad energy from computers and fax machines on the other side."

It is therefore surprising that academic research provides such little empirical evidence on the effect of superstition on business decision making, and we currently know even less about the implications of superstitious beliefs for consumers. Furthermore, the degree to which superstition's effects are based on a conscious versus nonconscious process has remained unexamined. The current study seeks to address these shortcomings by not only documenting the existence and robustness of the influence of superstitious

beliefs on consumer behavior but also specifying their conscious versus nonconscious underlying properties.

We begin with the impact of superstitious beliefs on consumer satisfaction following product failure by showing that consumers are less (more) satisfied with a product for which they hold positive (negative) superstitious associations based on its color, the product quantity, or the digits used in its price. However, we find that these effects are only observed when superstitious beliefs are allowed to work nonconsciously. Next, we demonstrate that the effects of superstitious beliefs are not limited to Asian consumers, showing that participants from the United States make significantly more risk-averse choices when a negative (vs. neutral) superstition is made salient. Finally, we provide evidence that even though the effect of superstitious beliefs on decision making has both conscious and nonconscious components, the contribution of nonconscious processing to the effect is three times the relative size of the conscious effect we observe. Next, we review literature on superstition and describe three studies that tested our hypotheses. We then discuss the theoretical and practical implications of this research.

THEORETICAL BACKGROUND

Belief in Superstition

Superstitions are beliefs that are inconsistent with the known laws of nature or with what is generally considered rational in a society (*American Heritage Dictionary* 1985). Belief in superstition dates back thousands of years and continues to the present (Jahoda 1969; Vyse 1997). Superstitions may be invoked to fend off bad luck, as Michael Jordan did when he changed the number on his uniform to change his luck after several inferior performances (*USA Today*, reported in Darke and Freedman [1997b]). Superstitions are also invoked to bring about good luck, as deep-sea fishermen in New Guinea often do when they perform elaborate magical rituals to ensure a successful fishing trip (Malinowski 1954).

Although superstitions can be found the world over, superstitious beliefs are most often culturally specific. For example, Chinese individuals often seek to deflect bad luck by putting up mirrors in their homes (Simmons and Schindler 2003). The color red and the number 8 are associated with prosperity and good luck; therefore, the Bank of China opened its doors in Hong Kong on August 8, 1988—considered to be the luckiest day of the century (Lip 1992). During Chinese New Year, older relatives give children lucky red envelopes with money inside. Colors and numbers (e.g., the number 4 and the color black) are also associated with unlucky consequences (Wiseman and Watt 2004). Some buildings in China have no fourth floor, and some parents refuse to let their children travel in unlucky taxis on the day of their college entrance exam (Yardley 2006). Examples of common superstitious beliefs in the United States include horseshoes and knocking on wood for good luck, and the number 13, walking under a ladder, or breaking a mirror for bad luck.

Although many superstitions are culturally shared and socially transmitted from generation to generation, others consist of relatively more idiosyncratic beliefs or rituals. For example, students can often be seen bringing lucky charms or lucky pens to an exam; an athlete may not change socks during a tournament; and a job applicant may wear a lucky outfit for a job interview. Each of these superstitious beliefs and behaviors is associated with desired positive outcomes; that is, people expect to do well on a subsequent task. Engaging in ritualistic behavior of this sort is consistent with Darke and Freedman's (1997b) empirical work on luck. They demonstrated that people's associations of luck with one performance create expectations about luck that extend beyond this single event to other independent and unrelated events.

Research also suggests that people are motivated to rely on superstitious beliefs when their control over an event is undermined or threatened. Case et al. (2004) conducted a series of studies investigating the relationship between the use of superstitious strategies and perceived control. The consistent finding across these studies was that as the likelihood of failure increased, so did the use of superstitious beliefs. Case et al. concluded that the more salient the failure is, the more people use superstitious strategies to explain the failed outcome. However, to date, this research has been limited to studies of personal failure.

The current research therefore starts with a focus on the use of superstitious explanations for nonpersonal or inanimate object failure, such as product failures. Morales and Fitzsimons (2007) recently demonstrated the transference of irrational beliefs onto inanimate objects (i.e., products). Though their study did not explore superstitious beliefs, Morales and Fitzsimons showed that irrational beliefs about one product can be contagious and affect other products. The question remains whether superstitious beliefs are transferred to inanimate objects in the case of product failures. In addition, we still do not know the degree to which consumers use superstitious beliefs, either consciously or nonconsciously, in their decision making under uncertainty. Given the importance placed on rationality and associated norms against relying on superstition in many modern societies (Vyse 1997), the degree to which the effects of superstition operate nonconsciously is an interesting open question.

Superstitions in the Marketplace

Despite the prevalence of superstitious beliefs, systematic study of such effects on managerial and consumer decision making is just beginning to enter the marketing literature. For example, investigating Chinese consumers' perceptions of alphanumeric brand names, Ang (1997) found that those containing lucky numbers and letters (e.g., A8) were perceived more favorably than those containing unlucky letters and numbers (e.g., F4). A content analysis of Chinese advertising showed that unlucky number 4 was

underrepresented and lucky number 8 was overrepresented in advertised prices in China, Hong Kong, and Taiwan (Simmons and Schindler 2003). Next, in an exploration of the consumer-behavior-related consequences of superstition, Mowen and Carlson (2003) studied the possible trait antecedents of superstition. They found that many of the antecedents one might expect to correlate with superstitious beliefs—such as education level, and age—in fact do not. It is interesting to note that they also found that a higher need for material possessions led to greater superstitious beliefs (Mowen and Carlson 2003). This body of work is a beginning to creating a literature on superstitions in the marketplace.

With this article, we add to this nascent body of knowledge by examining how superstitious beliefs influence product satisfaction and consumers' risk-taking behavior. We suggest that the superstitious associations that individuals hold concerning an object's attributes (e.g., color) will influence how well they believe the object itself should perform. For example, since red is a lucky color, Chinese consumers might expect a red rice cooker to perform better than a green one. More generally, superstitious beliefs may be a source of information relied upon in evaluation and satisfaction judgments.

Satisfaction is one of the most researched constructs in marketing (Oliver 1999) because of its influence on consumers' postpurchase behaviors. These include profitable behaviors following satisfactory product performance, such as repurchase, positive word of mouth, and recommendation of products or firms to other consumers, as well as harmful behaviors following dissatisfactory product performance, such as negative word of mouth, warnings (i.e., telling others not to buy the brand), and complaints to firms (Swan and Oliver 1989). Satisfaction is inextricably linked to customer loyalty, which is a major driver of purchase (Oliver 1999).

As discussed above, individuals rely on superstition or superstitious rituals in the hope that these behaviors will bring them luck and help them perform better. Analogously, we predict that superstitious associations with product attributes will also influence expected product performance and, as we investigate, consumers' satisfaction following product failure. Differences in expectations, in turn, may influence how satisfied consumers will be (Oliver 1980; Oliver and Bearden 1985; van Raaij 1991). Accordingly, we hypothesize the following:

H1a: Following product failure, consumers will be less satisfied with a product for which they hold positive (vs. neutral) superstitious associations.

H1b: Following product failure, consumers will be more satisfied with a product for which they hold negative (vs. neutral) superstitious associations.

Conscious and Nonconscious Components of Superstition

Clearly, many individuals subscribe to and rely on superstitions in a conscious manner. That is, students who come to class with their lucky pen, and consumers who read their horoscope or do not want to close on their mortgage on Friday the thirteenth, make a conscious decision based on superstitious associations with the object or date. However, other research from the current authors finds that superstitious beliefs can lead to behavior contrary to financial common sense (e.g., paying more money for fewer units of a product or a greater willingness to purchase a product at a relatively higher price). Such reversals of rationality suggest that superstitious beliefs may also work on a nonconscious level. Support for the nonconscious nature of processing stems from the conceptually similar work on the processing of stereotypes. Like stereotypes, superstitious beliefs represent a set of cultural associations that are learned through socialization processes and are socially transmitted (Devine 1989). Research shows that these sets of associations are automatically or unintentionally activated by the presence of a cue in the environment (Devine 1989), but can be adjusted through conscious thought. Similarly, when faced with a superstitious cue, like a Friday the thirteenth calendar date, cultural superstitions are likely to be automatically activated but can subsequently be controlled consciously.

Further support for an automatic component of superstition dates back to Freud's suggestion that superstition is associated with one's projection of fears and wishes in a person's unconscious (Tsang 2004). In fact, the literature on superstition repeatedly speculates that superstitious beliefs are automatically activated. Despite these assertions, there is no empirical evidence on the process by which superstitions influence decisions. Providing support for the relative impact of conscious versus nonconscious elements of superstitions would therefore help fill a large gap in the theory and understanding of such belief systems.

We used priming manipulations to test for conscious versus nonconscious processing in our studies. In particular, research suggests that primes can affect subsequent judgments in one of two ways: in the predicted direction of the prime when individuals are unaware of the prime, and contrasting away from the prime when individuals are aware of the prime (Bargh 1994). Therefore, we sought to examine the processing underlying the impact of superstition with priming tasks that varied in how obviously the primes were related to the subsequent dependent measures.

Specifically, priming can influence subsequent judgments through a nonconscious process when the priming task is seemingly unrelated to the main task (Bargh 1994; Bargh and Chartrand 1999; Bargh, Chen, and Burrows 1996; Strack et al. 1993). In other words, nonconscious (vs. conscious) processing can be detected (1) when the priming task makes superstitious beliefs salient but the main task does not, and (2) when the main task makes superstitious

beliefs salient but the priming task does not. Alternatively, when the priming task is obviously related to the main task, prior research suggests that subsequent judgments are derived through a conscious processing of the activated beliefs (Bargh 1994).

We test for conscious versus nonconscious processing in study 1 by priming superstition so as to make such beliefs salient to the individual versus a control condition in which no priming of superstition occurs. If superstitious beliefs activated in the primary task (e.g., lucky color red) nonconsciously influence subsequent judgments (e.g., lower satisfaction), then the effects hypothesized in hypotheses 1a and 1b should be obtained only in the control condition, but not when superstitious beliefs are also activated via a priming task.

We reverse this in studies 2 and 3, where it is the prime condition—unrelated to the main task—that drives the nonconscious processing. If superstitious beliefs are made salient via a priming task, their effects should be observed only when the main task appears to be unrelated to these primed beliefs. In sum, evidence of nonconscious processing is detected with judgments consistent with superstitious beliefs in the control condition in study 1 and the priming condition in studies 2 and 3. Finally, we seek direct evidence of the relative nonconscious and conscious contribution to the effect of superstition in study 3.

STUDY 1

We begin to test our hypotheses in a study with Taiwanese subjects, because individuals of Chinese backgrounds have been reported to be among the most superstitious in the world (Simmons and Schindler 2003; Tsang 2004). Before the main study, a separate sample of 24 Taiwanese individuals were asked (open-ended) in a pretest which numbers and colors represented the most good luck and bad luck. Supporting prior findings in the literature (Ang 1997), the majority of participants had the most positive superstitious beliefs concerning the color red and the number 8. Conversely, most participants had the most negative superstitious beliefs concerning the color black and the number 4. No participant mentioned the numbers 5 and 10, or the color green, which were consequently chosen as the neutral attribute-related superstitions. Three subjects mentioned the number 6 as a lucky number, which is consistent with Lip (1992), who described this number as "an auspicious number because it sounds like 'wealth' in Cantonese." Although the native language of our subjects was Mandarin, knowledge of Cantonese may have resulted in the three subjects perceiving the number 6 to be lucky.

It is important to point out that our questionnaires were prepared and completed in English. Since research has shown that cultural values can be made temporarily accessible through language (Hong et al. 2000), use of English (vs. Mandarin) in our studies provides a more stringent test of our hypotheses with this sample because our materials may have primed a Western worldview and thereby reduced reliance on superstitions grounded in Chinese culture.

Method: Participants and Procedure

Forty-eight students from a Taiwanese university participated in a study on consumer preferences for class credit and were randomly assigned to the superstition-salient versus control condition. In the superstition-salient condition, subjects read a short essay that discussed the importance of cultural awareness for international marketers. Part of the essay highlighted the impact of superstitions on consumer behavior. In the control condition, subjects read about the importance of political awareness for international marketers. The two essays were matched in terms of number of words and reading difficulty. Next, participants indicated their agreement that cultural awareness (political awareness) was important for marketers.

After finishing the first study, subjects were told to complete the second questionnaire on consumer preferences, which was attached to the first (priming) task. Here, subjects read three scenarios in which they were told to imagine that they were going to buy a product; one choice was described in terms of neutral attributes and one choice had an attribute with superstitious associations. In particular, in the first problem, subjects were told to imagine that they needed to buy a rice cooker and had found one that was described in terms of capacity, presence of a timer, length of keep-warm time, and color. The first three attributes were kept constant between conditions, while the color of the rice cooker was either red or green, depending on the randomly assigned condition. As we discussed, Chinese cultures tend to hold positive superstitious beliefs concerning the color red, but no superstitious beliefs concerning the color green. Subjects were then instructed to assume that they had purchased the rice cooker but when they used it for the first time, it burnt the rice.

The second problem concerned the purchase of tennis balls, and subjects were instructed to imagine that they had come across a package by Gamma Championship that contained either 8 (i.e., a lucky number) or 10 (i.e., a neutral number) tennis balls per pack, depending on the randomly assigned condition. Subjects were told to assume that they had purchased the tennis balls but that they had fallen apart after a few matches. In the third problem, subjects were told to imagine that they were going to buy a digital camera and had found one that was described in terms of three features (5 megapixels, 5X zoom, built-in flash) that were kept constant between conditions, and price (TW$6,444.44 vs. TW$6,555.55, depending on the randomly assigned condition). As mentioned, Chinese cultures tend to hold negative superstitious associations with the number 4, but no superstitious beliefs concerning the number 5. Subjects were then asked to imagine that they had purchased the camera but that it broke a few weeks later and could not be repaired.

After each scenario, subjects rated their expected satisfaction with the product described in the problem on the following scales (where 1 = strongly disagree and 7 = strongly agree): "I am satisfied with my decision to buy the [product]," "I think it was the wrong thing when I decided to buy the [product]" (reverse-scored), "My choice to buy

the [product] was a wise one," and "I am not happy that I bought the [product]" (reverse-scored); α = .86, .83, and .87 for the rice cooker, tennis balls, and digital camera, respectively. Next, subjects indicated the extent of their knowledge of spoken and written English (where 1 = not at all and 7 = very much so). As manipulation checks, subjects indicated their agreement (where 1 = strongly disagree and 7 = strongly agree) on the following scales: "red is a lucky color," "green is a lucky color," "8 is a lucky number," "10 is a lucky number," "4 is a lucky number," and "5 is a lucky number."

Results

Manipulation Checks. Three subjects rated their knowledge of English as lower than the scale midpoint and were hence eliminated, leaving a final sample size of 45 Taiwanese. As expected, participants differed in their positive associations with the numbers 8 versus 10 (M = 4.67 vs. 3.73; $t(44)$ = 4.62, $p < .001$) and the colors red versus green (M = 4.44 vs. 3.67; $t(44)$ = 3.61, $p < .001$). Participants also differed in their negative associations with the numbers 4 versus 5 (M = 3.07 vs. 4.07; $t(44)$ = 3.71, $p < .001$).

Product Satisfaction.   To establish the generalizability of the effect across different product categories and superstitious beliefs within a single study, we employed a repeated-measures design. Superstitious associations (present vs. absent) and superstition salience (high vs. low) were between-subject variables, and product category (tennis balls, rice cooker, digital camera) was a repeated measure. An ANOVA on the satisfaction index across the three product categories yielded only the expected superstitious association by superstition salience interaction ($F(1, 41)$ = 7.15, $p < .02$).

In particular, and as shown in table 1, when superstitions were not salient (control prime), participants expected to be significantly *less* satisfied following product failure of the tennis balls containing the attribute with which they had positive (vs. neutral) associations ($F(1, 41)$ = 9.29, $p < .01$), supporting hypothesis 1a. It is interesting to note that when superstitions were made salient, participants were marginally *more* satisfied following product failure of the tennis

balls containing the attribute with which they had positive (vs. neutral) associations ($F(1, 41)$ = 3.65, $p < .07$). Similarly, when superstitions were not salient, participants expected to be significantly *less* satisfied following product failure of the rice cooker containing the attribute with which they had positive (vs. neutral) associations ($F(1, 41)$ = 5.54, $p < .05$), again supporting hypothesis 1a. As expected, when superstitions were made salient, participants were equally satisfied following product failure of the rice cooker ($p > .10$). Note however that, directionally, participants were more satisfied following product failure of the lucky red (vs. neutral green) cooker (M = 3.73 vs. 2.89). Finally, when superstitions were not salient, participants expected to be significantly *more* satisfied following product failure of the digital camera containing the attribute with which they had negative (vs. neutral) associations ($F(1, 41)$ = 11.66, $p < .01$), confirming hypothesis 1b. However, when superstitions were made salient, participants were *less* satisfied following product failure of the digital camera containing the attribute with which they had negative (vs. neutral) associations ($F(1, 41)$ = 4.36, $p < .05$).

Discussion

Study 1 demonstrated how positive superstitious beliefs concerning colors and numbers affect product satisfaction judgments, showing that product failure results in lower satisfaction for products for which positive superstitious associations with an attribute exist. In addition, we showed that product failure leads to higher satisfaction for products with associated negative superstitions. To test our proposition that superstitious effects are at least partially driven by a nonconscious process, separate experimental conditions made the association between the activation task and the dependent measure obvious. We found that the effect of superstition on satisfaction was attenuated with the salience of superstitious beliefs. It is interesting to note that we obtained preliminary evidence that when superstitious beliefs were made salient, the effect may even reverse when participants are aware that the priming and evaluation tasks are related. In particular, participants were marginally more satisfied with 8 versus 10 tennis balls, directionally more satisfied with the red versus green rice cooker, but less satisfied with the digital camera ending with the digit 4 versus 5.

TABLE 1

THE EFFECTS OF SUPERSTITION SALIENCE AND SUPERSTITIOUS ASSOCIATIONS ON PRODUCT SATISFACTION

	Tennis balls	Rice cooker	Digital camera
Control prime:			
Superstitious associations present	2.06[a]	2.60[a]	3.89[b]
Superstitious associations absent	3.84[b]	4.25[b]	1.73[a]
Superstitious prime:			
Superstitious associations present	3.78[c]	3.73[c]	2.28[a]
Superstitious associations absent	2.75[c]	2.89[c]	3.69[b]

NOTE.— Means within a prime condition with different superscripts are different at $p < .05$. Superstitious beliefs for the tennis balls and rice cooker were positive; superstitious beliefs for the digital camera were negative.

This finding is in line with prior research on priming, reactance, and bias correction. In particular, Strack et al. (1993) showed that when participants were made aware of the priming task, a positive (vs. negative) prime resulted in more *negative* likeability ratings. More recently, Kray et al. (2004), in their work on stereotype reactance, have also demonstrated that awareness of a prime can lead to reactance, a motivation to restore a threatened freedom and an increased attractiveness of the constrained behavior (Brehm 1966). In particular, Kray et al. (2004) found that blatantly activating gender stereotypes (i.e., explicitly linking masculine traits to negotiator effectiveness) actually results in women outperforming men in negotiations. Conversely, following a subtle, implicit prime, men outperform women. Apparently, the blatant (vs. subtle) prime caused women to react against the negative stereotype. Petty and Wegener's Flexible Correction Model provides an interesting explanation for these results, as well as for the results we find in study 1. Specifically, Petty and Wegener posit that when judges are motivated and able to identify potential sources of bias arising from their naive theories of how the contextual influence operates, they correct their judgment in a direction opposite to that of the perceived bias and in an amount commensurate with the perceived amount of bias (Petty and Wegener 1993; Wegener and Petty 1995).

In study 1, we thus found support for a nonconscious component to the process of superstitious beliefs on consumer behavior. However, as mentioned earlier, even stronger support for a nonconscious process would be obtained if we could corroborate these findings in our next study in a priming condition in which activation of superstitions on subsequent judgments is followed by an unrelated choice task. Furthermore, while the first study has shown that superstitious beliefs have a robust effect on the consumer behavior of Taiwanese participants, in our next study we investigate if culturally relevant superstitions affect American individuals as well. As we discussed, one of the most prominent superstitions held by Americans is that Friday the thirteenth brings bad luck. It is estimated that as many as 9% of Americans are paraskevidekatriaphobics: afflicted with a fear of Friday the thirteenth (Vyse 1997). In fact, paraskevidekatriaphobia influences a wide variety of decisions, from architecture to personal risk aversion: 90% of Otis elevators have no thirteenth-floor button, the U.S. Navy will not launch a ship on Friday the thirteenth, and many Americans will not fly, get married, start a new job, or close on a house on this date (Brockenbrough 2006; Harris 2006).

Therefore, in addition to seeking further evidence for a nonconscious component of the effect of superstition, our next study tested how salience of Friday the thirteenth affects decision making under risk. We expected that priming participants with Friday the thirteenth and its associated potential for bad luck (vs. a neutral prime: Tuesday the nineteenth) would result in their making more risk-averse choices. That is, since priming Friday the thirteenth makes the possibility of bad luck accessible, we predict that subjects would avoid taking risks (i.e., choose a sure win of a

smaller amount over a gamble to win a larger amount) in subsequent choices.

Findings in the affect and consumer behavior literature provide support for our proposition. In particular, Raghunathan and Pham (1999; see also Raghunathan, Pham, and Corfman 2006) demonstrated that consumers who were induced with feelings of anxiety, uncertainty, and potential bad luck chose safer options that provided more control (i.e., they exhibited risk-averse behavior). These induced states are consistent with the activation of superstitious beliefs associated with Friday the thirteenth. Further support for the influence of superstitious beliefs on risk-taking behavior comes from the literature on gambling and the illusion of control (Langer 1975). For example, gamblers bet more money and were more confident of winning when throwing the dice themselves than when someone else threw the dice for them, even though in both cases the probability of winning was the same (Strickland, Lewicki, and Katz 1966).

> **H2:** Consumers make more risk-averse choices when negative superstitions are salient (vs. not salient).

STUDY 2

Method: Participants and Procedure

Ninety-five students from an East Coast university participated in a study on consumer preferences in exchange for $5. Subjects were told that they would participate in two unrelated studies. In reality, the first study consisted of the prime, disguised as a life inventory survey. In particular, subjects were told that we were compiling a list of things that come to mind when thinking about Friday the thirteenth or Tuesday the nineteenth, depending on the randomly assigned condition. Following the life inventory study, subjects completed an ostensibly unrelated questionnaire in which they were asked to indicate their preferences for two different bets, each of which consisted of a sure win of a small amount and a gamble to win either a large amount or nothing. Specifically, in the first bet problem, subjects were told to imagine choosing between receiving $18 for sure versus a 20% chance to win $240 and an 80% chance to win nothing. Next, in bet 2, subjects were told to imagine that in exchange for participating in a study, they could choose between the option to receive $12 for sure or the option to have a 25% chance to receive $175 and a 75% chance to receive nothing. After indicating their preferences in the two bets, subjects were thanked, debriefed, and dismissed.

Results

Manipulation Check. The total number of items listed did not differ by condition ($M = 5.67$ vs. 4.77 for Friday the thirteenth vs. Tuesday the nineteenth, respectively; $F(1, 93) = 1.76$, NS). Next, two independent raters categorized subjects' thoughts as negative or reflecting bad luck. Inter-rater agreement was 94%; disagreements were resolved

through discussion. As expected, subjects listed significantly more items with negative associations (e.g., horrible, death, or unfortunate events) in the Friday the thirteenth than in the Tuesday the nineteenth condition ($M = 2.27$ versus .17; $F(1, 93) = 48.70$, $p < .001$). Subjects also mentioned bad luck significantly more often following the Friday the thirteenth prime ($M = .75$ vs. .06; $F(1, 93) = 47.68$, $p < .001$).

Choice of Safe Option. We conducted an overall test of our hypothesis across the two bet problems using a logit model. The dependent variable was a 0–1 dummy variable, where 1 denotes choice of the safe option. The independent variables included (1) a dummy variable that had a value of 1 in the superstitious prime condition and (2) the two-way interaction between the prime manipulation and the bet problems. The overall model was significant ($\chi^2(2) = 14.90$, $p < .01$). As expected, superstition salience was a significant predictor of the mean choice of the safe option ($B = 1.44$, Wald's $\chi^2 = 11.58$, $p < .01$). That is, across the two bets, 50% of subjects in the superstition-salient condition, but only 24% of subjects in the control condition, chose the safe option.

Discussion

Study 2 found that superstitions also affect the behavior of U.S. consumers. In particular, participants became significantly more risk-averse in their choices after thinking about Friday the thirteenth, as compared to a day that is not associated with bad luck. In addition, this study's finding that the effect of superstitious beliefs is obtained when their activation and the main dependent variable task are unrelated (but not when they are clearly related) further supports our proposition that there is a nonconscious component to the effect of superstitious beliefs.

Further evidence for nonconscious processing comes from a series of regressions that test for the mediational role of the conscious thoughts that subjects expressed in the priming manipulation. In particular, as we discussed, priming had a significant effect on choice of safe option and number of negative-valenced thoughts and thoughts related to bad luck. Further, negatively valenced thoughts ($B = .249$, Wald's $\chi^2 = 8.83$, $p < .01$) and thoughts related to bad luck ($B = .628$, Wald's $\chi^2 = 6.06$, $p < .05$) were each significant predictors of choice of the safe option. However, when both priming and negatively valenced thoughts were entered into the regression, prime remained a significant predictor ($B = .96$, Wald's $\chi^2 = 4.91$, $p < .05$). Similar results were obtained when we entered both priming and thoughts related to bad luck into the regression (priming $B = 1.11$, Wald's $\chi^2 = 6.68$, $p < .01$). In other words, when conscious thoughts are included as a potential mediator, the effect of prime was diminished but still significant. This suggests that conscious thoughts only partially mediate the choice of the safe option. Thus, although conscious thoughts are present and affect decision making,

they seem to represent a smaller proportion of the effect than the nonconscious component.

In the next study, we seek to more fully understand the relative contribution of the conscious versus nonconscious components of superstition-driven decision making. Specifically, we use an experimental methodology designed to estimate the distinct contributions of conscious and nonconscious processing to a single cognitive task.

STUDY 3

Objective

The main objective of study 3 is to estimate the unique conscious and nonconscious influences of superstition on risky decision making. Following Fitzsimons and Williams (2000), we use a decompositional technique that allows for calculation of the conscious and nonconscious processing components by solving a set of simultaneous equations (see Fitzsimons and Williams [2000] for a full exposition of the technique and background literature). It is important to note that the two simultaneous equations are derived through setting up experimental scenarios such that in one scenario the conscious and nonconscious processes work in concert (magnification condition) and in another they act in opposition (reduction condition). Thus, following the procedure set forth in Jacoby (1991) and Fitzsimons and Williams (2000), in addition to the superstitious prime manipulation, we employed a second manipulation (level of uncertainty) that would either magnify or reduce the effect of superstition. As described in detail below, the design of the study was a 2 (prime: superstitious vs. control) × 2 (cognitive load: high vs. low) × 2 (uncertainty: high vs. low) between-subject design, which allows us to calculate the effect of superstition in four key conditions: low cognitive load, high uncertainty (LM); low cognitive load, low uncertainty (LR); high cognitive load, high uncertainty (HM); and high cognitive load, low uncertainty (HR).

In particular, in addition to the superstitious prime manipulation used in study 2, we chose a second manipulation that would either magnify or reduce the effect of superstition. Based on prior research that shows that reliance on superstitions tends to increase in times of greater uncertainty (Keinan 2002; Malinowski 1954), subjects were randomly assigned to gambles that differ in their level of outcome uncertainty. We expected that following the superstitious (vs. control) prime, subjects in the high-uncertainty (magnification) condition would be more likely to choose a safe option than subjects in the low-uncertainty (reduction) condition. Finally, as was done in previous research using decompositional techniques (Fitzsimons and Williams 2000; Jacoby 1991), subjects completed the study under high versus low cognitive load, such that the ability to engage in effortful, conscious processing was impaired for subjects in the former conditions, but not for subjects in the latter conditions.

Method: Participants and Procedure

One hundred and forty-six students from an East Coast university participated in the study on consumer preferences in exchange for class credit in a 2 (prime: superstitious vs. control) × 2 (cognitive load: high vs. low) × 2 (uncertainty: high vs. low) between-subject design. The procedure was identical to the one used in the previous study, except where noted below.

After the Friday the thirteenth versus Tuesday the nineteenth prime, subjects in the high cognitive load condition received an ostensibly unrelated study on comparing products that asked them to study a list of 20 features on which products can differ, for 2 minutes, and memorize as many of them as possible. Subjects were also told that this was a very hard task but that some people in prior studies had been able to recall all of the features. After studying the list, subjects in the cognitive load condition turned the page and completed the main study on risk-taking behavior. Subjects in the no-load condition completed the main study immediately after the priming manipulation.

Next, subjects indicated the choices they would make in two bet problems in which the level of uncertainty was manipulated by changing the odds of winning in the gamble option. In the first problem, subjects were asked to choose either between receiving $18 for sure versus a 50% chance to win $96 and a 50% chance to win nothing (high uncertainty, magnification condition) or between receiving $18 for sure versus a 20% chance to win $240 and an 80% chance to win nothing (low uncertainty, reduction condition). Following completion of the first bet problem, subjects in the high cognitive load conditions were reminded of the subsequent product feature recall task. In the second problem, subjects were asked to choose either between receiving $12 for sure versus a 45% chance to win $97 and a 55% chance to win nothing (high uncertainty, magnification condition) or between receiving $12 for sure versus a 25% chance to win $175 and a 75% chance to win nothing (low uncertainty, reduction condition). After indicating their preferences in the second bet problem, subjects in the high cognitive load task were asked to recall as many of the product features as they could, were thanked, debriefed, and dismissed. Subjects in the low cognitive load condition were thanked, debriefed, and dismissed after completion of the second bet problem. The uncertainty manipulation had been pretested with a separate sample of 18 undergraduate students. Results indicated that, overall, the uncertain conditions were rated as containing more uncertainty than the certain conditions ($t = 2.43$, $p < .05$).

Results

Manipulation Check. A 2 (prime) × 2 (cognitive load) × 2 (level of uncertainty) ANOVA on the total number of items listed yielded a significant effect for prime ($M = 7.05$ vs. 5.97 for Friday the thirteenth vs. Tuesday the nineteenth, respectively; $F(1, 138) = 5.02$, $p < .05$). Next, two independent raters categorized subjects' thoughts as nega-

tive or reflecting bad luck. Inter-rater agreement was 92%; disagreements were resolved through discussion. As expected, subjects listed significantly more items with negative associations in the Friday the thirteenth condition than in the Tuesday the nineteenth condition ($M = 2.06$ versus .06; $F(1, 138) = 290.72$, $p < .001$). Subjects also mentioned bad luck significantly more often following the Friday the thirteenth prime ($M = .64$ vs. .02; $F(1, 138) = 281.08$, $p < .001$). Finally, subjects in the high cognitive load condition correctly recalled on average 8.29 of the 20 product features.

Choice of Safe Option. We conducted an overall test of our hypothesis across the two bet problems using a logit model. The dependent variable was a 0–1 dummy variable, where 1 denotes choice of the safe option. The independent variables included (1) a dummy variable that had a value of 1 in the superstitious prime condition and (2) the two-way interaction between the prime manipulation and the bet problems. The overall model was significant ($\chi^2(2) = 6.25$, $p < .05$). As expected, superstition salience was a significant predictor of the mean choice of the safe option ($B = .805$, Wald's $\chi^2 = 6.16$, $p < .02$). In particular, across the two bets, 49% of subjects in the superstition-salient condition, but only 35% of subjects in the control condition, chose the safe option. These results replicate our findings from study 2.

Conscious versus Nonconscious Components of Superstitious Beliefs. A logit model was used to test for the unique conscious versus nonconscious components of the effect of superstition on risk aversion. The dependent variable was a 0–1 dummy variable, where 1 denotes choice of the safe option. The independent variables included (1) a dummy variable that had a value of 1 in the superstitious prime condition; (2) a dummy variable that had a value of 1 in the high uncertainty condition; (3) a dummy variable that had a value of 1 in the low cognitive load condition; (4) the two-way interaction between the prime and uncertainty manipulations; (5) the two-way interaction between the prime and cognitive load manipulations; (6) the two-way interaction between the cognitive load and uncertainty manipulations; (7) the three-way interaction between the prime, cognitive load, and uncertainty manipulations; and (8) the interactions between the bet problems and the prime, cognitive load, and uncertainty conditions. The overall model was significant ($\chi^2(8) = 24.94$, $p < .01$).

Results showed that our magnification-reduction manipulation worked as intended, as demonstrated by a significant superstition salience by uncertainty interaction ($B = 1.64$, Wald's $\chi^2 = 5.06$, $p < .05$). In particular, the effect of the superstitious prime was larger for subjects in the high-uncertainty (magnification) condition (40% vs. 22%; $B = 0.86$, Wald's $\chi^2 = 5.65$, $p < .05$) than for subjects in the low-uncertainty (reduction) condition (49% vs. 47%; $B = .09$, Wald's $\chi^2 = .07$, NS). Next, following Fitzsimons and Williams (2000), we estimated the individual contributions of nonconscious versus conscious processing to the increase

in the choice share of the safe option following the superstitious prime (see table 2).

After we obtained the impact of superstition salience on the choice share of the safe option under the four key conditions (LM, LR, HM, and HR), we calculated the conscious (CS_h and CS_l) versus nonconscious (NC) components of the effect according to the following equations developed by Fitzsimons and Williams (2000):

$$NC = \frac{1}{2}\left\{HM + HR - \left[\frac{LM + LR - HM - HR}{\left(\dfrac{LM - LR}{HM - HR}\right) - 1}\right]\right\},$$
$$(1)$$

$$CS_h = \frac{HM - HR}{2}, \qquad (2)$$

$$CS_l = \frac{LM - LR}{2}. \qquad (3)$$

Our results show that the nonconscious component of the effect of superstition leads to an increase of nearly 30% in the share of the safe option (NC), compared to an increase of 9.5% in choice share due to the conscious component of the superstition effect under high cognitive load (CS_h) and a slight increase of 3% under low cognitive load (CS_l).

Discussion

Study 3 once again showed the impact of negative superstitious beliefs on decision making under risk. In particular, we found that when primed with Friday the thirteenth, subjects made significantly more risk-averse choices (i.e., chose the sure-thing option). It is important to note that by using a process dissociation technique advanced by Fitzsimons and Williams (2000), we were able to separate the effect of superstition on decision making into its distinct conscious and nonconscious components. As suggested by the results of the first two studies, we found evidence of the role of nonconscious processing in the effect of superstition. As a matter of fact, the noncon-

scious component in this study was greater than the conscious one by a factor of three. The relative magnitude of the nonconscious to the conscious component demonstrates the significant effect that specific culture-bound beliefs can have on consumer behavior.

In addition, our final study found support for another prevalent speculative assertion in the superstition literature, namely, that reliance on superstitions tends to increase in times of uncertainty (Keinan 2002; Malinowski 1954). Based on anthropological work he conducted in the early 1900s, Malinowski posited that superstitions function to reduce anxiety arising from unknown or uncertain situations. Since that early work, there had been much anecdotal evidence to support this popular psychological theory of superstition (see Tsang [2004] for a review). Tsang (2004) provided such anecdotal evidence, along with qualitative informant quotes to suggest that Chinese executives invoke superstitions as a coping mechanism to deal with uncertain business decisions. The results of our current magnification/reduction manipulation provided empirical evidence, in a consumer domain, that the effects of superstitious beliefs are greater under conditions of high uncertainty—that is, for gambles with more uncertain outcomes.

GENERAL DISCUSSION

This research is one of the first to investigate the impact of irrational beliefs on consumer behavior in the marketplace (see also Morales and Fitzsimons 2007). A series of studies found a robust effect of superstitious beliefs on consumers' satisfaction judgments and risk-taking behavior. Notably, we furthermore extended prior research on superstition by providing important evidence of the nonconscious nature of superstitious beliefs. Note, however, that the nonconscious process of superstitious beliefs is not likely to generalize to superstitious rituals, such as carrying a rabbit's foot for good luck (Darke and Freedman 1997b). For example, students consciously bring lucky pens to class, and Chinese parents consciously give red envelopes for the New Year. Finally, we also found evidence for the moderating role of the level of uncertainty in the relationship between superstitious beliefs and risk-taking behavior.

In order to demonstrate the culturally relevant effects of superstitious beliefs, we limited this study to judgments of product satisfaction (Taiwanese participants) and decision making (U.S. participants). Related research by the current

TABLE 2

CHOICE SHARE OF THE SAFE OPTION BY CONDITION

Condition	Superstitious prime	Control prime	Impact of superstition salience
Low cognitive load, magnified (LM)	45	20	+25
Low cognitive load, reduced (LR)	50	31	+19
High cognitive load, magnified (HM)	42	27	+15
High cognitive load, reduced (HR)	59	63	−4

authors shows how strong an impact superstitious beliefs can have not only on product satisfaction but, importantly, on purchase likelihood (details can be obtained from the authors). Counter to economic rationality, Taiwanese consumers were more likely to purchase a portable radio when it was priced at a higher but lucky TW$888 than when the same radio was priced at a lower but neutral TW$777. In other words, participants were willing to spend nearly 15% more money for the same radio because of positive superstitious beliefs they had with the number 8 (vs. 7). In a separate study, we found that negative associations with the number 4 (vs. 5) caused Taiwanese participants to be more likely to purchase a digital camera when it was priced at a higher but neutral TW$6,555.55 than when they were priced at a lower but unlucky TW$6,444.44, thereby forgoing a discount. These effects of superstitious beliefs on purchase likelihood were independent of inferred price/quality differences. The findings of this combined research stream have important implications for marketing managers in that marketers may be able to strategically manage satisfaction and purchase likelihood through consumers' performance expectations with relatively easy-to-implement attribute changes in color or price.

Given that this research is one of the first to investigate the effect of superstition on consumer behavior, it has limitations that need to be acknowledged. First, we propose that superstitious beliefs set up product performance expectations that drive the differential levels of satisfaction demonstrated in study 1. However, we did not measure performance expectations in that study, so we do not have evidence for the hypothesized process. Yet, related work by the current authors demonstrates that differences in product satisfaction due to superstitious associations are greater for consumers who are more (vs. less) sensitive to the disconfirmation of expectations.

Next, although we show that the effect of superstition tends to be based on nonconscious processing to a great degree, we did not test for the more specific process underlying the effect. For example, thinking about Friday the thirteenth may have raised levels of anxiety for the participants in studies 2 and 3. As we did not measure the level of anxiety, we cannot make claims as to whether this is indeed the underlying affective driver of our results. Future research building on the current studies that attempt to understand the affective processes underlying superstitions is undoubtedly needed. It is possible that priming superstitious beliefs may be accompanied with an increase/decrease of appropriate emotions, both negative and positive. While Friday the thirteenth may raise levels of anxiety for Americans, thinking about the color red may increase perceived happiness among some Chinese. In addition, more research is needed to shed light on the specific consequences of superstitious beliefs. For example, one might investigate the proposition that superstitious beliefs result in biased information processing.

The current research also opens the door to many worthwhile avenues of future research. Findings that superstitious beliefs can cause consumers to violate economic rationality provide supportive evidence that superstitions work at a nonconscious level. Arguably, consumers would not consciously be willing to pay more for a product. In the current studies we show that indeed it is mostly through nonconscious processing that superstitious beliefs influence actions. In addition, it would be interesting to take this research further by investigating the consequences of these findings. For example, it is likely that attributions of product failure may differ across conditions according to superstitious beliefs. Therefore, future research could investigate the moderating role of internal versus external locus of control on the effect of superstitious beliefs on consumer judgments. Similarly, attributions of blame for product failure, and associated repurchase intentions, may differ with superstitious beliefs. That is, consumers may attribute failure of a product with positive superstitious associations on themselves, while attributing failure of a product without superstitious associations to the product itself.

In addition, the results of the current research are based on hypothetical choice scenarios. It is therefore important to replicate and extend research on the impact of superstitious beliefs on consumer behavior in field studies. Risk aversion based on superstitious beliefs can involve real costs—as exemplified by the fact that nearly $1 billion is lost in business in the United States each Friday the thirteenth (Palazzolo 2005).

Finally, the effect of superstitious beliefs on risk-taking behavior is not likely to be the same for all consumers. One stable personality trait worthy of future investigation, which is likely to moderate the effect, is an individual's beliefs about the causal properties of luck, as measured by Darke and Freedman's (1997a) Belief in Good Luck (BIGL) scale, for example. In particular, the BIGL scale assesses the degree to which individuals believe that luck is a stable quality that they possess (i.e., high belief in good luck) versus just random and beyond their control (i.e., low belief in good luck). It would be interesting to test how this stable trait influences chronically or temporarily accessible culturally shared superstitious beliefs.

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