

# Another Look at Why People Are Reluctant to Exchange Lottery Tickets

Jane L. Risen and Thomas Gilovich  
Cornell University

People are reluctant to exchange lottery tickets, a result that previous investigators have attributed to anticipated regret. The authors suggest that people's subjective likelihood judgments also make them disinclined to switch. Four studies examined likelihood judgments with respect to exchanged and retained lottery tickets and found that (a) exchanged tickets are judged more likely to win a lottery than are retained tickets and (b) exchanged tickets are judged more likely to win the more aversive it would be if the ticket did win. The authors provide evidence that this effect occurs because the act of imagining an exchanged ticket winning the lottery increases the belief that such an event is likely to occur.

*Keywords:* lottery tickets, status quo bias, subjective likelihood, imagination, negativity bias

People are often reluctant to take actions that may be in their best interest to pursue. Students are reluctant to abandon their initial answers on multiple-choice tests when further thought and more considered analysis indicate that another answer may be correct (Kruger, Wirtz, & Miller, 2005; see also Ballance, 1977; Foote & Belinky, 1972; Lynch & Smith, 1975; Mathews, 1929; Smith, White, & Coop, 1979). Shoppers are reluctant to switch checkout lines even when the one they're in is progressing painfully slowly and customers in another line are speeding along (Miller & Taylor, 1995). And owners of lottery tickets are reluctant to trade them in for a different ticket, even when they are offered an incentive for doing so (Bar-Hillel & Neter, 1996; see also Knetsch & Sinden, 1984; Langer, 1975).

Two explanations for this reluctance have been offered. First, people may refrain from taking such actions because of anticipated regret: They know that they will feel worse if their action leads to an undesirable result than if their inaction does so (Gilovich & Medvec, 1995; Gleicher et al., 1990; Kahneman & Tversky, 1982; Miller & Taylor, 1995). Thus, they avoid acting to avoid kicking themselves for a particularly painful mistake. Second, people may believe that the odds of achieving a favorable outcome are better if they stay where they are than if they make a switch. Miller and Taylor (1995) have pointed out that precisely because undesirable outcomes that result from actions taken are more painful than identical outcomes that result from actions forgone, instances in which one has been punished for acting are likely to be overrepresented in memory. Their disproportionate availability then distorts their perceived likelihood (Tversky & Kahneman, 1973).

The latter explanation may seem an unlikely account of the reluctance to exchange lottery tickets because lottery participants should have an overarching sense—reinforced by state lottery commissions in particular—that the lottery is fair, and hence all tickets are equally likely to win. Indeed, Bar-Hillel and Neter (1996) conducted a systematic program of research on this question and concluded that the reluctance to trade lottery tickets cannot be attributed to an “overestimation of the winning probability of one's own ticket” (p. 17). In the most direct test of this idea, they asked participants, “Are the chances for your ticket to win the lottery higher, lower, or equal to the chances of any other lottery ticket?” (p. 18). Less than 10% of the respondents stated that their own ticket was more likely to win, substantially less than the 59% who were unwilling to exchange their original ticket for another ticket plus a small bonus. Bar-Hillel and Neter concluded that it is an avoidance of possible regret that drives the reluctance to exchange tickets.

We agree that regret avoidance plays a prominent role in this phenomenon, perhaps the most powerful role. However, we do not believe that regret avoidance is the sole determinant. Instead, we contend that many people believe (with varying degrees of conviction) that if they were to give up a lottery ticket, it would become more likely to win. This contention is based in part on research indicating that many people—even those associated with elite universities who place a premium on rationality—believe that if they “tempt fate,” bad things are likely to result (Risen & Gilovich, 2007). Exchanging one perfectly good lottery ticket for another, small bonus or not, may be seen as just that—as tempting fate. Note that such a belief is not captured by the question put to Bar-Hillel and Neter's participants: A person can believe that the chances of his or her ticket winning the lottery are equal to the chances of any other lottery ticket and yet also believe that if the ticket were exchanged, it would become more likely to win. The research reported in this article was designed to examine whether people do indeed believe that exchanging a lottery ticket makes it more likely to win.

Some people, we contend, subscribe to a worldview that leads them to firmly believe this proposition. Others subscribe to a rationalist worldview that rules out such a conviction. These latter individuals are nonetheless likely to at least entertain the possibil-

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Jane L. Risen and Thomas Gilovich, Department of Psychology, Cornell University.

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Correspondence concerning this article should be addressed to Jane L. Risen, Department of Psychology, 211 Uris Hall, Cornell University, Ithaca, NY 14853. E-mail: jlr97@cornell.edu

ity that their former ticket, if they decided to exchange it, would be the winner. Having once entertained the idea, they may have a hard time getting that negative possibility out of their minds. Even for these individuals, then, the prospect of an exchanged ticket being the winner can come to be seen as more likely because events that one spends time imagining are seen as more likely to occur (Carroll, 1978; Gregory, Cialdini, & Carpenter, 1982; Sherman, Cialdini, Schwartzman, & Reynolds, 1985). Indeed, we have shown elsewhere that events that are seen as tempting fate automatically call to mind negative outcomes, and the extent to which such negative outcomes spring to mind mediates their judged likelihood of occurrence (Risen & Gilovich, 2007).

For many people, these automatic processes create a conflict between an intuitive sense that an exchanged ticket would be more likely to win and a rational conviction that the odds cannot change. This sort of conflict is well captured by recent two-systems accounts of human judgment and reasoning (Chaiken & Trope, 1999; Epstein, Lipson, Hosten, & Huh, 1992; Kahneman & Frederick, 2002; Sloman, 1996). A critical feature of these accounts is that the intuitive processes that underlie the gut feelings explored in this article are always engaged. (This makes them different from other dual-processes accounts, such as Petty and Caciopo's (1981) elaboration likelihood model of persuasion, according to which one set of processes is invoked when a person's motivation is low and another set of processes is invoked when motivation is high.)

Sometimes these intuitive processes and the gut feelings they produce are sufficiently strong that one "acts on one's gut." For example, research on the ratio bias shows that many people choose to bet on a draw from a large urn that contains several winning marbles instead of on a draw from a smaller urn with only one winning marble, even when the latter urn is clearly labeled as giving the participants better odds of winning (Denes-Raj & Epstein, 1994). That is, when one needs a red marble to win, the instinct to draw from the urn with more red marbles is often sufficiently strong to overcome the knowledge that the large urn also has more marbles that are not red (indeed, it has disproportionately more marbles that are not red).

On other occasions, of course, one's gut feelings are overridden by the workings of the rational system, and one "obeys" the dictates of one's rational analysis. However, even then, the gut feelings remain and can influence likelihood judgments, especially when those judgments are elicited through relatively subjective scales (Krizan & Windschitl, 2007; Windschitl & Wells, 1996). These likelihood judgments can then influence behavior, either by feeding back on and amplifying one's gut feelings and countering one's rational analysis or by determining behavior later on, when one's rational processes are less actively engaged.

The present research addresses these issues by investigating whether the existing literature on the reasons that people are reluctant to exchange lottery tickets is only half-right. People are indeed concerned about avoiding regret (Bar-Hillel & Neter, 1996). But might they also believe that if they exchange their ticket, it would become more likely to win? The present research was designed to find out. In Study 1, we put this question to participants directly, asking them to imagine holding a lottery ticket that they could exchange for another and to indicate whether the thought of doing so yielded a gut feeling that the exchanged ticket would be more likely to win. In Study 2, we went beyond gut feelings and examined whether the belief that an exchanged ticket

was more likely to win could influence both more considered judgments of likelihood and actual behavior. In Study 3, we examined whether the degree to which the belief that an exchanged ticket was more likely to win correlated with how painful that experience would be—consistent with the idea that the more vividly the outcome springs to mind, the more likely it seems. Finally, in Study 4, we directly tested the proposed underlying mechanism by examining whether more aversive outcomes more readily came to mind and whether their enhanced accessibility mediated their perceived likelihood of occurring.

## Study 1

Distorted assessments of a given ticket winning a lottery can take one of two forms. First, people may believe that their own ticket is luckier than other tickets (Langer, 1975). Bar-Hillel and Neter (1996) showed that this belief is not commonly held. Second, people may believe that the act of exchanging their ticket will change the likelihood that it will be drawn. If people believe that exchanging their ticket increases (rather than decreases) the chances of the ticket being drawn, then they should be unwilling to exchange it. Study 1 examined people's beliefs about an exchanged ticket's likelihood of winning.

### Method

*Participants.* Fifty-two Cornell undergraduates completed a packet of unrelated questionnaires in exchange for course credit in psychology or human development courses.

*Materials and procedure.* In the one pertinent questionnaire, participants were asked to imagine that they were entered in a 100-person lottery with a \$500 prize and that the following proposition was offered to them: "You can give up your lottery number in exchange for another randomly selected number plus a cash gift of \$10." Participants were then asked to rely on their "gut feelings"<sup>1</sup> and to indicate which of three possibilities was most likely to occur if they were to give up their number:

Making the trade would make my old number more likely to win.

Making the trade would not result in my old number becoming either more or less likely to win.

Making the trade would make my old number less likely to win.

### Results

The data from 4 participants were excluded because they did not select a single response, leaving 48 participants (92%) in the sample.

Of these 48 participants, 22 (46%) indicated that their number would be more likely to win if they made the trade, 2 (4%) indicated that their number would be less likely to win, and 24

<sup>1</sup> Participants were asked to rely on their gut feelings to measure their intuition that an exchanged ticket would be more, less, or equally likely to win. Although *gut feelings* and *intuition* may not be perfectly synonymous, research suggests that the two terms can be used interchangeably in directions to participants without any apparent consequence (Inbar & Gilovich, 2007). Moreover, participants did not report or display any difficulty or confusion when asked to respond on the basis of their gut feelings.

(50%) indicated that making the trade would not change the likelihood of the number winning.

A chi-square test supported the prediction that participants would not endorse each of the three possibilities equally,  $\chi^2(2, N = 48) = 18.5, p < .001$ . Further, we predicted that when participants deviated from the rational answer, they would be more likely to select the answer that reflected a belief in tempting fate. That is, when participants thought the trade would influence likelihood, we predicted that they would indicate that the trade would make their number more likely rather than less likely to win. A chi-square test supported this prediction as well,  $\chi^2(1, N = 48) = 16.7, p < .001$ .

### Discussion

The results of Study 1 suggest that the thought of turning in a lottery ticket elicits a gut feeling in many people that exchanging the ticket would make it more likely to win. Although Bar-Hillel and Neter (1996) showed that people's reluctance to trade lottery tickets is probably not due to an initial belief that their original ticket is particularly lucky, our data suggest that the reluctance to exchange tickets may be due, in part, to a concern about the consequences of tempting fate. Approximately half of the participants in this study reported that they felt that their lottery ticket would be more likely to win if they traded it—a proportion roughly comparable to the proportion of participants who were unwilling to trade tickets in the Bar-Hillel and Neter study cited earlier. Thus, people may be reluctant to exchange lottery tickets because they believe that doing so would make the exchanged ticket more likely to win, which, by necessity, would make them less likely to win with their new ticket.

In Study 1, participants were encouraged to answer by consulting their gut feelings and, apart from appearing irrational in the eyes of the experimenter, there was no cost to answering in an irrational manner. Study 2 was therefore designed to test whether people would express similar beliefs after more considered thought and whether they would back up their likelihood judgments with cash.

### Study 2

With the help of a confederate, we randomly assigned participants either to keep their lottery numbers or exchange them for new numbers. If people believe that exchanged lottery numbers are more likely to be drawn, then the participants who switched numbers should report that the exchanged numbers are especially likely to win. In addition, participants were offered the opportunity to purchase insurance against the possibility of losing. If people truly believe that exchanged tickets are more likely to be drawn, then participants who switched numbers should purchase more insurance. We anticipated that participants would think that an exchanged ticket would be more likely to be drawn than a retained ticket, even though participants were not asked simply to report their gut feelings and even though there were monetary implications of their choices. The psychological processes that give rise to these gut feelings (which we explore further in Studies 3 and 4) are sufficiently strong that, in many people, they can stand up to more rational processes and influence consequential behaviors such as the purchase of insurance.

### Method

*Participants.* Sixty-four Cornell undergraduates participated for a chance to earn up to \$8. Twenty-two of those participants also

earned course credit in their psychology or human development courses.

*Materials and procedure.* Participants were paired with a confederate for a group decision-making study. The participant and confederate were told that they would alternate making consequential decisions for an upcoming lottery drawing and that they would split evenly whatever prize they received. After alternating responsibility for deciding the team's name (confederate's choice) and color (participant's choice), the experimenter explained the procedures for the lottery.

She explained that she would draw once from an urn that had 180 pieces marked with integers ranging from 1 to 9. The number drawn determined whether the team would win the grand prize (\$16), a consolation prize (\$6), or no prize (\$0). The experimenter explained that across all experimental sessions each of the integers was equally represented in the urn but that the breakdown of the different integers could differ widely for each experimental session.

To make things clear to participants as they learned which numbers corresponded to the different outcomes for their team, the experimenter hung on the wall a large board that was split into winning, consolation, and losing columns. Nine numbered sticky notes were stuck in the consolation column to start. Participants were told that they would help determine the winning numbers for the next pair of participants by translating the letters of their own two names into two numbers (according to an algorithm there is no need to go into). After the confederate and the participant completed this task, the experimenter explained that their own two winning numbers had been determined by the names of the previous participants and told them what these numbers were. The participant was asked to move the two sticky notes with the winning numbers from the consolation column to the winning column. The experimenter further explained that the names of the participants from two sessions beforehand determined the current participants' two losing numbers and had the confederate move those sticky notes from the consolation column to the losing column. While gesturing toward the board, the experimenter repeated the different possible outcomes for the lottery—two losing numbers, two grand prize-winning numbers, and five consolation prize numbers, with an unknown number of pieces corresponding to each number.

Once the pair understood the rules and potential lottery outcomes, they were told that they would each make one decision that could affect the lottery outcome. The confederate was asked to decide whether to keep the pair's winning lottery numbers or to exchange them for the losing lottery numbers. The confederate was told that anyone choosing to exchange the team's numbers could, as a bonus, keep the pen that he or she had been using up to that point in the experiment. In the stay condition, the confederate answered, "I guess I'll stick with our numbers." The experimenter then said that she would leave the board as is. In the switch condition, the confederate answered, "I guess I'll go ahead and trade in our numbers." The experimenter then changed the board by switching the winning numbers to the losing column and the losing numbers to the winning column. It was thus made clear to these participants that the two numbers that formerly would have won them \$16 would now win them nothing and the two numbers that formerly would have won them nothing would now win them \$16.

Both the participant and the confederate were then asked to rate on 10-point scales how likely they believed it was that one of the

winning numbers, consolation numbers, and losing numbers would be drawn in the lottery. The scales were anchored with *not at all likely* and *extremely likely*.

After the subjective likelihood ratings, participants were given the opportunity to buy insurance for the lottery—an opportunity that was described as the final decision to be made in the study and one that was made by the participant, not by the confederate. Participants were told that for every 10 cents of insurance they purchased, the team would earn 10 cents if a losing number were drawn. They paid for the insurance from their prize winnings. For example, a team that purchased \$2 of insurance would receive \$2 if a losing number was drawn but only \$4 if a consolation number was drawn.<sup>2</sup> If participants thought that a losing number was especially likely to be drawn, they should be more likely to purchase insurance.

As the final dependent measure, participants were asked to respond to the question that the other “participant” had been asked. That is, participants indicated whether they would have kept or traded in their lottery numbers had the decision been theirs.

After the lottery drawing was held, a funnel debriefing was used to determine whether the participant had any suspicions about the confederate or the purpose of the study. Finally, the participant was debriefed, thanked, and paid his or her share of the amount determined by the lottery outcome and his or her insurance decision.

## Results

The data from 2 participants were excluded because of suspicion, leaving 62 participants (97%) in the sample, 31 in each condition. One participant in the stay condition was suspicious that the confederate was not a real participant, and 1 participant in the switch condition came close to articulating the hypothesis (that switching would affect his insurance decision).

*Subjective likelihood measures.* To obtain a measure of optimism about a positive outcome in the lottery, we subtracted the expressed likelihood of a losing number being drawn from the expressed likelihood of a winning number being drawn for each participant.<sup>3</sup> As predicted, participants in the stay condition were more optimistic ( $M = 0.35$ ,  $SD = 2.21$ ) than those in the switch condition ( $M = -0.81$ ,  $SD = 1.62$ ),  $t(60) = 2.36$ ,  $p < .05$ . Participants whose potential winning numbers were the ones that they had originally been given were more optimistic than participants whose team had tempted fate by exchanging numbers. In fact, participants in the switch condition were, in an absolute sense, pessimistic, with their mean difference score significantly lower than 0,  $t(30) = 2.77$ ,  $p = .01$ .

Separating the optimism score into its components, we found that the difference in optimism was primarily driven by participants’ judgments of the likelihood that a losing number would be drawn. As predicted, participants in the switch condition (for whom a potential losing number had formerly been a potential winning number) expressed a stronger belief that a losing number would be drawn ( $M = 4.81$ ,  $SD = 1.62$ ) than did those in the stay condition ( $M = 3.95$ ,  $SD = 1.49$ ),  $t(60) = 2.17$ ,  $p < .05$ . Participants in the stay condition expressed a slightly stronger belief that a winning number would be drawn ( $M = 4.31$ ,  $SD = 1.94$ ) than did those in the switch condition ( $M = 3.97$ ,  $SD = 1.64$ ), but this difference was not significant,  $t < 1.0$ . There was no difference in

the participants’ judgment of likelihood that a consolation number would be drawn,  $M_s = 6.76$  (stay condition) and 6.87 (switch condition),  $t < 1.0$ .

*Insurance purchased.* If people believe that exchanged numbers are especially likely to be drawn, participants in the switch condition should have feared that their old winning numbers—now losing numbers for them—would be especially likely to be drawn and therefore should have been more inclined to protect against that possibility. Participants’ insurance decisions supported this prediction. Participants in the switch condition purchased more insurance ( $M = \$1.15$ ,  $SD = 0.82$ ) than did participants in the stay condition ( $M = \$0.74$ ,  $SD = 0.84$ ),  $Z = 2.08$ ,  $p < .05$ .<sup>4</sup>

*What they would have done.* Of the 62 participants, 52 (84%) indicated that they would have kept the team’s lottery numbers if they had been given the decision, further evidence of the reluctance to exchange tickets (Bar-Hillel & Neter, 1996; Knetsch & Sinden, 1984; Langer, 1975). There was no difference in the tendency for participants in the stay or switch condition to make that choice.

## Discussion

The results of Study 2 indicate that the gut feelings reported by participants in Study 1 run deep. Participants in the switch condition were more pessimistic about their chances in the lottery than were participants in the stay condition, even though they were not encouraged to respond with their gut feelings and the real, consequential nature of the outcome presumably encouraged them to devote considerable thought to their assessments of likelihood. The firmness of participants’ beliefs was also reflected in their insurance decisions. Participants in the switch condition must have truly believed that their exchanged numbers were more likely to be drawn because they paid more to protect against that possibility. Because there were only two losing numbers and five consolation-prize numbers, the purchase of insurance lowered the expected value of the lottery and therefore was not a rational strategy. Thus, participants in the switch condition chose to protect against their pessimistic beliefs at a monetary cost to themselves.

It is interesting to note that the stay/switch manipulation had the pronounced effects that it did, even though the participants did not themselves choose to stay or switch. The confederate made that choice for them. We had the confederate make the critical choice to enable us to assign participants to conditions randomly, but we crafted our procedure to induce in participants a strong sense of shared fate with the confederate. This sense of shared fate doubtless played a role in eliciting the observed effects, as it does in

<sup>2</sup> Participants were also told that if they won the grand prize, the insurance costs would be waived, and they would receive the full \$16.

<sup>3</sup> Two individuals served as confederates in this study, and preliminary analyses revealed that there were no significant confederate main effects or interactions on either the subjective likelihood or insurance measures. Nor were there any significant effects related to whether the participant was participating for course credit. These variables are therefore not considered further.

<sup>4</sup> Because the distribution of the amount of insurance purchased was highly skewed (especially in the stay condition), we used the Mann-Whitney test to assess the statistical significance of this difference.

many everyday-life situations that elicit the feeling that fate might be tempted. In major league baseball, for example, it is considered bad luck for anyone on the team—not just the pitcher himself—to comment on a no-hitter in progress. The players share much of the same fate—winning or losing the game, a chance to partake in a rare accomplishment—and so anyone who tempts fate for himself does so for all. There are times, it appears, when one person's comments are thought to jinx the outcomes of another, even when the two individuals do not share a common fate. Sports fans, for example, often get angry at announcers who comment on their team's likely success (e.g., "This should be no problem—he's never missed a field goal from this close") because the fans are convinced that an announcer can tempt fate and bring misfortune even though the announcer does not share a common fate with the team. The rules governing whether the comments of a disinterested party are thought to tempt fate are interesting, probably complex, and beyond the scope of this article.

Discussions of the reluctance to trade lottery tickets or of the omission bias more generally often treat regret and subjective likelihood as if they were two independent factors that influence people's chosen course of action. But, often the two factors are inextricably linked. Miller and Taylor (1995) described one such link, arguing that painful experiences with regrets about one's action burn those experiences into memory and lead to the belief that taking action is more likely to lead to a bad outcome than refraining from action. An analogous process may operate prospectively, in the absence of any past experience with regrets of action or inaction in a given domain. Anticipating the pain that one would feel if one chose a given course of action and things turned out badly can itself make it seem more likely to occur through the well-documented link between imagination and prediction (Carroll, 1978; Gregory et al., 1982; Sherman et al., 1985). Thus, just as likelihood judgments can be distorted by affectively laden past experiences, they can also be influenced by the accessibility of affectively laden future contemplations.

Miller and Taylor (1995) emphasized the greater pain that people typically experience over mistakes of action than over mistakes of inaction, but there are other determinants of whether an outcome is experienced as especially aversive, determinants that are likely to have analogous effects on perceived likelihood. There is ample evidence of a general negativity bias, or a tendency "based on both innate predispositions and experience, in animals and humans, to give greater weight to negative entities" (Rozin & Royzman, 2001, p. 296). The greater attention that is devoted to negative outcomes can, all else being equal, make those outcomes seem more likely to occur than positive outcomes of roughly equal magnitude—at least for outcomes that are clearly outside one's control and thus are unlikely to engage the many mental processes that induce optimism in so many life domains (Dunning, 2005; Taylor & Brown, 1988; Weinstein, 1980). In other words, a general negativity bias and the link between imagination and expectation can combine to enhance the perceived likelihood of all sorts of negative outcomes, not just mistakes of action. We tested this idea in Study 3 by varying how aversive it would be if an exchanged lottery ticket ended up being the winning ticket and then examining its effect on perceived likelihood.

### Study 3

We contend that exchanged lottery tickets are considered especially likely to win because such an outcome is negative and uncontrollable and therefore is especially likely to capture the imagination. We designed Study 3 to examine this claim by testing whether the more negative an outcome would be, the more people would be compelled to imagine it happening and the more likely it would be judged to occur. By varying how aversive it would be for an exchanged ticket to win, we examined whether negativity, operationalized other than through the action–inaction dichotomy, has a predictable influence on perceived likelihood.

#### Method

*Participants.* Fifty-six Cornell undergraduates were approached on campus and asked to participate.

*Materials and procedure.* Participants were asked to read one of four scenarios and to answer the likelihood question that followed. In each scenario, they were asked to imagine that they had bought a \$5 lottery ticket from a fellow student who was organizing a lottery with a \$1,000 grand prize. They were to imagine further that they forgot their wallet on the morning of the drawing and had no way of buying lunch. The student who organized the lottery offered to sell their ticket back to them for \$5 so that they could buy lunch. One fourth of the participants were asked to imagine that they decided not to sell their ticket and instead planned to skip lunch or find a friend to lend them money. The remaining participants read that they decided to sell their ticket and that the student running the lottery tried to find someone else to buy it. One third of these participants were asked to imagine that their original ticket was sold to their close friend Allison; one third were asked to imagine that it was sold to another student that they did not know at all; and one third were asked to imagine that it was sold to Allison, their "ex-friend and least favorite person at school." Participants then rated how likely they believed it was that their ticket (in three quarters of the cases, their old ticket) would be the one drawn in the lottery by circling a number between 1 and 11, anchored with *not at all likely* and *extremely likely*.

We asked the participants to imagine an enemy, a stranger, or a friend buying their ticket in order to vary the aversiveness of the outcome should the exchanged ticket end up winning. Specifically, we expected that it would be most upsetting for participants to imagine an enemy with the winning ticket and least upsetting to imagine a good friend with the winning ticket (of course, we predicted that it would be better still to imagine having the winning ticket themselves).

To ensure that our intuitions about the aversiveness of these various situations matched the intuitions of participants in our subject pool, we had 72 additional participants read a scenario similar to the one in Study 3 and imagine that their exchanged ticket won in the hands of someone else. Participants indicated whether they would be most upset to learn that an enemy, a stranger, or their best friend had their old ticket. They then indicated whose winning would make them the next most upset and whose winning would make them the least upset. As predicted, 90% of the participants indicated that it would be most upsetting to learn that an enemy won with their ticket. Furthermore, a majority of participants (61%) reported the exact rank ordering that we

predicted—that it would make them most upset if their enemy had their ticket, less upset if a stranger had it, and least upset if a friend had it. The next most popular order (enemy, friend, stranger) was reported only half as often as the predicted order.

### Results

We predicted that participants' likelihood ratings would reflect the negativity of the anticipated outcome. That is, we predicted that participants who read that they had kept their ticket (and would win if the ticket were drawn [the self condition]) would be the least likely to think their ticket would win, that those who read that their enemy purchased the ticket (and who would suffer the most from the irony of having sold it) would be the most likely to think their ticket would win, and that the likelihood judgments of those in the other two conditions would fall between those in the self and enemy conditions. Participants' likelihood judgments followed the predicted linear pattern (see Figure 1). Specifically, those in the self condition reported a lower average likelihood judgment ( $M = 3.69$ ,  $SD = 1.75$ ) than those in the friend condition ( $M = 4.40$ ,  $SD = 2.47$ ), who reported a lower likelihood judgment than those in the stranger ( $M = 4.86$ ,  $SD = 3.06$ ) and enemy ( $M = 6.00$ ,  $SD = 1.52$ ) conditions. A one-way analysis of variance (ANOVA) with linear contrast weights (self:  $-2$ , friend:  $-1$ , stranger:  $1$ , enemy:  $2$ ) revealed that this linear pattern was significant,  $F(1, 52) = 6.67$ ,  $p < .02$ .

### Discussion

Although participants in the friend, stranger, and enemy conditions were all asked to imagine the same action of selling their lottery ticket (compared with the inaction of keeping the ticket in the self condition), the likelihood judgments differed depending on the aversiveness of the imagined outcome. Those in the enemy condition imagined the most painfully ironic outcome and made the highest likelihood ratings of the ticket being drawn. Thus, in

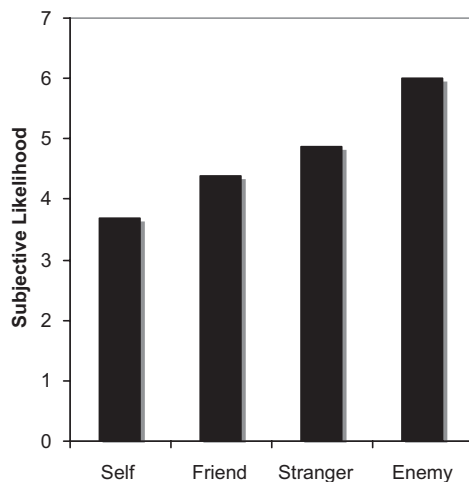


Figure 1. Mean likelihood of the lottery ticket being drawn, as rated by participants who were asked to imagine that they owned the ticket, their close friend owned the ticket, a stranger owned the ticket, and their enemy owned the ticket.

addition to exchanged tickets promoting more pessimistic likelihood judgments than kept tickets (Study 2), the results of the current study suggest that pessimistic likelihood judgments increase with how objectionable the resulting outcome would be. The more negative the outcome (at least, as we discuss below, for outcomes that are beyond one's control, like lotteries), the more the negative outcome springs to mind, and the more probable such an outcome is believed to be.

### Study 4

To examine more directly whether more negative outcomes spring more easily to mind and to determine whether this could account for the likelihood judgments observed in Study 3, we measured accessibility as well as likelihood judgments in Study 4. We used a reaction-time measure of accessibility, which is premised on the notion that participants would be faster to make a categorical judgment to the extent that the concept has already been brought to mind (Higgins, 1996; Neely, 1977; Srull & Wyer, 1979). Participants read a story about an exchanged lottery ticket and then were asked to indicate as quickly as possible whether a one-sentence ending fit the story that they had just read or whether the ending constituted a non sequitur. To the extent that reading the story encouraged participants to call to mind the subsequently presented ending, they should be quick to indicate that it constituted a sensible ending to the story. Conversely, to the extent that the story did not activate a particular ending, participants should be slow to indicate that it made sense. Therefore, we predicted that the more aversive the outcome, the faster participants would be to recognize that the ending made sense. Moreover, we predicted that participants' likelihood judgments would be mediated by their response latencies to the endings they were presented.

### Method

**Participants.** One hundred and twenty-nine Cornell undergraduates participated to earn course credit in their psychology or human development courses.

**Materials and procedure.** Participants read four short stories on the computer screen and were asked to determine, for each one, whether the ending that appeared on a follow-up screen was a logical conclusion to the story or a non sequitur. Participants were encouraged to read each story carefully and to take as much time as they needed to understand each one. However, once they advanced to the next screen, they were told to determine as quickly and as accurately as possible whether the one-sentence ending was a logical conclusion to the story. Participants pressed the *Yes* key if they believed that the ending "made sense," however likely or unlikely it might seem to them, and pressed the *No* key if they believed that the ending did not make sense (i.e., was a non sequitur). If the ending made sense, participants were then asked to indicate how likely they believed it was that such an ending would actually occur on a 0–9-point scale, anchored with *not at all likely* and *extremely likely*. Participants read two practice stories and their corresponding endings (one with an ending that made sense and one with an ending that did not make sense) and were told the correct answers to the practice stories before beginning the actual task.

The first three stories were fillers and were presented to all participants in the same order. Two fillers had endings that did not make

sense. For example, participants read one story about threatening weather at the time of their cousin's outdoor wedding followed by the ending, "The surprise party goes off without a hitch. Your dad is completely surprised." The other story had an ending that did make sense. For example, participants read about a poker game followed by the ending, "You don't get a full house but win the hand anyway with your original two pairs." The critical story was the lottery scenario from Study 3. All participants were asked to imagine that they had exchanged their lottery ticket so that they could buy lunch. One third of the participants were asked to imagine that their original ticket was sold to their close friend Allison; one third were asked to imagine that it was sold to a classmate Allison, whom they didn't know at all; and one third were asked to imagine that it was sold to Allison, their "ex-friend and least favorite person at school." After reading the story, all participants evaluated the ending, "Allison wins the lottery with the ticket that you exchanged." After determining whether the ending made sense, participants rated how likely they believed it was that the ending would occur. After participants completed all four stories, they were given a manipulation check to assure that they were paying attention to the stories. The manipulation check consisted of one recall question for each of the four stories. For the lottery story, participants were asked, "What was your relationship with Allison in the lottery story?" Participants were then thanked and debriefed.

## Results

Data from 11 (8.5%) of the 129 participants who completed the study were omitted because their reported relationship with Allison was incorrect. Participants were most often excluded for reporting that Allison was a friend when she was not or for claiming that Allison was the one who traded in her ticket. Of the 11 participants excluded, 1 was in the friend condition, 5 were in the stranger condition, and 5 were in the enemy condition.

**Response time.** Because the response time data were skewed, we used natural log transformations in all response time analyses, but we report the raw means for ease of interpretation.

As predicted, the more aversive it would have been for the exchanged ticket to be the winner, the more accessible the ending was for participants (see Figure 2). A one-way ANOVA with linear contrast weights (friend = 1, stranger = 0, and enemy = -1) supported the prediction,  $F(1, 107) = 7.29, p < .01$ .<sup>5</sup> Specifically, participants who read that their enemy had their ticket were faster to indicate that the ending made sense ( $M = 2,661$  ms,  $SD = 886$ ) than those who read that a friend had their ticket ( $M = 3,212$  ms,  $SD = 927$ ),  $t(73) = 2.78, p < .01$ . The average response time for those who read that a stranger had their ticket ( $M = 2,931$  ms,  $SD = 967$ ) fell between the average response times for those in the enemy and friend conditions, but this was not significantly different from either of those,  $t(70) = 1.07, p > .25$ , and  $t(71) = 1.56, p > .10$ , respectively.

**Likelihood.** Replicating Study 3, we found that the more aversive it would have been for the exchanged ticket to be the winner, the more likely the participants believed the outcome was to occur (see Figure 3). The predicted linear pattern was supported by a one-way ANOVA with linear contrast weights (friend = -1, stranger = 0, and enemy = 1),  $F(1, 115) = 4.28, p < .05$ . Participants who imagined that Allison was their enemy thought that she was more likely to win with their former ticket ( $M = 3.36$ ,  $SD = 2.13$ ) compared with those who imagined Allison as their

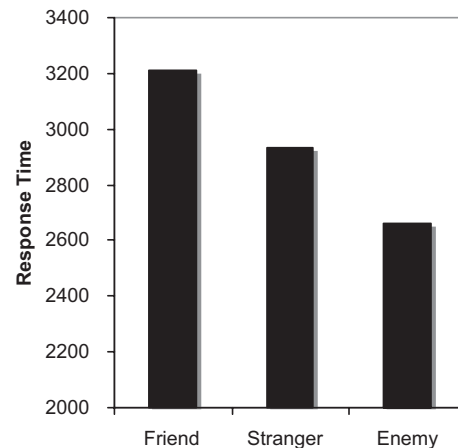


Figure 2. Mean response time (in milliseconds) to indicate that the ending "Allison wins the lottery with the ticket that you exchanged" made sense by participants who were asked to imagine that Allison was their close friend, a stranger, or their enemy.

friend ( $M = 2.41, SD = 1.82$ ),  $t(78) = 2.14, p < .05$ .<sup>6</sup> Participants who imagined not knowing Allison rated the likelihood of her winning ( $M = 2.82, SD = 2.17$ ) as falling between those in the friend and enemy conditions. Their ratings were not significantly different from those of participants in either of the other two conditions,  $t_s < 1.15$ .

**Response time and likelihood.** As predicted, there was a significant negative correlation between participants' latency to indicate that the ending made sense and their likelihood rating ( $r = -.31, p = .001$ ), indicating that the faster a participant had responded that the lottery story ending made sense, the more likely he or she believed the ending to be.

We have suggested that people believe that exchanged lottery tickets are more likely to be drawn than are tickets that have not been exchanged because the aversiveness of an exchanged ticket winning causes such an outcome to come to mind. Further, we have suggested that the more aversive it would be for an exchanged ticket to be the winner, the more people inflate its chance of winning because more negative outcomes more readily spring to mind and capture one's attention. In other words, we contend that the effect of negativity on assessments of likelihood is due to the differential accessibility of

<sup>5</sup> Eight participants (3 from the friend condition, 3 from the stranger condition, and 2 from the enemy condition) answered incorrectly (i.e., said that the ending did not make sense even though it did) and hence were excluded from all analyses involving the time taken to determine whether the ending made sense. Because all participants were prompted to answer the likelihood question, their responses were included in the likelihood analyses. The pattern for the likelihood analyses remained the same whether or not these participants were included.

<sup>6</sup> Note that these means are substantially lower than those reported in Study 3, which involved the very same scenario. There are two reasons for this. First, the scale was an 11-point scale in Study 3 and a 10-point scale in this study. Second, in Study 3, participants made likelihood ratings for this particular scenario only. In this study, in contrast, participants rendered judgments about a host of events—the lottery scenario being only one of them.

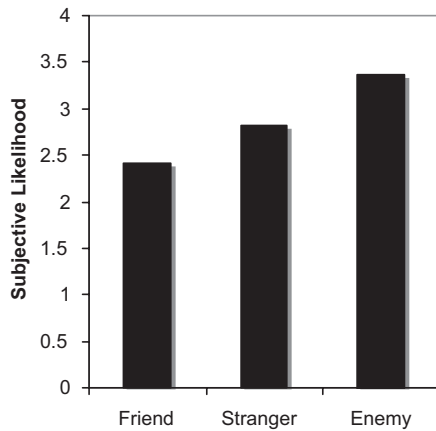


Figure 3. Mean likelihood of the lottery ticket being drawn as rated by participants who were asked to imagine that their close friend owned the ticket, a stranger owned the ticket, and their enemy owned the ticket.

outcomes that vary in negativity. To test this claim, we used procedures outlined by Baron and Kenny (1986) to assess mediation.

As reported above, the negativity manipulation—whether a friend, a stranger, or an enemy now had one’s exchanged lottery ticket—significantly predicted participants’ ratings of the likelihood that the exchanged ticket would win ( $B = 0.466$ ,  $SE = 0.277$ ,  $p < .05$ ) and the latency to indicate that the ending made sense ( $B = -0.101$ ,  $SE = 0.037$ ,  $p < .01$ ). In addition, the latency to indicate that the ending made sense significantly predicted participants’ ratings of the likelihood that the exchanged ticket would win ( $B = -1.86$ ,  $SE = 0.553$ ,  $p = .001$ ). Finally, when both the negativity manipulation and participants’ response times were included in the same equation predicting participants’ likelihood judgments, the former dropped to nonsignificance, and the latter remained significant ( $B = 0.298$ ,  $SE = 0.227$ ,  $p = .19$ , and  $B = -1.67$ ,  $SE = 0.57$ ,  $p < .005$ , respectively). The results of a Sobel test confirmed the significance of this mediated relation ( $z = 2.00$ ,  $p < .05$ ).

### Discussion

In Study 4, we successfully replicated the previous study by showing that exchanged tickets were judged more likely to win the lottery, the more aversive it would have been for that ticket to win. More important, the results of Study 4 support our suggested mechanism for the fact that exchanged tickets are considered more likely to win when the outcome is especially aversive. We have suggested that aversive outcomes readily spring to mind, and because they are easily imagined, they are judged to be especially likely to occur.

Supporting this contention, we found that the more aversive it would have been for an exchanged ticket to be the winner, the more accessible the outcome was. Participants who imagined that Allison was their enemy more readily anticipated that the exchanged ticket would be the winning ticket—and were therefore able to indicate that the ending made sense more quickly—than those who imagined Allison as a friend. Furthermore, we found that participants’ likelihood judgments were mediated by their speed to recognize that the ending made sense. In other words, it

appears that participants believed that an exchanged ticket was especially likely to win because that outcome was readily imagined. Thus, it appears that the tendency for more negative outcomes to spring to mind especially easily can explain the fact that people believe exchanged tickets are more likely to win the more aversive that outcome would be and, by extension, the fact that people believe exchanged tickets are more likely to win than retained tickets.

### General Discussion

The current studies indicate that people believe that an exchanged lottery ticket is more likely to win than a nonexchanged ticket. They believe it with their gut (Study 1) and are willing to back up their belief with cash (Study 2). Thus, anticipated regret may not be the only determinant of people’s general reluctance to exchange lottery tickets. People’s likelihood judgments also seem to play a role. Although people may believe, *ex ante*, that their ticket is no more likely than any other to win, our results indicate that they nonetheless believe that if they trade their ticket, it will become more likely to win.

We contend that the elevated perceived likelihood of an exchanged ticket winning is due to the tendency to entertain the painful possibility that the exchanged ticket will win. Once imagined, the outcome is seen as more likely to occur (Carroll, 1978; Gregory et al., 1982; Sherman et al., 1985). Several findings support this contention.

In Study 2, the differential optimism on the part of participants who had kept their original lottery numbers and those whose winning and losing numbers had been switched was driven primarily by participants’ beliefs regarding the likelihood of their (now) losing numbers being drawn. In other words, the difference between participants in the stay and switch conditions was more that switch participants felt that their old winning numbers—which were now losers for them—were likely to be drawn rather than that their now-winning numbers were unlikely to be drawn. This is precisely what one would expect if the act of picturing one’s old numbers winning is responsible for this effect.

The results of Studies 3 and 4 provide further evidence that the belief that an exchanged ticket is especially likely to win results from the ease of imagining that aversive possibility. We found that the more aversive it would be for an exchanged ticket to win, the more probable that outcome was judged to be and the more that outcome appeared to capture participants’ imagination, as evidenced by their speed to recognize the outcome as one that made sense. Moreover, their likelihood judgments were mediated by their recognition latencies. The faster participants recognized that Allison’s winning the lottery with the exchanged ticket was a sensible end to the story (presumably because they had already called such an ending to mind), the more likely they thought it was that such an outcome would actually come to pass.

Further evidence that the act of imagining an exchanged ticket as the winning lottery ticket is responsible for its enhanced perceived likelihood comes from research examining the accessibility of other negative outcomes that follow other actions that tempt fate (Risen & Gilovich, 2007). In a study similar to Study 4, participants read a number of narratives in which the protagonist did or did not tempt fate in various ways. In one narrative, for example, participants read about an individual who either had, or had not,

jinxed himself by eagerly wearing a T-shirt from his top-choice university while waiting to hear whether he would be accepted or rejected. The participants then read a possible ending to the story and were asked to indicate as quickly as possible whether the sentence they read was a sensible ending or a non sequitur. As expected, participants were faster to recognize negative—but not positive—endings to these narratives if they had earlier read that the protagonist had tempted fate. As in Study 4, their likelihood judgments were mediated by their speed to indicate that the ending made sense. The faster that participants recognized that a given negative ending made sense, the more likely they were to believe that the outcome would occur. Thus, it appears that actions that tempt fate call to mind the prospect of a negative outcome, which, in turn, increases the perceived likelihood of such an outcome.

As these results indicate, the tendency to imagine a negative outcome and therefore to believe that it is especially likely to occur manifests itself in many other circumstances beyond the decision of whether to exchange lottery tickets. We suggest that people believe negative outcomes are more likely when they take actions that diverge from how one “should” act because the negative outcomes—being more aversive—are more accessible in such cases. For example, participants believed that they were more likely to have an accident or to be pulled over by the police when they imagined borrowing their parents’ car without permission than when they imagined borrowing it with permission. Similarly, participants believed that they would be more likely to be called on in class when they imagined not having done the reading for class than when they imagined having done the reading (Risen & Gilovich, 2007).

Similar sorts of superstitious, pessimistic thinking can be found when people tempt fate in ways that do not involve the violation of moral injunctions. For example, people think that negative outcomes are likely to result from commenting on a run of good fortune (Gilovich, 1991; Kruger, Savitsky, & Gilovich, 1999; Risen, Gilovich, Kruger, & Savitsky, 2007). We suggest that when a streak of success is pointed out, people spontaneously imagine that the streak will end, which increases its perceived likelihood. Indeed, we found that participants in a lottery game reported that there was a greater chance of a losing token being drawn, estimated that there were more losing tokens in the pool, and were less likely to continue gambling if the streak of five winning trials that they were riding had been explicitly pointed out than if the streak were ignored.

It is important to point out that our analysis mainly applies to outcomes, such as lotteries or being called on in class, that are largely outside a person’s control. Tasks for which the outcomes are controllable call forth a host of self-enhancing psychological processes that typically yield much more optimistic forecasts (Dunning, 2005; Taylor & Brown, 1988; Weinstein, 1980). In contrast, the psychological processes responsible for the effects we have documented—the compelling quality of negative prospects and the link between imagination and subjective likelihood—are reliable but not sufficiently powerful to stand up to the psychological processes evoked by controllable tasks. The superstitious, pessimistic thinking we have documented thus mainly applies to outcomes that people think of as being visited upon them.

The reluctance to exchange lottery tickets is a type of status quo bias. Some status quo biases can be attributed to loss aversion (Ritov & Baron, 1992). A person who wins a bet, for example,

may be reluctant to accept an offer of double or nothing (i.e., to depart from the status quo) because the pleasure of moving from \$X to \$2X is exceeded by the pain of moving from \$X to \$0. Someone may decline to strike a deal with an adversary because what would have to be given up registers with more psychological impact than what would be gained. However, the comparison of loss and gain in contemplating whether to exchange lottery tickets is not commensurate in the way that it is in these other examples. One does not compare how bad one would feel if the exchanged ticket wins for someone else with how good one would feel if the new ticket wins for oneself—comparing potential gains and losses of making the switch. Instead, one compares how one would feel if one traded the ticket and it was a winner for someone else with how one would feel if one did not trade the ticket and it was a winner. This comparison results in a striking difference in simulated utility, but it has nothing to do with the differential weighting of (equivalent) gains and losses. Thus, unlike other status quo biases, the reluctance to exchange lottery tickets cannot be attributed to the tendency to weigh losses more heavily than gains. Rather, it appears to be due to the tendency to imagine blaming oneself for mistaken actions (regret avoidance) and, as suggested here, to the tendency to believe that the imagined negative events are especially likely to occur.

Do people really believe that a lottery ticket is more likely to win if they give it up? Yes and no. The psychological processes that give rise to the effects we have documented in this article (i.e., the mind’s tendency to seize on negative prospects and the connection between imagination and subjective likelihood) combine to produce a gut feeling that to tempt fate by exchanging tickets is to invite remorse—in fact, to make remorse more likely. However, for many people, as we have emphasized, such a clear-cut gut feeling conflicts with their more rational, deliberative thoughts on the matter. Indeed, when we ran a version of Study 1 in which we asked participants to respond not with their gut feeling but with their rational thoughts, 90% indicated that exchanging their lottery ticket would have no effect on its likelihood of being selected.

The belief that an exchanged ticket is more likely to win the lottery is therefore best understood from a dual-process or two-systems perspective (Chaiken & Trope, 1999; Epstein et al., 1992; Kahneman & Frederick, 2002; Slovic, 1996). For many people, the thought of exchanging a lottery ticket yields a conflict between the output of their intuitive and rational thought processes. The intuitive system believes that an exchanged ticket is likely to be a winner, but the rational system does not. We have referred elsewhere to these types of beliefs as *beliefs without justification* (Risen & Gilovich, 2007).<sup>7</sup> When people are explicitly asked to rely on their gut feelings or their rational thoughts, they can report the output of the relevant system. Thus, in these situations people are indeed of two minds. However, when asked a less explicit question or when assessing likelihood in contexts in which such

<sup>7</sup> The other type of conflict between the intuitive and rational systems—instances in which the rational system “believes” and the intuitive system does not—often yields abstract beliefs on which people find it difficult to act (Bechara, Damasio, Tranel, & Damasio, 1997; Damasio, 1994). We have referred to these beliefs as *beliefs without conviction* (Risen & Gilovich, 2007).

questions typically arise in everyday life, people's likelihood assessments are usually a blend of the output of the two systems.

As with most blends, the ratio of the ingredients can vary across occasions. In this case, the extent to which people rely on each system in making likelihood assessments varies depending on the context in which the questions arise. For example, when people are held accountable for their judgments or are asked to make their assessments on probability scales rather than on subjective likelihood scales, they are likely to rely on rational thought processes more heavily and may be less inclined to report the intuition that an exchanged ticket is more likely to win (Tetlock, 1992; Windschitl & Wells, 1996). However, when rational thought processes are taxed by means of a cognitive load manipulation, we find that participants exhibit an exacerbated effect of the tempting fate manipulation, presumably because they rely less on deliberative processes and more on their intuition (Risen & Gilovich, 2007). If we were able to interrupt or degrade the process of automatically imagining the negative outcome (perhaps by priming participants with an alternative outcome), then we would expect participants to be less likely to report that an exchanged ticket is more likely to win.

Although one might think that in most situations the rational system would hold the upper hand, it is often the intuitive system that people obey. After all, people usually refrain from changing checkout lines at the grocery store or from switching answers on multiple-choice tests (Ballance, 1977; Foote & Belinky, 1972; Kruger et al., 2005; Lynch & Smith, 1975; Mathews, 1929; Smith, White, & Coop, 1979), and the intuitive impulses we have investigated are sufficiently strong to contribute to people's reluctance to exchange lottery tickets.

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