Journal of Experimental Psychology: General
2009, Vol. 138, No. 4, 535–545

0096-3445/09/$12.00 DOI: 10.1037/a0016796

Negativity Bias in Attribution of External Agency

Carey K. Morewedge
Carnegie Mellon University

This research investigated whether people are more likely to attribute events to external agents when events are negative rather than neutral or positive. Participants more often believed that ultimatum game partners were humans rather than computers when the partners offered unusually unfavorable divisions than unusually favorable divisions (Experiment 1A), even when their human partners had no financial stake in the game (Experiment 1B). In subsequent experiments, participants were most likely to infer that gambles were influenced by an impartial participant when the outcomes of those gambles were losses rather than wins (Experiments 2 and 3), despite their explicitly equal probability. The results suggest a *negative agency bias*—negative events are more often attributed to the influence of external agents than similarly positive and neutral events, independent of their subjective probability.

Keywords: attribution, mind perception, negativity bias, superstition

> Prosperity is easily received as our due, and few questions are asked concerning its cause or author . . . . On the other hand, every disastrous accident alarms us, and sets us on enquiries concerning the principles whence it arose . . . . And the mind, sunk into diffidence, terror, and melancholy, has recourse to every method of appeasing those secret intelligent powers, on whom our fortune is supposed entirely to depend. (Hume, 1757/1956, p. 31)

People are apt to believe that computers are “trying” to antagonize them when important files are deleted, referees conspired to cause their team’s loss, and a deity’s wrath has been incurred when natural disaster strikes. Yet, when files are easily found, one’s team is winning, or the sky is clear and the sun is shining, the state of affairs is seldom attributed to the influence of external agents. This discrepancy reflects a general asymmetry in the way perceivers ascribe causality. Psychopathology, politics, religion, sports, and everyday experience are replete with attributions made to malicious external agents (Boyer, 2001; George & Neufeld, 1987; Gilbert, 1987; Guthrie, 1993; Shaughnessy, 2000). Although helpful external agents may be invoked to explain surprisingly pleasant events (D. T. Gilbert, Brown, Pinel, & Wilson, 2000), such attributions seem fewer and less frequent.

The present research investigated whether events that are negative are especially likely to be attributed to the influence of *external agents*—entities other than the self that possess their own beliefs and desires (Dennett, 1987). Negative events may be attributed to the influence of external agents simply because negative events are unlikely to be anticipated. Alternatively, people may exhibit a negative agency bias, whereby negative events are more likely to be attributed to the intentions of external agents than events that are similarly positive or neutral, regardless of their subjective probability.

Asymmetric Expectations

When outcomes violate one’s expectations, they are less likely to be attributed to internal causes and are more likely to be attributed to external physical or intentional causes (Kelley, 1977; Subbotsky, 2001). Overconfidence in the probability of one’s success and other egocentric biases (e.g., Dunning, Griffin, Milojkovic, & Ross, 1990; Kruger & Dunning, 1999; Weinstein, 1980) may lead one to more often expect positive outcomes to occur than negative outcomes. Simply because negative events are more frequently unexpected, they may be more frequently attributed to external causes than positive events (e.g., Gilovich, 1983; Pyszczynski & Greenberg, 1981; Weiner, 1985).

Unexpected events are likely to be attributed to external agents rather than to chance because intentional explanations are a useful way to understand the behavior of unpredictable entities (e.g., Dennett, 1987; Epley, Waytz, & Cacioppo, 2007; Rakison & Poulin-Dubois, 2001; Waytz et al., 2009). If an entity’s behavior is entirely predictable, one does not need to understand its intentions to be able to predict its behavior. Instead, one can simply recall what stimuli it recently encountered or its past reaction to a particular stimulus (Michotte, 1963). When one cannot easily predict an entity’s behavior from its past behavior, one must understand its beliefs and desires to infer its future behavior (Heider, 1958). By definition, unexpected events are difficult to predict. Because negative events are more likely to be unexpected, they may thus be more often attributed to the intentions of external agents than similarly positive and neutral events.

I gratefully acknowledge the support of a dissertation fellowship from the Institute for Quantitative Research in the Social Sciences at Harvard University and a John Parker Scholarship from the Graduate Society of Fellows at Harvard University. I thank Andrew Boston, Dina Gohar, Tessa Johung, Matthew Killingsworth, Amit Kumar, Kathy Lee, Rebecca Levine, Gregory McBroom, Sara Rabinovitch, Dadjie Saintus, Jill Swencionis, and Lisa Xu for their assistance in the execution of these experiments, and Susan Carey, Eugene Caruso, Daniel Dennett, Daniel Gilbert, and Daniel Wegner for their helpful suggestions.

Correspondence concerning this article should be addressed to Carey K. Morewedge, Department of Social and Decision Sciences, Carnegie Mellon University, 208 Porter Hall, Pittsburgh, PA 15213. E-mail: morewedge@cmu.edu

Negativity Agency Bias

People generally appear to suspect that the causal origin of events is a *prime mover*—an intentional agent that initiates the first event in a causal chain of events (Rosset, 2008; Vinokur & Ajzen, 1982). Infants expect an intentional agent to be the primary cause of an inanimate object's motion, even in the absence of any direct perceptual evidence (Saxe, Tenenbaum, & Carey, 2005). Adults seem to be no different. They initially assume that events occurred as a result of another agent's intentions, and subsequently correct that assumption only when given sufficient reason and time to do so (Rosset, 2008). Even unambiguously accidental events such as sneezing and slipping on ice may be attributed to intentional causes when observers are given limited time to infer the cause of an actor's behavior. Positive events and behaviors are likely to be attributed to one's intentions, whether enacted through skill or personal luck (Langer & Roth, 1975; Miller & Ross, 1975; Wohl & Enzle, 2002). As attributing negative events to the self is undesirable (Taylor & Brown, 1988), people may be inclined to attribute negative events to the intentions of external agents.

The findings of research examining moral judgment, intentionality, and attribution support this assertion. In contrast to attributions for their own behavior, people are more likely to attribute negative behaviors performed by external agents to their dispositions and intentions rather than to their situation or to chance: Others receive more blame for the negative side-effects of their intentional behaviors than praise for the positive side-effects of their intentional behaviors (Knobe, 2003, 2005). Intentions are more often attributed to computers that malfunction frequently than infrequently (Waytz et al., 2009). Memory is best for negative behaviors that were attributed to the disposition of an external agent and for positive behaviors that were attributed to their situation (Ybarra & Stephan, 1996). Most relevant, people are more likely to engage in extensive causal reasoning when experiencing events that are negative—whether those events were expected or unexpected (Bohner, Bless, Schwarz, & Strack, 1988).

Even negative psychological states that are incidental increase the tendency to attribute intentions to external agents. The tendency to anthropomorphize ambiguous stimuli is exacerbated when experiencing loneliness (Epley, Akalis, Waytz, & Cacioppo, 2008), and mortality salience increases belief in the existence of supernatural agents and their ability to influence worldly events (Norenzayan & Hansen, 2006).

A negativity bias exists in the domains of attention, categorization, person perception, memory, decision making, and causal explanation (for reviews, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Kanouse & Hanson, 1971; Rozin & Royzman, 2001). These findings suggest a negativity bias may exist in the perception of external agency. People may be more likely to attribute negative events to the intentions of external agents than similarly positive and neutral events, independent of the subjective probability of those events.

The Present Research

Three sets of experiments tested whether people are more likely to attribute negative events to the intentions of external agents than similarly positive or neutral events, and whether this asymmetry is due to differences in their subjective probability or to negative agency bias. Participants in Experiment 1A and 1B played three ultimatum games with partners who had or did not have a stake in the game. Each participant was offered an unusually positive and negative offer by different partners and guessed whether each of those partners was a human or a computer program. In Experiments 2 and 3, the probability of positive and negative events was explicit and equal. Participants in Experiment 2 experienced monetary gains and losses and reported which gains and losses they attributed to an impartial agent. Experiment 3 used implicit measures to test when the stated cause of positive and negative events (i.e., an impartial agent or chance) corresponded with their spontaneous attributions. Across all three sets of experiments, I predicted that participants would be more likely to attribute negative than positive events to external agents, regardless of their subjective or objective probability of those events.

Experiments 1A and 1B

Experiments 1A and 1B tested whether people are more likely to attribute unusually negative events than unusually positive events to external agents in modified ultimatum games. Each participant in Experiments 1A and 1B played three ultimatum games with three different anonymous partners (Güth, Schmittberger, & Schwarze, 1982). In the three games, participants were offered an unusually favorable, an even, and an unusually unfavorable split by different partners. After each game, participants guessed whether their partner was human or a computer program. (In fact, all of their partners were computer programs.) If people more often attribute negative events to external agents because they are more often unexpected, participants should then be equally likely to attribute unusually favorable and unusually unfavorable splits to human partners. If people more often attribute negative events to external agents because of a negative agency bias, then participants should be more likely to attribute unusually unfavorable than unusually favorable splits to human partners.

Both Human partners had a financial stake in the games played in Experiment 1A. Participants in Experiment 1B played ultimatum games with human partners who could not earn money in the games to test whether they would attribute outcomes differently if they believed that their human partners were not financially incentivized. In Experiment 1B, participants were also asked to describe their partner. These descriptions were coded for the use of intentional language and whether participants spontaneously identified their partner as a human being or a computer program.

Experiment 1A

Method

Participants. Thirty-five undergraduate and graduate students at Harvard University (19 women; $M_{age} = 22.2$, $SD = 7.7$) participated for money earned in the experiment ($5–$13).

Monetary splits. In each round of the ultimatum games, a participant and his or her partner split $3. The entity dividing the sum at stake in each round (the divider) could choose one of three splits to offer to his, her, or its partner (the receiver): an unusually unfavorable split ($\$2.25_{divider}/\$0.75_{receiver}$), a usual even split ($\$1.50_{divider}/\$1.50_{receiver}$), or an unusually favorable split ($\$0.75_{divider}/\$2.25_{receiver}$). These amounts were chosen on the basis of previous research examining average and modal offers in the United States (Henrich, 2000). Participants in both experiments were aware that the divider had to choose one of these three splits.

Procedure. Participants were run individually. They were informed that they would play three ultimatum games on a computer with three different partners, each of whom would be randomly drawn from a pool that included other human participants and computer programs. Participants were not informed of any strategy the computer programs might use to select splits, so computer programs could have been designed to maximize profits, select randomly, or maximize the number of splits accepted by participants.

Next, participants were informed that each game would consist of two rounds. In the first round, their partner received \$3 and chose one of the three splits to offer the participant. Then participants were given the choice to accept or reject that split. In the second round of each game, the partner and participants switched positions. Participants' splits were always accepted. Each of the 3 partners offered participants a different split (i.e., favorable, even, or unfavorable). Offer order was random. After finishing each two-round game, participants were informed of their earnings and were asked whether they believed that their partner was a human or a computer program. After finishing the last game, participants were debriefed and compensated.

Results

There were no significant effects of order in this or further experiments, so order is not further discussed.

Although participants were as likely to guess that their partner was a human being (50.5%) as they were to guess that their partner was a computer program (49.5%; $t < 1$), a nonparametric test revealed a significant effect of the generosity of their partner's split on inferences of the partner's identity, $\chi^2(2, N = 35) = 11.51$, $p < .01$. Participants were more likely to attribute an unfavorable split to a human partner than to a computer program, $\chi^2(1, N = 35) = 4.83$, $p = .03$, whereas participants were no more likely to attribute an even split to a human partner than to a computer program, $\chi^2(1, N = 35) = 0.26$, $p = .61$, and were less likely to attribute a favorable split to a human partner than to a computer program, $\chi^2(1, N = 35) = 6.43$, $p = .01$ (see Figure 1, left panel).

Experiment 1B

Method

Participants. Forty-four undergraduate and graduate students at Harvard University (28 women; $M_{\text{age}} = 20.8$, $SD = 2.7$) participated for money earned in the experiment (\$5–\$13).

Procedure. The procedure of Experiment 1B was identical to the procedure of Experiment 1A, with two exceptions. First, participants were informed that their human partners would not receive payment for the games they played with participants. Specifically, participants were told that the human players earned money from ultimatum games they played with other people but that the human players would not earn money from the ultimatum games they played with participants (see the Appendix).

Second, participants gave open-ended descriptions of what they thought of their partner immediately after each game. Three judges, blind to condition, rated the extent to which participants used intentional language to describe their partner or their partner's behavior on a 5-point scale ranging from 1 (*did not use intentional language*) to 5 (*definitely did use intentional language*). Judges also rated the extent to which participants spontaneously identified their partner as human participant or as computer program on a 5-point scale ranging from 1 (*definitely believed the partner was a computer program*) to 5 (*definitely believed that the partner was a human being*).

Results

Open-ended responses. Ratings of intentional language and spontaneous partner identification were averaged across judges (Cronbach's $\alpha = .71$; $\alpha = .72$) and submitted to a repeated measures analysis of variance (ANOVA), with three levels of split (unfavorable, even, favorable). That analysis yielded a main effect of split on the extent to which participants spontaneously used intentional language and spontaneously identified partners as hu-

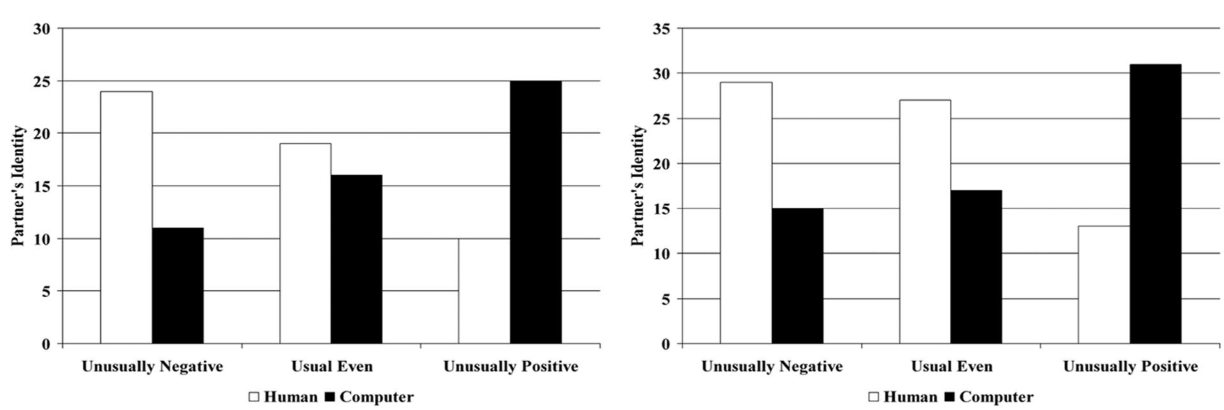

Figure 1. Participants were more likely to believe an ultimatum game partner was a human rather than a computer partner when offered unusually negative than usual even or unusually positive divisions of the money at stake in a round, whether their human partners did or did not have a monetary incentive, left and right, respectively (Experiments 1A and 1B).

man or as computer program, $F(1, 42) = 10.44$, $p = .002$, $\eta_p^2 = .20$, and, $F(1, 42) = 4.65$, $p = .04$, $\eta_p^2 = .10$, respectively. Post hoc tests (Fisher's least significance difference [LSD] test) revealed that participants were more likely to spontaneously use intentional language to describe partners who offered them unfavorable splits ($M = 3.47$, $SD = 1.07$) than partners who offered them even ($M = 2.94$, $SD = 1.10$) and favorable splits ($M = 2.49$, $SD = 1.05$; $p = .02$ and $p < .001$, respectively) and that participants were more likely to use intentional language when offered an even split than when offered a favorable split ($p = .03$).

Participants were also more likely to spontaneously describe their partners as human rather than as computer program when offered unfavorable splits ($M = 3.34$, $SD = 1.05$) than when offered even ($M = 2.92$, $SD = 1.02$) and favorable splits ($M = 2.71$, $SD = 1.15$; $p = .067$ and $p = .005$, respectively), but they were equally likely to identify their partners as human or as computer program whether offered an even split or a favorable split ($p = .28$). Of interest, the extent to which participants used intentional language was positively correlated with the extent to which participants spontaneously identified their partner as human and not as computer program, $r(42) = .54$, $p < .001$.

Agent perception. Although participants were as likely to guess that an unknown partner was a human partner (52.3%) as they were to guess that an unknown partner was a computer program (47.7%; $t < 1$), a nonparametric test revealed a significant effect of the partner's split on inferences made about the partner's identity, $\chi^2(2, N = 44) = 13.85$, $p < .001$. Participants were more likely to attribute an unfavorable split to a human partner than to a computer program, $\chi^2(1, N = 44) = 4.46$, $p = .04$, whereas participants were no more likely to attribute an even split to a human partner than to a computer program, $\chi^2(1, N = 44) = 2.27$, $p = .13$, and were less likely to attribute a favorable split to a human partner than to a computer program, $\chi^2(1, N = 44) = 7.36$, $p = .007$ (see Figure 1, right panel). These explicit inferences were positively correlated with spontaneous identifications of the partners as human or as computer program, $r(42) = .40$, $p = .008$.

Discussion

Whether their human partners had or did not have a financial incentive to behave selfishly, participants in Experiments 1A and 1B were most likely to infer that partners who offered them unfavorable splits were humans and were most likely to infer that partners who offered them favorable splits were computer programs. Given the similarity in their procedures and populations, it may be informative to compare attributions made when human partners were self-interested (Experiment 1A) and when they were not (Experiment 1B). As suggested by Rosenthal and Rosnow (1991), attributions were compared with a 2 (self-interest: self-interest, no self-interest) × 3 (split: unfavorable, even, favorable) mixed ANOVA, with repeated measures on the last factor. That analysis revealed a significant main effect of split, $F(1, 77) = 15.33$, $p < .001$, $\eta_p^2 = .17$, but no main effect of self-interest or interaction (Fs < 1). Post hoc tests (Fisher's LSD) revealed that participants were more likely to believe their partners were human when their partners offered them unfavorable or even splits than when their partners offered them favorable splits (ps $< .001$), but they were equally likely to believe their partner was human when their partners offered them unfavorable or even splits ($p = .20$) (see Figure 1). The most parsimonious interpretation of the similarity between the two experiments is that participants exhibited a negative agency bias. Whether external agents had or had no reason to act miserly or charitably toward participants, participants were more likely to attribute negative than similarly positive events to the intentions of external agents.

There are, however, two concerns with this interpretation of the results. The first concern is that it is not possible to determine whether attributions in Experiment 1B are biased. When people are given this choice of splits, total anonymity, and no payment, they may elect to offer unfavorable splits to other participants out of envy or because they derive pleasure from watching others suffer (Smith et al., 1996). If this is the case, then attributions made in Experiment 1B may have been accurate. To gain some understanding of the splits that dividers choose under these circumstances, a posttest was conducted in which dividers did not earn any money from the splits they offered to receivers.

Sixty-six dividers (34 women; $M_{age} = 22.11$, $SD = 3.97$) were paid a flat rate to choose which of the three splits would be offered to a receiver—another participant—at a later date. These flat-rate dividers knew that they would not earn money as a result of the split that they chose but that the receiver could earn money if he or she accepted the offered split. The posttest was conducted in an experimental economics lab with a no-deception policy, so dividers had no reason to suspect that the splits would not be offered at a later time to another person.

In stark contrast to the inferences made by participants in Experiment 1B, 71.2% of flat-rate dividers (47/66) elected to offer their partner the unusually favorable split. Only 19.7% of the dividers (13/66) offered their partner the even split, and 9.1% of the dividers (6/66) offered their partner the unusually unfavorable split. In other words, when dividers stood to earn nothing from the split they chose, the majority of those dividers offered their partners an unusually favorable split, $\chi^2(2, N = 66) = 43.73$, $p < .001$.

If one assumes that participants in Experiment 1B believed that there was an equal mix of humans and computers, P(human) = .5, and that a random offer strategy was used by computers [P(favorable split) = .33, P(even split B) = .33, and P(unfavorable split) = .33], then one can compare their attributions with the prior probability that a divider who offered them a favorable, an even, or an unfavorable split was a human rather than a computer program [P(human) = .68, .37, and .21, respectively]. Given these assumptions, binomial tests revealed that participants would have underestimated the probability that a divider who offered them a favorable split was a human, P(human) = .30, $p < .001$, correctly estimated the probability that a divider offering them an even split was a human, P(human) = .61, $p = .43$, and overestimated the probability that a divider offering them an unfavorable split was human, P(human) = .66, $p < .001$. This suggests that participants in Experiment 1B exhibited a negativity bias in the attribution of external agency.

The second concern regarding the foregoing interpretation of the results is that participants in Experiment 1B could have been confused or skeptical about their human partners' payment structure. The attributions made in Experiments 1A and 1B might both have been made under the assumption that human dividers were acting in accordance with their self-interest. Note that this interpretation does not rule out the possibility that participants exhibited a negative agency bias, as participants did not know the strategy used by the computer programs. There is no reason why the computer programs would be less likely to select splits strategically than randomly. If participants assumed that the computer programs were strategically selecting splits, then their attributions would still indicate that they preferentially attributed negative outcomes to self-interested agents (i.e., humans) than to self-interested nonagents (i.e., computers).

Experiments 2 and 3 addressed both concerns. Regarding the first concern, participants in Experiments 2 and 3 experienced to a series of monetary losses and gains that were random or influenced by an impartial partner. By explicitly making the probability of positive and negative outcomes equivalent, this design disambiguated whether the tendency to attribute negative outcomes to external agents was a bias. If participants more often attributed their losses than gains to the influence of their partner, then they would exhibit a negativity bias in their attributions of external agency. Regarding the second concern, participants were probed before and after the experiments to make sure that they understood (and believed) that their outcomes and their partner's outcomes were unrelated.

Experiment 2

Experiment 2 expanded on the previous experiment in three ways. First, the probabilities of positive and negative events were explicitly manipulated by forcing participants to play a series of gambles. This allowed me to test whether event probability and valence independently influence attributions to external agents. Second, participants could attribute those events to an impartial confederate or to chance. This meant that the experiment only tested participants' inferences about the behavior of human agents. It did not also test their inferences about the behavior of computer programs. Third, participants could not begin the experiment until they demonstrated that they understood that their partner's outcomes were unrelated to their outcomes. I predicted that independent of event probability, participants would be more likely to attribute negative events (i.e., monetary losses) than positive events (i.e., monetary gains) to the influence of the impartial confederate.

Method

Participants. Fifty-one undergraduate and graduate students at Harvard University (39 women, $M_{\text{age}} = 20.0$, $SD = 3.6$) received \$12 for participating (a \$7 show-up fee and an additional \$5 that was wagered on gambles). The responses of six suspicious participants were not included in any of the analyses.[1]

Procedure. An experimenter briefly introduced participants to a confederate and then escorted them to separate rooms so that they could not see or hear each other. Once seated, participants were informed that they and the confederate would win and lose money according to the outcomes of 40 rounds of a game of chance in which an arrow spun on a computerized color wheel (see Figure 2, left panel), and they received \$5 to use in the game. The color wheel consisted of a circle divided into five slices, some of which were yellow and some of which were blue. If the arrow stopped on a slice that was the participants' winning color in that round, they would earn the amount of money displayed in the top right corner of the screen. If the arrow stopped on a slice that was the other color, they would lose the amount of money displayed in the top right corner of the screen. Before the game began, participants chose a card that assigned them a winning color for each round of the game. Winning colors varied randomly across rounds in four random orders.

It was made clear to participants that their winning colors and amounts at stake were unrelated to the winning colors and amounts at stake of the confederate and that there was no way for them or the confederate to know whether they shared a winning color or a stake on any round. Participants were then told that the confederate could decide the outcome of five rounds and that their task was to report the extent to which they thought that the outcome of each round was due to chance or to the confederate on a 5-point scale ranging from 1 (*definitely random chance*) to 5 (*definitely the other participant*). After playing all 40 rounds, participants reported the amount they believed that they had won or lost and were carefully debriefed and compensated.

Stimuli and conditions. In a within-subjects design, each participant experienced all possible wins and losses at five stakes (\$0, \$0.25, \$0.50, \$0.75, \$1.00) and four levels of probability (20%, 40%, 60%, and 80%). In each round, the probability of winning was clearly indicated by the number of yellow and blue slices on the wheel (i.e., 1:4, 2:3, 3:2, or 4:1).

Results

Agent perception. Attributions of responsibility were analyzed in a 2 (outcome: win, loss) × 5 (stake: \$0, \$0.25, \$0.50, \$0.75, \$1.00) × 4 (probability: 20%, 40%, 60%, 80%) repeated measures ANOVA. Most important, the analysis revealed a main effect of outcome—participants were more likely to infer that the confederate controlled rounds when participants lost money ($M = 2.64$, $SD = 0.56$) than when participants won money ($M = 2.44$, $SD = 0.48$), $F(1, 44) = 11.23$, $p = .002$, $\eta_p^2 = .20$. The analysis also revealed a main effect of stake—participants were more likely to believe that the confederate controlled outcomes when participants had money at stake than when participants did not have money at stake, $F(1, 44) = 4.90$, $p = .03$, $\eta_p^2 = .10$. Post hoc tests (Fisher's LSD) confirmed that attributions were different for rounds when the amount at stake was \$0 than for rounds when the amount at stake was greater than \$0 (all $ps < .02$); linear contrast, $F(1, 41) = 8.34$, $p = .006$, $\eta_p^2 = .17$ (see Table 1).

These two main effects are best explained by an Outcome × Stake interaction, $F(4, 176) = 3.46$, $p = .009$, $\eta_p^2 = .07$. As illustrated by Figure 3, participants were equally likely to allocate responsibility to the confederate for their small losses and their small wins, but they were more likely to allocate responsibility to the confederate for their large losses than their large wins.

Unsurprisingly, a main effect of probability revealed that participants were more likely to allocate responsibility to the confederate for unlikely outcomes than for likely outcomes, $F(1, 44) = 18.89$, $p < .001$, $\eta_p^2 = .30$; linear contrast, $F(1, 44) = 28.48$, $p < .001$, $\eta_p^2 = .39$ (see Table 1). No other significant effects were found.

Monetary estimates. Although participants lost as much money as they won in the 40 rounds of the game, participants reported retaining a significantly smaller sum than the \$5 they were given before the first round ($M = \$2.89$, $SD = 2.72$), $t(44) =$

[1] During the debriefing, when participants were asked how they determined when the confederate controlled the wheel, 5 reported that they did not believe that the confederate controlled any spins of the wheel. One additional participant reported believing that the confederate was assisting the experimenter.

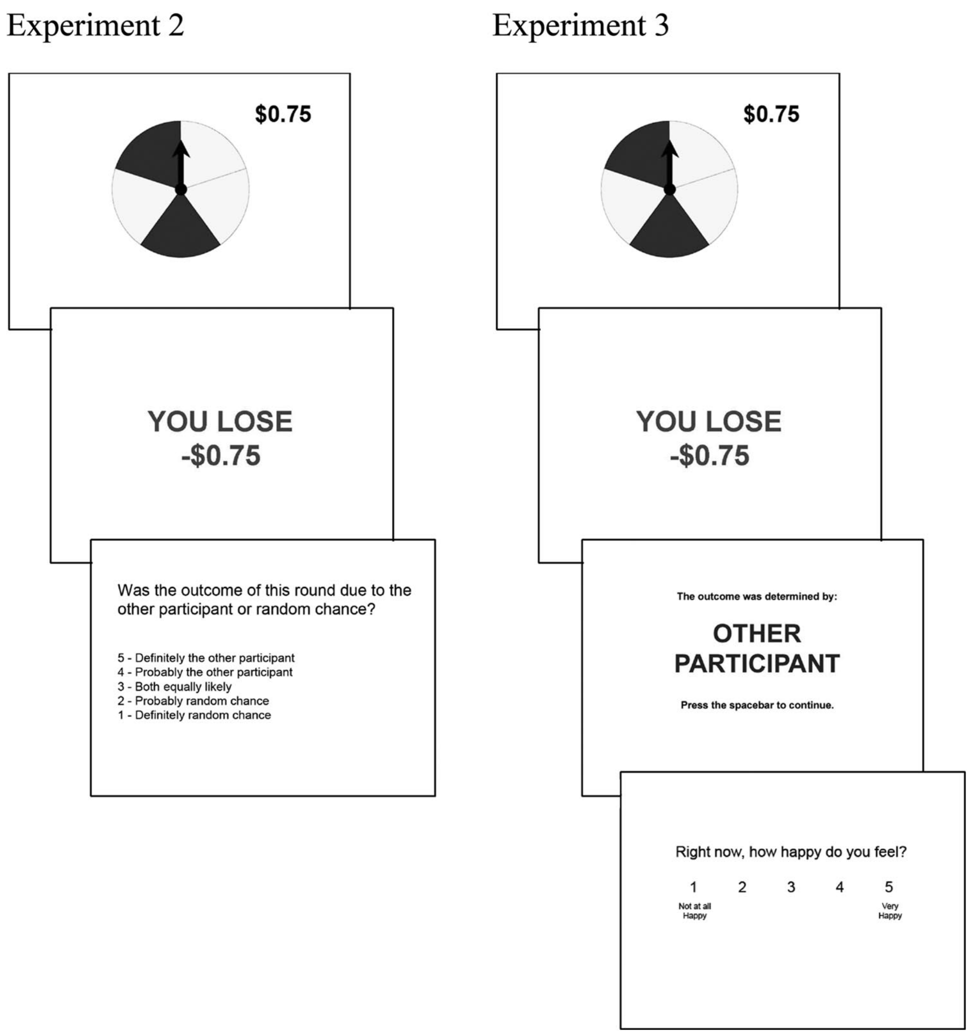

Figure 2. Examples of trials in Experiments 2 and 3.

5.20, $p < .001$, $r = .62$. Apparently, their losses were more memorable than their wins.

Discussion

These results suggest that independent of subjective probability, people exhibit a negative agency bias in attributions of external agency. Most important, participants were more likely to believe that an impartial confederate was responsible for their monetary losses than their monetary gains. As there was no interaction between outcome valence and probability, negative agency bias appears to occur independently of perceived event probability. Furthermore, it appears that participants in Experiment 2 did not simply use the norm of self-interest (Miller, 1997) to infer the confederate's behavior. As illustrated by Figure 3, participants thought confederates were equally responsible whether participants won smaller or larger amounts of money, whereas participants thought confederates were more responsible when participants lost larger amounts of money than when they lost smaller amounts. If participants believed that their fortune was inversely related to the fortune of the confederate, participants should have been more likely to attribute their large wins to chance than their small wins, as when participants received large wins the confederate would have received equally large losses.

Experiment 3

The results of the previous experiments suggest that people are more likely to explicitly attribute negative events to external agents than events that are similarly positive or neutral. In Experiment 3, I examined whether negative outcomes are spontaneously attributed to external agents by measuring the length of time participants spent processing information that attributed positive and negative outcomes to external agents and to chance. Just as infants and adults look longer at events that contradict their intuition (e.g., Baillargeon, Spelke, & Wasserman, 1985; Risen & Gilovich, 2008), it was predicted that the amount of time participants spent processing this information would demonstrate a negative agency bias. In other words, participants should spend more time processing information attributing their wins than losses to an external agent because the former information should contradict their spontaneous causal attributions.

Table 1
Attributions of Responsibility to an Impartial Confederate by Outcome Valence, Outcome Probability, and Outcome Severity in Experiment 2

	Outcome probability				
Outcome	80%	60%	40%	20%	*M*
Wins					
$0.00	2.27 (1.12)	2.11 (0.83)	2.47 (1.06)	2.31 (1.16)	2.29 (0.69)
$0.25	2.27 (0.94)	2.27 (0.94)	2.60 (0.99)	3.16 (1.30)	2.57 (0.60)
$0.50	1.96 (0.80)	2.29 (0.73)	2.58 (0.89)	2.91 (1.26)	2.43 (0.58)
$0.75	2.18 (0.89)	2.13 (0.73)	2.64 (1.13)	2.89 (1.15)	2.46 (0.60)
$1.00	1.96 (0.88)	2.18 (0.89)	2.73 (1.03)	2.80 (1.16)	2.42 (0.62)
M	2.12 (0.57)	2.20 (0.49)	2.60 (0.69)	2.81 (0.87)	2.43 (0.48)
Losses					
$0.00	2.09 (0.87)	2.27 (1.05)	2.58 (1.10)	2.64 (1.19)	2.39 (0.71)
$0.25	2.18 (0.78)	2.53 (1.04)	2.62 (1.05)	2.87 (1.34)	2.55 (0.63)
$0.50	2.40 (0.94)	2.38 (0.89)	2.73 (1.05)	3.20 (1.31)	2.68 (0.63)
$0.75	2.56 (1.08)	2.60 (1.01)	2.69 (1.08)	3.33 (1.22)	2.79 (0.74)
$1.00	2.44 (1.14)	2.56 (0.99)	3.02 (1.36)	3.07 (1.16)	2.77 (0.77)
M	2.33 (0.66)	2.47 (0.66)	2.73 (0.79)	3.02 (0.90)	2.64 (0.56)

Note. Standard deviations appear in parentheses. Probability figures refer to the probability of winning (top half) or losing (bottom half) in that trial. Scales marked with endpoints, ranging from 1 (*definitely random chance*) to 5 (*definitely the other participant*).

Method

Participants. Fifty-three residents of Cambridge, Massachusetts (31 women, $M_{\text{age}} = 24.5$, $SD = 10.8$) received $15 for participating in the experiment (a $10 show-up fee and an additional $5 that was wagered on gambles).

Procedure. An experimenter briefly introduced participants to their partner (another participant or a confederate) and then escorted them to separate rooms so that they could not see or hear each other. Participants were informed that the experiment was designed to assess how people feel about winning and losing different amounts of money. Participants were informed that they would win and lose money according to the outcomes of 48 rounds of a game of chance that was similar to the game described in Experiment 2 (see Figure 2, right panel), and they received $5 to use in the game. The game differed slightly from the game described in the previous experiment: Participants were told that their partner could control half of the outcomes (i.e., 24 rounds), and there were three amounts that participants could win or lose on each round (i.e., 25¢, 50¢, or 75¢). Each participant received each outcome at four levels of probability (20%, 40%, 60%, and 80%), in one of eight random orders.

On each round, participants first saw the arrow spin on the color wheel until it landed on a slice of the color wheel, with the money at stake displayed in the upper right corner. Then participants were informed how much they won or lost. Next, text appeared on the monitor that informed participants whether the outcome was caused by their partner or by a random number generator. The amount of time participants looked at this information before pressing the spacebar to continue to the next question served as the critical dependent measure (see Figure 2). Finally, participants reported how happy they felt on a 5-point scale ranging from 1 (*not at all happy*) to 5 (*very happy*). This was included to divert their attention away from the dependent measure. As in Experiment 2, participants estimated the amount of money they won upon the conclusion of the experiment.

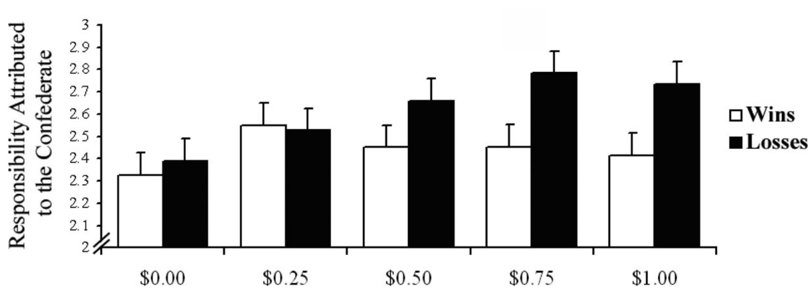

Figure 3. Participants were more likely to attribute large monetary losses than gains (wins) to the influence of an impartial confederate, but they were equally likely to attribute small monetary losses and gains (wins) to the influence of an impartial confederate (Experiment 2). Bars reflect +1 *SE*.

Table 2
Milliseconds Spent Looking at Attributions of Wins and Losses to Another Participant or Chance in Experiment 3

Cause	Wins (*SD*)	Losses (*SD*)
Other participant	1426_a (545)	1334_b (520)
Chance	1271_b (495)	1333_b (528)

Note. Means that do not share a common subscript differ significantly at the $p < .05$ level when compared with a paired-sample t test. (Untransformed reaction times are presented for the purpose of clarity.)

Results

Agent perception. A square-root transformation was applied to reading time to correct for skewness. The predicted Cause × Outcome interaction was tested and reported by collapsing across outcome stake and outcome probability for the purpose of clarity.

When looking time was analyzed with a 2 (cause: other participant, chance) × 2 (outcome: win, loss) repeated measures ANOVA, the analysis revealed a main effect of cause, $F(1, 52) = 10.21$, $p = .002$, $\eta_p^2 = .16$; no significant effect of outcome, $F(1, 52) = 1.24$, $p = .27$; and the predicted Cause × Outcome interaction, $F(1, 52) = 4.52$, $p = .04$, $\eta_p^2 = .08$. Participants looked longer at information when it revealed that the other participant was responsible for their wins than for their losses, $t(52) = 2.62$, $p = .01$, $r = .34$, but participants looked equally long at information, suggesting that chance was responsible for their wins and losses ($t < 1$; see Table 2). (The full factorial analysis and a comparison between the results of that analysis and the results of Experiment 2 can be found in this footnote).[2]

Monetary estimates. Although participants lost as much money as they won in the game, participants again reported that they retainined a significantly smaller sum than the \$5 they were given before the first round ($M = \$3.58$, $SD = 3.85$), $t(52) = 2.79$, $p = .009$, $r = .35$.

Discussion

Participants spent more time processing information suggesting that another person was responsible for their financial gains than for their financial losses, whereas participants spent an equal amount of time processing information suggesting that their financial gains and losses were random. These findings suggest that people are more likely to spontaneously assume that external agents are responsible for negative events than for positive events that occur randomly. Furthermore, the results suggest that negative agency bias appears largely due to what perceivers infer about the behavior of external agents rather than optimistically biased inferences about chance events—that agents are more likely to cause negative events rather than that good events are more likely to occur at random.

General Discussion

The findings of the present research demonstrate negativity bias in the attribution of external agency. Across three experiments, negative outcomes more often led perceivers to infer the presence and influence of external agents than did positive and neutral outcomes. In ultimatum games, dividers who offered participants unfavorable splits were more likely to be identified as humans than as computers, whereas dividers who offered participants favorable splits were more likely to be identified as computers than as humans. This bias occurred whether human dividers received some or none of the money they split with the participants.

Attributions of losses and gains in Experiments 2 and 3 suggest that negativity bias in the attribution of external agency is not due to differences in the subjective probability of positive and negative events. In Experiment 2, participants were more likely to infer that outcomes were due to the intentions of impartial confederates when outcomes were negative (losses) than when outcomes were positive (wins). This effect was exacerbated by the magnitude of negative outcomes, whereas the magnitude of positive outcomes did not affect participants' attributions. The findings of Experiment 3 suggest that people are more likely to spontaneously attribute negative outcomes to external agents than positive outcomes, whereas people are equally likely to spontaneously attribute positive and negative outcomes to chance.

[2] Reading time was submitted to the full 2 (cause: other participant, chance) × 2 (outcome: win, loss) × 3 (stake: 25¢, 50¢, 75¢) × 4 (probability: 20%, 40%, 60%, 80%) repeated measures ANOVA. In Experiment 2, an Outcome × Stake interaction found that participants were more likely to attribute large losses to the confederate than small losses but were no more likely to attribute large gains to the confederate than small gains. The corresponding test in Experiment 3, an Outcome × Stake × Cause interaction, was significant, $F(2, 104) = 13.61$, $p = .001$, $\eta_p^2 = .21$. In line with the previous findings, the pattern of means suggest that participants appeared to look longer at causal information attributing a win to their partner than to chance at all stakes. In contrast to the previous findings, participants looked longer at the lowest stake losses that were attributed to chance than to their partner and longer at higher stakes losses that were attributed to their partner than to chance. It is unclear why this pattern among losses did not replicate. Perhaps the different stakes used or the number of outcomes under the partner's control made participants surprised that the partner would attempt to control a round with a small stake.

The analysis also found significant interactions that were not predicted or found in Experiment 2 that are likely to be due to the different payoff structures, differences between spontaneous and deliberate attributions, and the different number of outcomes that were presumably controlled by the partner. For the purposes of clarity and space, I have attempted to interpret the means in a concise manner by only reporting the results of significant tests that were appropriately conservative tests (e.g., if sphericity was violated). A document containing the full analysis and means is available upon request from the author.

The analysis yielded: An Outcome × Probability interaction, $F(3, 156) = 8.20$, $p < .001$, $\eta_p^2 = .14$, whereby participants looked shorter at high probability (.8) losses than wins but looked equally long at losses and wins at other levels of probability; a Cause × Probability interaction, $F(3, 156) = 27.26$, $p < .001$, $\eta_p^2 = .34$, whereby participants looked longer when their partner caused improbable than probable outcomes but looked no longer when improbable or probable outcomes were random; a Cause × Stake interaction, $F(2, 104) = 7.96$, $p < .01$, $\eta_p^2 = .13$, whereby participants appeared to look equally long at outcomes attributed to partners at all levels of stake but looked shorter at random higher stake losses than random lower stake losses; a Cause × Stake × Probability interaction, $F(6, 312) = 11.79$, $p < .01$, $\eta_p^2 = .19$, whereby participants looked longer at improbable outcomes attributed to their partner than probable outcomes, but there was no clear pattern of responses for random outcomes. And participants exhibited an Outcome × Stake × Probability interaction, $F(6, 312) = 10.46$, $p < .01$, $\eta_p^2 = .17$, whereby participants looked longer at lower probability losses than higher probability losses but looked no longer at lower or higher probability wins, with no clear pattern differentiating lower and higher stake outcomes.

It is important to note that the negative agency bias demonstrated across the three experiments cannot simply be explained by an assumption that the partners were behaving self-interestedly or were motivated by envy or schadenfreude. Dividers gained nothing in the games they played with participants in Experiment 1B and thus benefited equally from all three divisions, so participants had no reason to assume they chose divisions according to their self-interest. In Experiments 2 and 3, participant and partner outcomes were ostensibly independent, so partners were just as likely to share the same reward structure with participants as have a reward structure that was inversely related to that of the participants. Moreover, the attributions made by participants in Experiment 2 suggest that they did not perceive their payments to be inversely related to their partners. If their reward structures were inversely related, then participants should have been more likely to attribute their larger wins to chance than their small wins, as their larger wins would have implied that their partner would have received an equally large (undesired) loss.

Other forms of misanthropy such as envy and schadenfreude may sometimes contribute to negative agency bias but cannot entirely account for the results of the experiments presented here. Perhaps an assumption of envy could explain the attributions made by participants in Experiment 1B. Participants may have assumed that human dividers offered them the worst of all possible splits because they could not profit from any of the splits they chose. Envy and schadenfreude cannot explain the attributions made by participants in Experiments 2 and 3 because neither they nor their partners knew whether the other person gained or lost money on any trial. Furthermore, the partners had greater power over outcomes, so they had no reason to envy the participants (Parrott & Smith, 1993). Finally, there was no reason for participants to assume their partners made choices to experience pleasure by watching them suffer. To experience such schadenfreude, their partners would have to have been able to watch participants lose, and partners and the participants would have to have been in direct competition. Schadenfreude should not occur when outcomes are unknown and independent, as they were in Experiments 2 and 3 (Heider, 1958; Takahashi et al., 2009).

Although a negative agency bias did nothing to improve the quality of judgments in the experiments presented here, there may be motivational and evolutionary advantages to committing such a Type I error. As suggested earlier in the introduction, people are motivated to think well of themselves and defer responsibility for negative events to causes other than themselves (Taylor & Brown, 1988). Given the general tendency to attribute events to an intentional first cause (Rosset, 2008; Saxe et al., 2005; Vinokur & Ajzen, 1982), they may be motivated to attribute negative events to agents other than themselves, which could lead to negative agency bias. People may also be motivated to attribute negative events to other agents rather than to chance to minimize their emotional impact. Events evoke spontaneous explanation (Lombrozo, 2006), and the uncertainty that accompanies unexplained events amplifies their emotional impact (Bar-Anan, Wilson, & Gilbert, 2009). Attributing an event to the intentions of an external agent provides perceivers with a satisfactory explanation (Jones & Davis, 1965). As people are motivated to amplify the impact of positive experiences and diminish the impact of negative experiences (Taylor, 1991), they should be more motivated to attribute negative than positive events to the intentions of external agents.

From an expected utility standpoint, the best strategy may be to assume that negative outcomes were caused by external agents. Intentional bads are more painful than accidental bads (Gray & Wegner, 2008), and they are more likely to be repeated if proactive measures are not taken (Axelrod & Hamilton, 1981). Within a single context, harm caused by an antagonist (e.g., being cheated by a casino) may be more likely to be repeated than a harm that was accidental (e.g., losing a gamble by chance). Antagonists may also harm a person in multiple contexts, whereas accidental threats and dangers are likely to be specific to a single place or situation. By assuming the presence of an antagonist, one may be better able to avoid a quick repetition of the unpleasant event one has just experienced. Repeated goods, whether intentional or accidental, do not immediately threaten one's survival and are less likely to require one's immediate attention. It may thus be rational and advantageous to more often spontaneously attribute negative than positive events to the intentions of external agents, even if that inference is often wrong (Haselton & Buss, 2000).

It is not entirely clear whether a negative agency bias is rational inference, however, as there may be steep costs to assuming that others intended to produce the negative events that one experiences. Participants in Experiment 1B exhibited markedly false assumptions about human behavior. Had they the opportunity to contact the humans who they believed were responsible for their divisions, their acrimonious assumptions may have poisoned any interpersonal interactions they had with (what would have apparently been well-intentioned) dividers.

Future research may find that negative agency bias contributes to pathological thinking, superstition, and misanthropy. There is a persecutory subtype of delusional disorder (i.e., paranoid personality disorder), for example, which is accompanied by self-persecutory delusions that lead people to believe other agents have or are planning to intentionally cause them harm. Perhaps negative agency bias is a milder and more common form of such disordered thinking. People sometimes do attribute extremely unusual positive events to the work of external agents (D. T. Gilbert et al., 2000), as in the case of attributing miracles to God, but there is no delusional disorder that leads people to believe that external agents have or are conspiring to bestow them with pleasures or successes that are anticipated (American Psychiatric Association, 2000). As in the case of self-serving attributions for success, however, some people do make delusional attributions for their real and unreal successes to themselves (i.e., megalomaniacs).

Widely held superstitious beliefs more often attribute negative than positive events to the work of external agents. Bostonians have long attributed the Boston Red Sox's 86-year losing streak and the Yankees' good fortune to "The Curse of the Bambino," a curse put on the team when it traded Babe Ruth to the Yankees in 1918 so that the owner could finance a Broadway musical (Shaughnessy, 2000). In contrast, the more recent successes of the Red Sox have been attributed to the skill of the team (Damon & Golenbock, 2005; Triumph Books & Boston Globe, 2007). Less industrialized cultures attribute the failure of crops and sickness on the work of external agents such as witches (Boyer, 2001). Folklore and mythology is replete with negative gods, demons, and supernatural creatures. Benevolent agents such as fairy godmothers, angels, and purely benevolent gods are less frequently mentioned (Campbell, 1949; Hume, 1757/1956).

Imaginary and unseen external agents are not alone. People exhibit a tendency to attribute their misfortune to more common external agents as well. Politicians have attributed the misfortune of their country to ethnic minorities (e.g., M. Gilbert, 1987). People are more likely to consider other people to be responsible for the side effects of their behaviors if those side effects are negative than if they are positive (Knobe, 2003, 2005; Leslie, Knobe, & Cohen, 2006). Fans are likely to see the infractions of rival teams as evidence of unsportsmanlike behavior (Hastorf & Cantril, 1954). And perceivers believe that others are more likely to cheat and act according to their self-interest than they would in the same situation (Miller, 1997; Miller, Visser, & Staub, 2005). In short, psychopathology, superstition, and common inferences about others' behavior suggest that people are more likely to believe that external agents are responsible for bad than for good. If a negativity agency bias plays some role in these forms of psychopathology, superstition, and misanthropic perceptions, then it is questionable whether the benefits it may confer outweigh its cost to the perceiver and to society.

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Appendix

Ultimatum Game Instructions in Experiment 1B

"In this study, you'll play six ultimatum games with three different opponents currently on our server—computer programs and people playing at other computers located in William James Hall and at Harvard Business School.

In an ultimatum game, one player, the divider, gets to split a pot of money between self and the other player, the receiver. If the receiver accepts the split, both get to keep the amounts stipulated by the divider for that round. If the receiver rejects the split, neither gets to keep any of the money from that round. You will play six ultimatum games, each for $3. With each opponent, you'll get to be the divider once and the receiver once. You are guaranteed to keep any money that you earn.

In today's experiment, your human opponents will earn money in games played with the other participants, but they will not be paid in the games they play with you.

When you are ready to begin, please click CONTINUE at the bottom right corner of the screen."

Received March 16, 2009
Revision received May 18, 2009
Accepted May 19, 2009 ■