

# Everyday Magical Powers: The Role of Apparent Mental Causation in the Overestimation of Personal Influence

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These studies examined whether having thoughts related to an event before it occurs leads people to infer that they caused the event—even when such causation might otherwise seem magical. In Study 1, people perceived that they had harmed another person via a voodoo hex. These perceptions were more likely among those who had first been induced to harbor evil thoughts about their victim. In Study 2, spectators of a peer's basketball-shooting performance were more likely to perceive that they had influenced his success if they had first generated positive visualizations consistent with that success. Observers privy to those spectators' visualizations made similar attributions about the spectators' influence. Finally, additional studies suggested that these results occur even when the thought-about outcome is viewed as unwanted by the thinker and even in field settings where the relevant outcome is occurring as part of a live athletic competition.

*Keywords:* magical beliefs, causal inference, self-perception, apparent mental causation, conscious will

Most of us make our way through life without any magical powers. Unlike Harry Potter, Superman, or other characters in fantasy, we find we can barely get the lid off the peanut butter jar, let alone levitate a villain or produce a banquet at the wave of a wand. There are some circumstances, though, in which we do find ourselves doing rather remarkable things. Every so often, we may learn that someone we have wished ill actually has *become* ill, for instance, or that the sports team for which we are cheering has in fact gone and won the game. When such things happen, although we are far from causal, we may nonetheless experience a sense of authorship—a feeling that we caused the events we had imagined. This feeling need not be particularly magical, however, as it may arise from the normal processes by which we infer the operation of our own causal influence in the world. The present experiments were designed to examine whether and when such experiences of everyday magical powers might arise.

## Magical Thinking in Everyday Life

Belief in the ability to influence events at a distance with no known physical explanation has been termed *magical thinking* (e.g., Eckblad & Chapman, 1983; Nemeroff & Rozin, 2000; Woolley, 1997; Zusne & Jones, 1989). Perhaps because this definition focuses on striking departures from normative reasoning, many of us would probably deny believing in magic. But many would not be surprised to learn that magical thinking has been found among people living in tribal cultures (e.g., Golden, 1977), people experiencing psychosis from schizophrenia or bipolar disorder (e.g., Thalbourne & French, 1995), and young children who have yet to learn the principles of science (Piaget, 1929; Woolley, 1997). What people probably would be surprised to learn is that glimmers of magical thinking appear even in ordinary people and circumstances when events conspire to promote it.

Research has shown several manifestations of everyday magical thinking. Studies by Rozin and colleagues have shown, for example, that people hold magical beliefs about contagion and contamination that can lead them to decline consuming a glass of juice that once had a sterilized roach in it or to decline sipping sugar water arbitrarily labeled “Sodium Cyanide” (Rozin, Millman, & Nemeroff, 1986; see Nemeroff & Rozin, 2000, for a review). Subbotsky (2004) has found that people sometimes behave as though they fear the operation of magical forms of causation. For example, people are reluctant to put their hand in a box when the suggestion is made that the box could cause harm to their hand, albeit through no known physical mechanism. Finally, superstition and magical thinking are observed in circumstances involving stressful and uncertain events. For example, college athletes show superstitious behaviors in sports competitions (Bleak & Frederick,

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1998; Ciborowski, 1997), and inhabitants of war zones report magical beliefs about their personal safety (Keinan, 1994).

Research on magical thinking has offered a number of theoretical explanations for why it is that magical thinking is found among individuals who are well versed in concepts of physical science. One set of explanations, building on primitive laws of contagion and similarity (Frazer, 1890/1959; Mauss, 1902/1972), suggests that people act as though they believe in those laws. An implicit belief in these laws leads people to behave, in spite of a rational analysis to the contrary, as though physical contact between objects leads to the transfer of "essence" between the objects and as though the transfer of such essence creates a connection between the two entities, thus, for example, making us unwilling to wear a washed garment once worn by a Nazi (Rozin et al., 1986; Rozin & Nemeroff, 2002).

But why might people act as though they subscribe to magical beliefs, such as beliefs in the laws of contagion and similarity, even though these beliefs defy rational, scientific analysis? Developmental psychologists (e.g., Piaget, 1929; Subbotsky, 2000, 2004; Woolley, 1997; also Freud, 1913/1950) have suggested that magical thinking could be a holdover from infancy when scientific conceptions of causality are less well understood (and less culturally ingrained). Consistent with the idea that reliance on scientific explanations rather than magical ones increases with psychological development, adults often refuse to verbally endorse magical beliefs even though, like young children, they may behave as though they hold those beliefs (Nemeroff & Rozin, 2000; Subbotsky, 2004).

Magical beliefs could also be the result of common cognitive errors involving the use of mental shortcuts, or heuristics (e.g., Gilovich, Griffin, & Kahneman, 2002; Kahneman, Slovic, & Tversky, 1982). One such heuristic involves the inference that the conceptual similarity of two events implies that one caused the other. This heuristic, known as the representativeness heuristic (Kahneman & Tversky, 1973), the resemblance criterion (Nisbett & Ross, 1980), or the assumption that likeness implies likelihood (Shweder, 1977) can lead to magical beliefs (e.g., "the sun is yellow and the sky is blue, so together they make the grass green"). It can also lead to rational inferences (e.g., "the paint can is green and the wet puddle on the floor is green, so the puddle must be from the paint"). This account of magical thinking thus allows for the same cognitive processes to govern both magical beliefs and commonplace causality assessments.

Coming from a more motivational perspective, another explanation for magical thinking suggests that it occurs, particularly in times of uncertainty or stress, to serve a motivational need for control. Support for this explanation comes from studies showing that people display signs of magical thinking when they are faced with a combination of uncertainty about an outcome and a desire for control over that outcome (e.g., Bleak & Frederick, 1998; Friedland, Keinan, & Regev, 1992; Keinan, 1994, 2002; Matute, 1994). For example, magical thinking has been documented among people such as inhabitants of Germany in the interwar period living in an environment of high unemployment and political instability (Padgett & Jorgensen, 1982), police officers with jobs that put them in dangerous situations (Corrigan, Pattison, & Lester, 1980), HIV-infected men lacking desired agency over their health (S. E. Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000), and even lottery players who possess "illusions of control"

regarding their ability to influence chance gambles (Langer, 1975). Even when people recognize that control over life events may be impossible to achieve, magical beliefs may arise out of a motivation to find "meaning" in that which they cannot control (Pepitone & Saffiotti, 1997).

### Perceptions of Magical Powers

The foregoing review of research on magical thinking provides evidence for some forms of magical thinking and also for how and why such thinking might arise. In so doing, it also sheds light on our present concerns about how people might come to believe in their own magical powers. Previous research on magical thinking has suggested that people may act as though they believe they possess magical powers even when they might rationally deny that belief. It further has suggested that belief in magical powers could be traceable to basic cognitive errors involving the perception of causal relationships when only noncausal associations are present. It also has suggested a more motivational explanation for magical perceptions of control, involving a need to perceive oneself as able to attain desired outcomes in uncontrollable situations. With this prior theorizing in mind, we now explore in more detail a theory for how everyday magical powers could emerge.

The belief that one has exercised magical powers necessarily involves erroneous perceptions of one's own actions. Because human action often originates from mental processes and contextual cues that are beyond conscious awareness (Nisbett & Wilson, 1977; Wegner & Bargh, 1998), people's perceptions of the origin of their own actions are frequently subject to error (Nisbett & Ross, 1980; Nisbett & Wilson, 1977). Rather than pleading ignorance regarding the causes of their actions, however, people may infer that they have personally caused or willed an action whenever they draw a causal inference linking themselves to the action (Wegner, 2002, 2003; Wegner & Wheatley, 1999).

Consider the experience of thinking ill of someone just before that person falls victim to an unpleasant fate. One grumbles bitterly about Grandma just before she falls and breaks a hip or expresses anger toward the greedy landlord the day before he is arrested for tax evasion. Without a shred of evidence about who caused their troubles, one may still feel implicated. Returning to our analysis of the prior literature, this sense may range from an outright belief in personal responsibility for the bad outcome to a nagging feeling of responsibility that persists despite the rational belief that one is not actually responsible. In any case, the inference involves an erroneous perception of causality: The occurrence of an "evil thought" before a conceptually related negative event induces a sense of authorship for that event. It is also worth noting that the inference does not appear to be motivated by a desire to have attained the relevant outcome; the occurrence of an unwanted outcome (such as Grandma's fall) could also elicit feelings of responsibility (and even accompanying feelings of guilt over that responsibility).

On a more positive note, consider the experience of rooting for a favorite basketball team at its home stadium. A person watching with fingers crossed, while silently reciting a mantra for the team's least reliable free-throw shooter, may feel deserving of some credit when the shot gracefully falls through the net. The point is similar to the one already stated: Generating consistent thoughts related to an event just prior to its occurrence may be sufficient to induce feelings of authorship for the event.

### Apparent Mental Causation

The hypothesis we propose is that belief in magical powers can arise when individuals infer that they have personally caused events on the basis of perceptions of the relation between their thoughts and subsequent events. No prior studies on magical thinking have examined the role of thoughts in magical perceptions of influence. The idea that relevant thoughts could elicit feelings of personal causality does relate, however, to more general theorizing about causal inference processes. Causal theorists have emphasized the role of perceived covariance and of perceived consistency in causal inference (e.g., Hume, 1739/2000; Kahneman & Tversky, 1973; Kelley, 1972; Nisbett & Ross, 1980). The theory of “apparent mental causation” (Wegner, 2002; Wegner & Wheatley, 1999) combines these theoretical principles involving inferences about causation to offer the novel suggestion that these principles also explain how one makes inferences about mental causation. Having thoughts prior to an action that are consistent with that action, and that occur in the absence of other obvious causes, can lead one to infer that he or she caused the action.

This hypothesis about perceived mental causation begins with the idea that inferences about one’s own causal power can arise in the same way as inferences about physical causation. People infer that a particular physical event has caused an effect if it appears closely prior to the effect, is consistent with the effect, and appears exclusive of alternative causes of the effect (Alloy & Tabachnik, 1984; Einhorn & Hogarth, 1986; Michotte, 1946/1963). Perceptions of personal agency could similarly arise from apparent mental effects. Although thoughts are not the only possible source of information about personal authorship of action—other sources could include proprioceptive, positional, visual, and environmental cues—the fact that people often think about actions before performing them makes prior thought a regular and important cue to authorship (Aarts, Custers, & Wegner, 2005; Wegner & Sparrow, 2004; Wegner, Sparrow, & Winerman, 2004).

Observing associations between external actions and one’s own thoughts, desires, and intentions may thus sometimes lead to the incorrect inference that one has somehow caused the actions to occur. This error in causal inference may underlie “illusions of control” (Langer, 1975; Matute, 1996; Thompson, Armstrong, & Thomas, 1998), in which people overestimate their causal impact on chance events by conceptualizing them as attributable to their own influence (although, it should be noted, no studies on the illusion of control have measured perceptions of the influence of thoughts). People may be overly prone to entertain their thoughts, desires, and intentions as possible causes of action because these mental experiences are salient to them and, perhaps consequently, overweighted in terms of their diagnostic relevance (Jones & Nisbett, 1972). People tend to show an “introspection illusion” (Pronin, Gilovich, & Ross, 2004), whereby they treat introspective information about their thoughts, intentions, and motives as a sovereign source of self-understanding. This has been shown to contribute to our concluding that we have not engaged in actions that we did not think about or intend to engage in (e.g., actions involving self-serving commissions of bias). It could also contribute to our concluding that we have engaged in actions that we did think about or intend to engage in.

Consider again the case of Grandma and her hip-breaking fall. If, prior to her fall, one was overcome by momentary but mean-

spirited thoughts about her, the present theorizing suggests that these thoughts could induce in that person a feeling of responsibility for her fall. Let’s imagine, though, that instead of grumbling about poor Grandma before her fall, one instead heard his or her cousin express irritation with her. In that case, a person might feel that Grandma’s fall was somehow the cousin’s fault, and that he should not have had such evil thoughts about Grandma. Inferences about personal agency that arise from prior and consistent mental activity may not be limited to perceptions of one’s own agency. They may typically involve ourselves as the relevant agent, though, as it is our own mental activity of which we are most likely to be aware.

### The Present Research

If people attribute authorship for action on the basis of their own thoughts, this process may explain how they come to overestimate their personal influence in a variety of happenstance events. People may come to believe in the effectiveness of occult machinations such as voodoo curses, as well as in the influence of fan support in sports, by inferring that thoughts consistent with events are responsible for the events when these events occur.

Our studies investigated these two examples. We examined the effects of individuals’ private thoughts on their perceived influence on external outcomes involving physical health symptoms (Study 1) and athletic performance (Study 2). Our first study tested whether belief in having harmed another person via a voodoo curse indeed arises when individuals are led to have prior thoughts that are consistent with the harm. Our second study tested whether belief in having helped another person via one’s spectatorship arises when people are led to have prior thoughts consistent with the help. It also explored whether an observer privy to these prior thoughts would arrive at the same belief. In Study 3, we examined whether this spectatorship effect would occur in a field setting. Study 4 was a correlational study that looked at whether these spectatorship effects would extend to people observing an outcome that they perceived as unwanted.

#### Study 1: The Witch Doctor’s Voodoo Curse

This study tested whether college students might come to believe that they had caused another person pain through a voodoo curse when they had thoughts about the person consistent with such harm. Experimental participants assumed the role of “witch doctor” in an ostensible voodoo enactment involving a confederate as their “victim.” To examine the influence of evil thoughts about the victim, we arranged for participants to encounter either a victim who was offensive or one who was neutral. After this encounter, participants were instructed to stick pins in a voodoo doll representing the victim, in the victim’s presence. The victim subsequently responded by reporting a slight headache, and participants were queried about their reactions to this symptom. This paradigm allowed for the investigation of whether participants who think ill of a “victim” are more likely than neutral-thinking participants to perceive that they caused the victim’s harm. We did not predict that our evil-thinking participants would feel more guilt, regret, and related negative affect, however, because we suspected that the victim’s ill fate would seem deserved on account of his offensive personality and behavior.

## Method

**Participants.** Thirty-six individuals (16 men and 20 women) were randomly assigned to either the neutral thoughts condition or the evil thoughts condition. Participants were Harvard summer school students or other residents of Cambridge responding to participant recruitment flyers.

**Procedure.** The experimenter greeted the participant and confederate (a 22-year-old man) in a waiting area and escorted them to the laboratory. She seated them at a table, distinguished only by a handmade twig-and-cloth voodoo doll lying on it, and asked them to read and sign a sheet indicating informed consent. She explained that the experiment concerned “psychosomatic symptoms, physical health symptoms that result from psychological factors” and that the study was “investigating this question in the context of Haitian Voodoo.” (Although genuine Haitian Voodoo does not involve dolls, they were used here to conform to participants’ expectations about voodoo practice.) For background, the experimenter furnished both individuals with an abridged version of Cannon’s (1942) “Voodoo” *Death*. This scientific account of how voodoo curses might impact physical health (i.e., by inducing fear-associated psychological stress and acute hypotensive shock on the part of the intended victim) was included to bolster the plausibility of curse effects.

It was during these initial stages of the procedure that the experimental manipulation was delivered. In the condition designed to induce evil thoughts, the confederate arrived at the experiment 10 min late, thus keeping the participant and experimenter waiting. (If the participant was late, the confederate arranged to be even later.) When the experimenter politely commented that she was really glad he made it, as she was beginning to worry, he muttered (with apparent condescension): “What’s the big deal?” He wore a T-shirt emblazoned with the phrase *Stupid people shouldn’t breed*, and he chewed gum with his mouth open. When the experimenter informed the participant and confederate that they had been given an extra copy of the consent form “to keep,” the confederate crumpled up his copy and tossed it toward the garbage can; he missed, shrugged, and left it on the floor. Finally, while he and the participant read the “Voodoo” *Death* article, he slowly rotated his pen on the tabletop, making a noise just noticeable enough to be grating. Postexperimental interviews indicated that participants in the evil thoughts condition indeed picked up on many of these annoyances and found themselves disliking the confederate. Although the confederate was, of course, aware of these adjustments in his behavior, he was otherwise uninformed about the study’s hypotheses.

After reading “Voodoo” *Death*, participant and confederate were asked to pick slips from a hat to determine who would be “witch doctor” and who would be “victim.” Both slips were labeled *witch doctor*, but the confederate pretended that his said *victim*. The confederate victim was then asked to write his name on a slip of paper to be affixed to the doll. Both victim and witch doctor then completed a page entitled “Baseline Symptom Questionnaire” that asked them to indicate whether they currently had any of 26 physical symptoms (e.g., runny nose, sore muscles, headache), with space at the bottom for written elaboration. The confederate circled “No” for every symptom and elaborated with “Fine. No problems.” To ensure that the participant knew the victim’s purported health status, the experimenter verbally confirmed that he currently had no symptoms.

At this point, the experimenter informed both individuals that “reported cases of voodoo” suggest that the witch doctor should have some time alone to “direct attention toward the victim, and away from external distractions” (before placing the curse by pricking the voodoo doll), and she escorted the victim from the room. The participant was then asked to generate vivid and concrete thoughts about the victim but not to say them aloud.

After this minute, the experimenter returned with the victim, who was again seated across from the participant. The participant was then instructed to stick the five available pins into the doll in the locations of the “5 major weaknesses of the body: the head, the heart, the stomach, the left side, and the right side.” Once he or she was finished, and the doll was thus

appropriately pierced, the victim was asked to complete a second symptom questionnaire (identical to the first, but titled “Current Symptom Questionnaire”). This time, the victim invariably circled one symptom: a headache. He elaborated at the bottom of the page: “I have a bit of a headache now.” When asked to confirm this symptom, he averred with a slightly uncomfortable facial expression and the response “Yeah.”

The experimenter then stated that she would like to take some time with the victim to question him in detail about his symptoms but that she would first quickly ask the witch doctor some questions about his or her experiences in the experiment and provide some debriefing information. Thus, with the victim escorted from the room, the participant was presented with the dependent measures.

**Dependent measures and debriefing.** The participant’s questionnaire began by stating that one needed to complete it *only if* the victim reported physical health symptoms during the experiment (otherwise, it stated that a subject number atop the page would suffice). Attached to the page were the victim’s two symptom questionnaires. Our primary measure consisted of three items probing for participants’ feelings and beliefs about whether they harmed the victim (Cronbach’s  $\alpha = .83$ ). These were “Did you feel like you caused the symptoms that the ‘victim’ reported, either directly or indirectly?” “Do you feel that your practice of voodoo affected the victim’s symptoms?” (both anchored by 1 = *not at all*, 5 = *somewhat*, 9 = *yes, definitely*) and “How much do you feel like you tried to harm the victim?” (1 = *not very much*, 5 = *somewhat*, 9 = *very much*).

A secondary set of measures assessed affective responses. Participants were asked to rate their current feelings of guilt, surprise, sadness, regret, anxiety, and happiness on scales anchored at 1 (*not at all*) and 9 (*extremely*). An additional item directly dealt with perceptions of guilt, asking participants, “Do you feel that sticking the pins in the doll was a bad thing to do?” (1 = *not at all*, 5 = *somewhat*, 9 = *yes, definitely*). As a manipulation check on whether participants had generated appropriately malevolent or neutral thoughts, two final items were included (Cronbach’s  $\alpha = .86$ ): “Did any negative thoughts about the victim pop into your head during the minute you had to yourself before the voodoo exercise?” and “Did you have any negative thoughts toward the victim before (or while) you did the pin pricks?” (both anchored by 1 = *definitely not*, 5 = *somewhat*, 9 = *definitely yes*).

To probe for accurate suspicions that might render a participant’s data invalid, the experimenter preceded the debriefing by asking, “Do you think there was anything in this experiment that was not what it seemed?” In response to this probe, 5 participants (2 in the neutral thoughts condition, and 3 in the evil thoughts condition) accurately suspected that the victim was a confederate and/or had been told to report a headache, and they were thus excluded from further analyses. Finally, the participant was thoroughly debriefed about our hypotheses and deceptions, and the reasons for both, and was given course credit or monetary payment.

## Results

**Evil thinking.** The evil thoughts condition successfully led participants to think ill of their victim. Participants in the evil thoughts condition reported more negative thoughts about the victim ( $M = 5.00$ ) than did those in the neutral thoughts condition ( $M = 2.19$ ). This difference was significant according to Welch’s analysis of variance (ANOVA),  $F(1, 30) = 13.52, p = .001, \eta^2 = .31$ . Welch’s ANOVA was used because Levene’s test indicated inequality of variances,  $F(1, 30) = 22.46, p < .0001$ .

**Perceived causality.** As predicted, the participants led to generate evil thoughts about their victim were more likely than the neutral-thinking participants to believe that they caused his headache. On our three-item measure of feelings and beliefs about causing harm to the victim, participants felt more responsible for the harm if they had first generated evil thoughts ( $M = 3.94$ ) rather

than neutral thoughts ( $M = 2.02$ ),  $F(1, 30) = 5.29$ ,  $p = .03$ ,  $\eta^2 = .20$ . These feelings of responsibility were apparent on each of the individual items in the composite, indicating that evil-thinking participants were more likely to feel that they had tried to harm their victim and also that they had in fact caused such harm ( $F$ s ranged from 3.58 to 6.17,  $p$ -values ranged from .02 to .07). The presence of evil thoughts was related to perceptions of causing the harm across all participants, as the correlation between the summed manipulation check items and the summed measures of causation was substantial,  $r(29) = .38$ ,  $p = .03$ .

*Supplemental (affective) responses.* Participants' affective reactions revealed no signs of guilt or negative affect, despite their sense of having harmed their victim. Factor analysis (with varimax rotation) of the affective responses revealed two factors, one involving guilt (i.e., guilt, sadness, regret, anxiety), and the other involving pleasant surprise (i.e., happiness, surprise). Participants prompted to think evil thoughts reported no more guilt than those prompted to think more neutrally ( $F < 1$ ). Rather, they reported more pleasant surprise,  $F(1, 29) = 6.16$ ,  $p = .02$ ,  $\eta^2 = .18$ . In addition, the item asking whether participants felt that they had done a "bad thing" revealed no differences between the two thoughts conditions ( $F < 1$ ). Perhaps participants saw the victim's headache as a just reward for his unpleasant behavior, and so they were not upset at having caused him pain.

#### *Follow-Up Study of Instructed Thoughts*

Two aspects of these findings prompted us to conduct a follow-up experiment in this paradigm. First, we were concerned that the manipulation of negative thoughts, although effective as assessed by the manipulation checks, could also have been a manipulation of negative affect. It might have been that the negative feelings toward the victim engendered by his untoward behavior were the active ingredient that enhanced participants' feelings of causality in harming him, and we were curious whether enhanced causality would be found if participants' evil thoughts were manipulated without such an affective instigation. Second, we suspected that if participants did not actually dislike the victim, and yet felt that they had caused the victim harm, they might express the guilt for their action that was not observed in this study.

The follow-up study set aside the manipulation of the victim's behaviors as a way of inducing evil thoughts, and instead manipulated evil thoughts directly through verbal instructions. Participants (61 Harvard undergraduates) were randomly assigned to direct their attention toward a female victim either by thinking about her "worst possible fate" and reciting an evil chant about her (in the condition designed to induce evil thoughts) or by thinking about "what she may be like" and reciting a benign verse about her (in the condition designed to induce neutral thoughts). As in Study 1, they then stuck pins in a doll representing the victim, and she responded with "a headache." Participants completed the same measures of their feelings of responsibility and/or causality and of their affective state in response to the victim's reported symptom. Again, some participants were excluded from analyses because they were accurately suspicious ( $n = 9$ ). Others were excluded because they failed to respond to the instructional manipulation—that is, they reported no negative thoughts in the evil-thoughts

condition or highly negative thoughts in the neutral-thoughts condition ( $n = 8$ ).

The results of the follow-up revealed that participants who followed instructions to have evil thoughts about a victim, as compared with those who followed instructions to have neutral thoughts, felt more responsibility for her pain on our index of three items probing for feelings and beliefs about having caused harm to the victim ( $M$ s = 3.94 vs. 2.76),  $F(1, 42) = 5.14$ ,  $p = .03$ ,  $\eta^2 = .11$ . In addition, however, our affective measures indicated that the malevolent-thinking participants felt no more happiness and surprise than the neutral-thinking participants ( $M$ s = 3.89 vs. 3.45),  $F < 1$ , whereas they did feel more guilt and negative affect than those participants ( $M$ s = 4.60 vs. 3.24),  $F(1, 42) = 4.05$ ,  $p = .05$ ,  $\eta^2 = .09$ . Although the influence of the instructional manipulation in the follow-up study was not as strong on the cognitive measure as was the behavioral manipulation in the main experiment, participants apparently felt more guilt and negative affect about what they did in the case of the instructional study, perhaps because their evil thoughts about the victim were unjustified by any untoward behavior on her part.

#### *Discussion*

This study found that participants who had been induced to think ill of their victim were likely to feel that they had caused the victim's symptoms and that their practice of voodoo had affected these symptoms. Those in a control condition that did not elicit ill thoughts were less likely to hold these beliefs. This difference between the two conditions is striking given that participants in both of the conditions observed the same correlation between their actions and the victim's symptoms. Given the population of students sampled for our study, though, it is not at all surprising that this mere correlation was not sufficient to induce a large proportion of them to believe that they had just placed a voodoo hex (even given their reading of Walter Cannon's article). What is surprising, however, is that they were more inclined to believe in the effectiveness of voodoo when their practice of it was accompanied by ill will.

In both conditions, participants placed a voodoo hex on their victim by sticking pins in a voodoo doll affixed with the victim's name, and they observed the victim report a headache shortly thereafter. However, although participants in both conditions engaged in the same voodoo activities, those in the evil-thoughts condition felt somewhat more that they had tried to harm their victim. Perhaps their prior evil thoughts toward the rude and unpleasant confederate led them to feel more zealous about the voodoo task at hand. This could also explain why these participants experienced more pleasant surprise following the voodoo enactment. They may have viewed his suffering as a just punishment for his bad behavior.

This experiment involved causal inferences elicited by the awareness of one's malevolent thoughts toward someone before harm befalls this person. But is this result limited to causal perceptions deriving from negative thoughts? Perhaps the perception that one has personally influenced a relevant outcome could also derive from positive thoughts, such as "healing thoughts" directed toward an ailing loved one or "hopeful thoughts" directed toward a friend in need. Perhaps the sports spectator's inner cheer operates

in the same way, leading the spectator to feel a bit of everyday magical power when the game goes as hoped.

### Study 2: The Spectator's Inner Cheer

The inspiration for this experiment came from sporting-event spectators who perceive themselves as playing a role in their team's performance even when their own participation involves nothing more than intense thoughts of hope or confidence, or perhaps a little armchair coaching. We sought to test the hypothesis that success thoughts directed toward a target (a basketball shooter) before his successful performance would lead to the perception of having influenced that performance. This experiment included a set of observer conditions designed to test whether observers, aware of actor participants' thoughts, would arrive at the same causal conclusions as those actors. Some hints from prior research led us to suspect that they might. Specifically, this work has suggested that when observers are privy to the same internal information (such as thoughts, feelings, and intentions) as actors, they may come to the same conclusions as those actors (Buehler, Griffin, & Ross, 1994; Nisbett & Ross, 1980, Chapter 9).

This experiment used a mock basketball court with a confederate shooter trained to make successful shots and pairs of participants watching the confederate take those shots. "Spectator" participants were instructed to produce thoughts (i.e., mental visualizations) that were either consistent or inconsistent with the shooter's success, and "witness" participants were provided with access to these thought instructions. The main prediction of the study was that participants who had consistent thoughts before a series of successful shots would feel more responsibility for the success of those shots than would participants who had inconsistent thoughts before the shots. The study also tested whether a witness who had access to the spectator's visualization instructions would similarly view the spectator as responsible for the shooter's success.

### Method

*Participants.* One-hundred two high school and college students (29 men and 73 women, all age 18 years or older) attending Harvard summer school received course credit or monetary payment for their participation.

*Experimental setup.* To ensure consistent success in the shooter's performance, the role of the shooter was played by a confederate (a male undergraduate). His task involved shooting a toy basketball (10 cm in diameter) while blindfolded into a 20-cm-diameter basket that was 1.37 m away and 1.52 m high. The blindfold was used to increase the apparent difficulty of the task (so that our participants would not perceive the shooter's success as inevitable). It was actually semitransparent, thereby allowing the confederate to shoot quite successfully.

*Procedure.* The experimenter greeted the participants and confederate and told them that the experiment was about "the effects of spectator influence on athletic performance." The participants and confederate were then asked to provide written informed consent, and the experiment began. The experimenter explained that the study required a shooter, a spectator, and a witness. She then stated that each of these roles would be randomly assigned using the last four digits of the participants' social security numbers so that the participant with the lowest number would be shooter, the next-lowest spectator, and the highest witness. The 2 participants were randomly assigned to their roles via this method, with the exception that the confederate always secured the role of shooter (by offering his number last so that he could offer the lowest number of the three).

The experimenter next described the three roles. To the confederate, she said: "You will be playing the role of the shooter. You will attempt 8 shots and your performance will be recorded. In order to vary the difficulty of the task across participants, we will have you wear this blindfold while shooting." To the spectator, she said: "You will play the role of the spectator. You will be asked to visualize something different before each shot. The details about each visualization are given to you in this packet. Before each shot, you will read and memorize the visualization. Then, you will close your eyes and visualize the action described." Finally, to the witness, she said: "You will play the role of the witness. You are asked to simply observe the spectator and shooter as they perform their roles. Just to let you know everything that will be going on, please take a minute to read this packet to familiarize yourself with the visualization instructions that will be given to the spectator." The experimenter then gave the visualization packet to the witness and asked the confederate to step to a line on the floor to be blindfolded. Once the witness finished reading, the spectator was instructed to read the first visualization.

Participant pairs were randomly assigned to the consistent thoughts or inconsistent thoughts conditions. The confederate was never informed of his condition. Examples of the eight visualizations (one for each shot) provided to participants in the consistent thoughts condition included the following: (a) the shooter releases the ball and it swooshes through the net, (b) the shooter's arm extends and the ball falls into the hoop, and (c) the shooter tosses the ball and it falls through the net. Examples of visualizations in the inconsistent thoughts condition included the following: (a) the shooter's arm curls to lift the dumbbell to his/her shoulder, (b) the shooter's elbow bends to lift the dumbbell to his/her shoulder, and (c) the shooter pulls the dumbbell up from thigh to shoulder level.

While the spectator read these instructions, the confederate took three practice shots. He was trained to make only one of these shots, as a way of demonstrating to participants that he was not naturally brilliant at this task. The experimenter then said:

The main part of the experiment will now begin. In order to be as unobtrusive as possible, I will not speak during the experiment except to cue the spectator and shooter. First I will say "OK," which will cue the spectator to flip to the next page and begin the visualization. About 10 seconds later, I will say "shoot," which will cue the spectator to open his/her eyes and watch, and will cue the shooter to take a shot. I will record whether the shot is successful or not for each trial. The witness will simply observe both the spectator and the shooter while they perform their tasks. The spectator and witness should keep track of how many of the 8 shots go in.

After ensuring that everyone understood, the experimenter said "OK" to start the trials. The confederate was trained to make 6 of the 8 shots. Because he was not perfectly able to control his performance (he averaged 5.4 successful shots), it was recorded each time.<sup>1</sup> After the eight trials, the shooter was told to remove his blindfold. Shooter, spectator, and witness were told that they would be interviewed before they would be dismissed. The shooter was told that his interview would be longer and that for that reason, the other participants would be interviewed first. He was asked to wait in the hall while these interviews were conducted. The participants each then received the dependent measure questionnaire.

*Dependent measures and debriefing.* As a check on participants' attention to the shooter's performance, the questionnaire began by asking, "How many shots did the shooter make?" (with "\_\_\_/8" as the response

<sup>1</sup> The number of successful shots made by the confederate differed by about one half of one shot between the consistent thoughts condition ( $M = 5.61$ ) and the inconsistent thoughts condition ( $M = 5.15$ ),  $F(1, 101) = 7.16$ ,  $p < .01$ . The reported effects and their statistical significance were unaffected when the confederate's success rate was used as a covariate.

stimulus).<sup>2</sup> The next two questions constituted our measure of perceived visualization clarity (Cronbach's  $\alpha = .86$ ). These items were necessarily worded differently for the spectator than for the witness. The spectator was asked, "How clearly did you visualize each of the actions you were asked to?" and "How vivid were your visualizations?"; the witness was asked, "How clearly do you think the spectator visualized each of the actions he/she was asked to?" and "How vivid do you think the spectator's visualizations were?" The next set of questions involved perceptions of the spectator's influence on the shooter's successful shots (Cronbach's  $\alpha = .89$ ). These items involved the feeling that the spectator's thoughts influenced the shooter's success ("Did you feel like [your/the spectator's] thoughts influenced the success of the shooter's shots?" "Did you feel that [your/the spectator's] visualizations affected the shooter's performance?"), the belief that the spectator somehow caused the shooter's success ("How much responsibility do you think [you deserve/the spectator deserves] for the shooter's successful shots?"; "Did [you/the spectator] cause the shooter's successful shots?"), and the perception that the spectator had intended to influence the shooter's success ("How much do you feel like [you/the spectator] tried to influence the shooter's performance?"). All items, except for the question regarding the shooter's hit rate, were accompanied by 7-point response scales (anchored at 1 = *not at all* and 7 = *very*, with the midpoint of 4 labeled *somewhat*).

To probe for accurate suspicions that might render a participant's data invalid, the experimenter began the debriefing with the question, "In some psychological experiments, not everything is exactly what it seems. Was there anything in this study that you thought may not have been what it seemed?" and followed this up with the questions "Did you have any suspicions about the study? If so, what specifically?" On the basis of this probe, 1 spectator in the consistent thoughts condition, 2 witnesses in the consistent thoughts condition, 3 spectators in the inconsistent thoughts condition, and 1 witness in the inconsistent thoughts condition were excluded from analyses because they correctly suspected the nature of the study's hypothesis. (Less pointed suspicions that the shooter might be a confederate or that his blindfold might be inadequate revealed no associations with condition and/or role, and thus participants with either of those suspicions were kept in our sample.) Finally, the participant was thoroughly debriefed about our purposes, predictions, and deceptions.

## Results

*Spectators' causal influence.* Our primary prediction was that spectators who generated thoughts consistent with the shooter's success would feel they had more causal impact than spectators who generated thoughts irrelevant to it. We also wondered whether yoked observers privy to the spectators' visual thoughts would also see the spectators as more responsible when they generated consistent rather than inconsistent thoughts. To test these predictions, we performed a two-way (Thought: Consistent vs. Inconsistent  $\times$  Role: Spectator vs. Witness) ANOVA on our five-item spectator's influence composite measure. It revealed that spectators and witnesses in the consistent thoughts condition attributed more causal influence to the spectator ( $M = 2.38$ ) than did spectators and witnesses in the inconsistent thoughts condition ( $M = 1.63$ ),  $F(1, 92) = 11.45, p = .001, \eta^2 = .11$ . These differences were apparent for items involving the feeling that the spectator's thoughts influenced the shooter, the belief that the spectator caused his success, and the perception that the spectator tried to influence his performance ( $F$  values ranged from 6.35 to 8.94,  $p$ -values ranged from .01 to .004). There was no significant main effect of role, and there was no significant Thought  $\times$  Role interaction ( $F$ s = 1.39, and 0.37, respectively).

*Visualization clarity.* Visualizations that were consistent with the shooter successfully making shots were reported as clearer

( $M = 5.36$ ) than were inconsistent visualizations involving him lifting a dumbbell ( $M = 4.79$ ),  $F(1, 92) = 6.63, p = .01, \eta^2 = .06$ . Perceived clarity was also associated with perceptions of spectators' causal influence on our measure of spectator influence,  $F(1, 92) = 5.53, p = .02$ . The results of the subsequent analyses, and their statistical significance, were not changed when visualization clarity was included as a covariate.

## Discussion

Spectators of a basketball shooter perceived themselves, and were perceived by others, as more responsible for the player's success when they generated positive visualizations consistent with that success prior to its occurrence. The spectating participants themselves, as well as witnesses privy to the spectators' visualizations, fell victim to this error in causal perception. This misperception was observable for questions involving both participants' feelings that the spectator's thoughts had affected the shooter and involving their belief that the spectator was somehow responsible for the shooter's success.

Apparently, generating visual thoughts about the success of the basketball-playing confederate, in his immediate presence, led to the inference that one contributed to his subsequent success. This is noteworthy given that our general conception of the way in which spectators influence athletes involves more direct and less "magical" routes than positive visualizations. Both laypeople speculating about spectator influence, and researchers studying it, focus on the importance of a visible (and often loud) fan presence in motivating athletes by reminding them that their fans care and by providing moral support (Agnew & Carron, 1994; Baumeister & Steinhilber, 1984). In the current experiment, however, participants in both thought conditions provided a visible spectator presence, and participants in neither condition engaged in any observable cheering. The difference between the two conditions involved the private thoughts being entertained in the mind of the spectator.

The impact of such private thoughts on perceptions of causal influence could in part explain why people sometimes exhibit an obstinate determination to watch their favorite team play in a crucial game or to stay glued to the television, cheering as forcefully as possible, during especially critical moments of play. The experience of everyday magical powers makes people wary of cutting off their support at such key times, as they put off trips to the fridge and even avoid bathroom breaks in the pursuit of their team's success.

The present experiment examined how people feel about the spectator influence of themselves and of other people. Spectators engaged in a sort of mental cheerleading before each of the shooter's shots, whereas witnesses were aware of the spectators'

<sup>2</sup> Participants' accuracy regarding the number of shots made by the confederate was measured by taking the absolute deviation of the number of shots the participant thought the shooter successfully made from the number of shots that he actually successfully made. Overall deviation from accuracy was quite low ( $M = 0.27$ ). Out of 102 participants, only 7 misestimated by more than one shot (21 misestimated by exactly one shot). There were no significant effects on accuracy of participants' assigned thought condition or their role as spectator versus witness; there was also no interaction between these two independent variables.

mentation but were not instructed to mimic it. Nevertheless, witnesses of spectators who generated relevant thoughts were more likely to feel that the spectators had contributed to the shooter's success. Witnesses seemed to be persuaded of spectators' influence in much the same way that those spectators were—that is, by the spectators' antecedent thoughts.

The question of how a third-party observer perceives an individual's causal influence over another person's actions need not be investigated in as magical a context as the one here. The question has previously been asked by researchers who used the teacher-learner paradigm, in which teachers and observers assign credit for a student's success to the teacher or to the student (Beckman, 1970; Frieze & Weiner, 1971; Johnson, Feigenbaum, & Weiby, 1964; Ross, Bierbrauer, & Polly, 1974). The present experiment suggests that teachers will overassign credit to themselves when they generate prior thoughts relevant to a student's success (e.g., when they think of the answer to the math problem the student is computing just before the student writes it down). It also suggests that observers will similarly overassign credit to such teachers if they are made aware of the teachers' thoughts prior to the student's success.

### Study 3: The Fan's Thoughtful Contributions (a Field Study)

The studies we have reported thus far reveal that individuals are more likely to see themselves as having influenced outcomes when they have first generated thoughts relevant to those outcomes. Our next two studies bring our interests out of the laboratory and into the field to see whether our results obtain in less-controlled but more ecologically valid settings. Study 3 involved spectators at a college basketball game. The spectators were Princeton fans attending a critical match-up against Harvard, in which the Princeton team sought both to avenge a road loss against Harvard earlier in the season and to maintain a 15-game winning streak at home against the Harvard team.

The study examined whether spectators' perceptions of their influence on the game would vary depending on an experimental manipulation of the contents of their thoughts. This manipulation led them to think about how specific key players on their school's team could contribute to the team's play that day. In a control condition, participants were also led to think about those same key players, but this time in terms of how each one could be identified in a crowd. Our prediction was that in the context of a live basketball game, spectators would feel more responsible for the outcome of the game if they had, before the start of it, entertained outcome-relevant thoughts about how each player could contribute to the game.

#### Method

*Participants.* Participants were 67 people (31 women and 36 men) in attendance at a men's college basketball game at Princeton University's Jadwin Gymnasium. Their median age was 49 years (range = 18 to 85).

*Procedure.* Before the game began, spectators who had taken their seats in the stadium were approached by one of four experimenters and asked to provide consent to participate in the study. They were then given a pencil and a two-page survey (with an initial page of instructions). The first of the two survey pages introduced our experimental manipulation. The second page, which was folded over, stapled, and sealed from the

participant's view, contained our dependent measures. Participants were also provided with the verbal (and written) instruction that they "complete the first page *only*" and that an experimenter would return to let them know "when to continue to the stapled page." On the visible portion of the stapled page, further instructions reiterated, "*Do not open* this page until instructed by experimenter (the experimenter will return during a time-out)."

An experimenter returned to each participant during a time-out and informed the participant that it was time to break the staple and finish the final part of the survey. Each participant was approached for a third time by an experimenter who collected the participant's survey, offered some candy in appreciation, and answered any questions the participant had about the study.

*Experimental manipulation.* The first page of participants' surveys contained our experimental manipulation. This page was identical across conditions except for the instructions at the top. The page provided a photograph and an accompanying set of facts for each of seven different players on the Princeton team. These players were chosen because we expected (accurately) that the five starters would be selected from among them. The information provided about each player included his name, number, position, Princeton class, height, weight, high school, hometown, and major.

In the player contribution thoughts condition, participants received the following instructions at the top of their page:

The players below often start for the Princeton team. For each player, list one or two ways that you think that player could contribute to the team's play today (based on the information listed about the player, or any other information you have). For example, next to one player you might list "Good 3-point shooter; quick rebounder" or "Looks big, could be strong on defense."

In the player identification thoughts condition, participants instead received the following instructions atop their page:

The players below often start for the Princeton team. For each player, list one or two characteristics that could be used to identify this person in a crowd (based on the player's appearance, the information listed about the player, or any other information you have). For example, next to one player you might list "Crew cut hair; thin build" or "Brown hair; shy."

This difference in instructions constituted our experimental manipulation.

*Dependent measures.* Participants completed a page of dependent measures entitled "Final Survey." Our primary measure consisted of three items probing for participants' feelings and beliefs about whether they had influenced the athletes' playing (thus far). These items were "How responsible do you feel for how the players have been playing so far?" "Up to this point, do you feel like you have affected how the players have performed?" and "How much do you feel like you have tried to influence the outcome of the game (up until now)?" All three items were on 6-point scales (1 = *not at all*, 2 = *very slightly*, 3 = *a little bit*, 4 = *somewhat*, 5 = *a fair amount*, 6 = *a great deal*). Cronbach's alpha coefficient of reliability was .72.

Participants were also asked to report their gender and age, the number of other Princeton men's basketball games they had attended that season, whether they knew any players on the team, the current game score for both teams, and which team they thought would win.

#### Results

As predicted, the participants led to generate thoughts about how the team's leading seven players could contribute to the game were more likely to feel that they influenced how the team played than were participants who thought about how those players could be identified in a crowd. On our three-item measure of feelings and

beliefs about influencing the athletes' playing, participants felt more responsible for the team's play if they had first thoughts about how certain key players could contribute to it ( $M = 2.24$ ) rather than about how those team members could be identified ( $M = 1.57$ ),  $F(1, 66) = 6.93$ ,  $p = .01$ ,  $\eta^2 = .10$ . This result was apparent for each of the individual items in the responsibility composite ( $F$ s ranged from 3.90 to 4.80,  $p$ -values ranged from .03 to .05).

We also measured a number of background variables to compare their effects with those of our manipulated independent variable. None of the following variables were associated with perceptions of having influenced the game: (a) prior attendance at the team's games that season, (b) personal acquaintance with any of the players, (c) beliefs about which team would win, or (d) participant gender. (Pearson's correlations ranged from  $-.08$  to  $.16$ ,  $p$ s  $> .21$ .) The only variable other than experimental condition that was associated with perceived responsibility was age,  $r(64) = .31$ ,  $p = .01$ . Given the impact of this particular variable, our initial analysis involving perceived responsibility was also conducted with age as a covariate; the reported result was unaffected when effects of age were controlled for statistically,  $F(1, 66) = 8.69$ ,  $p = .005$ ,  $\eta^2 = .11$ .

### Discussion

People sitting in a stadium and watching a live college basketball game felt more responsible for the players' performance in that game if they had first thought about how those players could contribute to that game rather than about how the players could be identified in a crowd. A small manipulation delivered before the start of the game influenced spectators' perceptions of their influence over its outcome, even though their perceptions were measured more than 30 min later and participants had been engrossed in the game in the interim.

A number of details of the experimental manipulation used in this study lend to the power of the present results. For one, participants in this study were not watching the game in a laboratory environment in which no other factors were likely to be in place to influence their perceptions of responsibility. On the contrary, the participants varied in their familiarity with the team, their dedication to attending its games, their motivation to cheer the team on, and their interest and ability to focus on the game (in the face of obstacles such as bored children, annoying bleachermates, and uncomfortable seats). Furthermore, the outcome of the game itself was not experimentally controlled, and thus participants were faced with a more ambiguous outcome than in our laboratory settings.

It is important to note, with respect to all of the details of this study that were necessarily left free to vary, that only one of them (participant age) was associated with feelings of responsibility for the game's outcome. The sorts of things that one might think would lead people to feel more influential in the game, such as personally knowing some of the players or attending many of the team's games, had no noticeable effect. What did have an effect, by contrast, were participants' prior thoughts about the team before they began watching the game.

Perhaps the most important detail to note about our experimental manipulation of participants' thoughts is how little it differed between conditions. In both conditions, participants thought in

detail about seven of the most critical players on the team. The precise content of their thoughts, in fact, was sometimes fairly similar: In both conditions, participants were likely to have thought about the height and weight of the players and, perhaps, whether they seemed sly, shy, or aggressive. The key difference, of course, was that in the condition predicted to induce feelings of responsibility, participants' thoughts specifically focused on what the players could contribute to that day's game. Thus whereas participants in both conditions may have thought about a player as being tall and heavyset, the participant who had such thoughts in the context of how the player could contribute to the game was more likely to feel responsible for the team's performance than the participant who had such thoughts in the context of how the player could be identified in a crowd.

### Study 4: The Armchair Quarterback's Losing Thoughts

When placing evil hexes on people, one typically hopes that some harm will befall them. Similarly, when rooting for favorite athletic teams, one typically hopes that they will win. If the hexes (or cheers) are met with success, one thereby finds oneself experiencing outcomes that were not only thought about but also wanted. In these situations, our results suggest, people are likely to perceive that they have contributed to the relevant outcomes. Do similar feelings of responsibility accompany the occurrence of outcomes that people have thought about, but not wanted? Such instances are commonplace. After taking an important exam, one might find one's self thinking, "I failed it." Or, after hearing about a faraway earthquake or tropical storm with as-yet-undetermined consequences, people might find themselves thinking that it will cause immense harm. In these cases, our thoughts are quite different from our desires. The present theorizing suggests that people feel more responsible for a failing grade on an exam or for death and destruction following a natural disaster if they have had thoughts related to those outcomes before their occurrence (rather than if they had been thinking about something else).

This study examined whether individuals who generate thoughts relevant to an outcome feel more responsible for that outcome than their peers—even if they consider the outcome to be undesirable. The example investigated in this study involved watching a high-stakes athletic competition in which a favorite team is unable to take the lead. In this situation, we expected, a person would be likely to have many thoughts about the team's prospects for winning or losing the game. In our theories, we suggested that in this situation one would feel more responsible for the team's eventual loss than would a person who had not been thinking about the game. By examining whether individuals view themselves as responsible for a losing outcome, we address the possibility that perceptions of responsibility for thought-about outcomes simply reflect a self-serving tendency to take personal responsibility for desirable outcomes and to deny responsibility for undesirable ones.

This study made use of a real event about which our participants felt passionately: The Super Bowl. Participants were residents of Princeton, New Jersey, which is less than 50 miles from Philadelphia. They had gathered to watch the 39th Super Bowl, in which the Philadelphia Eagles were taking on the defending Super Bowl champion New England Patriots. In this study, we sought to test whether fans who had just finished watching the game on television would feel differing degrees of responsibility for the outcome

of the game depending on how much they had thought about it—regardless of whether they perceived the outcome of the game as desirable or undesirable. This study also differed from our previous studies in that it measured participants' own perceptions of their thoughts rather than manipulating those thoughts via external means.

### Method

**Participants.** Participants were 58 people (17 women, 39 men, and 2 who did not indicate gender) who had been watching the Super Bowl on a big-screen television in the student center at Princeton University.

**Procedure.** Three experimenters distributed surveys to participants as the game came to a close, with the New England Patriots triumphing over the Philadelphia Eagles, 24 to 21. Participants were instructed to complete the one-page survey individually, and upon returning it, they were provided with candy as compensation.

**Survey.** The survey was entitled "Super Bowl XXXIX Survey." Two items measured participants' amount of thinking about the game (Cronbach's  $\alpha = .59$ ). These were "During this Super Bowl, how often did you think in advance about whether the upcoming play would be a run or a pass?" (1 = *didn't think about it before any of the plays*, 5 = *thought about it before approximately 10 of the plays*) and "During this Super Bowl, what percent of the time were you thinking about the game?" (1 = *1%, or less [none of the time]*, 5 = *60%, or more [most of the time]*).<sup>3</sup> Two items measured participants' perceived responsibility for the outcome of the game (Cronbach's  $\alpha = .91$ ). These were "How responsible do you feel for the outcome of this Super Bowl Game?" and "Do you feel like you tried to influence the outcome of this Super Bowl?" (for both items, 1 = *not at all*, 2 = *very slightly*, 3 = *a little bit*, 4 = *somewhat*, 5 = *a fair amount*, 6 = *a great deal*). Participants were also asked to place a checkmark next to either the Patriots or the Eagles in response to the question, "Which team were you rooting for?"

### Results

**Perceived causality.** Consistent with our experimental findings, the more participants perceived themselves as having thought about the game, the more they felt responsible for the game's outcome. This correlation was significant,  $r(56) = .40, p = .002$ . Indeed, whereas participants in the bottom quartile for their perceived degree of thinking about the Super Bowl did not view themselves as being at all responsible for its outcome ( $M = 1.14$ ), participants in the top quartile actually viewed themselves as slightly responsible for the outcome of the game they had just watched on television ( $M = 2.48$ ),  $F(1, 41) = 9.91, p = .003$ . The relevant correlations were significant for both the responsibility item concerning perceptions of trying to influence the game ( $r = .45, p = .0004$ ) and for the item concerning actually having influenced it ( $r = .30, p = .02$ ).

**Effects of seeing the outcome as a win versus a loss.** Our primary interest in this study concerned whether participants who thought more about the game would perceive themselves as having had a greater impact on its outcome—even when the outcome was the opposite of what they had wanted. To investigate this question, we conducted correlational analyses separately for the 16 fans of the winning team and the 39 fans of the losing team. (Only 3 participants claimed not to have rooted for either team, and they are not included in these analyses.)

The more that fans of the winning team reported thinking about the game, the more responsible they felt for its outcome,  $r(14) =$

$.49, p = .05$ . More central to our present predictions, we expected to see similar results among participants who had experienced an unwanted loss. Consistent with our expectations, these losing participants also felt more responsible for the game's outcome the more they had thought about the game,  $r(37) = .44, p = .005$ . The correlation between thoughts and perceived influence did not differ depending on whether the participant achieved a desired or undesired outcome, according to a  $z$  test of the difference between correlations,  $z = .19, p = .85$ .

Finally, participants did not show any general tendency to make attributions of personal responsibility in a self-serving way. Their reported feelings of responsibility for the outcome of the game did not differ depending on whether they had experienced a win ( $M = 1.63$ ) or a loss ( $M = 1.79$ ),  $F < 1$ . (There also was no difference between the winners and losers in their reported amounts on thinking about the game,  $F < 1$ .)

### Discussion

This study provides two main results supportive of our theorizing. First, it provides evidence consistent with the experimental findings of our previous studies. Although the present results are correlational, and thus do not yield the opportunity to make causal inferences, it is noteworthy that when participants' thoughts were left unperturbed by experimental manipulation, the same pattern evident in our experimental studies was again present. In this study, viewers of the Super Bowl on television who reported more thoughts about the game also reported feeling more responsible for its outcome. Even though they knew that the game they were watching was taking place hundreds of miles away, they nevertheless felt as though they had influenced it.

A second finding of this study is equally important. That is, some of the participants had been rooting for the team that won and some (in fact, most) had been rooting for the team that lost. This allowed us to compare the association between thoughts and perceived influence for people who observed a desired outcome versus an undesired outcome. No difference between these two groups was apparent. Even those who witnessed the opposite of what they had hoped for felt more responsible for the outcome of the game the more they had thought about it. This result suggests that the tendency to take more credit for thought-about outcomes is not simply an artifact of a self-serving bias. That is, the experience of a causal link between thoughts and events does not seem to be a mere reflection of the tendency for people to take credit for things that they want (and to thereby also take credit for things that they think about, when those are also things that are wanted). Even when people have thoughts that are later followed by an unwanted outcome, we still are more likely to feel responsible for that outcome if our prior thoughts were related to it.

<sup>3</sup> An alternative set of labels was also used for these scales, in which the first question was anchored at 1 (*thought about it before 10 of the plays, or less*) and 5 (*thought about it before almost every play*) and the second question was anchored at 1 (*50%, or less [about half the time, or less]*) and 5 (*100% [constantly, the entire time]*). Because these label differences are not the focus of the current study, they are not discussed in this article.

### General Discussion

These studies illustrate one means by which people may come to experience magical powers, or the feeling of having caused events they did not actually control. The particular means by which people may come to hold such beliefs is their inference of an association between an observed outcome and prior thoughts that are conceptually related to that outcome. In our first study, the outcome in question involved a peer's adverse physical symptoms, and in the second study, it involved a peer's successful athletic performance. In our third and fourth studies, the outcomes involved real athletic competitions. In each study, the relevant outcome occurred regardless of participants' thoughts (it was experimentally predetermined in our first two studies, and it was part of a live sporting event in our second two studies). However, in each study, participants were more likely to feel and to believe that they were responsible for the relevant outcome if they had generated prior thoughts related to it.

Participants in Study 1 were more likely to report having harmed their victim and caused his negative health symptoms if they had first been in a position to think ill of him. Comparison participants who had encountered no inducement to think ill of their victim were less likely to feel responsible for his reported plight. A follow-up study indicated that the tendency to feel responsible for harm to the victim even surfaced when participants merely followed instructions to think negative thoughts. Participants in Study 2 were more likely to report having aided their peer in his athletic success if they had first been asked to generate visual thoughts consistent with that success. Comparison participants who had been asked to generate visual thoughts unrelated to that success were less likely to feel and believe that they had somehow contributed to it. Furthermore, this effect was similar for participants who were not themselves asked to generate any such visualizations but who were rather exposed to a fellow participant's visualizations and then asked about that participant's effect on the athlete's performance. In Study 3, fans of a college basketball team felt more responsible for the team's performance if they had first thought about how specific key players could contribute to that performance (rather than if they had thought about how those players could be identified in a crowd). Finally, the results of our fourth study showed that participants who had thought more about a Super Bowl game they had been watching on television took more credit for its outcome—even if they viewed that outcome as a loss.

Could the results of these studies be explained by experimental demand? Perhaps participants' reported feelings of responsibility were prompted by their inference that this was what the experimenter expected. In experiments that are purportedly about the impact of voodoo curses on physical health or about the impact of spectatorship on athletic performance, it might be reasonable for a participant to infer that the experimenter expects such effects. That inference may have been further encouraged by our dependent measures, which directly asked participants about their feelings of personal responsibility. However, although these details may have suggested the experimenter's expectations, that suggestion was clearly not sufficient to lead participants to claim responsibility. Participants in our control conditions were exposed to the same experimental cover story, and to identically worded dependent measures, but they readily denied responsibility for the outcomes

in question. It was specifically those participants who had generated outcome-relevant thoughts who expressed such responsibility. It would be difficult to argue that these two sets of participants held different beliefs about the experimenter's expectations. For example, in the voodoo experiment, both sets of participants were told that the experimenter was interested in voodoo as a way of testing whether psychological factors can affect physical health. Both sets were asked to direct their thoughts toward their victim before placing a hex on him, and both sets were explicitly asked about their responsibility for the victim's headache. The only difference was whether the victim himself behaved in a way that prompted the participant to think ill of him. Although our manipulations may have suggested to participants that it would be acceptable for them to express feelings of responsibility, it appears that when they did express such feelings it was because of their own thoughts and not because of any felt demand from the experimenter.

Although our experiments did not create a demand that was sufficient to induce participants to claim responsibility for external outcomes, they likely did license participants to express such feelings when they had them. It is possible that people often have an intuitive sense of responsibility when external outcomes are preceded by their own relevant thoughts but that their rational mind leads them to disregard those feelings. Participants in the present experiments may have been less inclined to override their intuitions for the reasons described. To that end, an interesting direction for future work would be to use more spontaneous or indirect measures of responsibility. These could involve implicit measures of construct accessibility (e.g., accessibility of pride-related feelings in reaction to generating positive thoughts prior to an athlete's success) or nonobvious measures of felt responsibility (e.g., willingness to lend a headache-stricken victim \$5 to buy some aspirin). Such measures could shed light on the extent of participants' magical beliefs. On a related note, it would be useful to use implicit manipulations of thought content that could not be plausibly linked to the experimenter's goals or expectations. Such manipulations have been shown to induce causal inferences regarding ordinary outcomes (see Aarts et al., 2005); it would be interesting to see whether they would also induce such inferences regarding seemingly magical ones.

Our studies dealt with positive thoughts and negative thoughts as well as with outcomes likely to be perceived as both desirable and undesirable. Evidence from a follow-up study using our voodoo scenario suggested that participants do not need to have desired the attending outcome to feel more responsible for it after generating relevant thoughts. In that study, evil-thinking participants felt more responsible for their victim's negative health even though they also felt more guilt about that outcome (presumably because their victim had done nothing to merit their ill will). The results of our fourth study are also consistent with these results. Fans of the losing Super Bowl team felt just as responsible for the game's outcome as winning fans. The more both sets of fans reported thinking about the game, the more responsibility they felt over it. Notably, participants in this study were likely to have differed in the precise content of their game-related thoughts. Some may have thought mostly about their team winning, others may have thought mostly about their team losing, and still others may have had both thoughts. The results of the study do not shed light on the question of whether these different thoughts may have

affected participants' feelings of responsibility (e.g., such that envisioning the correct outcome engendered greater feelings of responsibility). The results of our two experiments involving athletic performance make it clear that thinking about athletes' performance, rather than about something less relevant to that performance (such as their lifting a dumbbell, in Study 2, or their identifiability in a crowd, in Study 3)—affects perceptions of personal influence. However, those experiments did not examine whether participants feel more responsible for athletes' performance after generating "winning" versus "losing" thoughts about athletes' subsequent winning versus losing performance. The question of whether people feel more responsible for outcomes they have thought about, even when their thoughts run contrary to the valence of the outcome, is a useful one for future research.

One interesting case about this involves the feeling of having "jinxed" a desired outcome by thinking about it. People sometimes have the experience of generating positive thoughts about something in the hopes that it will happen and then blaming themselves afterward when it does not—as though their premature and overly positive thoughts must have brought on the bad luck. The admonition against "counting one's chickens before they hatch" may reflect not only pragmatic wisdom about not investing too many resources in an uncertain outcome but also a more magical concern that such "mental counting" may decrease the likelihood that the desired outcome will occur. Displays of defensive pessimism (e.g., Norem, 2001; Norem & Cantor, 1986; K. M. Taylor & Shepperd, 1998) may in part be a way of preventing this; in these cases, people may intentionally envision negative outcomes rather than positive ones to avoid the possibility of "jinxing" themselves.

The present studies support the notion that everyday processes of causal inference can lead normal people to develop the perception that they have magical powers. In so doing, this research also supports the theory of apparent mental causation (Wegner, 2002; Wegner & Wheatley, 1999) regarding how people perceive the cause of action more generally. According to this theory, people perceive human agents and their thoughts to be the cause of physical outcomes in much the same way that they perceive physical objects to be the cause of contiguous physical outcomes. That is, we conclude that the relevant agent has been causal when its thoughts are conceptually consistent with, and apparent prior to, the relevant physical outcome.

Although our focus in this research has been on the magical nature of participants' causal perceptions, it is worth placing that emphasis in cultural perspective. The beliefs in personal responsibility reported by participants in our studies seem to defy any known scientific mechanism of causation. However, some of our participants (and, perhaps, some of our readers) might defend their beliefs in the harmful power of voodoo or the positive power of athletic fans' positive thinking. Cultural, national, and religious differences are likely to underlie such differences in beliefs. In future research, it would be interesting to examine whether such differences in background account for some of the effects observed in magical thinking experiments such as those reported here. Although many of our participants were White American college students, not all of them were, and it could be that some of our effects are attributable to the beliefs of a small subset of our participants who were from backgrounds in which belief in voodoo (or positive visualization) would not be considered magical.

Indeed, the present research suggests how certain cultures and groups might come to adopt beliefs in forms of causation for which Western science knows no physical mechanism. It could be that the adoption of magical beliefs involves the psychological mechanism we have put forth, combined with either a temporary or chronic disregard for (or unawareness of) Western scientific causal principles. For most people, magical beliefs may come to mind when their thoughts precede relevant external outcomes, but they may suppress them when concerns about scientific rationality are prominent. Participation in a scientific experiment in a psychology laboratory could be one such condition. In this regard, it is worth noting that participants in our studies were loath to use the top half of our scales when expressing beliefs in their personal responsibility for external outcomes. Those who generated evil thoughts about a voodoo victim before he got a headache or those who generated positive visualizations about a basketball shooter before he succeeded at making his shots acknowledged feeling some responsibility for the outcome—in comparison to their peers who did not report any such feelings—but their responses indicated that they attributed even more of that responsibility to some other source. In a sense, all of our participants were reluctant to express beliefs in personal mental causation; what is noteworthy is that those who generated relevant thoughts were more likely to overcome such reluctance.

Although the focus of these studies is belief in personal causation, the results of one study (Study 2) suggest that a similar mechanism influences beliefs about other people's causation. In that study, yoked observers were more likely to view spectators as responsible for an athlete's success when those observers were privy to the spectators' prior relevant thoughts. This tendency to infer others' causal responsibility on the basis of their prior thoughts has numerous consequences. It suggests one reason why verdicts in murder cases often take into account a person's thoughts prior to the killing. Premeditated killings involve prior relevant thoughts, and their agents are deemed more responsible (and hence subject to tougher sentencing). Such causal inferences need not only involve the placement of blame. People may be given far more personal credit for successes when they have thought long and hard about how to achieve those successes rather than when those successes simply have fallen in their lap. In such cases, mental effort, much like physical effort, may help a person lay claim to a subsequent success. Although the nature of one's assessments of one's own and others' causal agency may both be responsive to the presence of relevant mental events, important differences in the causal assessments made are likely to arise because people are far less aware of others' mental events than of their own. As a consequence, attention to mental events in making causal assessments may be a cause of seeing oneself as far more causally responsible than others for external outcomes (Ross & Sicoly, 1979).

These studies focused on voodoo hexes and athletic fandom. The results also suggest, though, that healing thoughts directed at an ailing loved one or motivational thoughts of oneself succeeding at impending challenges would also yield the perception that one has personally caused the relevant outcomes, should they occur. Hopes and prayers, like curses and armchair cheers, may contribute to inflated estimates of personal agency when they occur just before the events they portend. In this sense, this research is not really about voodoo spells or athletic spectatorship at all. Although

its point of departure was the odd circumstance of a magical hex, it might be better understood as an examination of the inference processes that underlie the experience of authorship of action. Such inference processes can lead modern American college students to believe they have hurt someone with a voodoo doll, so perhaps they play a role in the self-perception of action more generally.

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