ELSEVIER

Effects of subliminal priming of self and God on self-attribution of authorship for events ☆

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Abstract

Three studies investigated how subliminally primed thoughts of an agent prior to action can affect ascriptions of authorship for that action. Participants competed against a computer program to remove words from a computer screen. Participants reported greater feelings of authorship when primed with first person singular pronouns, and lower feelings of authorship when primed with "computer." We also investigated whether authorship feelings could be affected by priming subjects with a supernatural agent (i.e., God). Feelings of authorship decreased when participants were primed with God, but only among believers.
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Keywords: Subliminal priming; Agency; Attribution; Self

When you do something, how do you know you're the one who did it? Normally, this doesn't seem like much of a mystery, because you can feel yourself doing things and appreciate the operation of your physical body. But what happens when the self is not the only agent that might be responsible for the body's actions? At times, agents other than the self are very plausible causes for actions, such as when your computer crashes and it is not clear whether you pressed an inappropriate key or whether the computer is to blame. In addition, at least for some people, there may be non-self agents present in a mere psychological sense, potential causal forces that are believed to exist and guide action—agents such as spirits, angels, Satan, God, or even

the inner voices that accompany delusional states. How do people sort out the causes of their own actions when they believe in such agents? These studies explored the idea that the attribution of authorship for action to self might be influenced by the subliminal priming of particular agents, and that the influence of such priming might depend on the person's beliefs in the agent.

Attribution of authorship

The feeling that the self is the author of an action is derived in part from basic physiological systems of the body. One knows one is doing something by virtue of interoceptive sensations of the body's movement (Craig, 2003) that occur both before action (Frith, Blakemore, & Wolpert, 2000) and after action (Gandevia & Burke, 1992). Such bodily feedforward and feedback systems are supplemented by visual and auditory feedback, as we can often see and hear ourselves act. However, these sensory indicators of authorship for action are often overridden by a

variety of social and contextual variables that can drive attributions quite independently of direct sensation (Wegner, 2002; Wegner & Sparrow, 2004). In the case of actions that do not have obvious bodily sensations, or that are so distant from their bodily wellsprings as to be difficult to trace, the experience of authoring the action may depend not on sensation, but on processing causal information and arriving at an attribution judgment (Heider, 1958; Kelley, 1972; Jones & Davis, 1965; Gilbert, 1997).

An early theory of such attribution proposed by Ziehen (1899) held that thinking of self before action yields the experience of own agency. He remarked that "…we finally come to regard the ego-idea as the cause of our actions because of its very frequent appearance in the series of ideas preceding each action. It is almost always represented several times among the ideas preceding the final movement. But the idea of the relation of causality is an empirical element that always appears when two successive ideas are very closely associated" (Ziehen, 1899, p. 296). The hypothesis that thoughts of self may incline people to interpret actions as their own was later noted by Michotte (1963), and was developed yet more fully in the objective self awareness theory of responsibility attribution (Duval & Wicklund, 1972; Duval & Silvia, 2001).

Research on attention and causal attribution has shown that people who are led to attend to themselves become more likely to attribute responsibility to self for causally ambiguous events (Duval, Duval, & Neely, 1979; Duval & Wicklund, 1973), although not always in the case of negative events (Federoff & Harvey, 1976). More generally, when attention is drawn to any social entity—self, other, or group—that entity becomes likely to draw attributions of causation and responsibility (Arkin & Duval, 1975; Lassiter, Geers, Munhall, Ploutz-Snyder, & Breitenbecher, 2002; McArthur & Post, 1977; Storms, 1972; Taylor & Fiske, 1978; Wegner & Giuliano, 1982). This view of attribution suggests why actors more often view their behavior as caused by situations, whereas observers of those actors view the same behavior as caused by the actors' dispositions—the difference may occur in part because actors are attending to situations and observers are attending to the actor (Jones & Nisbett, 1972).

The attentional view of causal attribution also solves an important problem in how agency judgments are made. The attention theory suggests that prior thought about an agent or cause creates a frame for cause perception, a general tendency for agency to be ascribed to the attended agent. Such a frame or set can explain why it is that attributions of agency to self are often very fluid and perfunctory (e.g., Aarts, Custers, & Wegner, 2005), occurring with a rapidity that suggests automatic processing (e.g., Taylor & Fiske, 1978) rather than a thorough information search (e.g., Kelley, 1967). If every event in the world required a full analysis of possible agents, after all, quick judgments of own agency would seem unlikely. For example, the simple act of going the kitchen for a midnight snack could throw a person into an attributional crisis if one had to consider the

multiple possibilities that self is doing this, or that others present are eliciting the action, or perhaps even that absent others or supernatural agents such as God are prompting the action. The person would seldom figure out who did it before the snack was all gone. Because people also make rapid authorship judgments not only for actions but for their own thoughts—and thoughts are only misattributed to non-self agents in psychopathology or in unusual circumstances (Frith et al., 2000; Graham & Stephens, 1994)—it seems there must be a mental system that regularly guides attributions of agency toward a current default agent.

Past research on causal attribution for own actions has focused on situational variables that influence attention, such as point of view (e.g., Storms, 1972; Taylor & Fiske, 1978). The default agent for own action must be determined, however, by mental processes that operate without such sensory guidance—or we would be mystified about who is doing our thinking and behaving each time we awake in the dark of night. The system of mind underlying the experience of authorship for our own actions seems likely to operate through a cognitive process that "keeps in mind" a current likely agent for action. This process should be susceptible to associative priming of information that serves to remind the person of a particular agent. Such priming could even ensue from subliminal sources, as conscious attention can be guided readily by unconscious primes (e.g., Dijksterhuis, 2004; Strahan, Spencer, & Zanna, 2002). Self-attributions of authorship may be driven, in short, by an unconscious *authorship processing* system (Wegner & Sparrow, 2004) that can be biased regarding attributions to particular default agents by associative priming.

Such automatic, associative priming will generally have direct effects on perceived authorship, in that increased accessibility of an agent will lead to enhanced attribution to that agent. If the self is more accessible, the possibility that an action is ascribed to self increases. Likewise, if another external agent is accessible, attributions to the self become less likely. For instance, if the concept of "computer" is primed, a sudden computer failure during a routine maintenance would likely be attributed to the computer itself, rather than to the technician working it. Both the attention/attribution model and our authorship processing view are able to explain such direct effects.

However, an important virtue of the authorship processing view is that it makes predictions that do not follow easily from a simple attention/attribution model. The attention/attribution model predicts inflexibly that increased attention to or priming of any agent would enhance attribution to that agent, whereas the authorship processing view opens a second possibility based on the assumption that people always keep in mind a default agent (often the self): a person might think of another agent alternatively as a rival for authorship, leading to less attributed agency to the default agent. For example, priming the concept of "God" may decrease experienced authorship for

behavior among believers, because it rivals with the default concept of "self" as an author.

Self versus other agents

The belief that agents other than self might influence actions of the body is common in many cultures. Polls indicate that upwards of 95% of people in the USA profess a belief in God or a universal spirit (Bishop, 1999), and many believers worldwide ascribe authorship to God for all things (Boyer, 2001). It is common, too, for people to ascribe their creative insights ("Eureka experiences") to supernatural agents (Ghiselin, 1952). Young children are also often adept at ascribing events to culturally sanctioned imaginary agents of other kinds, such as Santa or the Tooth Fairy (Woolley, 2000), and some have imaginary friends whom they feel influence their actions (Taylor, 1999). Some individuals with schizophrenia may ascribe actions, thoughts, or voices to imagined agents inside or outside themselves (Frith, 1994). And of course, there are a wide range of occult beliefs involving spirit agents, such as beliefs in trance channeling (Brown, 1997) and spirit possession (Bourguignon, 1976). Humans seem to live in a world in which potentially many non-self agents might potentially be seen as controlling the body (Guthrie, 1993).

It is remarkable that people should be so willing to make attributions to agents that they do not physically encounter, and who leave little evidence of their actions (or their existence). Guthrie (1993) argues that the tendency to anthropomorphize is responsible for religious beliefs; we attribute agency to supernatural beings and develop religious beliefs around these agents. People possess a readiness to detect agents (Baron-Cohen, 1995; Heider, 1958; Heider & Simmel, 1944), an advantage because it allows them to quickly identify potential threats, mates, and helpers. Most people with religious beliefs never see the gods or spirits they believe in. They expect to see the work of supernatural agents in everyday events, and so they do.

There may be a connection between the ability to perceive intentional external agents and religious thought (Barrett, 2000. Boyer (2003) suggests that religious concepts often revolve around intentional agents that one does not physically encounter, such as ghosts, spirits, and gods, and that this is an extension of the human ability to run off-line interactions with imagined agents (Povinelli & Preuss, 1995; Scott, Baron-Cohen, & Leslie, 1999). Bering (2002) suggests that people turn to intentional forces as a way of making sense of life events. Impactful events are often seen as some agent's attempt to communicate with a person, and to teach that person important life lessons (e.g., I broke my legs so that I would value life more). Gilbert, Brown, Pinel, & Wilson (2000) found that people seek external agents to explain fortunate events. People were found to ascribe agency to an external force when things worked out in their favor, and to attribute characteristics of benevolence and insight to that external agent. The agents a person might conceivably hold responsible for an event, in short, might include not only

self and other real people or physical objects—but also could include supernatural agents.

The assignment of authorship to agents, both self and non-self, has been viewed in prior theory as an attribution problem. Spilka, Shaver, & Kirkpatrick, 1985) proposed that the availability of thoughts of God would influence whether believers would make either secular or religious attributions for events. This hypothesis resembles the attention theory of attribution, in that it suggests that the salience of thoughts of God should influence attributions of agency. Although the hypothesis has been evaluated in some studies, research has not revealed consistent effects of availability—finding instead a general bias toward attributions to God for positive as opposed to negative events (Lupfer, De Paola, Brock, & Clement, 1994). We contend that attributions to God do not follow directly from mere attention or salience, but from more the complex processes of authorship processing. It could be that this inconsistency derives from variations in the degree to which God as an agent is seen as a causal alternative to self as agent. For instance, attributions to God only make sense if the person making the attributions perceives God as a plausible causal agent. Therefore, *believers* who are exposed to thoughts of God might attribute their own actions to an external source because God becomes a salient alternative cause (Kelley, 1972), whereas this should not be the case for non-believers.

The study of the attribution of agency to self when people have been led through subliminal primes to think of self or of God, then, provides a context for understanding how authorship processing follows from different views of how internal and external agents interact.

The present research

Our experiments examined the influence of subliminal priming of agents on perceptions of the authorship of action. We designed a paradigm in which the authorship of a large number of simple actions was ambiguous. Participants competed against a computer program to remove words from the screen faster than the computer did, and on each trial judged whether they had successfully beat the computer to remove the word. Just before each word was presented, however, participants were subliminally primed with a word relating to self, another agent, or a control word. Thus, immediately before the act, the person was thinking about either self or another agent. The initial expectation was that priming of self-related words would lead to ascription of agency to self, whereas priming of words suggesting other agents would reduce ascription of agency to self.

It should be noted that we primed agents subliminally for two reasons. First, as said before, we believe authorship processing relies on the mere accessibility of agents, and does not require conscious awareness. Subliminal priming has been shown to affect judgments in a variety of different domains (for a review see Dijksterhuis, Aarts, & Smith, 2005), including judgments about the self. For example,

Dijksterhuis (2004) investigated how implicit self-esteem could be improved by subliminal association of the self and positive primes. It was found that when self words were paired subliminally with positive words, participants had higher implicit self-esteem, as measured by their preference for letters in their own name. Subliminal priming in the present studies was used as a way of enhancing the accessibility of thoughts relevant to specific agents (cf. Dijksterhuis & Bargh, 2001; Wegner & Smart, 1997). The second reason we used subliminal priming is that supraliminal priming may render the task odd for participants. Indeed, participants may become suspicious if they see different potential agents before each trial.

The experiments began with a focus on natural agents: self (Experiment 1), and the computer (Experiment 2). Then, we turned to the analysis of subliminal influences of priming with thoughts of God. We examined how subliminal priming of God would impact authorship judgments of those who believed or did not believe in God (Experiment 3).

Experiment 1: Self-primes

Methods

Participants

Fifteen undergraduate students (11 women and 4 men) from the Radboud University Nijmegen participated in the experiment. They received Dfl. 5 (about 2.5 US dollars) in return.

Instructions

It was explained that participants had to do a lexical decision task. A series of letter strings would appear on the screen and for each of these letter strings participants had to decide as quickly as possible whether the string was a word or a nonword. They were asked to decide by pressing a "word" key (A) or a "nonword" key (6). Pressing a key removed the letter string from the screen. It was explained to participants that the computer could remove the letter string before they had responded so an additional task was to beat the computer.

Measures and stimuli

Participants completed 72 lexical decision trials and 12 practice trials. Each trial included a 250 ms premask (XXXXXX), a 17 ms prime, a 50 ms postmask (XXXXXX), and the target letter string. In half the trials, the target word was a random letter string (e.g., "gewws"). In the remaining half, the target word was a short, medium, or high frequency, word (bike, chair, etc.). In the experimental Self-prime trials, the prime "ik" (I in Dutch) and "mij" (me) were each used 18 times. The 36 control primes all contained the prime "de" (the). The practice trials did not have a prime. All primes were evenly divided over the targets so that half of the experimental primes had a nonword as a target whereas the other half had a word as a target.

The computer was programmed to remove the letter string from the screen after participants had pressed the word/no word key, or at a maximum word time. This maximum time varied. It was programmed to be 450, 500, 550, 600, 650, or 700 ms, each used on 12 trials and on 2 practice trials. The range of maximum word times varied because it allowed for more individual differences in mean response time, and in addition it prevented subjects from judging responsibility just by some timing heuristic for when the word was removed.

As a measure of feeling of authorship, subjects were asked to decide whether it was they themselves or the computer that was responsible for the removal of the letter string following each trial ("Was it you or was it the computer?"). Responses were made on a six-point scale ($1 =$ I'm sure it was me, $2 =$ I think it was me, $3 =$ If I would have to guess I'd say it was me, $4 =$ If I would have to guess I'd say it was the computer, $5 =$ I think it was the computer, $6 =$ I'm sure it was the computer). The practice trials were presented immediately before the actual task to give participants a feel for the task.

Results and discussion

Response times

There were no differences in response time for different primes ($M = 487$ ms). Also, the percentage of trials where participants did indeed beat the computer (80.9%) did not differ between different primes.

Feelings of authorship

Reported feelings of authorship were recoded so that higher scores indicated greater feelings of own authorship. The mean overall feeling of authorship was calculated for the word and the nonword trials, and for the experimental and the control prime. These means were subjected to a within-subjects analysis of variance. Feeling of authorship was indeed higher after Self-primes ($M = 3.83$, $SD = .68$) than after control primes ($M = 3.64$, $SD = .74$), $F(1, 14) = 5.02$, $p < .05$, $\eta^2 = .21$.

Experiment 2: Computer primes

In Experiment 1 authorship ascriptions to the self increased following priming with the self, which provides evidence that agent-relevant thoughts act as cues in authorship processing. As a follow-up, we examined whether feelings of authorship could also be influenced by thoughts of external agents—one that might also be responsible. In Experiment 2 we tested whether feelings of authorship might decrease after thoughts of an external agent. As in Experiment 1, participants performed lexical decision tasks on a computer. Because the competitor in this task was the computer, we primed subjects with thoughts of the computer just before action. We expected that thoughts of the computer would result in greater attributions of authorship to the computer, and decreased attributions to the self.

Methods

Participants

Thirty people (19 women and 11 men) were recruited through advertisements in the Psychology Department at Harvard University. Volunteers received payment of five dollars for participation.

Procedure

Much of the procedure in Experiment 2 was the same as Experiment 1. Participants were instructed to press the "word" key (E) when the letter string was a word, and the "not word" key (O) when it was a nonword. These keys were labeled for participants. Subjects completed a total of 112 lexical decision trials and 4 practice trials. Each trial included a 250 ms premask (XXXXXX), 15 ms exposure to the prime, 50-ms postmask (XXXXXX), and the target letter string. In half the trials the letter string was a word, in half the trials the letter string was a nonword. The prime "Computer" was used on 56 trials. Two different control primes were each used in 28 trials; the word "Broccoli," and a series of lowercase X's ("xxxxxx".) We opted to use lowercase X's to maintain the flickering effect that was seen on the other trials. As in Experiment 1, the computer removed the target letter string if the subject pressed the word/not word key, or at the maximum word time, whichever came first. The maximum word times were programmed to be 450, 500, 550, 600, 650, 700 or 750 ms, each used on 16 trials. Order of trials was generated randomly. The target words and nonwords were selected randomly from a list for each trial. As an awareness check, subjects were asked at the end of the study whether they saw any words appear on the computer screen before the appearance of the target words.

Results and discussion

Response times

There were no differences in response time for different primes ($M = 500$ ms). Also, the percentage of trials where participants did indeed beat the computer (63.4%) did not differ between different primes. No subjects reported that they could detect the subliminal primes before the appearance of the target words.

Feelings of authorship

Reported feelings of authorship were recoded so that higher scores indicated greater feelings of own authorship. The mean overall feeling of authorship was calculated for all trials, and for each specific prime. There was an overall difference among the three primes on feelings of authorship, $F(2, 28) = 5.13$, $p < .05$, $\eta^2 = .27$. Ratings of authorship did not differ between the two control primes, $F(1, 29) = .62$, ns, and so the control trials were collapsed together. Supporting our hypothesis, feelings of authorship decreased when subjects were primed with "Computer" ($M = 3.87$, $SD = .76$) as compared with control primes ($M = 4.05$, $SD = .89$, $F(1, 29) = 7.89$, $p < .01$, $\eta^2 = .21$).

Experiment 3: God primes

In Experiment 2 we found that priming thoughts of a competing agent prior to an action decreased attributions to the self and increased attributions to the competitor. Together with Experiment 1, this provides evidence that agent-relevant thoughts influence authorship processing such that attributions are consistent with the agent-relevant thoughts one has before action.

In the following experiment, we were interested in whether thoughts of supernatural agents might also affect authorship processing. God is an external agent, and so thoughts one has about God before action should decrease attributions to the self for that action. As argued in the Introduction, our authorship processing view entails that people will have a default agent accessible (generally self) and priming a potential rival agent will reduce experienced authorship. It is important to note that this does not necessarily have to coincide with explicit awareness of increased agency for this rival agent. In our computer task, which is the same as in Experiments 1 and 2, we will not ask participants whether it was them or God who took the word from the screen. The suggestion of such as explicit attribution to God would be preposterous for almost all people. Instead, we ask participants, as we did in the earlier studies, whether it was them or the computer. Given that the self is the default agent in the paradigm we used (the agency scores are generally leaning towards the "self" end of the scale) and assuming that God is seen as a plausible rival to the self (and not to a computer), we predict that priming God will reduce authorship.

However, authorship attributions can only be made to agents that are capable of creating the action. If a person does not believe God to be a capable agent, she will not alter her attributions based on thoughts about God. In conclusion, Experiment 3 tested two hypotheses: First, that priming participants with the word "God" would decrease attributions made to the self. Second, that this effect is moderated by belief in God, with differences in attributions to the self occurring only among believers.

Methods

Participants

Fifty-five undergraduate students (41 women and 14 men) from the Radboud University Nijmegen participated in the experiment. They received Dfl. 5 (about 2.5 US dollars) in return.

Measures and stimuli

The same instructions and procedure from Experiment 1 were used. Participants completed 72 lexical decision trials and 12 practice trials. In the 36 experimental God prime trials, the prime "God" was used. The 36 control primes all contained the prime "de" (the). The practice trials did not have a prime. All primes were evenly divided over the targets so that half of the experimental primes had a nonword as a target whereas the other half had a word as a target.

At the very end of the experimental session we asked participants whether they believed in God. The experimental session contained other experiments that were administered between the current experiment the question about belief in God, so that the question about belief was asked 35–45 min after participants performed the main task. We simply asked them "Do you believe in God?" and they were requested to either press a "yes" key or a "no" key. Twenty participants indicated they did believe in God, whereas 35 indicated that they did not.

Results and discussion

Response times

There were no differences in response time for different primes ($M = 492$ ms). Also, the percentage of trials where participants did indeed beat the computer (80.1%) did not differ between different primes or between believers and non-believers.

Feelings of authorship

The mean overall feeling of authorship was calculated for the experimental God and the control prime. These means were subjected to a 2 (belief in God: Yes versus No) × 2 (prime: God versus Control) mixed analysis of variance. The main effect for Belief was significant, $F(1,53) = 4.45$, $p < .05$, $\eta^2 = .08$, however, this effect was qualified by the two-way interaction, $F(1,53) = 5.49$, $p < .05$, $\eta^2 = .10$. As expected, participants indicated less authorship after being primed with God, but this effect was only obtained for believers. Compared to authorship after control primes, believers experienced less authorship after God primes, $F(1,53) = 4.14$, $p < .05$, $\eta^2 = .07$. Furthermore, for the non-believers the control prime and God prime conditions did not differ on authorship, $F(1,53) = 1.43$ ns. Means are shown in Table 1.

The results of Experiment 3 supported our predictions. Among believers, people felt decreased authorship when primed with God. This was not so for non-believers, who were unaffected by the God prime.

It should be noted that we assessed whether participants believed at the end of the experiment. We did this because we did not want to draw attention to belief in God prior to the computer task in which we subliminally primed God. However, one could argue that the computer task may have affected the answers participants gave on the belief question. This is unlikely though. First, the priming of God was subliminal and therefore very subtle. Indeed, participants

Table 1
Feelings of authorship as a function of prime and belief in Experiment 3 (standard deviations in parentheses)

	Prime	
	Control	God
Believers	3.63[a] (1.30)	3.05[b] (1.42)
Non-believers	3.72[a] (1.24)	4.01[a] (1.03)

Means with different superscripts differ significantly.

were unaware of the prime. Second, we addressed the belief question only after a 35–45 min interval.

General discussion

The results of these studies provide evidence that subliminally primed thoughts about particular agents before an action impact the ascription of authorship for that action. In Experiment 1, subliminal primes of the self that were given before an action increased the personal feeling of authorship for that action. In Experiment 2, the feeling of authorship decreased after subjects were subliminally primed with the computer, an agent also capable of performing the target action. In Experiment 3, we found that feeling of authorship decreased when people were subliminally primed with God, a supernatural agent who could perform the target action. However, this was only the case for people who believe in God; non-believers did not differ in their feeling of authorship between primes.

There are several issues that should be addressed in the interpretation of these results. As we mentioned before, one issue concerns the possibility that the results obtained in Experiments 1 and 2 reflect a semantic priming effect (Neely, 1991) rather than an agent priming effect. Priming subjects with the word "computer" or the word "Me" might affect their preferences for responses that contain these target primes, regardless of their personal feelings of authorship. However, we obtained evidence for an agent priming effect in Experiments 3, in which the experimental prime word "God" was not seen in the measure of authorship attribution. This shows that there is more than semantic priming at work in these cases.

Another issue with the interpretation of these data is whether our manipulation might have affected actual authorship of action, rather than just the feeling of doing. If we impacted actual authorship through these subliminal primes, making people faster or slower on the lexical decision tasks, it would seem only reasonable that the participants' feelings of authorship be adjusted accordingly. However, the primes had no effect on either the participants' response time or actual success at beating the computer. This suggests that the feeling of authorship can be relatively independent of actual authorship in these studies, or at least that there is more to the feeling of authorship than genuine authorship.

It should be noted that there are potential boundary conditions for the effects we observed. Ambiguity is a prerequisite for the effects to occur. Someone who is fully convinced that a hurricane is caused by God (to punish a society), will probably not change his mind after being primed with an agent (God or other). However, the behavior participants performed in our experiments was not only ambiguous in terms of agency, but also relatively unimportant and neither very positive nor very negative. The effects we obtained may be attenuated for behaviors that are very important and consequential, at least in part because such behavior is often (though not necessarily always) not ambiguous. In addition,

the degree of positivity or negativity of ambiguous behavior may introduce a potential bias. We are inclined to attribute positive behavior more to the self, and negative behavior to external agents (e.g., Federoff & Harvey, 1976). This implies that effects of agency priming will be attenuated for extremely positive or negative behavior, because there is less room to maneuver. If very positive behavior leads to a strong feeling that the self is doing it, activating the self subtly may make little difference. These are speculations though, and further research may address such potential moderators related to the kind of behavior under consideration.

It is interesting to further scrutinize the findings of Experiment 3. We found that, among believers, priming God led to decreased experienced agency. The authorship processing view we propose can explain this finding with the assumption that heightened accessibility of an agents reduces the attribution to the default agent. In concrete terms, heightened accessibility of God reduced attribution of an action to the self, for believers at least. We would like to emphasize though, that we used the concept of "God" merely as a highly useful example of an external agent. The authorship processing view predicts that the effects can be generalized to other external agents.

The null results found for non-believers on God primes points to the importance of the perceived efficacy of a potential agent. It could have been the case that authorship processing is always consistent with any agent-relevant thoughts before action. For example, if I think about my Aunt Jean in Colorado before I bowl a strike in Connecticut, I could think she had done it, or if I look in the mirror before Ruud van Nistelrooij scores for Holland in the World Cup Soccer, I could think I had done it. Such attributions would not only be wrong, but completely absurd. Agent-relevant thoughts that occur before action should impact authorship processing only if that agent is perceived to be capable of that action. Thus, thinking about myself before a winning goal could increase attributions to myself if I am a player in the game, but not if I am watching it on television. For the same reason, people who did not believe in God were not impacted by the God primes, because God was not believed to be an agent.

The role of perceived agent efficacy could be examined in future studies. For example, if we had asked subjects about their attitudes on the omnipotence of God, we might have found that the effects were mediated by how powerful God was believed to be. In a similar vein, self-primes should have less authorship in those who have lower self-esteem, because these people should have less confidence in their own abilities. In fact, recent evidence points at this possibility. Self-primes led to lower rather than higher feelings of agency among dysphoric participants (Aarts, Wegner, & Dijksterhuis, 2006).

In addition to these general beliefs about the efficacy of various agents, a person may have a general tendency to perceive a particular agent as the most likely author, across many situations. For example, a person who had strong beliefs in God and His omnipotence could be more likely to judge Him to be responsible for actions (even in the absence of our subliminal primes). It seems likely that all people have some sort of agent framing that is their baseline in making authorship attributions. If the cues used in authorship processing are shortcuts to making these judgments, then agent framing is the map we use to draw those shortcuts.

In activities that one is directly involved, (e.g., playing a soccer game), the default agent frame may be the self. Research on locus of control has shown that people vary in the extent to which they perceive actions to be within their control, and the extent to which they are willing to make internal attributions for an outcome (Rotter, 1966; Seligman, 1975). Indeed, the results from the present studies suggest that most people have a general tendency to attribute authorship to the self when the self may be implicated; for all primes in all studies, attributions of authorship leaned more toward the self than the computer. However, the self is only one kind of agent frame that a person could use. The plane crash in Queens (NY) in November 2001 and the blackout in August 2003 that affected 50 million people in the United States and Canada had many people immediately thinking that terrorists had struck again. Many forms of paranoia also involve some agent frame, such as suspicions of government conspiracy or delusions of alien influence.

Agent frames may vary between people, but they are only a baseline for authorship processing. If such cues become more frequent over time, we could expect that the agent frame might shift to a different baseline. Several personal failures can make a person less prone to attribute authorship to the self, and several successes could promote the tendency to attribute agency to the self. Evidence from this study points to the temporary malleability of those agent frames by external cues and new information, in particular that they are influenced by agent-relevant thoughts, and are consistent with those thoughts.

Conclusion

The authorship of an action is not always clear, but several kinds of cues aid a person in judging who is responsible. In the present research, subliminal primes of the self before an action increased feelings of personal authorship for that action, subliminal primes of the competitor (computer) decreased feelings of own authorship, whereas subliminal priming of the inapplicable term Broccoli left felt authorship unaffected. When we extended the investigation to include supernatural agency, we found that subliminal primes of God decreased feelings of personal authorship, as had primes of the computer. However, this effect appeared only for those who believe in God. This is evidence that authorship attributions are influenced by agent-relevant thoughts, and are consistent with those thoughts, and that agent-relevant thoughts that a person has prior to action are one cue that is used during authorship processing. Genuine authorship for an action may not always be clear, so we rely on our thoughts as clues to discerning the most likely actor.

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