“Princess Alice is watching you”: Children’s belief in an invisible person inhibits cheating

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Abstract

Two child groups (5–6 and 8–9 years of age) participated in a challenging rule-following task while they were (a) told that they were in the presence of a watchful invisible person (“Princess Alice”), (b) observed by a real adult, or (c) unsupervised. Children were covertly videotaped performing the task in the experimenter’s absence. Older children had an easier time at following the rules but engaged in equal levels of purposeful cheating as the younger children. Importantly, children’s expressed belief in the invisible person significantly determined their cheating latency, and this was true even after controlling for individual differences in temperament. When “skeptical” children were omitted from the analysis, the inhibitory effects of being told about Princess Alice were equivalent to having a real adult present. Furthermore, skeptical children cheated only after having first behaviorally disconfirmed the “presence” of Princess Alice. The findings suggest that children’s belief in a watchful invisible person tends to deter cheating.

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Introduction

A growing body of experimental research suggests that supernatural beliefs can promote altruistic behavior and adherence to social norms, at least among adults (Bering, McLeod, & Shackelford, 2005; Shariff & Norenzayan, 2007; Sosis & Ruffle, 2004). For example, Bering and colleagues (2005) found that college students who were led to believe they occupied the same room as a ghost were better than control participants at inhibiting their motivation to cheat on a competitive laboratory task.
Likewise, Shariff and Norenzayan (2007) found that priming adults with religious words (e.g., God, sacred) increased their generosity in an economic game compared with a control group who received neutral primes. Presumably, supernatural beliefs promote prosocial behavior by eliciting reputational concerns about being watched and punished by “morally interested” supernatural agents (see Bering, 2006; Boyer, 2003; Johnson & Bering, 2006; Norenzayan & Shariff, 2008).

Despite the accumulating experimental evidence that supernatural beliefs promote altruism and rule following in adults, almost no evidence exists concerning the role of supernatural beliefs in children’s rule following. To fill this gap, in the current experiment we sought to test the hypothesis that belief in an invisible person inhibits cheating among children in an unsupervised context. Children were introduced to a novel invisible person (“Princess Alice”) and were explicitly asked whether they believed she was real. They then performed a challenging rule-based game in the absence of the experimenter. We hypothesized that children who professed belief in the invisible person would be less likely to cheat in the game compared with a control group of unsupervised children.

However, we also had reason to believe that the mere exposure of information about a watchful invisible person would inhibit cheating to a certain extent among “skeptical” children (i.e., children who reported not believing in Princess Alice) as well insofar as these children may harbor an unexpressed ambivalence about the invisible person’s watchful presence. Thus, we assessed children’s exploratory behavior aimed at testing the “presence” of Princess Alice (e.g., waving one’s hand over a chair where she is said to be seated) in addition to their explicit beliefs. Based on observations drawn from a previous pilot study, we expected that skeptical children would attempt to test their unexpressed ambivalence about the existence of the invisible person prior to cheating on the task and that this disconfirmation of Princess Alice’s presence would serve to undermine the inhibitory benefits of their exposure to information about the invisible person. Such a hypothesis is consistent with research suggesting that children actively test their assumptions about the natural world rather than blindly accepting every proposition presented to them by adults (Gopnik, Meltzoff, & Kuhl, 1999; Harris, 2007). For example, young children reject information from adult informants who repeatedly present falsifiably inaccurate information (Koenig & Harris, 2005). Thus, as our second hypothesis, we predicted that children who expressed disbelief in the invisible person would engage in agent-directed exploratory behavior prior to cheating on the task.

In addition to comparing a group of unsupervised children exposed to an invisible person with an unsupervised control group, in the current design we included a comparison group of actually supervised children. Research suggests that children’s rule compliance in the absence of adult supervision improves as children’s inhibitory control develops (Kochanska, Coy, & Murray, 2001; Kochanska, Murray, & Coy, 1997; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996). Inhibitory control involves the capacity to suppress inappropriate responses or impulses. According to Kochanska (2002), children pass through at least two stages of behavioral compliance: from “situational compliance” (i.e., halfhearted compliance that is contingent on sustained parental control) to “committed compliance” (i.e., wholehearted self-regulated compliance with parental norms). This developmental shift from situational to committed compliance usually occurs within the first 4 years of life (Kochanska et al., 2001), although improvements continue on into school age (Kochanska et al., 1997). Given these developmental differences, we assessed several components of children’s temperament that might affect their level of committed compliance, including inhibitory control and impulsivity, via parental ratings of children’s temperament. We hypothesized that older children would have an easier time at following the rules than younger children due to their developmental advances in inhibitory control. Most important, however, we hypothesized that belief in a watchful invisible person would inhibit cheating over and above individual differences in children’s temperament.

Method

Participants

Participants were 39 5- and 6-year-olds (M = 5.76 years, SD = 0.58) and 29 8- and 9-year-olds (M = 8.86 years, SD = 0.74) from Belfast, Northern Ireland. Among these children, 1 6-year-old failed
to demonstrate comprehension of the task and, therefore, was omitted from the sample, leaving a total of 67 children (36 female and 31 male). Regarding ethnicity, 76% were from White European families and 24% were from mixed or other ethnic backgrounds. Although religious backgrounds of the children were not collected, there is reason to believe that our sample was religiously diverse; many of our participants were drawn from a university area and were from highly educated and/or ethnically diverse families. The age groups were selected on the basis of a pilot study that found that children younger than 5 years of age were unresponsive to our invisible person manipulation and that by 7 years of age children readily voiced their doubts about the existence of the invisible person.

**Design and measures**

The design was a 3 (Condition) × 2 (Age Group) factorial: invisible agent (n_{5–6} = 14, n_{8–9} = 9), adult supervision (n_{5–6} = 10, n_{8–9} = 10), or no supervision (n_{5–6} = 14, n_{8–9} = 10).

**Invisible agent manipulation**

To introduce the invisible person, children in the invisible agent condition received the following information from the experimenter:

Before we begin the game, I would like to introduce you to someone very special. Her name is Princess Alice. Have you ever heard of Princess Alice? [No child said “yes.”] Well, let me tell you about her. Princess Alice is a friendly magical princess with a special ability. [She was described as “friendly” to reduce the risk of frightening children.] Do you think you know what her special ability is? [No child guessed right.] Well, let me tell you. Princess Alice can make herself invisible. Do you know what invisible means? [Most children said, “It means you can’t see her.”] That’s right—it means that you cannot see her even though she’s there! And guess what? Princess Alice is in the room with us right now and she is sitting in that chair. [The experimenter pointed to an empty lab chair. See Fig. 1 for the experimental setup.]

In the adult supervision condition, an unfamiliar female adult confederate was seated in the same lab chair on which children from the invisible agent condition were told Princess Alice was seated. These children were informed that the confederate was there as a silent observer and would not be playing the game with them. The confederate was instructed to minimize interaction with children (e.g., no talking) while continuously observing them throughout the session. In keeping with the “friendly” nature of Princess Alice, the confederate was instructed to maintain a natural neutral expression throughout the session but to gently smile at children if they attempted to engage with the confederate (so as not to frighten children). In the control condition, children did not receive any information about the invisible agent, nor were they supervised by an actual person; they were simply led to believe that they were left alone in the room during the rule-following task.

**Belief in the invisible person and exploratory behavior**

For those children randomly assigned to the invisible agent condition, belief in the invisible agent was measured with both an open-ended question and agent-directed exploratory behavior. As a measure of explicit belief, children in the invisible agent condition were asked, “I want to know what you think. Do you think Princess Alice is real?” The question was framed in terms of children’s personal beliefs to discourage socially desirable responses. This occurred immediately after being introduced to the invisible person. Responses were scored in terms of degree of belief in Princess Alice (yes = 2, maybe = 1, no = 0). For the current purposes, children who answered “no” are referred to as “skeptical” children and children who answered “yes” are “nonskeptical” children (children who answered “maybe” are treated separately from both skeptical and nonskeptical children). A trained independent rater (blind to the hypotheses) coded instances of and latency to first instance of agent-directed exploratory behavior, which included (a) reaching for the invisible agent or feeling over her chair (for an example, see Fig. 1) and (b) visually attending to or gazing at Princess Alice’s chair. For obvious reasons, both of these measures were used for the invisible agent condition only.
Rule-following throwing game

The throwing game was adapted from Kochanska and colleagues (1997). Children threw Velcro balls at a target to win a prize of their choice (a toy, a diary, or art supplies). To win, at least one ball needed to stick to the center of the target while children followed three rules. Children were instructed that they had an unlimited number of attempts to strike the center of the target. The three rules were (a) throwing the balls from behind a line marked on the ground approximately 6 feet from the target, (b) throwing with their nondominant hand only (a wristband was worn on the correct hand as a memory aid), and (c) throwing while facing away from the target (i.e., throwing behind their back). The rules were meant to create a virtually impossible task where children would be motivated to break at least one of the rules. Nevertheless, violations of the three rules were inherently ambiguous in terms of their intentional (vs. accidental) nature. However, an incontrovertible measure of intentional or full-blown cheating (labeled “full cheating”) occurred when children manually placed a ball on the center of the target in clear violation of multiple rules. Therefore, this full cheating response (i.e., latency to first full cheat) served as our primary measure of cheating.

Dependent measures

The experimenter and an independent rater (blind to the hypotheses) coded videos of the 3-min trials for frequency of rule breaking (i.e., number of wrong-handed throws, line crossing, and facing forward) and latency of rule breaking (i.e., lapsed time to first rule violation). Interrater agreement was high (frequencies: \( \alpha = .90–1.00 \); latencies: \( \alpha = .95–.99 \)). Frequencies and latencies of the three rule violations were separately aggregated into indexes of wrong throws and rule-breaking latency, respectively. Full cheating latency (i.e., lapsed time to first full cheating response) served as our third and most important measure.

Temperament in Middle Childhood Questionnaire

Parents completed a shortened version of the Temperament in Middle Childhood Questionnaire (TMCQ) (Simonds & Rothbart, 2004), a parental report questionnaire that provides a multicomponent index of temperament during middle childhood. Only those TMCQ components deemed as relevant to rule following and supernatural beliefs were included in the current study, and these were activation control (capacity to perform an action when there is a strong tendency to avoid it), activity level (level of gross motor activity, including rate and extent of locomotion), affiliation (desire for warmth and closeness with others), attention (capacity to maintain attentional focus on tasks), fantasy/openness
(active imagination and curiosity), fear (negative affectivity within potentially threatening situations), impulsivity (speed of response initiation), inhibitory control (capacity to plan and suppress inappropriate approach responses under instructions or in novel situations), and shyness (slow or inhibited speed of social approach). In particular, fantasy/openness and shyness were expected to relate to belief in Princess Alice, based on previous findings (Taylor, 1999), whereas impulsivity and inhibitory control were expected to relate to cheating inhibition, as found in previous research (Kochanska et al., 1997). Internal reliabilities (Cronbach’s $\alpha$) ranged from .71 to .90.

**Procedure**

Children were tested individually in a campus laboratory by a male experimenter (the first author). All sessions were covertly videotaped and lasted approximately 20 to 30 min. When children first arrived with their parent(s), they performed a warm-up game with the experimenter that involved throwing balls at the target prior to the administration of the rules. Next, parents were moved to a separate adjacent room and filled out the TMCQ while children were instructed on the task. After receiving the instructions, children performed a pretest to demonstrate that they comprehended the rules of the game. This pretest entailed performing six sequential throws without violating any of the rules. After the pretest, children performed the game on their own following a cover story where the experimenter removed himself from the room for 3 min. In the experimental conditions, before leaving, the experimenter reminded children that Princess Alice (or the female confederate) would be “watching” them. When the experimenter returned, he revealed that he had accidentally given children the wrong rules, and so they played an amended version of the game that guaranteed they received a prize. At the end, children were verbally debriefed and it was made clear to them that Princess Alice was “not real” but rather “pretend”.

**Results**

**Preliminary analysis of gender**

Preliminary analyses with gender included as an independent variable revealed no main effect of gender or interaction effect on any of the dependent measures (all $p$s > .12). Thus, gender was omitted from further analysis.

**Overview of main analyses**

To test the first hypothesis that children who expressed belief in Princess Alice would inhibit their cheating more than the control group, we conducted a chi-square analysis of full cheating occurrences by condition and a 2 (Age) × 3 (Condition) between-subjects analysis of variance (ANOVA) on full cheating latency, followed by planned contrasts. This was done first with all children in the analysis and then with skeptical children omitted. To test the second hypothesis that skeptical children would engage in exploratory behavior prior to cheating, we conducted a paired samples $t$ test of skeptical children’s exploratory behavior latency and full cheating latency. To test the hypothesis that older children would have an easier time at following the rules than younger children, we conducted a 2 (Age) × 3 (Condition) multivariate analysis of variance (MANOVA) on wrong throws and rule-breaking latency scores, followed by simple effects tests. Finally, to assess the hypothesis that belief in the invisible person would inhibit cheating over and above children’s temperament, we conducted a hierarchical regression of expressed belief and temperament variables on full cheating latency.

**Belief in the invisible person and cheating**

With all children in the analysis, there was a nearly significant main effect of condition on occurrences of full cheating (invisible person = 26%, supervision = 10%, no supervision = 42%), $\chi^2(2) = 5.58$, $p = .06$, and a significant main effect of condition on full cheating latency, $F(2, 61) = 3.44$, $p = .04$,
$\eta^2 = .10$, but no effect of age, $F(1, 61) < 1$, ns (interaction $F < 1$, ns). Simple contrasts revealed that greater resistance to cheating in the adult supervision condition ($M = 168.60, SD = 39.51$) compared with control ($M = 122.13, SD = 75.72$), $t(64) = 2.58, p = .01$, was the primary source of the main effect. However, full cheating latency was also greater for the invisible agent condition ($M = 150.09, SD = 54.44$) compared with control, albeit not quite significantly, $t(64) = 1.61, p = .11$, with all children in the analysis.

In the invisible agent condition, 11 children (48%) professed belief in Princess Alice, 5 (22%) were unsure, and 7 (30%) professed their disbelief. Consistent with our pilot study, older children were significantly more skeptical of Princess Alice being real (yes = 11%, maybe = 44%, no = 44%) than younger children (yes = 71%, maybe = 7%, no = 21%), $\chi^2(2) = 8.63, p = .01$. An independent $t$ test of skeptical versus nonskeptical children of all ages showed that children who professed belief in the invisible person resisted cheating to a significantly greater degree ($M = 164.27, SD = 52.16$) than children who professed disbelief ($M = 106.43, SD = 54.71$), $t(16) = 2.25, p = .04$. In terms of cheating frequency, only 1 of 11 children (9%) who professed belief or uncertainty manually placed the ball on the target, whereas 5 of 7 children (71%) who professed disbelief committed a full cheating response, and this difference was significantly greater than chance occurrence, $\chi^2(1) = 7.48, p = .006$.

Importantly, when the 7 children who professed disbelief in the invisible agent were removed from the sample and contrasts of the three conditions were conducted a second time, the contrast between the invisible agent and control conditions for full cheating latency was significant ($Ms = 169.19$ and 122.13, respectively), $t(57) = 2.53, p = .01$, and the means for the two experimental conditions were equivalent (see Fig. 2); that is, as predicted, children who professed belief in the invisible agent displayed significantly greater resistance to cheating than control participants and at a level equal to children in the adult supervision condition.

![Fig. 2](image_url). Mean full cheating latency as a function of children’s age (in years) and condition, with skeptical children removed from the analysis. With skeptical children removed, cheating latencies from both experimental conditions were significantly different from control (with $\alpha = .05$).
Exploratory behavior and timing of cheating among skeptical children

Among children in the invisible person condition, expressed belief correlated negatively with the amount of exploratory reaching for Princess Alice, \( r(23) = -24 \), \( p = .27 \), albeit not significantly. Belief did not correlate with visual attending to her chair, \( r(23) = .09 \), ns. In other words, skeptical children were more likely to reach for Princess Alice than nonskeptical children, but skeptical children were equally likely to visually search for her. Of the 5 skeptical children who committed a full cheating response, all of them engaged in some kind of exploratory behavior aimed at testing the presence of Princess Alice (see Fig. 1). These skeptical children engaged in exploratory behavior for, on average, \( 63.00 \) s (SD = 63.94) prior to engaging in a full cheating response. The paired samples \( t \) test confirmed that this duration of time was nearly significant, \( t(5) = 2.41, p = .06 \). Thus, as we hypothesized, skeptical children’s full cheating occurred only after they first obtained disconfirming evidence for Princess Alice’s existence (e.g., reaching for Princess Alice and feeling nothing there).

Age and rule breaking

As expected, there was a significant main effect of age on rule-breaking latency, \( F(1, 61) = 9.00, p < .01 \), \( \eta^2 = .13 \), with older children violating rules later (\( M = 144.29, SD = 38.30 \)) than younger children (\( M = 106.66, SD = 56.32 \)), but no effect of condition, \( F(2, 61) = 1.65, p = .20, \eta^2 = .05 \) (interaction \( F < 1, ns \)). There was no main effect of age or condition on wrong throws (\( ps > .20 \)). However, there was a significant interaction of age and condition, \( F(2, 61) = 3.48, p = .04, \eta^2 = .10 \). Simple effects tests revealed that for older children, adult supervision led to fewer wrong throws (\( M = 0.80, SD = 1.32 \)) compared with the invisible agent (\( M = 3.89, SD = 3.82 \)), \( t(26) = 2.06, p = .05, \) and control (\( M = 3.90, SD = 4.01 \)), \( t(26) = 2.12, p = .04 \). Unsupervised children and children in the invisible agent condition did not differ (\( t = 0 \)). For younger children, information about an invisible person led to fewer wrong throws (\( M = 4.64, SD = 4.73 \)) compared with adult supervision (\( M = 10.80, SD = 10.45 \)), \( t(35) = 2.07, p = .05 \), but not significantly fewer than control (\( M = 7.14, SD = 6.38 \)), \( t(35) = 1.23, p > .22 \). The contrast of control and supervision was not significant (\( p > .35 \)). A simple effects test of the effect of age on wrong throws within the adult supervision group revealed that younger children made significantly more wrong throws (\( M = 10.80, SD = 10.45 \)) than older children (\( M = 0.80, SD = 1.31 \)), \( F(1, 18) = 9.01, p = .008, \eta^2 = .33 \). However, there was no difference due to age within the other two conditions (\( Fs < 2.01, ps > .16 \)).

Thus, in sum, older children were able to resist breaking the rules longer than younger children. Moreover, the presence of a watchful adult led to fewer wrong throws for older children than imagining an invisible person or no supervision, whereas the presence of a watchful adult led to more wrong throws among younger children compared with the imagined presence of a watchful invisible person (see Discussion for possible explanations for this latter unexpected finding).

Belief in the invisible person and individual differences in temperament

A preliminary ANOVA revealed that there were no differences in any of the temperament variables across conditions (all \( ps > .20 \)). Simple correlations revealed three components of temperament that correlated with full cheating latency: activation control, \( r(67) = .26, p = .04 \), fear, \( r(67) = -.27, p = .03 \), and shyness, \( r(67) = -.24, p = .05 \) (all other \( ps > .07 \)). Although inhibitory control had a positive relationship with cheating inhibition, \( r(23) = .16, p = .20 \), it was not significant. The only component of temperament that correlated with expressed belief in Princess Alice was shyness, \( r(23) = -.43, p = .04 \), an inverse relationship (all other \( ps > .14 \)). Unexpectedly, fantasy/openness failed to correlate significantly with expressed belief, although the correlation was in the expected direction, \( r(23) = .29, p = .18 \).

To test whether individual differences in children’s temperament could not explain the role of expressed belief in inhibiting cheating; a hierarchical regression was conducted on full cheating latency for children in the invisible agent condition. Degree of belief in Princess Alice (\( yes = 2, maybe = 1, no = 0 \)) was entered into the regression first (step 1), followed by the relevant temperament variables at step 2. As depicted in Table 1, belief explained a significant proportion of the variance at step 1 and
remained a significant predictor of cheating latency at step 2. In addition, impulsivity and fear emerged as significant negative predictors of full cheating latency; the more impulsive and fearful children were, the quicker they engaged in a full cheating response. In summary, although impulsivity and fear predicted cheating, these components were unrelated to belief in the invisible person, and expressed belief explained a significant proportion of cheating inhibition not explained by individual differences in children’s temperament.

Discussion

As hypothesized, children who professed belief in the invisible person were less likely to cheat on a challenging rule-based game than children who simply performed the task in the absence of adult supervision. Moreover, children who professed belief in the invisible person resisted cheating equally to children who performed the same task in the presence of an actual watchful adult. In contrast, the majority of skeptical children fully cheated on the task at some point in the experiment. However, investigation of the timing of skeptical children’s transgressions and their exploration of the alleged invisible person revealed that most of these skeptical children were secretly ambivalent about her presence. In fact, it was not until they confirmed their null hypothesis about the existence of Princess Alice that they went on to cheat on the task. In short, belief in the invisible person (whether expressed or unexpressed) helped children to resist cheating in the absence of the experimenter’s supervision. Moreover, belief in the invisible person predicted cheating inhibition over and above the influence of children’s temperament, including individual differences in impulsivity and fearfulness.

Our findings are consistent with previous findings demonstrating the prosocial effects of priming adults with supernatural agents (Bering et al., 2005) or religious concepts (Shariff & Norenzayan, 2007) and, more broadly, with an evolutionary rationale (Bering, 2006; Boyer, 2003; Johnson & Bering, 2006; Norenzayan & Shariff, 2008) arguing that the representation of watchful supernatural agents afforded ancestral humans with adaptive social benefits (i.e., inhibiting selfish behavior under conditions in which the threat of actual human detection was underestimated and, therefore, may have protected an individual’s reputation). Our findings are also consistent with theory and research suggesting that children’s ability to reason about supernatural agents develops naturally alongside their ability to reason about natural human agents (Barrett, 2000; Kelemen, 2004; Lane, Wellman, & Evans, 2010).

Importantly, the current findings demonstrate that the prosocial effects of imagining morally concerned supernatural agents are not limited to adults (e.g., Bering et al., 2005) but rather extend to children as young as 5 or 6 years of age. Second, they demonstrate that the prosocial effects of priming thoughts about supernatural agents are not limited to culturally based religious concepts (e.g., God, ancestral spirits) but rather are easily generalized to novel supernatural agents to which children have had no previous exposure. Finally, our findings suggest that it is not just “believers” who benefit from

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Note: Belief was scored in terms of responses to the question, “Do you believe that Princess Alice is real?” (yes = 2, maybe = 1, no = 0). Belief was entered at step 1, and temperament variables were entered at step 2. Belief remained a significant predictor of full cheating latency even after controlling for children’s temperament.

* $p < .05$.
** $p < .01$.  

Table 1
Hierarchical regression analysis of full cheating latency in the invisible agent condition.
the cognitive capacity to represent supernatural agency; even skeptical children, who professed their disbelief in the invisible person, were reluctant to cheat until they had gathered enough empirical evidence that Princess Alice was indeed not real. This suggests the intriguing hypothesis that supernatural agent concepts may, under certain conditions, motivate even skeptics to refrain from antisocial behavior.

It is currently unclear, however, which specific aspects of our manipulation motivated rule compliance. Were those children who followed the rules in the Princess Alice condition doing so simply to please her, because they were afraid of her punishing them for cheating, or because they were afraid that she would somehow communicate their misdeeds to the experimenter? Future work in this area, therefore, would benefit from controlled manipulations of specific aspects of the supernatural agent (e.g., her character, perceptual capacities, and communicative abilities). In addition, it is unclear why being primed with a supernatural agent concept led to fewer wrong throws among younger children than having an actual watchful adult present in the room (although not less so than the control condition). One possibility is that young children interpreted the watchful adult’s gentle smiling and ostensibly reluctant to reprimand them (social cues that were absent in the invisible agent condition) as a tacit endorsement of their rule breaking while failing to consider the confederate as a potential confidant of the experimenter. In contrast, older children may have been more concerned with the watchful adult or invisible agent reporting their rule violations to the experimenter. In short, developmental advances in the understanding of tattling and gossip (see Hill & Pillow, 2006; Ingram & Bering, 2010) might explain why an adult’s watchful presence promoted rule adherence among older children but not among younger children. However, it is important to point out that these differences due to age are limited to acts of rule breaking that were potential accidents. In contrast, the two age groups performed at equivalent levels with respect to full-blown cheating.

Finally, although Princess Alice was presented as a “real” agent rather than as a pretend character, it is still possible that some children inferred such a make-believe context. However, nothing in the experimenter’s tone or speech indicated that it was a play context. The experimenter presented Princess Alice in a factual manner and solicited children’s personal beliefs on the matter. Regardless of the reasons behind children’s expression of belief, those who stated that they believed in the supernatural agent adhered more closely to the rules. Of course, because we could not experimentally manipulate children’s belief in Princess Alice, the possibility remains that another variable might better explain the observed findings; for example, it may be that children who expressed belief in Princess Alice have internalized the importance of following rules to a greater extent than children who expressed disbelief, or perhaps nonskeptics were more motivated to please the experimenter. Future studies should address these issues by comparing the inhibitory effects of supernatural agent primes in a context of pretend play versus one of serious instruction while controlling for individual differences in children’s commitment to following rules.

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References