

Non-Reflective Thinkers Are Predisposed to Attribute Supernatural Causation to Uncanny Experiences

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Abstract

For unknown reasons, individuals who are confident in their intuitions are more likely to hold supernatural beliefs. How does an intuitive cognitive style lead one to believe in faith healing, astrology, or extrasensory perception (ESP)? We hypothesize that cognitive style is critically important after one experiences an uncanny event that seems to invite a supernatural explanation. In three studies, we show that irrespective of their prior beliefs in the supernatural, non-reflective thinkers are more likely than reflective thinkers to accept supernatural causation after an uncanny encounter with astrology and ESP. This is the first time that controlled experiments demonstrate the negative dynamics of reflection and supernatural causality attribution. We consider the possible generalization of our findings to religious beliefs and their implications for the social vulnerability of non-reflective individuals.

Keywords

cognitive style, intuition, dual-process theories, paranormal beliefs

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Introduction

Supernatural beliefs are widespread and influential: 80% of Americans believe in miracles (Pew Forum on Religion & Public Life, 2008), 40% believe in extrasensory perception (ESP), and 25% believe in astrology (Gallup, 2005), resulting in a multi-billion dollar psychic industry in the United States alone. Given this prevalence, a major challenge for the cognitive sciences is to identify the cognitive processes that enable or sustain supernatural beliefs (Brugger & Mohr, 2008). Considering the protean contents of supernatural beliefs, it would be tempting to assume that they derive from a multifaceted set of cognitive processes (Willard & Norenzayan, 2013). Recent research took a major step toward unification, though, with the application of the dual-process model of cognition to supernatural belief (Gervais & Norenzayan, 2012; Pennycook, Cheyne, Barr, Koehler, & Fugelsang, 2014; Pennycook, Cheyne, Koehler, & Fugelsang, 2013; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Razmyr & Reeve, 2013; Shenhav, Rand, & Greene, 2012).

The dual-process model applies to a large range of higher mental functions including reasoning (Evans, 2008), decision making (Kahneman, 2011), and moral judgment (Greene, 2013). The model typically assumes that information can be processed by a fast, intuitive, and automatic

cognitive route, and by a slow, reflective, and deliberate route whose output can override the output delivered by the intuitive route. Different individuals have different propensity to complete this reflective override of intuition (De Neys & Bonnefon, 2013). This propensity is typically indexed by the Cognitive Reflection Test (CRT) featured in Table S1 in the supplementary materials (Frederick, 2005). This test consists of three questions with a compelling yet incorrect intuitive response. Non-reflective thinkers tend to give a greater number of incorrect responses (because they trust their initial intuition) whereas reflective thinkers tend to give a greater number of correct responses (because they are willing to engage resource demanding analytic reasoning to question their initial intuition).

Recent research reported that believers in the supernatural gave a greater number of incorrect responses to the CRT (Gervais & Norenzayan, 2012; Pennycook et al., 2012; Razmyr & Reeve, 2013; Shenhav et al., 2012), and showed lesser performance on other tasks where analytic processing

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is thought to be necessary to override intuitions (Pennycook et al., 2014; Pennycook et al., 2013). Such results robustly establish the link between a non-reflective cognitive style and belief in the supernatural, but they are silent on the underlying causal mechanisms. Some have speculated that supernatural belief emerges from a suite of intuitions relative to, for example, psychological immortality and mind-body dualism (Gervais & Norenzayan, 2012). Others have suggested that reflective thinkers are more likely to “unbelieve” in the supernatural because they spot inconsistencies between the natural and the supernatural (Pennycook et al., 2014; Pennycook et al., 2012). Indirect evidence for this account was provided by data reported in Pennycook et al. (2014), showing that conflict detection in a reasoning task was negatively correlated with religious belief.

In broad agreement with this research program, we argue that cognitive style is critical when one experiences an uncanny event that seemingly invites a supernatural explanation. Dreaming of an event before it happens is a typical example of such uncanny events, whose supernatural causation may seem more intuitively compelling than a merely statistical explanation. Accordingly, we suggest that less reflective thinkers (in the sense of the dual-process model, as indexed by CRT score) are more likely to endorse the supernatural explanation of uncanny events (leading to the possible adoption of supernatural beliefs), compared with reflective thinkers who are more likely to override their intuition in favor of a mundane explanation.

Others before us speculated that people may develop paranormal beliefs because they misattribute paranormal causation to normal experiences (Wiseman & Watt, 2006). This approach has suffered from two limitations. First, it has proven difficult to identify the individual characteristics that predispose some people to such a misattribution (Dagnall, Drinkwater, Parker, & Rowley, 2014): Here we focus on cognitive style within the broader framework of the dual-process model, which links our account to a broad range of higher cognitive functions. Second, past research speculated about misattribution, but did not catch it in action: Here we report studies in that we set up participants to experience uncanny events, to catch them engaging in misattribution.

Study 1

Method

Participants. Participants of Study 1 (44 men and 33 women, $M_{\text{age}} = 21$) were told that the experiment investigated astrological sign as a predictor of personality. Our target sample size was 70 (based on a power of .80 to detect a correlation of .30 at the .05 level), and data collection ended at the end of the day when this target was reached. Participants were approached individually on campus and filled the consent form. No financial compensation was offered to participate, and sessions lasted between 10 and 15 min. At the end of

each session, participants were asked what the purpose of the study was, and they were then thoroughly debriefed about the objectives and the methods.

Materials and procedure. Participants completed the CRT, then the Paranormal Belief Scale (Tobacyk, 2004). In this and the following study, participants also completed a Religious Belief Scale. Including this control variable did not change the results of the regression analyses, and did not improve the fit of the models. Accordingly, we will not consider it any further. The Paranormal Belief Scale showed good reliability (Cronbach’s $\alpha = .86$). Participants provided their date of birth to the experimenter, who then started to work on their astral theme on his computer. During that time, the participants could not see the screen of the experimenter’s laptop. After 8 min, the experimenter showed the resulting personality profile to the participants. This profile was purportedly based on their astral theme, but was actually always the same. It consisted of 10 Barnum statements—that is, statements that ring true of about everyone. We provide its English translation here, the French version used in the experiment being available in the supplementary materials:

You have a great need for other people to like and admire you. You have a tendency to be critical of yourself. You have a great deal of unused capacity which you have not turned to your advantage. While you have some personality weaknesses, you are generally able to compensate for them. Disciplined and self-controlled outside, you tend to be worrisome and insecure inside. At times you have serious doubts as to whether you have made the right decision or done the right thing. You prefer a certain amount of change and variety and become dissatisfied when hemmed in by restrictions and limitations. You pride yourself as an independent thinker and do not accept others’ statements without satisfactory proof. You have found it unwise to be too frank in revealing yourself to others. At times you are extroverted, affable, sociable, while at other times you are introverted, wary, reserved. Some of your aspirations tend to be pretty unrealistic. Security is one of your major goals in life.

After studying the profile for about 2 min, the participants were asked to rate the accuracy of this description on a 7-point scale anchored at *this description is nothing like how I am* and *this description is exactly how I am*. In this first study, we use this rating (the Barnum index) as a proxy for participants’ acceptance of the efficacy of astrology for personality profiling. Finally, the participants were asked what the purpose of the study was. They were then thoroughly debriefed.

Results

Figure 1 displays the distributions and the correlations of our three variables of interest, as well as the partial regression plots showing the impact of CRT and prior paranormal belief on the Barnum index. We regressed the (standardized) Barnum index on participants’ standardized CRT score and

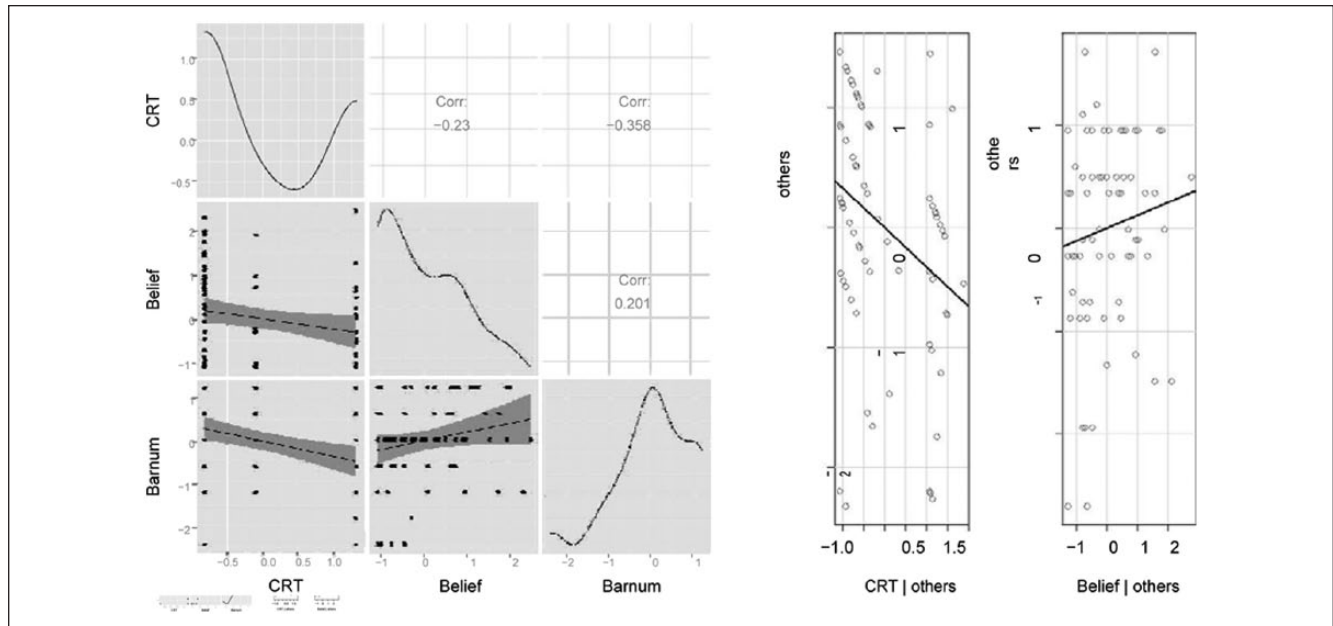


Figure 1. Main results of Study 1: Distribution of the standardized CRT score, prior belief in the paranormal, and Barnum index, together with pairwise correlations (left); partial regression plots showing the impact of CRT and prior paranormal belief on the Barnum index (right).

Note. CRT = Cognitive Reflection Test.

standardized prior belief in the paranormal. Whereas prior belief in the paranormal had no significant effect ($\beta = +.12$, $p = .26$, 95% confidence interval (CI) = $[-.09, +.34]$), CRT score negatively affected the Barnum index ($\beta = -.33$, $p < .004$, 95% CI = $[-.55, -.11]$).

In sum, although both reflective and non-reflective thinkers were likely to recognize the Barnum statements as correct descriptors of their personality, only the reflective thinkers appeared to suppress that belief, presumably on account of the dubious source of the Barnum description. This is consistent with the hypothesis that reflective thinkers were able to override the temporary intuition that astrology might result in an accurate personality profile. Non-reflective thinkers, however, appeared to accept their uncanny experience as evidence for the accuracy of astrology. A stronger test of our general hypothesis would nevertheless require an explicit assessment of the explanations (mundane or supernatural) that reflective and non-reflective thinkers endorse after an uncanny experience.

Study 2

Method

Participants. Participants of Study 2 (20 men and 44 women, $M_{age} = 21$) were told that the experiment investigated the possibility of a telepathic transfer of information from one person to another. Each session involved the experimenter and two participants, one of whom was in fact a secret confederate of

the experimenter, who attended each session. As a matter of convenience, data collection ended the day we came within reach of a target sample size of about 70 (based on a power of .80 to detect a correlation of .30 at the .05 level).

Materials and procedure. After the participants had completed the CRT and Paranormal Belief Scale, the experimenter explained that one participant would choose one card at a time from a set of five, and that the other participant would try to read the mind of the first to guess which card he or she had picked. To prevent participants from realizing that the experiment was rigged, a fake role allocation was conducted. The real participant was asked to choose between two pieces of paper, each purportedly bearing one word corresponding to a specific role (“Chooser” vs. “Reader”). In fact, both pieces of paper read “chooser,” ensuring that the confederate always ended up being the mind reader.

The protocol consisted of the chooser picking one card after the other from a classic Zener set (i.e., cards displaying one of five symbols: square, circle, cross, star, and wave), and the reader attempting to telepathically guess which card was picked. Participants could only see each other’s head and shoulders, and the mind reader could not possibly see the selected card. The instructions to the chooser were as follows: (a) shuffle the cards, (b) place them in front you, (c) choose one, and (d) pull the selected card toward you. At this stage, the experimenter turned to the mind reader and asked him to focus on the participant for guessing the card.

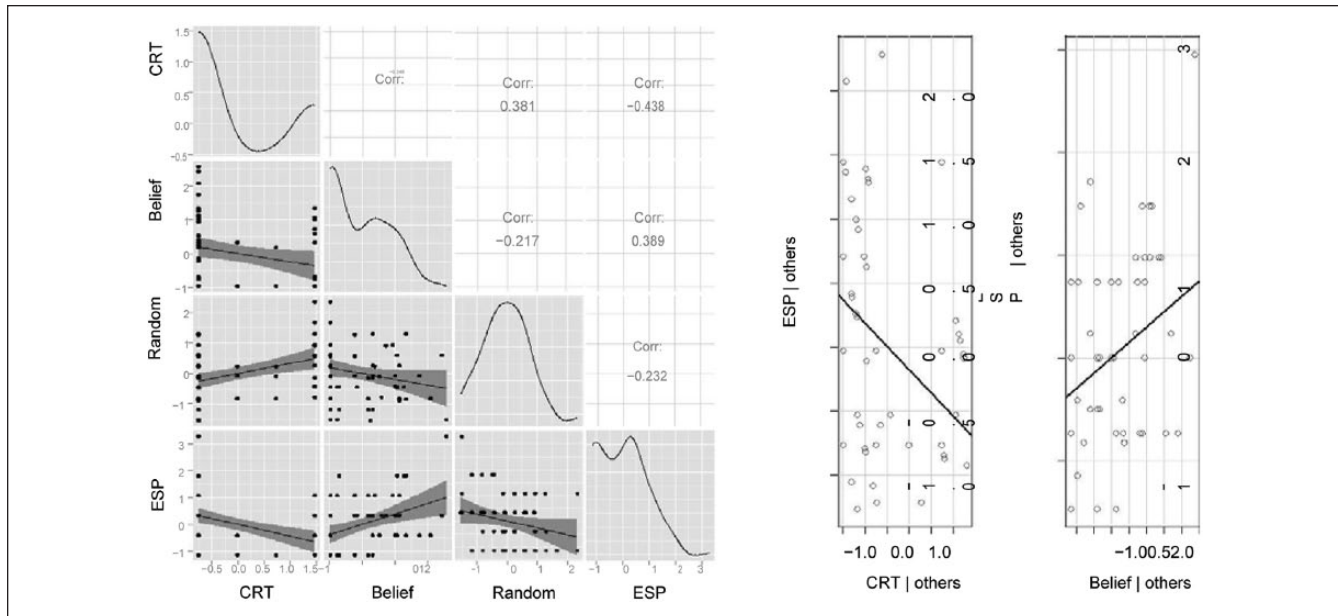


Figure 2. Main results of Study 2: Distribution of the standardized CRT score, prior belief in the paranormal, and endorsement of the randomness or extrasensory explanations, together with pairwise correlations (left); partial regression plots showing the impact of CRT and prior paranormal belief on endorsement of the extrasensory explanation (right).
 Note. CRT = Cognitive Reflection Test; ESP = extrasensory perception.

Because the experimenter was able to see the card chosen by the participant, he could discreetly communicate that information to the confederate by means of a pre-arranged code. The way the experimenter started his instruction to the reader (“Well now,” “Ok,” “Well ok,” “Well,” and “Please now”) corresponded to the star, the wave, the cross, the square, and the circle, respectively.

After three correct guesses, the participant (and, ostentatiously, the confederate) rated their agreement with three explanations of what just happened, on 7-point scales anchored at *strongly disagree* and *strongly agree*: “the result of this experiment can be explained by luck,” “the result of this experiment can be explained by probability,” and “the result of this experiment can be explained by a non-scientific phenomenon such as extrasensory perception.” The ratings of the first and second explanations were averaged to form an index of randomness as an explanation, whereas the rating of the third explanation served as an index of ESP as an explanation.

Finally, the participants were asked what, in their opinion, the purpose of the experiment was. Not a single participant expressed doubt about the cover story used in the experiment, or suspected that the other participant was a confederate. At this stage, participants were thoroughly debriefed about the deceptive nature of the study and its real objectives.

Results

Figure 2 displays the distributions and the correlations of our four variables of interest, as well as the partial regression plots showing the impact of CRT and prior paranormal belief

on the endorsement of ESP as an explanation. We regressed the (standardized) endorsement of the ESP explanation on participants’ standardized CRT score and standardized prior belief in the paranormal. This time, both prior belief in the paranormal ($\beta = +.30, p = .01, 95\% \text{ CI} = [+0.08, +.52]$) and CRT score ($\beta = -.36, p < .002, 95\% \text{ CI} = [-.58, -.14]$) had a significant impact. Intuitive thinkers, irrespective of their prior belief in the paranormal, were more likely to endorse ESP as an explanation of their uncanny experience. When we analyzed the endorsement of the mundane explanation, prior belief in the paranormal had no significant effect ($\beta = -.11, p = .28, 95\% \text{ CI} = [-.31, +.08]$), but the CRT score had a positive impact ($\beta = +.30, p = .005, 95\% \text{ CI} = [+0.10, +.50]$). Irrespective of their prior belief in the supernatural, analytic thinkers were more likely to endorse a mundane explanation of their uncanny encounter with mind reading. Specifically, they saw the event as a mere statistical fluke. Note that this result rules out the possibility that non-reflective thinkers accept just any explanation of the uncanny event: They are more likely to accept the supernatural explanation but less likely to accept the statistical explanation.

Study 3

Method

Study 3 aimed at providing a direct replication of Study 2, with two additions. First, we measured the degree to which participants perceived their experience as uncanny, and whether this feeling might be different as a function of their

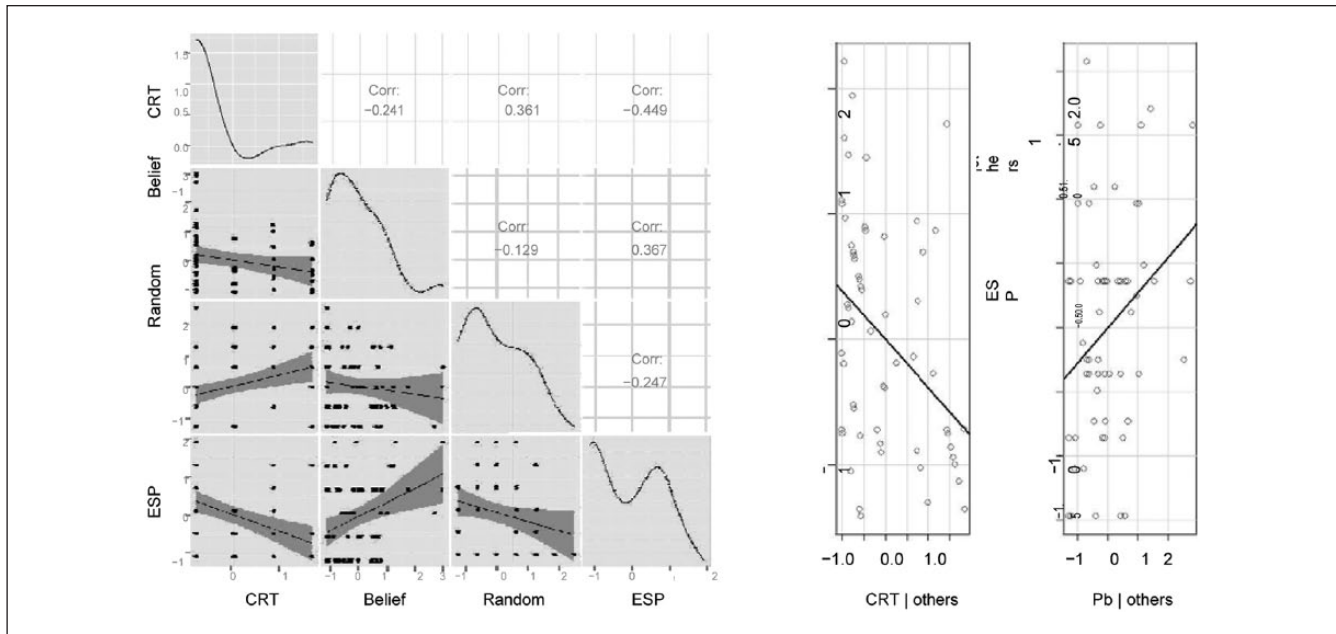


Figure 3. Main results of Study 3: Distribution of the standardized CRT score, prior belief in the paranormal, and endorsement of the randomness or extrasensory explanations, together with pairwise correlations (left); Partial regression plots showing the impact of CRT and prior paranormal belief on endorsement of the extrasensory explanation (right).

Note. CRT = Cognitive Reflection Test; ESP = extrasensory perception; Pb = paranormal belief.

CRT score or prior belief in the supernatural. Second, we measured posterior belief in the supernatural, to assess whether belief in the supernatural (as captured by the Paranormal Belief Scale) changed as a result of taking part in the experiment.

Accordingly, participants (31 men and 30 women, $M_{\text{age}} = 21$) went through exactly the same protocol as in Study 2, except for two additional measures at the end of the experiment. The first measure (of uncanniness) consisted of three items. Participants were asked whether what happened in the course of the experiment could be qualified as *mysterious* or *understandable* (left and right anchors of a 7-point scale), *strange* or *mundane* (left and right anchors of a 7-point scale), and *troubling* or *ordinary* (left and right anchors of a 7-point scale). The other additional measure simply consisted of taking the Paranormal Belief Scale a second time at the end of the study.

As in Study 2, participants were finally asked what, in their opinion, the purpose of the experiment was. Not a single participant expressed doubt about the cover story used in the experiment, or suspected that the other participant was a confederate. At this stage, participants were thoroughly debriefed.

Results

As expected, participants perceived their experience as uncanny. After reverse-coding the uncanniness items so that higher scores correspond to greater feelings of uncanniness,

and summing up the three items (leading to a composite score in the 3 to 21 range), we observed that 75% of participants obtained a composite score greater than the midpoint of 12. The 95% CI for the mean was [13.9, 15.4], significantly above the midpoint of 12. Furthermore, feelings of uncanniness were neither significantly correlated with CRT (95% CI for the correlation = [-.33, +.16]) nor with prior belief in the supernatural (95% CI = [-.13, +.36]). It would appear that reflective and non-reflective thinkers alike perceived the experience as uncanny.

Other results were entirely in line with the findings of Study 2 (see Figure 3). We regressed the (standardized) endorsement of the ESP explanation on participants' standardized CRT score and standardized prior belief in the paranormal. Both prior belief in the paranormal ($\beta = +.27$, $p = .02$, 95% CI = [+0.05, +.49]) and CRT score ($\beta = -.38$, $p < .002$, 95% CI = [-.60, -.16]) had a significant impact. Non-reflective thinkers, irrespective of their prior belief in the paranormal, were more likely to endorse ESP as an explanation of their uncanny experience. When we analyzed the endorsement of the mundane explanation, prior belief in the paranormal had no significant effect ($\beta = -.5$, $p = .72$, 95% CI = [-.29, +.21]), but the CRT score had a positive impact ($\beta = +.35$, $p = .007$, 95% CI = [+0.10, +.60]). Once again, irrespective of their prior belief in the supernatural, reflective thinkers were more likely to endorse a mundane explanation of their uncanny encounter with mind reading.

Belief in the supernatural did not increase overall after the experiment, $t(60) = 1.36$, $p = .18$, 95% CI = [-.17, +.89],

even when limiting the analysis to the items directly relevant to psychic powers, $t(60) = 0.56$, $p = .58$, 95% CI = $[-.25, +.45]$. This was also true for the 36 participants with the lowest possible CRT score of zero. Thus, the paranormal belief scale failed to capture any change in belief that would have resulted from the uncanny experience, a point to which we will return in the “General Discussion” section.

General Discussion

Participants in our studies experienced uncanny situations such as being accurately profiled by astrological means, or having their mind read by a confederate. Reflective and non-reflective thinkers did not differ in the degree to which they experienced these situations as uncanny—but they eventually settled on different explanations for what happened. Whereas non-reflective thinkers were more likely to embrace the supernatural explanation of their experience, reflective thinkers were apparently able to override their intuitive responses, to discard supernatural explanations, and to endorse a mundane explanation.

These findings shed new light on the previously observed correlation between cognitive reflectiveness and supernatural beliefs (Gervais & Norenzayan, 2012; Pennycook et al., 2014; Pennycook et al., 2013; Pennycook et al., 2012; Razmyar & Reeve, 2013; Shenhav et al., 2012). Indeed, we have offered the first demonstration of the dynamics of uncanny experiences, cognitive reflectiveness, and acceptance of supernatural causation. Uncanny experiences lead to intuitions about supernatural causation, which are then accepted or discarded as a function of cognitive reflectiveness. As they accrue with time, these intuitions about supernatural causation may solidify into supernatural beliefs proper.

Two important caveats are necessary at this point. First, we do not claim that uncanny experiences are the only possible trigger of intuitions about supernatural causation. This is especially clear with respect to religious beliefs. Cognitive reflectiveness correlates with religious beliefs as well as paranormal beliefs (Gervais & Norenzayan, 2012; Razmyar & Reeve, 2013; Shenhav et al., 2012), but our studies only targeted paranormal beliefs (astrology and ESP). Accordingly, we cannot generalize our account to the acquisition of religious beliefs. Leaving aside the difficulty of setting up comparable studies targeting religious experiences, we may reasonably doubt that uncanny experiences drive the acquisition of religious beliefs as they drive the acquisition of paranormal beliefs. People are socialized into religious beliefs more so than into paranormal beliefs, and religious disbelief appears to arise from a number of interactive pathways (Norenzayan & Gervais, 2013) in addition to the cognitive-reflective pathway.

When it comes to non-religious supernatural beliefs, though, it seems plausible that uncanny experiences play a large role in the transition from skeptic to believer. Indeed, believers in the supernatural mainly trace their belief to a personal experience (Clarke, 1995), emphasizing that their

prior skepticism faded because of such an experience (Lamont, 2007). We contend that our studies captured the onset of such a phenomenon, that is, the initial acceptance of supernatural causation after a single uncanny experience.

A second and important caveat is that we did not capture the actual acquisition of a supernatural belief, but only the initial stage at which a supernatural explanation is seriously considered. To offer compelling evidence of the acquisition of a supernatural belief, conditional on experience and cognitive reflectiveness, we would have to set up an experiment in which some individuals get an uncanny experience and others do not, and assess the degree to which these two groups acquire a supernatural belief and the degree to which this acquisition is moderated by cognitive reflectiveness. One problem with such a project is to find the proper way to measure the acquisition of a supernatural belief. A serious issue here is that it would seem implausible that people would change their long-term beliefs in just a few minutes after the experiment. This is one possible reason why we did not see any changes in paranormal belief score, before and after Study 3. Even though a longer delay might be necessary to obtain a change in beliefs, it would seem unethical not to debrief participants about the deceptive nature of our protocol, immediately after the experiment.

As a final thought, we note that dual-process theorists are usually very cautious not to imply that reflective thinking is “better,” in any sense, than non-reflective thinking. On this occasion, though, it seems appropriate to break with this tradition of cautiousness. We showed that a single uncanny experience may be enough for non-reflective thinkers to seriously consider the possibility of supernatural causation. This makes them especially vulnerable to scammers who attempt to leverage paranormal beliefs into profits. A common trick, for example, consists of pretending to detect a paranormal ability in an individual, only to offer him or her an expensive training aimed at developing this potential. Individuals with a predominantly non-reflective cognitive style should be well warned against their own reaction to such and other encounters with the supernatural.

Author Contributions

R.B. designed the research and conducted the experiments; R.B. and J.-F.B. analyzed the data and wrote the article.

Declaration of Conflicting Interests

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Supplemental Material

The online supplemental material is available at <http://pspb.sagepub.com/supplemental>.

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