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Is Fear of Supernatural Punishment the Foundation of Religion? An Examination of Bering's Theory of Dead Agents

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Abstract
Cognitive psychologist Bering attempted to explain away religion by suggesting that the evolutionary process predisposed the human mind to assume a spiritual realm in which dead people continue to keep their consciousness. In Bering's study participants were asked to rate the characteristics of persons in given photos in two sittings. When the experimenter told the participants that one of the persons in the photo passed away in the second round, the average ratings for that person significantly went up. Bering concluded that higher ratings were a result of participants' fear of being punished by the dead agent. By replicating this experiment, the authors found that initially the non-religious group gave higher ratings to the dead person than the religious group in the pretest, but the order switched in the posttest. Our study suggests that there might be alternate sources of our belief system, and also there might be alternate explanations for the same phenomenon revealed by the data.

Keywords: Cognition, Evolution, Death, Fear, Religion, Moral Foundation

1. Introduction

1.1 Explaining away Religion

For the last several centuries numerous academic endeavors have attempted to explain the origins of religion and religious beliefs. However, many of these approaches seem to "explain away" rather than merely explain religion. There is a subtle difference between the two. An explanation is not necessarily exhaustive, whereas "explaining away" something is a much stronger assertion. Explaining away is to reduce X to "nothing but A," and in this way, deny or minimize the significance of the very essence of X. Using physical factors in neuroscience to explain free will away is a typical example (Lavazza, 2016). In the context of this article, certain psychological theories of religion reject the possibility of its divine origin so that religion is viewed as nothing but a human phenomenon.
One of these academic endeavors to naturalize religion so that it is explained away is led by cognitive scientist Jesse Bering. Bering and his collaborators conducted a series of empirical studies to support his evolutionary explanation of religion, such as the interviews about the biological and psychological functioning of dead people

(Bering & Bjorklund, 2004), the experiment of puppet play (Bering, Blasi, & Bjorklund, 2005), the experiment of trait attributions by photos, the content analysis of obituaries, and the experiment of ghost story (Bering, McLeod, & Shackelford, 2005). In Bering's 2005 study (Bering, McLeod & Shackleford), participants were asked to rate the traits of three strangers displayed in photos. A week later they returned to continue the study but were told that one of the persons had died over the weekend. Afterwards, on average, participants rated the dead person more favorably than others. Bering and his colleagues (2005) hypothesized that adaptive evolutionary cognitive functions caused subjects to give the dead agent a more "positive" rating for fear of being punished through negative life events. Bering (2005) originally proposed that culturally acquired religious concepts are unimportant in how one would rank the dead agent on various traits. Following this line of reasoning, Johnson and Bering (2006) argued that fear of supernatural punishment is the foundation of our moral order, which is gradually developed through the evolutionary process. Following the same line of reasoning, Piazza, Bering, and Ingram (2013) argued that if a person believes that an invisible being is watching, it can deter immoral behaviors, such as cheating.

More specifically, humans are distinctive from other species in two areas. First, humans use "the theory of mind" to interpret other people's behaviors, assuming that they have a mind like ours (Whiten, 1998). Second, humans developed languages to convey complicated ideas. Animals can be selfish without worrying about how their behaviors would be reported, but humans are afraid of being criticized and even punished. For Bering, this fear of human punishment is extended to the fear of divine punishment. Divine punishment deters people from doing bad things to others even if nobody is around, thus increasing the survival fitness of the species.

At the functional level Bering's theory seems to be pro-religion because supernatural beliefs can serve the function of laying the moral foundation and enhancing the chances of reproductive success. However, at the ontological level this theory has a different implication. Bering (2009) states, "I reiterated my empirically based argument that belief in the afterlife is more or less an inevitable byproduct of human consciousness" (para. 5). Bering wrote the preceding sentence in the context of Israel-Arab conflict, which is referred by Bering as to "another conflict at least partially fueled by head-scratching religious ideologies" (para. 3). Bering (2009) argues that religion would have been biologically adaptive because it generates social cohesiveness, resulting in better chances of survival in a larger group. He explained this phenomenon by saying,

"It's a bit like Santa Claus knowing whether we're bad or good (but Santa doesn't cause you to suffer renal failure, kill your crops, or sentence you to everlasting torment) … People engage in all sorts of costly religious behaviors—wasting time on rituals, wearing uncomfortable clothes, spending their hard-earned money—because, in doing so, they are advertising their commitment to the religious in-group. In other words, if you're willing to do things such as cut off your child's foreskin, pay a regular alms tax of 2.5 percent of your net worth or sit twiddling your thumbs for two hours every Sunday morning on a hard church pew, then your fellow believers will assume that you're really one of them and can therefore be trusted" (para. 6-7).

Bering went further to write, "What if … the data suggest that God is actually just a psychological blemish etched onto the core cognitive substrate of your brain? Would you still believe if you knew God were a byproduct of your evolved mental architecture?" (para 9). The meanings of the above statements are very explicit. These statements carry several main points (1) Belief in the supernatural is natural because it is inevitable (everyone is born with this natural tendency); (2) This is a byproduct of evolution, meaning that it is an unintended side effect departed from the original purpose, just like air pollution is a side effect of driving; (3) Religious ideas are compared to legends like the fairy tale of Santa Claus, but religious beliefs stir up conflicts and cause other damages while the tale of Santa Claus is harmless; (4) The concept of God is a product of our psychological flaw, and it could be explained at a physical level (cognitive substrate); (5) All of the above claims are substantiated by empirical data.

1.2 Cognitive Science of Religion

The Cognitive Science of Religion (CSR) is an interdisciplinary field that involves evolutionary psychology, anthropology of religion, neuroscience, and cognitive psychology. Scholars within CSR have developed an impressive amount of research that also attempts to examine the origins of religious beliefs—albeit not through

cultural explanations (as mentioned above), but through identifying how certain cognitive structures of the mind lends itself to religious beliefs. Descriptions that recognize the role of cognitive functions for the formation of religious beliefs can be classified as "naturalistic" explanations. Within the field of CSR, Bering (2004, 2006a), Bloom (2004), Boyer (1994, 2001), Guthrie (1993), and Barrett (2004) adopt this naturalistic approach. In Barrett's (2004) view, human cognition carries certain hard-wired dispositions that lead us to embrace supernatural beliefs. Barrett suggests that religious concepts and practices, which emerged from communities, strengthened moral and social order, and equipped religious people with survival advantages over non-religious people (Barrett, 2004). Bloom (2004) contends that humans are prone to be dualists because mind-body dualism is compatible with common sense. For instance, while children accept the brain as responsible for some aspects of mental life, such as solving math problems, they simultaneously deny the brain having something to do with loving one's brother. It is natural for humans to postulate that there is some entity beyond the body, and therefore, people are receptive to supernatural beliefs. In a similar vein, Boyer (2001) asserts that our minds are well prepared for religion due to natural selection. That is, religious people perceive their god in anthropomorphic terms. In other words, humans tend to conceptualize a god that is in many aspects like us; but this deity is much more powerful than humans. We have intuitions about what gods should look like, which religious concepts are good, and we project these images onto the supernatural world. This cognitive preparedness for religion cannot be exhaustively explained by cultural diffusion. Additionally, Bering (2003) argues that the majority of people turn to religion because of subjective negative experiences—not for "cultural" reasons like objective events in a hostile environment. Bering notes:
"Default inferences that are typically associated with religious thinking (e.g., belief in the continuity of personal consciousness after death; belief in an abstract intentional agency as the arbiter of life events, and the creator of species and natural inanimates) are not activated *by* culturally transmitted religious concepts, but instead give rise to religious concepts themselves" (Bering, 2003, p. 245) [emphasis in the original].

Although Bloom, Bering, Barrett, Boyer and Guthrie adopt a naturalistic approach to the origins of religious beliefs and behaviors, there are disagreements within the field concerning whether or not religious beliefs are merely "adaptations" or "byproducts" of the mind. The adaptationist-byproduct debates among those who advocate for naturalistic explanations of religion highlights an important distinction within CSR and helps situate Jesse Bering's position within the field.

Adaptationist accounts state that religion and religious ideas are propagated because there is a direct fitness advantage to the individual who holds these beliefs. Proponents of this approach note how, over time, religious beliefs have certain capability gains like extending human co-operation, co-ordination, and other pro-social behaviors (Powell & Clarke, 2012; Sosis, 2009). Thus, religious beliefs and behaviors enhanced the formation of certain types of social groups, and these social groups developed habits and traits that enabled them to outcompete other groups—and over time, gave them an evolutionary advantage (Dunbar, 1998).

In contrast to adaptationist accounts, the byproduct account of religion is espoused by a number of leading scholars in the field (e.g. S. Atran, 2002; Barrett, 2004, 2011a, 2011b; Boyer, 1994, 2001; McCauley & Lawson, 2002; Whitehouse, 2004). These scholars argue that religion did not evolve as an adaptation, but is a result (or byproduct) that emerged from other various cognitive evolutions. Religion arose for various purposes "unrelated to the religious beliefs they now encourage" (Greenway & Barrett, 2021). Put it another way, religious beliefs evolved as an outcome of other cognitive structures that developed—not because religion simply helped humans adapt to their environment and have a fitness advantage.

For example, proponents of the byproduct view theorize that certain cognitive structures (like agency detection) helped produce religious beliefs. Cognitive scientists point to things like the Hyperactive Agency Detection Device (HADD), which most likely evolved to help our ancestors remain highly alert to anything that could be perceived as a predator or adversary. However, as a byproduct of HADD, our ancestors may have misperceived many ordinary things as a threat, and consequently, this made them receptive to invisible agents. It was this mistake "or byproduct" of HADD that may have led early hominin groups to believe in spirits or ghosts. As Sosis (2009) describes, "We are inclined to see faces in the clouds and creatures in the closet because natural selection favored a response system that actively perceives agents and agency in events" (p. 317).

While the byproduct view remains dominant within CSR, Bering and other scholars in the field have questioned byproduct accounts of religion (see also: Bulbulia, 2004; Alcorta & Sosis, 2005, 2006; Johnson & Bering, 2006; Dow, 2008; Richerson & Newson, 2008; Sanderson, 2008). Although Bering has disagreed with various aspects of the byproduct position, his view does not strictly adhere to other adaptationist accounts either (Johnson and Bering, 2006). Sosis (2009) notes that Bering's position is an adaptationist model that incorporates findings from the byproduct approach. In short, Bering argues that religious thoughts and behaviors were formed because of other psychological functions of the mind, but were then co-opted and had adaptive purposes. Bering notes, "We too argue that religion is grounded in and enabled by engineering requirements of our species' naturally designed cognitive systems. But this is where our shared opinion with most other cognitive scientists begins to diverge" (Bering et al., 2005, p.361). Bering later points out how these cognitive byproducts of the mind had adaptive properties and argues that religion "may be side effects of other design features" but these design features "had salutary effects of their own on the organism's ability to pass on its genes and, over time, were independently subjected to natural selection" (Bering, 2005, p. 361). Consequently, for Bering, religion is a byproduct of the mind, but these cognitive "byproducts" were then selected over time and had adaptive effects to help our ancestors pass their genes along. These arguments are expressed in a variety of studies that we will examine below.

In Bering's popular book, *The belief instinct*: *The psychology of souls, destiny and the meaning of life* (2012), Bering traces our belief in the supernatural to be an "instinct" of the mind and identifies both cognitive and evolutionary reasons why humans are inclined to believe in God. A central argument of *The belief instinct* is how and why humans find meaning in events. Bering contends that even though events in the universe are random, we tend to find a pattern or purpose in these events. This meaning or purpose served an adaptive function and was developed among our ancestors throughout the history of evolution. For Bering, our ancestors were helpless when facing unfortunate events, and used coping mechanisms to optimize negative outcomes that were out of their control, such as putting their faith on an external agent (e.g. gods or God) (Bering, 2003, 2012). Bering stresses that because our minds have an "instinct" towards supernatural beliefs—this can actually explain away religion.

Bering (2002) also hypothesized that humans have a natural tendency to perceive cognitive systems as continuing to function after death, and this disposition might be the psychological foundation of religion. The underlying mechanism of this inclination is called theory of mind (Bering, 2006b), and has been extensively studied by numerous psychologists (e.g. Avis & Harris, 1991; Flavell, Flavell, & Green, 1983; Gopnik & Astington, 1988; Richert & Barrett, 2005; Wigger, 2011; Wigger, Paxson, & Ryan, 2012). Theory of mind, according to Bering, is a consequence of evolution and a "cognitive bias" so that we see intentions and desires in things that may not have those mental capacities. Humans perceive intent in things like animals, inanimate objects, and also in other human beings—even when intent or desire is not there. In brief, humans are capable of attributing mental states to others even though these mental states are not directly observable. For the purposes of our study here, this is applicable since Bering suggests that humans' theory of mind is responsible for the "illusions" that humans have of finding meaning in life. Theory of mind also explains how people think they know what it is like to be dead or have ideas about what dead people think about us.

Two other key features that play into Bering's cognitive explanation of religion are the conceptions of "teleological reasoning" and "common-sense dualism." "Teleological reasoning" is the inclination of seeing random events as designed for a purpose by God (Bering, 2006b, p.453). This idea can be traced back to Kelemen and Rosset's (2009) notion of promiscuous teleology. Teleological reasoning also causes humans to perceive their existence as having a purpose and lends to the thinking that "humans exist for a reason" (Bering, 2006b, p. 458). Next, Bering's understanding of, "common-sense dualism" explains the innate inclination of humanity to separate body from mind/soul and have intuitive conceptions of the afterlife and souls (Bering, 2006b). According to Bering's notion of common-sense dualism, we are born with the innate idea that there is a spiritual realm in which the deceased continue to exercise their will and other cognitive functions. The belief that things do not end with this life becomes the foundation of our moral order. Bering and his colleagues conducted a series of studies to support this claim, such as those mentioned above—the experiment of puppet play (Bering, Blasi, & Bjorklund, 2005), the experiment of trait attributions by photos, the content analysis of obituaries, and the experiment of ghost story (Bering, McLeod, & Shackelford, 2005).

1.3 Religion as an Illusion?

As noted earlier, Bering's observation that religion may be an accidental byproduct has similarities to what other evolutionary psychologists and cognitive scientists have argued, while differing along the lines of how cognitive features relating to religion are byproducts that become adaptive. In addition to this, a key feature of Bering's work is his conclusion that religion is false because it is an accidental byproduct of other cognitive features. In a discussion of supernatural agents, Bering and Johnson (2005) maintained that making supernatural causal inferences enabled our ancestors to control events through "implanting false beliefs, repairing false beliefs," and "manipulating emotion" (p.119). Bering (2006a) recognized the adaptive function of supernatural fear, such as counteracting bold and dangerous miscalculations, and discouraging people from social deviance. However, his insistence that religion is an "accidental byproduct," (p.143) "a spandrel or an exaptation" (p.146) causes him to determine that religion is false and illusory. The pre-supposition that the belief of God is nothing more than an illusion is explicitly expressed in *The belief instinct* (Bering, 2012):

"So it would appear that having a theory of mind was so useful for our ancestors in explaining and predicting other people's behaviors that it has completely flooded our evolved social brains. As a result, today we overshoot our mental-state attributions to things that are, in reality, completely mindless...What if I were to tell you that God's mental states, too, were all in your mind? That God, like a tiny speck floating at the edge of your cornea producing the image of a hazy, out of reach orb accompanying your every turn, was in fact a psychological illusion, a sort of evolved blemish etched onto the core cognitive substrate of the brain? It may feel as if there is something grander out there…watching, knowing, caring. Perhaps even judging. But, in fact, that's just your overactive theory of mind. In reality, there is only the air you breathe" (p. 37).

In the passages noted above, it is obvious that religious beliefs and the supernatural are stated in a negative term and a judgmental tone (e.g. "false belief", "manipulating emotions", and "illusion"). Bering rightly notes that there must be a cognitive reason that people have an instinct towards the supernatural—while wrongly concluding that because religious beliefs are a byproduct of the mind they must be false. It is important to point out that this tone is also found in his academic book, such as calling belief in God "an adaptive illusion" (Bering, 2012, p.165). Since neutrality is a common protocol that is sought after in the social sciences, it is odd to see such conclusive evidence in his scholarship that supernatural or religious beliefs are false.

Bering's conclusion about the veracity of religion and religious beliefs can be seen as an extension of thought that cognitive scientist Pascal Boyer popularized in his book, *Religion Explained: The evolutionary origins of religious thought* (2001). Boyer concludes that the explanation for religion and religious behaviors can be found "in the way that all human minds work" (Boyer, 2001, p. 2), as he also upholds that religion is a mishap. For Boyer, "…religion emerged not to serve a purpose—not as an opiate or social glue—but by accident. It is a byproduct of biological adaptations gone awry" (Boyer, 2001, p.41). And, to understand religion as something that has gone "awry" is not too far afield from Bering's suggestion that belief in God is a "psychological illusion."

However, this is not the story in its entirety. Other cognitive scientists like Barrett (2011b) and Van Slyke (2013) point out the difficulty in this line of reasoning. In Barrett's critique (2011b) of Bering, Barrett asks: "Cognitive science can tell us why we perceive color without explaining color away, so why can it not tell us why we perceive gods or purpose in life's events, leaving metaphysical questions aside?" (p. 244). Similarly, Van Slyke (2013) notes that the cognitive sciences must be careful in distinguishing empirical results from metaphysical conclusions. Conclusions made by Bering about the viability of religious belief become "metaphysical" statements since normative judgments are added to his theory of mind (Van Slyke, 2013). Or, said another way, when statements are made about the impossibility of the supernatural agents, scientific data are being interpreted and used as a metaphysical statement rather than a scientific one (Van Slyke, 2013). Thus, Bering can safely make the assertion and present evidence for the cognitive origins for religious beliefs from his psychological research, however, to make the conclusion that religious or supernatural beliefs are "illusions" simply because they are generated from cognitive structures lies outside the realm of his research, and quickly moves into the field of philosophy.

1.4 Hypotheses and Research Question

In spite of Bering's reassertion of the empirical foundation of his theory, the authors of this paper found that there are some leaps of faith in his inferences. Simply stated, his empirical data do not firmly support his argument, and each progressive statement of his argument does not logically follow the previous statement. Examining all of Bering's claims requires a book in its own right, but due to space constraints, the authors investigated only one of Bering's empirical studies. In the study about rating the traits of the dead, the assumption by Bering et al. (2005) is that positive trait attributions are motivated by supernatural fear. However, this is not the only explanation for participants rating the dead person more favorably. For example, the works of a deceased artist may become more valuable because this artist can no longer produce any more paintings. Similarly, we may say nice things to the dead out of sympathy. Data collected in Bering et al.'s study cannot allow us to identify the cause of positive attributions, either. Thus, the authors of this paper decided to replicate the study of trait attributions by photos with a different sample and with two additional components in the research design: ask the participants why they gave higher ratings to the dead person and also treat religious beliefs of the participants as a covariate.

In this study it is hypothesized that the belief of afterlife or dead agents has no relationship with ratings of human attributes. Our study shows that posthumous attribution shifts is dependent upon other factors besides fear of supernatural punishment, and at least leaves open the possibility that cultural factors may be involved. This research does not undermine Bering's assertion that there could be an adaptive function to religious beliefs—this in fact might be the case. It does, however, cast doubt on some of Bering's arguments regarding the adaptive function of religion, and, in this case, supernatural fear.

2. Method

2.1 IRB Approval

The research design and data collection method were approved by the university's IRB based on the adherence to the Ethical Code of Conduct of the American Psychological Association (American Psychological Association [APA], 2003). This Code of Conduct is composed of five basic principles: beneficence and non-maleficence, fidelity and responsibility, integrity, and respect for people's rights and dignity. The research team executed the research plan by following the preceding principles.

2.2 Population and Sample

The target population to which the inference is made consists of adolescents regardless of their religious belief, gender, and ethnic group. The accessible population, which is the sampling pool, includes youths in southern California only. Forty-one youths were recruited through SONA Management Recruitment Systems at the university as well as through Facebook invitations, afterschool clubs, and church groups.

2.3 Sampling and Screening Procedures

A convenience sampling scheme was employed for this study. The original sample size in this study was 41, but three participants were excluded from data analysis because their responses to the interview in the posttest revealed that they knew the objective of the study. Specifically, in response to Question 1: "Can you guess the objective of this study?" they stated, "To see how feelings have changed knowing the invidual (sic) has passed away," "the study of whether or not someone is dead affects how we view their personality," "too (sic) see if I would rate the dead person better than the last time." It is important to point out that some participants skipped certain questions and thus the sample size varies across different analyses.

2.3.1 Sample Size, Power, and Precision

G*Power (Heinrich-Heine-Universität Düsseldorf, 2010) was utilized to compute the appropriate sample size for this study. Given that the desired power level is set to .8, the alpha level is .05, and the effect size is as small as .2, 36 participants are needed for a repeated measure GLM with a 2-level between-subject factor and a 2-level within-subject factor.

2.3.2 Materials and instrument

Evaluation of Others Questionnaire (EOOQ) (Shapiro, 1988) was the primary instrument for this study. EOOQ consists of 38 traits spanning across four subscales: Achievement, kindness/morality, social skills, and subjective well-being (see Table 1). Each trait is rated on a Likert-scale ranging from 1 ("None") to 10 ("a lot"). To maintain consistency, the scores of negatively stated items were reversed. No psychometric information about EOOQ was found in the literature; nonetheless, the authors adopted this scale used by Bering because this study is a replication of his previous research. In this data set the Cronbach Alpha was found to be as high as .9378, which is considered excellent. Further, exploratory factor analysis shows that a large portion of the eigenvalue (15.74) is attributed to a single factor. Correlational analysis and inspection by scatterplots also indicate that the scores of all four subscales are significantly correlated with each other, and therefore the average score of the whole scale was used for data analysis.

Table 1: Evaluation of Others Questionnaire

Achievement-relatedness		
Creative		
Wise		
Intelligent		
Kindness/morality		
Kind	Good-looking	Depressed
Hypocritical	Ethical	Helpful
Trustworthy	Competent	Easy to get along with
Phony	Efficient	Selfish
Sad	Conceited	Loving
Cruel	Moody	Accomplished
Snobby	Knowledgeable	Psychologically healthy
Hard-working	Dishonest	Talented
Happy with their lives	Likable	Depressed
Social skills		
Charming	Attractive	
Good sense of humor	Shy	
Friendly	Fun to work with	
Subjective well-being		
Sorrow		
Anxious		
Happy with themselves		

In addition to EOOQ, the experimenter interviewed each participant after the posttest ratings using the following questions:

1. Can you guess the purpose of this study?

2. Why do you give the dead person a more positive rating than others?
3. Do you believe in supernatural beings? Please explain.
4. Did you experience any supernatural event in the past? Please explain.
5. Are you afraid that if you didn't give positive rating to the dead person, you may face some negative consequence? Please explain.

2.3.3 Data Collection Procedures

During the recruitment the researchers concealed the real purpose of the study by telling the students that this study was about how people rated one's personality by appearance alone. In the pretest all participants were asked to give ratings of three persons on the photos using EOOQ. To avoid any order effect (e.g., contrast, assimilation) different participants viewed the photos in different sequences. A week later the same participants returned to perform the same task. During the second session of the experiment, participants were informed that one of the individuals in the photographs passed away. To keep this variable constant, the experimenter repeated the script to every subject: "This young man was driving to San Diego and his car was crashed by a truck. He died instantly." After the ratings, the participant answered the five interview questions.

2.3.4 Variables

In this study the dependent variables are the ratings of the two alive agents and the single dead agent at two time points (pretest and posttest). The primary independent variable is the self-report religious affiliation of the participants. The authors are well-aware of the existence of several validated scales of religiosity. However, some of them have not been validated for youths while some are under development and validation (Hernandez, 2011). It is noteworthy that very often religious belief of youths is heavily influenced by parents or/and peers. However, a thorough literature review of religiosity and spirituality scales indicates that most of these scales were not specifically adapted for adolescents, such as omitting the preceding social influences (Cotton, McGrady, & Rosenthal, 2011). Given the fact the psychometric soundness of these scales for this population is in question, the authors would rather use self-report religious affiliation. Although by doing so the inference of this study is limited, the interpretation is straight-forward because self-report religious affiliation is an objective and observed measure. The authors also notice the distinction between religiosity and spirituality. One may argue that people who are not affiliated with any organized religion might still engage in private and inner-spirituality with an impersonal god or an abstract cosmic power (Bowland, Edmond, & Fallot, 2012; Hill & Pargament, 2008). However, the definitions of spirituality are inclusive and not consensual (Aten & Leach, 2009), thus resulting in "ungrounded, nebulous, imprecise, and vague" conceptualizations of the term (Milacci 2006, p.230). No doubt using spirituality as a variable would add an extra layer of complexity into this study, but the benefit is not obvious. Hence, it is the conviction of the authors that staying with an objective measure would enhance clarity of the interpretation.

Originally there are six categories in religious belief: Not religious/atheist, Islam, Hinduism, Christianity, and Buddhism. In some categories there are only two to three observations (e.g., Islam, Hinduism, and Buddhism). For RM GLM the data were collapsed into two categories only: no religious affiliation (11 counts) and have religious affiliation (26). One participant did not report her religious faith, and as a result the effective sample size of this study is 37. For triangulation a question about whether the participant believes in supernatural was asked after the study was complete. It was found that religious affiliation was 100% corresponding to belief in supernatural or not. Specifically, all participants reporting no religious affiliation did not believe in supernatural (highlighted observations) whereas all participants reporting the otherwise said that they believed in supernatural.

2.3.4 Research Design and Data Analysis

In this study methodological triangulation was utilized to analyze the same data set in order to internal validity. To be more specific, both the frequency and Bayesian approaches were employed. If different approaches based on different paradigms lead to a converged conclusion, it is less likely that the finding is obscured by statistical artifacts. Using the analogy that voting by a panel is better than decision-making by a single individual, Heesen et al. (2016) argued that triangulation is preferable to methodological purism.

Both JMP Pro 17 (SAS Institute, 2022) and JASP (JASP Team, 2023) were utilized for data analysis. In this study repeated measures (RM) ANOVA, also known as repeated measures generalized linear model (GLM), was employed for primary data analysis. For analyzing temporal data, mixed modeling is considered superior to RM ANOVA because the latter must assume compound symmetry whereas mixed modeling allows the analyst specify different forms of covariance structure. In addition, mixed modeling is robust against missing data (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006). However, mixed modeling is more demanding in sample size than RM ANOVA. In this study ANOVA has no issue in the covariance matrix structure because there are only two time points (pretest and posttest), and also there are no missing values in this data set. Other viable alternatives are treating the pretest as the covariate or using the change score as the dependent variable, but these approaches do not allow the analyst viewing the two time points. Conversely, the least square mean plot output by RM GLM can be used to visualize the trends of different groups.

The research team is well-aware that the sample size of this study is small. To rectify the situation, Bayesian *t*-tests using the change scores (the difference between the pretest and the posttest scores) were employed to verify RM ANOVA, which is based upon the classical frequency approach to probability. It is crucial to point out that the foundational philosophies of the frequency and Bayesian schools are vastly different. The former interprets probability in terms of the frequency of the observed events relative to many cases, and therefore the *p* value is treated as an indicator for the chance of observing the test statistics in the long run. This is expressed by sampling distributions, which are normal and asymptotic. On the contrary, the Bayesian School treats probability as the degree of belief informed by the evidence. Specifically, Bayesian methods evaluate the strength of evidence given the data at hand, rather than relying on asympotics and *p* values. Thus, the Bayesian approach is very useful for modeling small sample data (Baldwin & Fellingham, 2013; Van de Schoot, Broere, Perryck, Zondervan-Zwijnenburg, & Van Loey, 2015). In addition, in the Frequency School the *p* value shows the chance of the event given the null hypothesis is true, and thus at most the *p* value, if significant, can be used to reject the null only. If it is not significant, one can say it fails to reject the null hypothesis, but it does not necessarily mean that the alternate is true. In contrast, the Bayes factor in the Bayesian School directly compares the evidence for the null and alternate hypotheses (Hoijtink, Mulder, van Lissa, & Gu, 2019; Schönbrodt, & Wagenmakers, 2018). Further, unlike the *p* value that leads to a dichotomous conclusion (reject or not to reject the null), the Bayer factor presents evidence on a continuous scale. This orientation is an alignment with the philosophy of Lindsey (1956): "the object of experimentation is not to reach decisions but rather to gain knowledge about the world" (Lindley, 1956, p. 986). However, unlike its classic counterparts the Bayesian approach does not control the Type I and Type II errors (Hoijtink, Mulder, van Lissa, & Gu, 2019). Because both schools of thought have merits and limitations, both were utilized in this study for triangulation so that a holistic picture can be obtained.

For further triangulation other data visualization methods, such as linking and brushing, was also employed. The open-ended responses collected from the posttest interview were classified into fewer categories for either Chi-square analysis or *t*-test.

3. Results

3.1 Demographics information

The demographic information of this sample is presented in Table 2. There are missing data because some participants did not disclose their demographic information (e.g., gender). The authors of this paper are well-aware that the gender composition of this sample is highly asymmetrical (32 males, 2 females). This will be discussed in the limitation section. Nonetheless, both religious affiliation and racial composition are very diverse, which strengthens external validity and generalization of this study.

Table 2: Demographic information.

Gender		
Female	2	5.90%
Male	32	94.12%
Belief		
Buddhism	2	5.41%
Christianity	16	43.24%
Christianity (Catholic)	3	8.11%
Hinduism	2	5.41%
Islam	3	8.11%
Not Religious and atheist	11	29.73%
Education		
High School	35	92.11%
College Freshman	2	5.26%
College Sophomore	1	2.63%
Ethnic group		
Arab	1	2.70%
Asian	5	13.51%
Bi-racial	1	2.70%
Black	8	21.62%
Egyptian	1	2.70%
Indian	1	2.70%
Latino/Hispanic	10	27.03%
Native American	1	2.70%
Persian	1	2.70%
White	8	21.62%
Age		
Mean	16.61	
SD	1.38	
Median	16.5	

3.2 Repeated measures GLM

Figure 1: Least square means of ratings of alive agent across pretest and posttest.

Inspection of data structure was performed and no significant deviation from parametric assumptions, such as normality and homogeneity of variance, was found in the data. No main effect of belief ($F(1, 35) = 0.26$, $p = .6101$) or time ($F(1, 35) = 3.448$, $p = 0.0718$) was found in the ratings of alive agents by RM GLM. The interaction effect was also absent ($F(1, 35) = 0.0192$, $p = .8906$). As shown in Figure 1, the two groups had almost the same scores in both the pretest and the posttest. Although there was a slight increase of their ratings in both groups, this change was not found to be significant.

Figure 2: Least square means of ratings of dead agent across pretest and posttest.

The result of the ratings of the dead agent was vastly different. Although no main effect was found, there was a significant religious affiliation X time interaction effect ($F(1, 35) = 4.54$, $p = 0.0401$). As indicated by Figure 2, initially the non-religious group gave higher ratings to the dead person in the pretest, but the order switched in the posttest. Specifically, religious participants gave much higher ratings to the dead agent in the posttest than what they gave in the pretest. On the other hand, the non-religious group dropped their ratings slightly.

The preceding result is corroborated with data visualization. Figure 3 shows the linking and brushing result of two graphical panels. On the left panel the darkened observations are participants who are affiliated with a particular religion. Obviously, their change scores (post – pre) spread across the spectrum. On the right panel the observations who have no religious affiliation are highlighted, and it is clear that they tended to decrease their ratings from pretest to posttest.

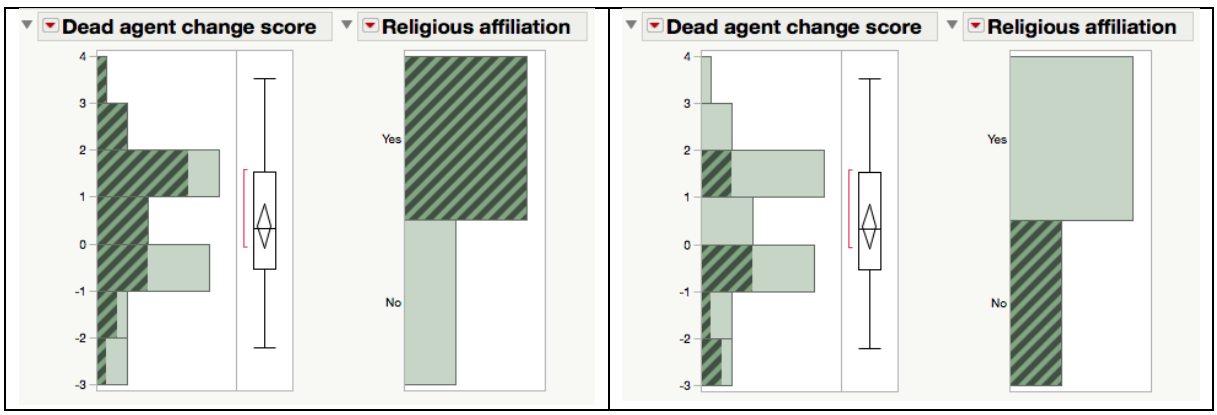

Figure 3: Linking and brushing of religious affiliation and change score of dead agents.

3.3 Bayesian analysis

To some certain extent the result of the Bayesian 2-independent-sample t-tests concur with that of RM AMOVA. In the *t*-test comparing the religious and non-religious groups in terms of the change score of their perception of

alive agents, the Bayes Factor favoring the alternative hypothesis (BF10) is 0.34 whereas the Bayes Factor favoring the null hypothesis (BF01) is 2.915. In other words, the null hypothesis can fit the data 2.915 times better than the alternative hypothesis, implying that there is no meaningful difference between the two groups.

Conversely, BF10 of the 2-sample independent t-test for the change score of their perception of dead agents is 1.825, meaning that the alternate hypothesis can fit the data 1.825 times better than the null hypothesis. The error rate of the BF is 2.104e-5, which is small enough to be ignored. The 95% credible interval of the difference between two groups is between -1.328 and 0.048. Figure 4 shows the prior and the posterior distributions. In the prior distribution the mean of the effect size is 0, but obviously the posterior shifts to the left, favoring the alternate hypothesis.

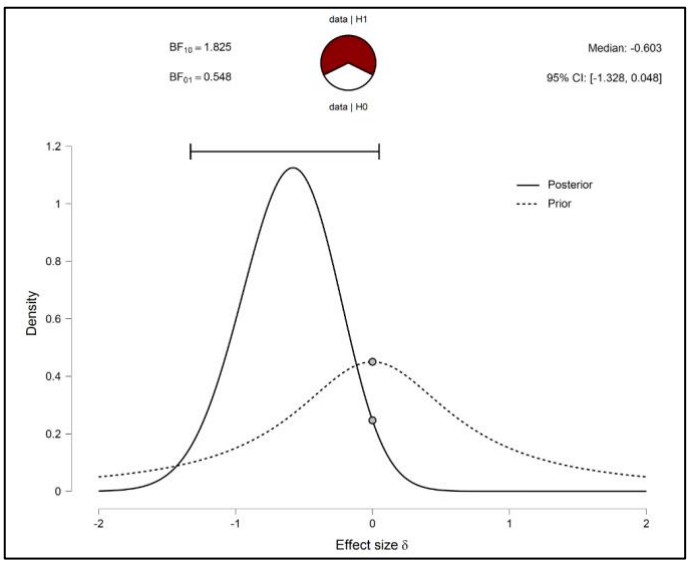

Figure 4: Prior and posterior distributions of the difference between religious and non-religious groups in terms of change score of dead agents.

In order to maintain our neutrality and avoid controversial subjectivity, the research team did not specify any prior for the Bayesian analysis. Rather, following the tradition set by Jeffreys (1961) default values of for the variance (width) of the prior distribution was adopted so that sensitivity analysis could be conducted to check how the outcomes were influenced by different priors. Figure 5 indicates that as the prior increases from 0 to 0.4, the strength of evidence or the degree of conviction favoring the alternate hypothesis increases, but between 0.4 and 0.5 the growth is flattened. After 0.5 it even goes down. More importantly, the strength of evidence is considered anecdotal only.

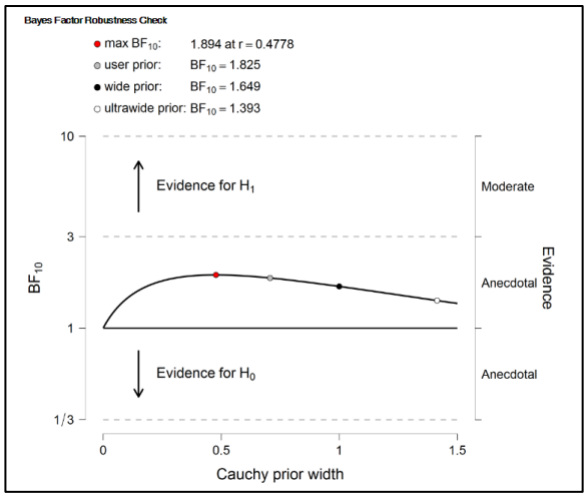

Figure 5: Sensitivity analysis showing the change of the Bayes Factor by prior width.

Figure 6 shows the result of sequential analysis, a process of updating the strength of evidence as more data are taken in account. When only eight observations are included into the computation, the evidence favoring the alternate hypothesis (H1) seems to be very strong. However, as more data are input into the equation, the strength of evidence goes down. When the sample size is 25, the null hypothesis seems to be more plausible. Nonetheless, BF increases again when more observations are included. But at most the strength of evidence is only anecdotal.

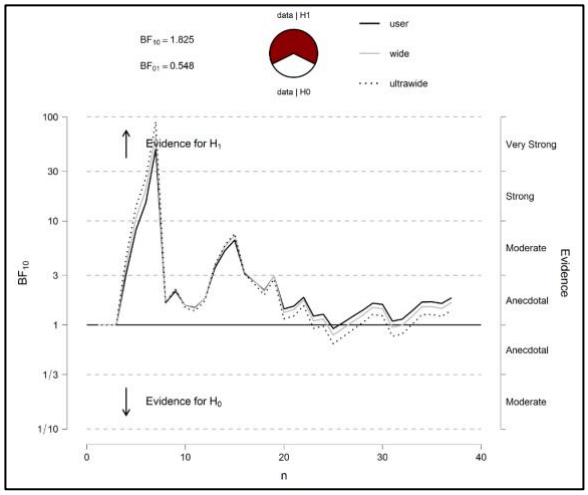

Figure 6: Sequential analysis of the strength of evidence as the sample size increases.

3.4 Chi-Square Analysis and Fisher's Exact Test

Based on the wording used by the participants, the responses to the question "Why do you give the dead person a more positive rating than others?" were classified into two categories: "Be nice and sympathetic" and "didn't give more positive rating." Chi-square analysis of religious affiliation by this response category didn't yield a significant association (X^2 = 0.032, p = 8583). Among the participants who reported they didn't give a higher rating, 72% are people who are affiliated with a religion while only 28% are not. Among the participants who reported their reasons of higher ratings are "be nice and be sympathetic," 69.23% of them are affiliated with a religion whereas 30.77% are not (see Table 3). The Bayesian test of contingency indicates that the BF favoring the null hypothesis is 2.461, which is six times stronger than the BF favoring the alternate (0.406).

Table 3: Crosstab of religious affiliation and "Why do you give the dead person a more positive rating than others?"

Religious affiliation	Be nice and sympathetic	Didn't give more positive rating
No	4(30.77%)	7(28.00%)
Yes	9 (69.23%)	18(72.00%)

Answers to Question 3 concurs with what they reported in the question regarding their religious affiliation and thus additional analysis is not necessary. In Question 4 the participants reported various kinds of supernatural experiences, such as "I've seen a cripple man walk," "My aunt was sick and got better all of suden (sic)." The responses were classified into two categories, "Yes" (6) and "No" (33). A t-test of dead agent change score by supernatural experience was performed. Interestingly, there is no significant difference between people who had supernatural experiences and those who didn't in terms of their change score of dead agent (t(1, 37) = 0.71, p = 0.5, 95% CI[0.25, 0.75]). Similarly, in the Bayesian t-test the Bayes Factor favoring the null hypothesis is 1.862, and the 95% credible interval is between -10.08 and 0.432. However, it is important to point out that only six participants had supernatural experiences and thus it is an asymmetrical comparison.

Question 5 is: "Are you afraid that if you didn't give positive rating to the dead person, you may face some negative consequence? Please explain." Thirty-six participants reported "No" (90%), one response was ambiguous, only four said "yes" (10%). Those who said "yes" reported the following: "Yes because you can get haunted," "Karma,

do good and it will come back," and "I do, they might think I am cruel." The vague response is: "I did actually yhink (sic) about this, but I figured we were told this so that we would give him positive rattings (sic)." Table 4 illustrates how their responses are related to their religious affiliation. Because of low cell counts, the Fisher's exact test instead of Chi-square analysis was utilized. The exact test showed that there is no significant association between being afraid of haunting and religious affiliation (p = .8134). Similarly, the Bayesian test of the independence of contingency table yielded a BF01 of 3.923, implying strong evidence for lack of association between religious affiliation and answer choice.

Table 4: Crosstab of religious affiliation and "Are you afraid that if you didn't give positive rating to the dead person, you may face some negative consequence?"

Religious affiliation	Answer: No	Yes
No	10(27.77%)	1(33.33%)
Yes	26 (72.22%)	2(66.66%)

4. Discussion

There are several limitations in this study. First, the gender composition of the sample is asymmetrical and thus it obscures the generalizability of the conclusion. Second, an objective measure regarding religion (religious affiliation) was used as the grouping factor while spirituality and the subjective dimension of religiosity was not included into the study. Nonetheless, certain findings of this study can shed some light on this controversial problem of psychology of religion. Third, the sample size is small and therefore the analytical result based on the frequency approach might not be replicable. Nonetheless, this limitation is rectified by the Bayesian analysis, which can model small sample data at hand instead of computing the probability in the long run.

RM GLM indicates that people who are affiliated with a religion increased their scores accordingly. On the other hand, people who are not affiliated with a religion were not influenced by the tragic stories told by the experimenter. While Bering attributed higher ratings to fear of supernatural, our qualitative data collected from Question 2 shows that religiously affiliated people tended to be nicer to the deceased; responses from Question 5 suggests that being afraid of haunting is not the primary reason for giving better ratings. Although the Bayesian statistics provide only anecdotal evidence supporting the notion that there is a meaningful difference between religious and non-religious participants in terms of their perception of dead agents, the Bayer factor, as mentioned in the method section, presents evidence on a continuous scale rather than leading to an all-or-none decision. Even though the strength of evidence is anecdotal, it is not the same as the evidence of absence, and therefore further investigation is still worthwhile. Taking the results of both classical and Bayesian statistical analyses into consideration, the authors suggest a second thought be given to Bering's psychological theory of religion. This theory is built upon the assertion that the perception of active dead agents is a built-in component of human cognitive functionality, which is said to be an inevitable byproduct of evolution. Nonetheless, this exploratory and triangulated study suggested the verdict awaits further examination.

The authors are well-aware that Bering acknowledges the role of cultural factors in religious belief. Moreover, the thesis of this paper is not to assert that belief in ghosts or supernatural beings is totally cultural. Rather, the authors side with Barrett's (2011) position that nature vs. nurture is a false dichotomy. Every human phenomenon can be interpreted as a result of both nature and nurture. For example, every normal human being is born with certain musical intelligence, such as a sense of rhythm. However, it takes training to be a pianist. As Fromm (1956) said, everyone has the innate ability of love, but love is a form of art that requires practice to be good at that.

In Bering's approach, the belief in ghosts and religious beliefs are treated equally. As a result, data that indicated the tendency to believe in ghosts was used to make inferences about religious ideas. However, the idea that we can make conclusions about religious belief based on supernatural fear (as Bering does) ends up being a non-sequitur argument. For example, for two thousand years the Chinese culture had been dominated by Confucianism, which is highly secular and humanist (Lai, 2010), yet the Chinese literature is flooded with ghost stories. Based

on her anthropologic studies, Luhrmann (2012, 2016) asserted that faith (religious belief) is effortful because we have many intuitions that contradict basic ideas about deity.

The main question is the reductionist character of Bering's theory. Based on his empirical studies (e.g., ghost story, obituary, puppet play, ratings of the dead…etc.), Bering attempted to use the naturalistic origin of supernatural belief to ascertain that God exists in the human mind only. As mentioned before, it takes a bold leap of faith to reach his conclusion. First, it is a bold conjecture for him to assume that his theory of evolutionary psychology in the present time can be applied to what our ancestors did in prehistory societies. Second, whether his empirical studies can be replicated across different groups is questionable (Yu, 2015). Data collected in our study suggest that there might be alternate sources of our belief system, and also there might be alternate explanations to the same phenomenon revealed by the data. Thus, a reductionist approach to religion, as Bering presents, is highly questionable.

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