important to place greater emphasis on the prevalence of supernatural beliefs across other domains, if only to counter simplistic divisions between rationality and irrationality recently aligned with the contentious science/religion debate.

We are in agreement with Bering's general thesis that the folk psychology of the soul can be traced to the development of intuitive theories regarding the nature of the reality and intentionality, as well as the difficulty of conceiving of the state of nonexistence. However, we contend Bering's claim that there exists an "organized cognitive 'system' dedicated to forming illusory representations" of an afterlife that has "evolved in response to the unique selective pressures of the human social environment" (target article, sect. 1, para. 5). Bering has proposed that a belief in the afterlife has the effect of promoting prosocial behavior because of the perceived connection between the moral implications of our actions whilst alive and the possible recriminations from the deceased and/or possible jeopardizing of our immortal souls on death. The first problem we have with this central thesis is that there are other social mechanisms that do not have anything to do with the folk psychology of souls that also act to constrain and control social behaviour. A brief consideration of the vast research field on compliance and cognitive dissonance proves that people conform to social conventions through the effect of peer pressure and social evaluation. A belief in retribution from beyond the grave may contribute to this list of cognitive mechanisms for socialization but it does seem a little ad hoc to make it a primary mechanism operating under Darwinian selection. After all, many social animals also show behavioural inhibition and prosocial behaviour without necessitating a specialised cognitive mechanism for a belief in souls.

Our second problem with this central thesis, and the alternative theoretical standpoints addressed in the article, is that they fail to appreciate the extent of supernatural thinking as a general feature of human cognition. Bering offers a convincing range of evidence for the universality of beliefs in an afterlife to cast doubt over the "spandrel hypothesis" of supernatural thought. We would add that a growing body of literature suggests that belief in an afterlife has many positive cognitive effects, such as perceptions of control and security, which may have adaptive advantages. We also agree that previous models of supernatural belief based only on agency-detectors may be sufficient for deities and ghosts but fail to capture many aspects of human experience that are perceived to be under supernatural control. For example, compelling evidence for supernatural beliefs in the domain of folk biology comes from Paul Rozin and colleagues (e.g., Nemeroff & Rozin 1994) who have repeatedly shown that moral contagion from items associated with "evil" people is extraordinarily difficult to ignore and is supported by a belief in a physical manifestation of a moral stance. Or consider the peculiar and yet prevalent belief (found in around 90% of adults) that we can detect the unseen gaze of others (Titchener 1898). In both these examples, we expect that a sizeable number of individuals who explicitly reject notions of the afterlife and souls would still nevertheless follow the general position that garments can be contaminated and that they can feel the unseen gaze of others.

There are similar examples of naïve beliefs in supernatural forces in the domain of folk physics. For instance, naïve reasoning about dynamics is predominantly in terms of the belief that objects are kept moving by internal forces and not external ones (e.g., McClosky et al. 1980). These supernatural internal forces are in direct contradiction to Newtonian laws of physics, but are characteristic of medieval impetus theories and are widely spread throughout both naïve populations and those with formal physics training. Like supernatural beliefs in an afterlife, these naïve impetus theories can be very hard to overcome and are often held simultaneously with formal theories of Newtonian dynamics and used interchangeably (e.g., Viennot 1979). The "hyperactive agency detector" could not extend to explain these diverse supernatural beliefs across domains of thought. On the other hand, it has not been suggested that dedicated and uniquely human cognitive systems have evolved individually in each of these domains that account for these pan-cultural, early developing, and intransient naïve errors. So while we agree that supernatural thinking about the soul could serve to cement social cohesion, supernatural thinking in many domains could operate as socializing mechanisms that enable us to think of ourselves as connected to others by tangible forces, even though much of that reasoning may be implicitly held. We would argue that supernatural thinking, in the form of positing invisible forces that defy scientific validation, is an innate human tendency that goes far beyond the realm of religious thought into all domains of knowledge. We see little evidence in this article that proves that naïve beliefs in an afterlife are qualitatively different from naïve theories in folk biology and folk physics.

We feel that it is important to extend this work into other realms of reasoning because recent commentary, figure-headed by such prestigious names as Richard Dawkins and Daniel Dennett, polarizes the debate by aligning religious belief with irrational memes propagated by the church and aligning atheism with rationality. If religious inclination instead proves to be associated with a universal human tendency towards supernatural beliefs, from which even atheists are not exempt, this arbitrary divide could prove to be both dangerous and scientifically untenable. Rather, we would prefer that the proposal for future research, and the debate in general, recognized that we all entertain supernatural belief systems which must be taken into account when studying human cognition and behavior.

Souls do not live by cognitive inclinations alone, but by the desire to exist beyond death as well

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Abstract: Bering's analysis is inadequate because it fails to consider past and present adult soul beliefs and the psychological functions they serve. We suggest that a valid folk psychology of souls must consider features of adult soul beliefs, the unique problem engendered by awareness of death, and terror management findings, in addition to cognitive inclinations toward dualistic and teleological thinking.

Bering's analysis provides an inadequate "folk psychology of souls" because folks have motivational and affective concerns and are heavily influenced by culture, and these factors must be considered, along with cognitive propensities, to account for soul beliefs.

Bering's reliance on cognitive biases particularly pronounced in children is insufficient for two reasons. First, people relinquish many childish beliefs as they mature, as Bering's research shows. Adults generally do not believe dead mice get hungry, or that taller glasses necessarily contain more milk. Why do soul beliefs persist, when so many childhood ideas do not? How can someone smart enough to elude security and commandeer and steer an airliner precisely into a building believe he will enter a paradise filled with 72 virgins on impact?

Second, adult spiritual beliefs seem quite different than mere cognitive errors of imputing mind; they vary widely across cultures and are often quite complex (e.g., Watson 2005). In some cultures, there was no immortal soul, in others only the

wealthy, or only men, or only women who died in childbirth had immortal souls. In some, moral action affected one's afterlife, in others, not. The first Chinese emperor sent vessels in search of the Islands of Immortality. In the Sumerian Epic of Gilgamesh, Gilgamesh, disturbed by the prospect of death, embarked on a search for immortality. The Christian and Islamic conceptions of soul and afterlife are extraordinarily elaborate, buoyed by many symbols and rituals. The Aztec conception involved sixteen stages of existence and elaborate rituals, including the excision of sacrificial human hearts while still beating. If immortality beliefs were a simple default by-product of cognition, why would these beliefs be so varied and so complex? These fervently held belief systems, with their extensive time, effort, and life-consuming rituals, are neither child's play nor simple elaborations of cognitive errors.

By-products of cognitive inclinations cannot account for the elaborate nature of soul beliefs and the deep commitments to them. Nor is it likely they are primarily products of selection for avoidance of socially prohibited behavior. The prophet Zarathustra replaced the Persian class-based notions of afterlife reserved for the wealthy with the first modern beliefs in the soul's fate determined by moral behavior on earth (Kriwaczek 2002). Thus, belief in afterlife rewards for altruism was culturally constructed (partly to enhance social control) and memetically transmitted, rather than selected for as a cognitive predisposition.

A propensity for altruism could result simply from feelings of empathy and attachment, and sensitivity to contingencies for tangible rewards and punishments. Wouldn't irrational worrying about invisible forces have been counterproductive? Wouldn't self-serving immoral behavior be most adaptive when one's deities would be the only witnesses? How could cognitive predispositions that caused individuals to sacrifice their own offspring, perform time-consuming rituals, or feel crushing guilt at acts that violated the Golden Rule, be selected for, unless these beliefs served some more pressing evolutionary function than protection of reputation?

Bering hints at such a function, mitigating existential despair, but gives it insufficient weight. As many have observed (e.g., Rank's *Psychology and the Soul*, 1931/1961), the dawning realization of the inevitability of death had to be monumentally problematic for proto-humans. Many of our physiological systems function to keep us alive in a perilous world, and yet, thanks to our intellect, we know they will inevitably fail. This had to arouse intense concerns with personal vulnerability, and the resulting potential for anxiety would have been immobilizing without comforting mythic illusions of deistic protections and an everlasting soul. To be willing and able to hunt large game, compete for resources, and so forth, such beliefs provided necessary equanimity and confidence. Although these spiritual beliefs would not always over-ride fight or flight responses to imminent danger, they would allow individuals and groups to function more effectively, with their anxieties largely in check.

Why would people fear no longer existing when they cannot easily simulate it? According to Zilboorg (1943) and others, we are predisposed to fear death because it is highly adaptive to do so – it helps keep us alive. Our brains are designed to react to things that threaten our continued existence with fear, arousal, and defensive responses; from such reactions, it is a simple cortical inference that what we fear is death. Unfortunately, there is no simple fight or flight response to the knowledge of the inevitability of death, leading to the elaborate symbolic defenses provided by culture.

Second, we fear many things before we have experienced them, things we can't simulate – cancer, AIDS, a root canal, bungee-jumping. We fear whatever might cause us pain or end our existence. Third, the non-dreaming phases of sleep and being anaesthetized are somewhat similar to death – in these states, we are not, as far as we can tell, conscious or thinking. Finally, we fear death primarily not because of what we imagine it to be but for what we can easily imagine it takes away: life. We can imagine not seeing, not hearing, not tasting, not smelling, not feeling, not being able to touch or communicate with loved ones, not being able to listen to music, watch movies, take walks, and so on.

Terror management theory (TMT), based on Becker (1971; 1973), posits that spiritual beliefs serve the function of helping humans deny the finality of death (Solomon et al. 1991). The theory posits that over childhood, the security base provided by care-taking adults is replaced by deities and cultural authorities. Just as the young child sustains the love and protection of its caretakers by meeting standards of worth, the adult typically sustains security by adhering to the standards of worth of the spiritual and secular authorities of the culture. From this perspective, deities have so commonly been patriarchal or matriarchal because they have been modeled after the childhood care-takers. Deities are also judgers and punishers because in a world full of tragic, scary events, a deity who does not dole out punishment is not plausible.

Over 250 studies supporting TMT have documented that reminders of death (mortality salience: MS) increase advocacy of beliefs and behaviors that serve to convince people that they are worthy members of a meaningful universe, rather than mere animals fated only to obliteration. For example, MS increases identification with death-transcending groups and ideologies (e.g., I am more than an animal, I am an American!) and bolsters efforts to believe the world is just; and threats to these protective beliefs increase the accessibility of death-related thought (Greenberg et al., in press).

Becker argued that worldviews with spiritual components work best for managing terror. This may be why correlational evidence consistently finds that religiosity is associated with mental health and lower death anxiety (see Pargament 1997). Importantly, experimental research provides converging evidence of a protective terror management role of spiritual belief (Greenberg et al., in press). MS increases bias toward members of one's religion and against proponents of another, reluctance to use religious icons inappropriately, and, among the religious, MS increases belief in an afterlife, religiosity, and belief in prayer. Finally, increased belief in an afterlife and making religiosity salient to religious people reduce the use of secular terror management defenses such as worldview bolstering, and also reduce death-related thinking (Dechesne et al. 2003; Jonas & Fischer, in press). Thus, spiritual beliefs protect people from concerns about mortality.

In sum, although one could limit analysis to cognitive inclinations, doing so provides a very impoverished folk psychology of souls. To truly understand the psychology of souls, we should build on extant knowledge regarding evolution, the nature of soul beliefs, and psychological defenses, and acknowledge the role of the unique selection pressures engendered by human awareness of death in the evolution of supernatural beliefs.

Learning that there is life after death

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Abstract: Bering's argument that human beings are endowed with a cognitive system dedicated to forming illusory representations of psychological immortality relies on the claim that children's beliefs in the afterlife are not the result of religious teaching. We suggest four reasons why this claim is unsatisfactory.