Reasoning about Dead Agents Reveals Possible Adaptive Trends

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We investigated whether (*a*) people positively reevaluate the characters of recently dead others and (*b*) supernatural primes concerning an ambient dead agent serve to curb selfish intentions. In Study 1, participants made trait attributions to three strangers depicted in photographs; one week later, they returned to do the same but were informed that one of the strangers had died over the weekend. Participants rated the decedent target more favorably after learning of his death whereas ratings for the control targets remained unchanged between sessions. This effect was especially pronounced for traits dealing with the decedent's prosocial tendencies (e.g., ethical, kind). In Study 2, a content analysis of obituaries revealed a similar emphasis on decedents' prosocial attributes over other personality dimensions (e.g., achievement-relatedness, social skills). Finally, in Study 3, participants who were told of an alleged ghost in the laboratory were less likely to cheat on a competitive task than those who did not receive this supernatural prime. The findings are interpreted as evidence suggestive of adaptive design.

KEY WORDS: Afterlife; Attribution; Cooperation; Death; Evolutionary theory; Religion; Theory of Mind

Let nothing be said of the dead but what is good.
—Solon

Over the past few years, the cognitive science of religion has become something of a hothouse for evolutionary critique (see Atran and Norenzayan 2004; Bering 2005; Boyer 2001; Pyysiäinen 2001; Sosis 2003; Wilson 2002). According to many

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scholars in the field, religion historically has been the subject of undue adaptationist speculation, all too susceptible to "just-so" stories. Although the debate over whether religion occurred by design or by chance has lately been stirred up by the publication of several new books on the topic, the question has been around for some time.

In their classic indictment of human sociobiology for its "Panglossian" theorizing, Gould and Lewontin (1979) tagged religion, along with music, law, and language, as a prime example of a spandrel—a *non-selected-for* and incidental by-product of *selected-for* large brain size in humans. In later writings, Gould even joins forces with Freud by contending that religion is likely owed to *Homo sapiens*' unique awareness of death, which itself is a side-effect of human consciousness.[1] In a heated tête-à-tête with Pinker over what he considered to be the promiscuous usage of adaptationist arguments in evolutionary psychology, Gould (1997:56) singled out religion once again:

I don't see how a biologist could argue that the human brain evolved consciousness in order to teach us that we must die. Knowledge of death is therefore probably a spandrel—an ineluctable consequence of consciousness evolved for other reasons. But this spandrel may then have inspired one of our defining institutions.

We believe that Gould is mistaken in his claims that humans' unique struggle with death is the sole reason for religion. Nevertheless, it is undoubtedly an integral feature of religion. It has also been a focus of our own recent laboratory studies. Ironically, however, many evolution-minded cognitive scientists would tend to agree with Gould (and Pinker, for that matter) that the psychological foundations of religion are by-products of other design features of the mind (Barrett 2000; Boyer 2001; Pyysiäinen 2001; Sperber 1996). According to many researchers in this area, religious concepts are argued to exploit information-processing mechanisms into paying attention to them because they violate ontological regularities by hybridizing or violating natural categories (Atran and Norenzayan 2004; Barrett 2000; Boyer 2000, 2001). These writers argue that only the cognitive architecture itself can be the product of natural selection; religious ideas are seen as simply being parasitic on this evolved architecture—as nothing more than noise that shares a general frequency between cultures (e.g., Pyysiäinen 1999; Sperber 1996).

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 (see also Bering 2002, in press). This is because stating that religious concepts work by "parasitizing" psychological architecture is different from stating that behaviors that are associated with religion, by virtue of their incidental phylogeny, did not confer fitness advantages in the ancestral past or were limited to cultural selection (Bulbulia 2004). The psychological foundations of some religious behaviors, including those related to death, may be *co-opted spandrel*s (Andrews, Gangestad, and Matthews 2002; Buss et al. 1998). They may be side effects of other design features that, quite by chance, 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.

REPRESENTATION OF PSYCHOLOGICAL CONTINUITY AFTER DEATH

As a test case for these adaptationist speculations, we have begun a research program designed to investigate the possibility that ancestral humans' confrontation with death—an ontological regularity in the surest sense—led to species-specific psychological mechanisms that bear hallmarks of adaptive design (Bering 2002; Bering and Bjorklund 2004; Bering, Hernández-Blasi, and Bjorklund in press). Because evolved systems often demonstrate precursory components through developmental emergence, we began with what we knew about children's reasoning about death. Although Piaget never wrote about children's understanding of death from the perspective of his cognitive stage model, research on this topic was, until recently, dominated by Piagetian-style analyses (for a review, see Kenyon 2001). Thus, previous investigators argued that children's views of death must be constrained by their particular stage of cognitive development, with children in the preoperational stage (2–6 years), for example, seeing death as reversible, as personally avoidable, and as leaving dead agents with bodily functions still intact. According to Speece and Brent (1984), not until age 7 (marking the transition to concrete operations) do children develop a comprehensive death concept that mirrors adults' biological understanding (with the transition to formal operations, adolescents are said to think in abstract terms about what death *means* from social and religious perspectives).

As with many Piagetian frameworks, however, subsequent research served to roll back the developmental trajectory of these abilities. Slaughter and her colleagues found that preschoolers who understand the vitalistic purpose of various activities, such as eating and drinking, correctly identify these activities as ceasing at death (Slaughter and Lyons 2003; Slaughter, Jaakola, and Carey 1999; see also Inagaki and Hatano 2002). Because young children who are given explicit information about these vitalistic activities (e.g., that people eat food in order to stay alive) display a more sophisticated understanding of death than those who are not, these findings suggest that Piaget's cognitive stages do not impose impassable constraints on children's ability to reason about the biology of death.

In addition, findings reported by Barrett and Behne (2005) and by Bering and Bjorklund (2004) demonstrate that even 3- and 4-year-olds may possess implicit knowledge of the biological verities associated with death, particularly when death is made visually apparent. Bering and Bjorklund (2004) found that the majority (85%) of young children reasoned that the brain of a mouse killed and eaten by an alligator (both puppets) stopped working at its death. In the same study, however, preschoolers often reasoned that the psychological functions associated with these biological imperatives *continued* after death—for example, despite the dead mouse's brain not working anymore, it could still think and remember; or despite the fact that the dead mouse needn't drink water anymore, it still retained the capacity for thirst (see also Bering et al. in press).

With increasing age, and likely as the result of an accretion of scientific facts

concerning mind-body relations, children's belief in the continuity of psychological states after death declines. But it declines in a predictable fashion, such that certain categories of mental states (e.g., perceptual and psychobiological states) are more frequently reported as ceasing than other, ostensibly more ephemeral categories (e.g., emotional, desire, and epistemic states). Whether they grow up in overtly or only peripherally religious surroundings, most young adolescents continue to strongly endorse psychological continuity after death for these latter types of states (e.g., Bering et al. in press).

In terms of capacity to harbor such beliefs, then, children's reasoning about life after death is not solely a function of acquiring these ideas through various cultural channels. Rather, reasoning that psychological states survive death appears to be the *default* stance and is fleshed out into more sophisticated, adult-like afterlife beliefs through cultural exposure (and sometimes, rarely, usurped altogether by science-mindedness). In an earlier study with adults, Bering (2002) found that even individuals who classified themselves as agnostic or as having "extinctivist" beliefs about life after death (that personal consciousness is entirely snuffed out at the moment of death) nevertheless often attributed emotions, desires, and beliefs to a character *after* this person's sudden death (e.g., by reasoning that the character "knows" that she has died). Furthermore, Bering reported that, in looking at latency of response, it took participants *longer* to report that emotions, desires, and beliefs had been permanently interrupted than it did to report that other functions had ended.

These findings converge to suggest that humans are intuitively biased toward holding mental representations of psychological continuity after death and that it may be cognitively effortful to adopt a true materialist stance in relation to this subject. (For related, more formal philosophical treatments of people's inability to conceptualize posthumous nonexistence, see Clark 1994; Luper 2002.)

MENTAL STATE REPRESENTATION AS UNDERLYING SYSTEM

The capacity to represent higher-order mental states is a defining feature of human social cognition (Povinelli and Bering 2002; Tomasello et al. in press). An absence or impoverishment of this "theory of mind" capacity would obviously disallow the entertainment of beliefs about psychological continuity at death. It is therefore a non sequitur to ask whether those species that are biologically unequipped to take the intentional stance (cf. Dennett 1987) can form such representations. We believe that this cognitive specialization in humans served as the starting point for more recent psychological adaptations related to afterlife beliefs (as well as potentially many other psychological adaptations; see Bering and Shackelford 2004).

Both children and adults can best be classified as "common-sense dualists" (Bloom 2004). Recent findings by Kuhlmeier, Bloom, and Wynn (2004) show that infants might start off with a better grasp of the immaterial properties of people (that they are intentional agents) than of material properties (that they are also physical objects). These investigators presented 5-month-old infants with an expectancy

violation test in which a solid object appears to violate the law of continuous motion by "skipping" through empty space in real time. Whereas infants dishabituate to (i.e., look longer at) inanimate objects that violate this law (their surprise reflecting an understanding of naïve physics), they appear nonplussed when observing a human similarly engaged in discontinuous motion.

Although Kuhlmeier and colleagues are cautious in their interpretation of these findings, they reason that 5-month-olds may have separate construals for processing the physical dynamics of agent-related behaviors and object-related events. They argue that these data show that "infants do not readily view humans as material objects" (2004:101) and that an "appreciation that . . . people *are* just objects may be a developmental accomplishment" (2004:102; italics in original).

The capacity to see others as intentional agents lays the cognitive groundwork for people's stubborn penchant for reasoning that other agents' minds survive their corporeal death. Operating in concert with this set of sophisticated social skills, however, are more ancient adaptations that solved basic and recurrent problems but that are not clearly grounded in representational competencies. Boyer (2001) has pointed out that because of the problems of contamination and predators, the reality of a rapidly decaying human body in one's immediate environment demanded effective behavioral recourse, including burial, incineration, and abandonment of corpses in remote areas (e.g., see Reynolds and Tanner 1995). People's strong emotional reactions of disgust to dead bodies appear to trigger such adaptive behavioral responses (Rozin, Haidt, and McCauley 1993).

But all this does not make the case for psychological adaptations that implicate the *minds* of dead agents. What would be required to make this case is to show that a representational bias leading to belief in the continued existence of mental states after death fructified into self-contained psychological mechanisms dedicated to processing information and generating adaptive responses relevant to this domain (Andrews et al. 2002; Buss et al. 1998). One must establish, first, how this representational bias came to impact the net genetic fitness of individual humans and, second, that natural selection likely operated on this representational bias in ancestral environments.

We do not pretend to accomplish this difficult task with the set of studies reported here. Nevertheless, we believe that the current studies, which explore people's trait attributions to recently dead agents and investigate whether a prospective ghost in the environment curbs selfish intentions, move us in the right direction. We view these studies as an initial step toward testing the adaptationist hypothesis that representational biases underlying afterlife beliefs led to genetic fitness advantages in the ancestral past.

PRESENT RESEARCH

In Study 1, on two separate occasions, we asked undergraduates to rate the same three strangers (depicted in black-and-white "head shots") on a large number of

both desirable (e.g., "intelligent," "trustworthy") and undesirable (e.g., "hypocritical," "conceited") traits. Upon arrival at the laboratory for the second session (one week after their first visit), participants were informed that one of the individuals shown in the photographs had died, but that they should nevertheless re-rate each of the targets on the same scale as before. This gave us the opportunity to see if participants' subjective liking of others is influenced by having knowledge of these others' recent death. Popular wisdom and everyday observation that people "don't speak ill of the dead" led us to predict that the participants would rate the dead agent more favorably than they would before learning of his death.

More importantly, this would also be consistent with the evolutionary hypothesis that belief in dead agents' minds served an adaptive moral regulatory function (e.g., Boyer 2001). It is not only true that a belief in the afterlife is culturally recurrent; in the majority of hunter-gatherer societies dead agents also are envisioned as wielding considerable punitive power over social transgressors (Bering and Johnson 2005; Boyer 2001; Reynolds and Tanner 1995). The cross-cultural literature suggests that dead agents are most frequently seen as causal agents who (1) are particularly concerned with and emotionally invested in behaviors from the moral domain; (2) have privileged epistemic access to the self's actions within this domain—knowing about the self's actions even when they occur in private; and (3) reciprocate through positive life events for the self's prosocial actions and retaliate through negative life events for the self's antisocial actions (Fiske 2002).

We reasoned that the *proximate* cause of positive changes in subjective liking of the recently dead is fear of being punished through negative life events. This fear can be either implicit or explicit; individuals who do experience increased positive feelings of the recently dead may not be consciously aware of the proximate cause of these emotional changes. Many individuals are fully cognizant of this fear of dead others, but as cognitive philosophers such as Stocker (1987) and Deigh (1994) point out, belief, and perhaps even thought, are not prerequisites for fear. (Even the most science-minded of us would likely cringe at the idea of spending a night alone in a cemetery, or sharing a room with an angry spirit in a presumably haunted house.) From an evolutionary perspective that emphasizes unconscious processes, people should act submissively toward dead agents since the latter's "behaviors" cannot be subjected to normative punitive sanctions. Similar obsequious attribution processes involving genuine threats of social punishment by other (living) dominant group members have been hypothesized in the cooperation literature (see Fessler and Haley 2003; Fiske 2002; Gilbert 2000). These mechanisms should be particularly pronounced when it comes to making submissive appeals to the *morality* of the dominant other, especially when this other wields so-called absolute power. This is because reminding dominant others that they are, for example, good and kind should have the overall effect of rebinding them to social contracts whenever they are tempted to engage in arbitrary punishment without penalty (think of the hapless plebe who throws himself at the mercy of the king).

To test this secondary (morality-specific trait attribution) hypothesis further ,

and to secure a measure of validity outside the laboratory, Study 2 involved a content analysis of the attributions of trait variables found in obituaries authored by family members and close friends of recently deceased individuals. In line with our evolutionary model, we hypothesized that descriptions of the recently dead should emphasize prosocial and morality-relevant traits (e.g., "generous," "loving") over other traits (e.g., "hardworking," "outgoing").

We also hypothesized that the *ultimate* cause in positive attributions to recently dead agents—the long-term genetic gain—is a consequence of the adaptive behaviors that these attributions would have been associated with in the ancestral past. Increasingly positive attributions should be linked to cooperative behaviors to the extent that prosocial actions can be motivated by fear of supernatural punishment (Fiske 2002; Johnson and Krüger 2004).

In general, selfish strategies are detrimental to one's genetic fitness in the long run because of the importance of reputation-related reproductive strategies in human sociality (Bering and Shackelford 2004; Frank 1988; Sober and Wilson 1998). Therefore, whether it works through veridical or illusionary means, any psychological trait that facilitates inhibition of selfish actions in group settings is a candidate for adaptive design (Bjorklund and Kipp 2002). If the fear of watchful dead agents facilitates the inhibition of selfish behaviors, which would yield the real-world benefits of preserving reputation in situations where individuals underestimated the risk of detection by living group members, then a person who is primed with a "ghost story" should be less likely to cheat on a difficult task than participants who are not exposed to this dead agent prime. Study 3 aimed to test this hypothesis.

STUDY 1

Participants

Fifty-two (20 men, 32 women) undergraduates participated in and completed the study (mean age = 21.40 ± 4.86). Data from five participants who did not return for the second half of the study were excluded from the analyses.[2] All students were enrolled in an introductory psychology class at the University of Arkansas and participated in exchange for course credit.

Stimulus Photographs

Three black-and-white photographs were selected from a pool of 50, obtained from the Psychological Image Collection at Stirling University (PICS). The photographs depicted forward-facing head-and-neck images of college-age men displaying a neutral facial expression.

The initial pool of images was collated into a serial presentation of such photographs (5 × 10 cm each) which were then rated for attractiveness by students in an

undergraduate psychology class ($N = 29$) at the University of Arkansas. Attractiveness ratings were based on a scale of 1 ("very unattractive") to 4 ("very attractive"). The three images most closely matched on attractiveness (mean = 3.32 ± .05) were selected as the stimuli. These images were then enlarged to 10 × 15 cm displays and laminated for use in the study.

Evaluation of Others Questionnaire (EOOQ)

The Evaluation of Others Questionnaire (EOOQ) is a 38-item checklist assessing attributions of traits from four psychosocial categories: achievement-relatedness (AR: 9 items), social skills (SS: 9 items), subjective well-being (SWB: 8 items), and kindness/morality (KM: 12 items). Because the items comprising the SWB subscale were pragmatically odd (e.g., "happy with their lives") in their application to a newly dead agent, they served as filler items only and were not included in the analyses.

The scale was developed by Shapiro (1988) as a measure of one's evaluation of other people in general. The EOOQ is based on social comparison theory and has received concurrent validity with a depressed sample by showing that evaluation of others is related to one's own evaluation and self-concept. Because in the current study the scale was adopted for rating specific individuals, the reliability and validity of the scale for this purpose is unknown. Each trait was rated on a Likert-type scale from 1 ("has none of the characteristic") to 10 ("has a very great deal of the characteristic"). Thirteen of the items in the EOOQ were negative. After reverse-scoring these items, dividing each of the subscale scores by the number of items in that subscale produces a score ranging from 1 to 10, with higher scores reflecting more positive attributions to the specific individual.

Procedure

The experiment consisted of two 20-minute sessions, separated by exactly one week. During the first session, participants were informed that the purpose of the study was to determine how people judge strangers on the basis of physical appearance alone. Furthermore, the researcher told participants that the study was being conducted in collaboration with a researcher in the U.K. and that the photographs they would be asked to judge were of students from this foreign university.

Participants were then separately presented with the three photographs, in counterbalanced order, and asked to complete the EOOQ for each of the individuals shown. The researcher provided verbal instructions for completing the questionnaire; in addition, explicit directions were given on each EOOQ answer sheet. Participants were assured that their ratings would remain anonymous and confidential. The researcher remained nearby during the session and intervened only for procedural purposes.

Upon their second visit one week later, the same researcher instructed the par-

ticipants that they would now be given the opportunity to re-rate the people shown in the photographs. ("Now that you have had a week to think about your ratings, we want to give you a chance to re-rate the photos in case you have changed your mind.") The second session was therefore identical to the first, with one exception. Just prior to being shown one of the photographs, the researcher informed the participant that the individual had died over the weekend but that he should still be rated.

Control factors associated with the "decedent" variable were completely counterbalanced (1–3 of image presentation *as well as* 1–3 of specifically photographed person). If probed by the participant about the death, the researcher reported that he/she had not received any additional details.

To address possible diffusion of treatment effects (i.e., subjects communicating with each other about their experiences in the study), participants received an e-mail debriefing following completion of the data collection. The debriefing statement also included a query that asked participants if they believed, at the time of the study, that the individual had died or if they were aware that this was an experimental manipulation. Although the probability of a retrospective knowledge and/or self-presentation bias precluded using this belief measure as a meaningful covariate, the majority (60%) of those who responded to this query ($N = 20$) claimed to have believed that the person had in fact died.

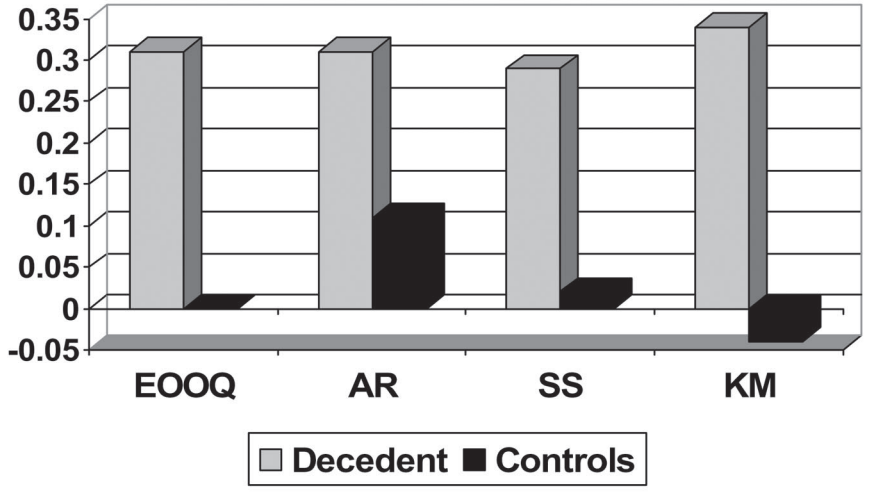
Results and Discussion

Overall Change (Time 2 – Time 1) on EOOQ. Figure 1 presents the mean change (Time 2 – Time 1) in participants' ratings of the targets on both the overall EOOQ and the individual subscales (AR, SS, KM). Preliminary analyses showed no significant main effect or interaction of participant gender or the position of the Decedent Target (presented first, middle, or last at Time 2) ($p > .05$), and subsequent analyses were collapsed across these variables.

A *t*-test revealed no significant difference between Target 1 and Target 2 on mean overall change between sessions, $t_{102} = -1.09$, $p > .05$. These data were therefore combined and compared to the data for the Decedent Target, revealing a significant effect of target, $t_{102} = 2.27$, $p <. 05$. Participants were significantly more likely to adjust their attributions for the Decedent Target (mean = .31) than they were for the Control Targets (i.e., "still-living" individuals) (mean = .00) between the sessions. As hypothesized, participants rated the Decedent Target more favorably after learning of his death than they did the previous week, before having knowledge that he had died.

Change (Time 2 – Time 1) on Independent Subscales of EOOQ. To test the secondary hypothesis that morality-relevant traits should be especially susceptible to a posthumous attribution shift, we conducted *t*-tests for the independent subscales (AR, SS, KM) of the EOOQ. As in the foregoing analysis, scores for Target 1 and

Figure 1. Average Intersession Change—Study 1. Mean change on attribution ratings for the overall EOOQ scale and on each of the three subscales (SS, AR, KM) between Time 1 and Time 2. Scores for control targets ("still-living") have been averaged in the figure. Higher values reflect more favorable attributions to the targets.



Target 2 were combined for each of the following subscale analyses after *t*-tests showed no significant difference ($p > .05$) between these two targets on any of the subscales between sessions.

For the Achievement-Relatedness (AR) subscale, a *t*-test comparing the average change (Time 2 – Time 1) between the Decedent Target and the Control Targets showed no significant effect of target, $t_{102} = 1.11$, $p > .05$, although a general trend of positive attribution change was more apparent for the Decedent Target (mean = .31) than for the other targets (mean = .11). Similarly, there was no significant effect of target on average change between sessions for the Social Skills (SS) subscale, $t_{102} = 1.63$, $p > .05$, although again the trend was in the predicted direction (Decedent Target mean = .29; Control Targets mean = .02). For the Kindness and Morality subscale (KM), as hypothesized, there was a significant effect of target on degree of change between sessions, $t_{102} = 2.15$, $p < .05$ (Decedent Target mean = .34; Control Targets mean = –.04), with participants rating the Decedent Target more favorably on this trait dimension after his death than before.

The findings from Study 1 show that individuals do change their views of others to reflect more positive trait attributions after learning that these others have died. Although there are numerous explanations for these overall findings, we believe that the data from the individual subscales present problems for more parsimonious interpretations (e.g., social desirability, stimulus enhancement, sympathetic concern) and support the theory that these attribution changes are evidence of implicit social submission to the recently dead. This is because the only subscale in which participants showed a degree of change between the sessions greater than chance

was the kindness/morality subscale, where participants' ratings of the decedent significantly spiked between sessions relative to the two controls.

Nevertheless, the demand characteristics of the study may have led participants to become "good subjects" by rating the decedent more favorably than the other targets because they knew what was expected of them. However, since, again, the data show that people's ratings of the recently dead significantly increases in the content-specific area of prosocial and morality-relevant traits (i.e., the KM subscale), but not significantly for other types of personality traits (i.e., the AR and SS subscales), this interpretation seems problematic. It seems unlikely that participants would have shared knowledge of this secondary hypothesis with the experimenters.

Furthermore, this interpretation is left wanting by the nature of the dependent measure. The study measured change in the evaluation of the targets over a week-long interval. Although it is possible that participants recalled their general rating patterns from the previous week, and simply shifted their ratings in a positive direction for the Decedent Target, but not for the Control Targets, this would require participants to have retained relatively accurate knowledge of their prior ratings for 114 items (38 items of the EOOQ × 3 targets) over an extended period of time. Even a gist recollection of the previous week's ratings would probably strain the participants' memory.

Although we cannot rule out competing interpretations in their entirety with this preliminary study, we believe that the present results can *best* be understood as supportive of an evolutionary interpretation. However, because these data involve attributions to strangers in a laboratory setting, they may not accurately reflect the attribution mechanisms that are at work after having learned that a family member or close friend has died. Study 2 was therefore conducted to test the hypothesis that the prosocial and morality-relevant traits of recently dead loved ones will be emphasized over other types of attributes (such as those that would be comprised in the achievement relatedness or social skills dimensions in the EOOQ) in posthumous descriptions of the decedent's personality.

STUDY 2

Materials and Procedure

Four-hundred-ninety-six paid death notices published in the *New York Times* between June 13 and October 31, 2003, were subjected to a content analysis of trait attributions to adult decedents of both genders (311 men, 185 women). This obituary archive was selected because of (1) its publicly accessible and searchable online records; (2) its trend in publishing obituaries authored by family members and close friends of the decedents, and thus including trait attributions to the decedents by those who knew them well; and (3) the publication's representation of an urban metropolitan area with a diverse religious, ethnic, and socioeconomic population

(however, it is also an economically biased sample in that the notices were paid). Because the hypothesis for the current study involved attributions to recently deceased individuals only, the content analysis did not include "In Memoriam" notices.

After controlling for those attributions that involved the author's subjective valuing of the decedent (e.g., "beloved," "adored") and selecting only attributions that reflected the perceived *qualities* that the decedent was envisioned as possessing (e.g., "loving," "adoring"), a total of 1,196 trait attributions were included in the analysis. In a few cases, it was necessary to classify these attributions through various phrases in the obituaries (e.g., "would drop everything for someone else in need") if one-word trait descriptors (e.g., "selfless") were not used by the obituary author. In addition, specific attributions occurring more than once in a single obituary (e.g., "loving") were scored only once per their occurrence in each notice.

Trait attributions were then independently classified by the first author and by a research assistant naïve to the purpose of the study as falling into one of the three subscales from the EOOQ (AR, KM, SS). Those variables that could not be classified as such were scored as "Other." Inter-rater agreement along the three subscales of the EOOQ was 83.2% (Cohen's $\kappa = 0.71$, indicating "good" inter-rater agreement; Altman 1991; Cohen 1960). Classificatory disagreements were resolved by appeal to the theory used to develop the EOOQ (Shapiro 1988).

Results and Discussion

Prosocial and morality-relevant traits of recently dead loved ones appeared more frequently than other types of attributes in obituaries written by those closest to the decedent. Of 744 traits categorized into one of the three subscales of the EOOQ, 58.6% were prosocial and morality-relevant (KM), 22.2% were achievement related (AR), and 19.2% made reference to the decedent's social skills (SS; $\chi^2_2 = 214.75$, $p < .001$). These results are consistent with the hypothesis that the prosocial and morality-relevant traits of recently dead loved ones will be emphasized over other types of attributes in posthumous descriptions of the decedent's personality. These results corroborate the results of Study 1 in a natural context and provide evidence that the operation of the relevant attributional mechanisms does not depend on one's relationship to the decedent.

The final study was designed to test the hypothesis that supernatural primes concerning dead agents serve to curb selfish intentions, with the potential to ultimately maximize long-term fitness effects by preserving reputation in situations where, historically, individuals underestimated the risk of detection of social transgressions (see also Fiske 2002).

STUDY 3

Participants

All of the 127 (53 men, 74 women) undergraduate participants in Study 3 (mean age = 20.62 ± 4.02) were enrolled in an introductory psychology class at the University of Arkansas and participated in exchange for course credit.

Test of Spatial Intelligence

Twenty-five items measuring spatial intelligence (including those assessing *kinetic imagery*, "the ability to manipulate or rotate an object in the imagination, imagining it as it changes position in space moving in any axis," and *dynamic imagery*, "the ability to manipulate elements within a 3D configuration") were selected from an interactive tutorial for Spatial Intelligence at the University of Limerick. According to the author of the original scale, these 25 items comprised the most advanced items in the tutorial and were designed for experienced users (high spatial intelligence ability). Thus, the level of difficulty was presumed to be very high. These mental rotation items were adopted for use in a specialized computer task created specifically for the current study. In addition to the 25 challenging items comprising the task, two additional mental rotation items, designated as "easy" by the tutorial designer, were used as training stimuli in the present study.

Procedure

Participants were misled about the true purpose of the study and were informed that they would be asked to complete a newly designed measure of spatial intelligence to test the validity of the items comprising the scale. Individuals were assured that their answers would remain anonymous and confidential, but were also told that they were competing for a $50 grand prize:

At the end of the study, the person who has scored the highest on the test will be awarded this prize. In the event of a tie for the highest score, a random drawing will determine the winner. Please note that this is a very difficult test and we ask only that you try your hardest when attempting to solve the problems.

Prior to the administration of the computerized test, the participants were asked to read and then reread the following written instructions (if necessary, the experimenter also iterated these instructions verbally):

> In a moment, you will begin the test on the computer. There are 25 multiple choice items on the test. For each problem, you will be shown a "target" figure (an image) and asked to mentally rotate that image in your head. You will then be asked to select from a group of figures that matches the target object. For example, you might be shown a square and asked how the square would look if it were folded a certain way. You will be given 2 practice questions and will have 30 min to complete this test.

Also included in the written instructions, and presented immediately beneath the foregoing details, was the following note:

> IMPORTANT NOTE: Because this is a new test, the computer program periodically malfunctions. In some instances, the correct answer may appear on the screen BEFORE the actual problem. If you see the word "ANSWER" at any time, this is a mistake (this is the correct answer to the following problem). **If this happens, please press the space bar immediately so that you can solve the problem honestly.** ONLY BY PRESSING THE SPACE BAR WILL THE SCREEN BE CLEARED. Thank you for your patience while we attempt to fix this problem.

Thus, by surreptitiously measuring the latency of response to press the space bar on such items, these data arguably served as objective indices of the participants' intentions to cheat at a competitive task when the risk of social detection was ostensibly low to absent. For these "glitch" items, participants could control the duration of their exposure to the correct answer, which, in all cases, was in the form of a complex image that could be matched to one of several similar images (i.e., possible answers) on the subsequent page.

Participants were randomly assigned to one of three testing conditions. Those assigned to the control group proceeded directly onto the spatial intelligence test. In contrast, participants who were assigned to the "In Memoriam" condition (hereafter IM), were asked to read the following brief statement prior to taking the test:

> In Memoriam: This test is dedicated to the memory of Paul J. Kellogg, who died unexpectedly in May 2004. Paul was a graduate student in the department, and his contributions to the development of this spatial intelligence test were invaluable.

Individuals assigned to the IM condition, therefore, received information about a dead agent but, like the control participants, they did not receive the attendant supernatural prime. Finally, participants who were randomly assigned to the "Ghost Story" condition (hereafter GS) also read the brief memorial to the fictive decedent. In addition, however, these people were told by the experimenter, as a casual but serious aside, that he/she had recently seen the ghost of the dead graduate student in the room where the participant was to be tested and that other people had made similarly eerie sightings of "Paul" there as well.

Participants were tested alone in a small laboratory room measuring approximately 6' × 8'. The door remained closed during the testing procedure and the experimenter waited outside in the hallway while the participant completed the test. No corrective feedback was provided to the participants following their answers to the problems. Participants left the testing situation without knowing either their final score on the test or whether they had successfully answered any given item.[3] On a randomly counterbalanced 5 of the 25 items, however, the alleged computer glitch occurred. In such cases, the correct answer was "accidentally" revealed to the

participant prior to the problem. As stated in the instructions, the only way for participants to avoid seeing the correct answer to the following problem was to immediately press the space bar, which served to advance the screen to the appropriate page.

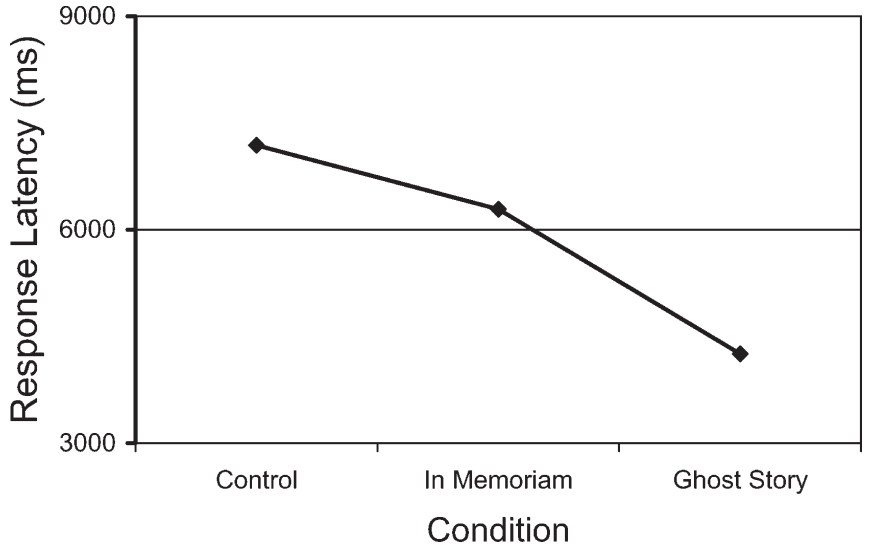
Results and Discussion

On the percentage of items correct overall ($N = 25$ items), a 3 (condition) × 2 (gender) analysis of variance yielded significant main effects of condition ($F_{2, 120} = 5.67$, $p < .005$ [control mean = 55.5%; IM mean = 52.6%; GS mean = 45.1%]), and gender ($F_{1, 120} = 12.13$, $p < .001$ [male mean = 56.7%; female mean = 47.2%]), but no significant interaction on this overall percentage correct measure. When the same analysis was performed while excluding the 5 targeted glitch items ($N = 20$ items), the pattern of findings was identical, with significant main effects of condition ($F_{2, 120} = 7.11$, $p < .01$), and gender ($F_{1, 120} = 10.24$, $p < .01$), but again no significant interactive effect. The gender differences are consistent with a multitude of findings showing that males tend to outperform females on most measures of spatial representation (see Voyer, Rodgers, and McCormick 2004), but are not central to the present hypotheses.

A similar 3 (condition) × 2 (gender) analysis of variance yielded no main or interactive effects for the percentage correct on the five targeted glitch items only. For these items, males (mean = 71.9%) were no more likely to answer correctly than were females (mean = 65.4%), and although control (mean = 72.4%) participants performed somewhat better on these problems than either IM (mean = 68.1%) or GS (mean = 63.8%) participants, the trend was not significant. Because several participants appealed to the experimenter for help when the first glitch item occurred, suggesting that they did not initially understand the instructions for correcting the problem by pressing the space bar, we subsequently decided to treat the first glitch item as a "practice" item. Even with this first glitch item excluded ($N = 4$ items), however, there were no main or interactive effects of gender (male mean = 72.1%; female mean = 65.2%) or experimental condition (control mean = 73.8%; IM mean = 65.5%; GS mean = 64.9%).

Latency of Response. As with the percentage correct measure, we treated the first glitch item as a "practice" item when analyzing the participants' latency of response data. We were therefore primarily interested in the amount of time it took for those assigned to the different experimental conditions to press the space bar on the remaining four glitch items. Nevertheless, when all 5 glitch items were included, a 3 (condition) × 2 (gender) analysis of variance yielded no significant main or interactive effects for latency of response. Exclusion of the first glitch item, in contrast, yielded the predicted significant main effect of condition $F_{2, 120} = 3.11$, $p < .05$ (control mean = 7015.3 ms; IM mean = 6144.4 ms; GS mean = 4302.9 ms), but no interaction or main effect of gender. Subsequent Tukey-Kramer post-hoc tests ($p <$

Figure 2. Response Latencies—Study 3. Average latency of response (in ms) for participants assigned to each of the experimental conditions to press the space bar on the four glitch items in Study 3.



.05) showed that control participants took significantly longer (mean = 7186.3 ms) to press the space bar than those who were assigned to the GS condition (mean = 4255.4 ms), but not to the IM condition (mean = 6287.7 ms) (see Figure 2). The difference between IM and GS participants' latency of response on these 4 glitch items was not significant, although it was in the hypothesized direction.

The findings from Study 3 show that participants who were exposed to the supernatural prime (in the form of hearing a "ghost story" about the haunted laboratory room) prior to taking the spatial intelligence test performed significantly worse overall than those who did not receive this prime. At the very least, this suggests that the ghost story served as a cognitive distraction that impaired the participants' ability to perform well on a competitive, challenging task (in the control condition, performance hovered around chance levels for both genders on the non-glitch items). Furthermore, it was not the death prime, per se, that seemed to disrupt performance, since participants who read the In Memoriam immediately before the test, but who did not hear the ghost story, performed equivalently to the control participants.

Although it is unclear what led participants from the GS condition to markedly differ on this task, fear of the ambient dead agent ("Paul J. Kellogg") seems a likely mediating factor. For example, two female participants in this condition agreed to participate only if the experimenter would leave the door partially ajar while they were being tested alone in the room. Another possible interpretation for the GS participants' relatively poor performance, however, is that the experimenter's casual remark about the ghost violated their expectations about the study; because the comment appeared to be a salient deviation from an otherwise automated method-

ological routine, this may have invoked an explanatory social cognitive search that interfered with the participants' ability to concentrate on the computer task. In other words, while taking the test, participants in the GS condition may have been cognitively burdened with the additional task of deciphering the researchers' motivation for sharing this atypical information with them, and this disrupted their overall performance. This explanation does not require that the GS participants believed in the veracity of the experimenter's tale of the ghost, only that they found the information to be puzzling.

If this were the case, however, then one might expect that GS participants' latency of response on the glitch items would actually be delayed compared with those assigned to the control and IM groups. This is because the dual-processing demands associated with reasoning about the experimenters' intentions while answering the test items should in principle hinder the efficiency of their cognitive processing on the task, thus slowing down their reaction time. The opposite pattern was actually found; as predicted, GS participants had a more rapid response rate in clearing the glitch items compared to control and IM participants. These findings appear to show, therefore, that supernatural primes dealing with dead agents genuinely reduce people's *willingness* to intentionally cheat on a competitive task where the risk of social detection appears low.

The fact that control and IM participants, despite their longer response latencies, were no more likely to answer the glitch items correctly than were GS participants is somewhat counterintuitive. After all, they presumably looked longer at the correct answer and had more of an opportunity to study the image. It is possible, however, that although these individuals were willing to study the correct images longer for selfish, strategic purposes, they still did not allow themselves enough time with each glitch item to benefit from them. In addition, because the images were complex and the multiple choice stimulus images were all highly alike (thus potentially sabotaging eidetic imagery), participants may have simply failed to profit from their uncooperative tactics despite their full intentions to do so.

CONCLUSION

Together, the present findings suggest that distinct psychological processes underlie people's reasoning about dead agents. These processes appear meaningfully *organized,* such as the tendency to make increasingly positive attributions of prosocial traits to both familiar and unfamiliar decedents, and *strategic,* such as people adopting a policy of social compliance, despite the temptation to cheat, when faced with the prospect of a supernatural agent in the immediate environment.

In both cases, these processes were possibly linked to adaptive behaviors in the ancestral past. If dead agents were even implicitly envisioned as vested partners in the moral framework, and were believed to retaliate against social transgressors, then supernatural primes dealing with these figures should have motivated prosocial or cooperative actions. Because human social systems are characterized by the rapid

transmission of social information between individuals, wherein knowledge of the self's selfish acts can spread in the community at an alarming pace, it is generally to the self's advantage to curb selfish intentions and instead to cultivate a "good" reputation—as someone who subscribes to the rules and refrains from cheating (Alexander 1987; Daly and Wilson 1994; Emler 1994; Frank 1988; Schelling 1960).

However, in some instances, the threat of social detection may appear deceivingly low, such that individuals are tempted to profit from cheating tactics without fear of social repercussions (castigation, imprisonment, execution, etc.). In such "no-one-will-ever know" cases, supernatural primes may serve to counteract these dangerous risk miscalculations, persuading the person to refrain from some act of social deviance and, subsequently, to preserve their genetic fitness. In a related study, Burnham and Hare (2006) report that, in anonymous and final interactions, participants contributed significantly more to a public good when "watched" by a robot with large, human-like eyes. Although their experiment was motivated by the hypothesis that human eyes would trigger unconscious mechanisms that gauge privacy, and thus serve to elicit prosocial behaviors, the presumed presence of a dead agent seems to similarly prime cooperative effort.

Furthermore, because the capacity to represent an afterlife is inseparably connected to the standard cognitive architecture of the human brain, the conditions under which the present mechanisms may have been subjected to evolutionary pressures are as ancient as the species itself (Bering in press). Certainly, in both hunter-gatherer and modern societies, the fear of ghosts is a common one (e.g., see Reynolds and Tanner 1995). Its frequency rivals such evolutionarily obvious fears as those of snakes and spiders, and, in children, it is even more resistant to treatment than fear of strangers (Gullone et al. 2000). Thus, despite its apparent sensationalism, the idea that ghosts and spirits (as well as gods) played an important role in the evolution of human sociality seems a biologically plausible one.

It is unclear whether explicit or culturally acquired concepts of "ghosts" or "spirits" are somehow facilitative of—or even underlie—the sort of psychological attributions to the recently dead reported here (cf. Barrett 2000; Boyer 2000). Future research should therefore seek to replicate the current findings with cross-cultural samples, particularly those that entertain highly discrepant views on the role of dead human agents in the affairs of the living (or on the fate of "souls" after death entirely). Evidence that morality-specific posthumous attribution shifts occur across such religiously diverse cultures would be evidence for the relative unimportance (and perhaps even epiphenomenal nature) of culturally acquired religious concepts in generating these sorts of responses. If the data are indeed borne out in future studies and are cross-culturally replicated, then it may be that dying is the ultimate way to win friends and influence people.

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NOTES

1. This perspective of religion as singly traceable to fear of death was shared by the cultural anthropologist Ernest Becker (1973); more recently, it is found in the writings of "terror management theorists" such as Pyszczynski, Greenberg, and Solomon (for a review, see Pyszczynski et al. 2004).
2. Data from four additional participants who received the wrong counterbalancing order as a result of experimenter error were also excluded from the analyses, such that a total of 61 participants were sampled.
3. As with the first study, in order to control for diffusion of treatment effects, an e-mail debriefing followed completion of the data collection for Study 3. At this time, the person with the highest score was also notified that he had won the $50 prize. However, no participant received their individual score on the spatial intelligence test.

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