

## Reports of My Death Anxiety Have Been Greatly Exaggerated: A Critique of Terror Management Theory from an Evolutionary Perspective

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*Although terror management theory's proponents claim that it is an evolutionary theory of human behavior, its major tenets are implausible when examined carefully from a modern evolutionary perspective. We explain why it is unlikely that natural selection would have designed a "survival instinct" or innate "fear of death," nor an anxiety-reduction system in general, or worldview-defense system in particular, to ameliorate such fears. We argue that results of mortality-salience experiments are better explained as by-products of a psychological system of coalitional computation that evolved for a variety of functions, including defense against other humans, that is activated by certain kinds of death-related thoughts.*

Terror management theory (Greenberg, Pyszczynski, & Solomon, 1986; Pyszczynski, Solomon, & Greenberg, 2002) is in many ways an unusual theory in the contemporary social-psychology landscape. Most striking to us is the fact that, in a field dominated by countless mini-theories and highly circumscribed areas of specialization, TMT unabashedly stakes claim to having identified fundamental aspects of human nature that explain a broad swath of observations about behavior and motivation. In this sense it harks back to a bygone era of psychology in which researchers widely aspired to "grand theories" of human nature. Whatever "big picture" of human psychology might be out there in the minds of social-psychological researchers today remains largely implicit, if one is out there at all.

In our view, these aspirations of TMT are admirable. We think it is rather a shame that social psychologists rarely speak explicitly about human nature; the term itself has virtually disappeared from the field's working lexicon. This perhaps is in part because so many have gone there and failed: Human nature is a tough nut to crack, and countless previous attempts have come and gone. We suggest that this is because such theories have not been anchored correctly in evolutionary theory. Any theory of human nature must be, at some level, an *evolutionary* one, because the fundamental design of human psychological architecture, like that of all other living species, are the result of evolutionary processes. Any claim that human nature takes some particular form must explain why it takes this particular form rather than some other. Answers to these questions can come only from an understanding

of how and why human nature has evolved to be the way it is.

It is only in the last decade or so that the modern field of *evolutionary psychology* has begun to emerge as an approach to psychology that takes seriously the fact that humans are evolved creatures whose fundamental design, both physically and psychologically, can be understood in terms of *adaptations* designed by natural selection to solve adaptive problems of survival and reproduction in ancestral environments. From this perspective, there "really is" a human nature, which in some ways is very similar to, and in other ways very different from, dog nature or ant nature or bacteria nature. These similarities and differences make sense only in light of evolutionary theory, as they reflect fundamental differences in the respective natural histories of different species and the particular adaptive problems to which physical and psychological adaptations evolved to solve.

The authors of TMT claim that theirs is an evolutionary theory (Pyszczynski, Greenberg, & Solomon, 1997; Pyszczynski et al., 2002), but in several crucial ways it is entirely out of step with contemporary understandings of evolution by natural selection. Historically and conceptually grounded in psychoanalytic theories from the early 20th century, TMT retains misguided assumptions about evolved human nature that plagued those earlier theories. This problem is not unique: Indeed, any psychological theory about human nature developed prior to the 1960s is, *a priori*, suspect because many crucial developments in evolutionary biology occurred during that decade that radically altered our understanding of how natural selection

works, and therefore what “kinds” of human minds could evolve. Freud’s misunderstandings about evolution, for example, led to such ideas as a death instinct and boys wishing to have sex with their mothers, both of which are preposterous from the perspective of modern evolutionary theory. We believe that TMT is similarly based on misconceptions about evolution and natural selection.

In this brief essay we examine the basic assumptions of TMT from a contemporary evolutionary perspective, and show that the theory simply is not plausible in several crucial ways. In particular, we argue that the assumption that humans have a survival instinct or innate fear of death is unwarranted—and that even if it was, it is not obvious why defending one’s worldview should be the expected evolved solution to the adaptive problems purportedly posed by death anxiety. We then argue that despite our belief that neither fear of death nor worldview defense reflects an adaptation with the functions postulated by TMT researchers, an evolutionary perspective is potentially valuable in understanding and reinterpreting the many empirical findings produced in TMT research. (For a more thorough discussion, see Navarrete, 2005; Navarrete & Fessler, 2005; Navarrete, Kurzban, Fessler, & Kirkpatrick, 2004).

### Theoretical Problems with TMT from an Evolutionary Perspective

For our purposes, we organize the following discussion around four major tenets of TMT: (1) Humans (and other species) possess a *survival instinct*; (2) in conjunction with this survival instinct, the evolution of advanced cognitive abilities in humans led to a paralyzing, incapacitating, *fear of death* that created a new adaptive problem for our ancestors; (3) the adaptation produced by natural selection to solve this adaptive problem was an anxiety-reducing *terror-management system*; and (4) a central process incorporated in the design of this terror-management system involves *worldview defense*. Below we address each of these tenets, in turn, from an evolutionary perspective.

#### Tenet 1: Humans Possess an Evolved “Survival Instinct”

The logic of TMT begins with the notion that humans, like other species, are characterized by a *survival instinct*. This term is commonly used in colloquial discourse, not to mention countless television programs about natural history, and it seems imminently plausible on its face. However, the term originates in an era well before the details of natural selection were well understood. It was not until the work of Hamilton (1964) and Williams (1966), whose contri-

butions became known to a broader audience a decade later (Dawkins, 1976; E. O. Wilson, 1975), that it became clear that biological evolution is not primarily about the survival of individuals—or, much less, of groups or species—but rather the differential reproduction of genetic information. Hamilton pointed out, among other important insights, that one’s own survival and reproduction provides only one way for one’s genes to be transmitted to future generations; another is to help ensure the reproductive success of close kin who are more likely than nonkin to carry copies of the same genes. To answer an age-old question, a chicken is just an egg’s way of making another egg.

This insight solved a number of otherwise intractable theoretical problems posed by many examples of apparent *altruism* in nature. Natural history is dense with examples of behavioral systems that make sense only in terms of Hamilton’s theory of *inclusive fitness* and clearly contradict the idea of a survival instinct. Most obvious are the many examples of species (including humans) in which parents incur tremendous costs to themselves in order to ensure the safety and survival of their offspring. At the extreme, many species of ants and bees are characterized by caste systems in which the vast majority of individuals not only are motivated to readily sacrifice their lives for the colony, but have even given up their ability to reproduce at all.

**A survival instinct would be maladaptive** From this inclusive-fitness perspective, the criterion by which natural selection operates is decidedly not the survival of individuals, but of replicable information. Survival matters only to the extent that it leads to success in generating replicable information (and in the case of most organisms, replicating the particular genes responsible for the adaptation in question). Genetic recipes that build organisms with long lifespans, but which are not successful in attracting mates, will always be disfavored relative to alternative recipes for short-lived, but reproductively successful organisms. Genetic recipes that build organisms that produce helpless offspring unable to care for themselves, but then fail to provide the necessary care and protection to these offspring, will similarly be disfavored over recipes that build nurturing parents (or precocious offspring who can fend for themselves).

Consequently, genetic recipes for building organisms with a survival instinct would be potentially *maladaptive* for many species with diverse reproductive systems. If individuals were motivated primarily to avoid their own demise and focus on their own survival, salmon would not fight their way upstream to breed, ants and bees would not live in colonies characterized by specialized castes, and parents across taxa would not readily sacrifice their personal safety and resources for the benefit of their offspring. It would not be the case that the first thoughts of human parents

faced with danger involve the safety of their children, or that these parents would unhesitatingly risk their own lives to rescue their children from a house on fire. Natural selection has designed us, like other organisms, to behave in ways that (on average, in ancestral environments) led to the replication of the genetic recipes underlying these behaviors. Many such adaptations function to maintain individual health and survival, but many involve placing other goals above our own survival (e.g., Sober & Wilson, 1998).

**A survival instinct would be superfluous.** Even if natural selection were in fact primarily a contest for individual survival, a “survival instinct” would in principle be of no adaptive value. No chess-playing computer program contains an instruction to “make good moves.” Such an instruction would be of no practical value because it provides no guidance regarding what constitutes a good or bad move. Instead, such a program contains numerous specialized mechanisms for evaluating positions and threats, gaining material advantage, protecting the king, and so forth. The ultimate goals of winning and avoiding checkmate are implicit in the overall design of the system, which reliably leads to those outcomes under expectable conditions, but nowhere is it explicit (Buss, 1990).

Similarly, a psychological mechanism containing the instruction “avoid death” would provide no guidance in determining how to behave to accomplish this goal (Paulhus & Trapnell, 1997). Instead, each species’ evolved psychology comprises numerous, functionally specialized mechanisms for avoiding particular kinds of dangers specific to the ecology of a given species, as well as mechanisms for other behaviors (such as those related to parental investment) that motivate individuals to face up to dangers to achieve reproductive goals. (It is perhaps worth noting here that, for the same reasons, contemporary evolutionary researchers do not posit any kind of higher-order systems or mechanisms containing instructions such as “spread your genes” or “enhance your inclusive fitness.”) From a design perspective, a survival instinct would be superfluous and of no adaptive value.

## **Tenet 2: Fear of Death is Incapacitating**

Strictly speaking, however, the survival-instinct tenet of TMT is not essential for the rest of the theory to work. TMT proponents might still argue that humans are able to fear death, and that realization of one’s own mortality can be paralyzing or incapacitating, but not because natural selection has instilled this into our genetic makeup. Instead, fear of death could be one of countless examples of thoughts and ideas that humans are uniquely capable of producing as a consequence of a plethora of uniquely human cognitive capacities. No

one believes that we possess evolved mechanisms for doing calculus, playing chess, or developing psychological theories and writing manuscripts about them. Perhaps our distant ancestors came to learn to fear death in much the same way that we in the modern West have learned to fear evolutionarily novel dangers such as electricity and car bombs. Our abilities to engage in these sorts of activities is conceptualized by evolutionary psychologists as *by-products* of systems that evolved for other specializations, but that can be recruited in the service of novel tasks. (See Pinker, 1997, for a discussion of how “higher-order” cognitive processes emerge via analogy and metaphor from evolved systems.) Thus, as TMT researchers argue, death anxiety might well have emerged in our species only after many uniquely human cognitive systems had evolved, which enabled humans to reflect on their own mortality and potentially be terrified by these thoughts.

**It is unclear why fear of death is incapacitating.** Although the idea of an incapacitating fear of death is not ruled out by the absence of a survival instinct, the hypothesis loses some of its punch without such a mechanism to motivate it. Most important, it is no longer clear why, among the many novel thoughts humans were able to produce after the evolution of various “higher” cognitive abilities, thoughts of death would be so terrifying as to be paralyzing or incapacitating. We have no trouble granting that such thoughts are troubling, but so are a great many other concerns for which terror-management mechanisms did not evolve.

From an evolutionary perspective, it seems reasonable to expect that other novel thoughts that began to appear with the evolution of the modern *Homo sapiens* would be at least as disconcerting as those about death. For example, by the same logic that leads TMT researchers to posit death anxiety as emerging from new abilities confronting an innate survival instinct, it might be expected that single people should become “terrified” if they fail to attract a mate, and particularly so if they reach middle age or so childless. Such thoughts are no doubt disconcerting to many people, but rarely to such an extent that it would have been necessary for natural selection to fashion a terror-management system to ameliorate them. Thus, the assumption that death anxiety is inherently so terrifying as to be paralyzing or incapacitating seems rather less implausible in the absence of a survival instinct.

**An incapacitating fear of death could not evolve.** Even if a fear of death were indeed so strong—whether rooted in a survival instinct or not—it is highly unlikely that the process of natural selection could ever design a corresponding fear-of-death system that systematically produced the kind of incapacitating paralytic state postulated by TMT researchers. Natural selection can be counted on to find equilibria among competing

psychological systems. For example, rabbits seem rather paranoid in the sense that they run for cover in response to the slightest unexpected noise. Rabbits make many errors in mistaking rustling leaves for predators, because rabbits that made the opposite kind of error did not become rabbit ancestors. A high state of vigilance is adaptive for rabbits, but such vigilance has its costs. If a hyper-vigilant rabbit errs were to err too much on the side of paranoia, it would be unable to spend enough time out of its burrow to eat, find mates, and so forth. But this in fact is not how rabbits are designed, because death by starvation is no better than death at the teeth of a predator. Likewise, it seems highly unlikely that the evolved psychological systems that give rise to death anxiety (whether as an adaptation or a by-product) could ever evolve to the point that it paralyzed other adaptive behaviors and required the evolution of new psychological systems to preclude paralysis.

The idea that death anxiety could evolve to such a point as to become maladaptive is reminiscent of a classic tale in the annals of evolutionary biology. The Irish elk, famous for its enormous antlers, became extinct some ten thousand years ago. For many years it was believed that its extinction owed to its antlers having evolved to become so large as to become a hindrance to eating, mating, and other life tasks. The fundamental misunderstanding was that natural selection of a trait, once started in a particular direction, somehow develops momentum that continues to drive evolution in that direction for better or worse. This notion turns out to be badly mistaken. Instead, the extinction of the legendary Irish elk is now known to have resulted from more mundane and typical adaptive problems associated with rapid climate change (Gould, 1977). In short, there is no drive behind natural selection toward maintaining any particular evolutionary trajectory that could enable death anxiety to evolve from an adaptive to a maladaptive trait.

### **Tenet 3: Evolution of a Terror-Management System**

According to the preceding arguments, it is unlikely that fear of death could ever have become so debilitating as to be maladaptive and thus a part of the universal psychology of humans. Even if it were the case that natural selection produced an adaptation in an organism whose by-products were severely debilitating, we find it equally implausible that evolution would have created a separate psychological system to solve the original problem.

#### **Adaptations for anxiety-reduction are dubious.**

First, it is doubtful that natural selection would design any system whose function was to reduce the fear or anxiety produced by another evolved system. Emotion

systems that give rise to fear and anxiety are themselves complex, highly adaptive systems that serve to organize behavior quickly when rapid response is required. Like rabbits, we are designed to become fearful in response to cues of potential danger, but not in the absence of such cues. Any system that served to reduce fear or anxiety that is produced by an adaptive system would, in principle, undermine the adaptive value of that other system. The evolution of rabbit paranoia was constrained by the need for rabbits to spend sufficient time foraging and mating, but natural selection did not and could not have solved this problem by designing new rabbit-psychology systems to make them feel comfortable and secure. Such a solution simply could not work. Assuming that anxiety and fear systems are themselves adaptive, then selection should strongly disfavor additional systems that inhibit anxious responses (Leary & Schreindorfer, 1997; Pelham, 1997).

Thus, if fear of death were adaptive, a terror-management psychological system that reduced it artificially could not evolve without undermining its adaptive value. If fear of death were maladaptive, it could not have evolved in the first place (as discussed above). The remaining logical possibility is that fear of death is on average neither adaptive nor maladaptive, i.e., it is adaptively neutral. In this case it is also implausible that a terror-management system would evolve to reduce it, because there would be no adaptive problem to be solved.

Perhaps it could be argued that although fear of death is adaptively neutral, it is at least unpleasant, and that a terror-management theory might have evolved to relieve the discomfort associated with it. It is worth noting why this hypothesis fails because it illustrates a general principle that seems widely misunderstood by some researchers in applying evolutionary theory to human psychology. In general, natural selection cannot be expected to design systems merely for the sake of making organisms feel good, happy, or secure. Natural selection is blind to purely internal psychological states or feelings except insofar as these lead to adaptive or maladaptive behavior. Natural selection is not in the business of building happy organisms.

The argument here has much in common with other problems in psychology regarding the purported evolution of various feel-good states such as high self-esteem. In contrast to a long history of theories positing that a fundamental motive or need of humans is to maintain high self-esteem, Leary and co-workers (1995) have argued effectively that self-esteem functions like a gauge (a *sociometer*) that reflects perceived success in regard to the attainment of other goals. It is not a fundamental motive of a driver to keep her car's fuel gauge pointing to "full"; if it were, this could be accomplished by simply gluing the needle in the desired position. Low self-esteem is an adaptive signal to motivate behavior in the service of

other goals and, like anxiety or fear, the system's adaptive value would be compromised by artificially inflating one's self-views without fixing the underlying problem. Similarly, experiencing an awful taste sensation after eating rancid food is unpleasant, but reflects a system functioning just as it should. Any artificial means that might be used to ensure that everything we put in our mouths was delicious, or that ensures that we experience high self-esteem irrespective of our social reality, would have disastrous consequences. Feeling states, like taste sensations, are functional precisely because they are variable; being positive most of the time is usually a sign of dysfunction, not success. (See Kirkpatrick & Ellis, 2001, in press, for further discussion.)

**Simpler and better solutions would have evolved instead.** A second reason why natural selection is unlikely to have designed a terror-management system as a solution to paralyzing death anxiety (assuming that this indeed posed an adaptive problem to be solved) is simply that there are much simpler and more reliable ways to solve the problem. Natural selection is a conservative process that tinkers with existing designs to the minimal degree necessary to meet new needs. A worldview-defense system seems immensely complicated and would require countless genetic modifications to instantiate. An infinitely simpler solution to the problem of excessive death anxiety would be simply to recalibrate the anxiety mechanisms that give rise to the problem in the first place. It would be a trivial task for natural selection simply to tweak a parameter or two to prevent death anxiety from becoming paralyzing, and natural selection would surely have hit upon this solution long before it built a complex terror-management system.

Alternatively, natural selection could have solved the death-anxiety problem by modifying existing psychological systems that regulate risky behavior. One simple way to reduce fear of anything is to avoid situations that make that thing more likely. Such a solution not only would help to solve the (presumed) problem of death anxiety per se, but would also address the real underlying problem of avoiding death itself. Existing behavioral systems could be tweaked easily to motivate people simply to reduce their engagement in dangerous activities. Consistent with our previous claim that avoiding death is in fact not the central problem to be solved by evolution, humans do not in fact appear to be well-designed to avoid risky situations.

This point is underscored by the examination of demographic trends in risk-taking behavior. Assuming that a hypothesis about a survival instinct also acknowledges the importance of reproduction, we should expect that people who are the most cautious would be those who have yet to reproduce. As automobile insurance companies know well, however, the opposite pat-

tern is the case: Young people take the most risks with their survival, while the middle-aged are much more cautious. Within any given age or sex group, marrying (often the first step toward reproduction) reduces risk-taking, while divorce and widowhood increase it (Daly & Wilson, 2001; M. Wilson & Daly, 1985). These observations make sense only outside of the perspective of the survival of the individual, and from the perspective of the replication of genetic information, according to which certain populations-particularly young males, who compete vigorously with each other to attract and retain quality mates-are willing to flirt with injury and death to ensure mating success, and the replication of the genetic information predisposing them for such strategies (Daly & Wilson, 1988).

#### **Tenet 4: Worldview Defense as a Terror-Management Adaptation**

We have argued that two central tenets of TMT-the existence of a survival instinct and an evolved system for reducing death anxiety-are implausible in light of contemporary understandings of evolution by natural selection. However, TMT could be modified further to parry this adaptationist critique and still remain largely intact. It could be argued that such strategies as worldview defense are a relatively modern solution invented by people or cultures rather than by natural selection; that is, both the problem of death anxiety and a worldview-defense solution may be by-products of other evolved systems. Our modern fear of electric shock and car bombs are useful in terms of their adaptive value in modern environments, but they are likely to be by-products of our evolved psychology rather than adaptations specifically encoded into our genomes. The same could be said of the various strategies we have developed to deal with them (e.g., circuit breakers, concrete security barriers). Fear of death is, in evolutionary terms, a quite recent development emerging as a by-product of our evolved psychology as well, and in response humans have invented various ways to reduce it or distract themselves from it because it is unpleasant. Such a version of the theory would be more similar to early versions of TMT (Greenberg et al., 1986), before its authors began to explicitly build evolutionary arguments into their presentations of it (Solomon, Greenberg, Schimel, Arndt, & Pyszczynski, 2004).

Demoting the major components of TMT to the status of by-products rather than adaptations does not mean, however, that the problem is any less important or interesting. It also does not mean that an evolutionary perspective is not useful for examining it. The problem for an evolutionary psychologist merely shifts from that of identifying the function and design of a purported adaptation, to identifying the evolved mechanisms purported to give rise to the by-product and ex-

plain how and why the by-product emerges (Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998). One of us (Kirkpatrick, 1999, 2004, in press) has argued, for example, that religion is not an adaptation per se but rather emerges as a collection of byproducts of numerous psychological systems evolved to solve mundane adaptive problems related to understanding the natural world (e.g., naïve physics, naïve biology) to negotiating functionally distinct forms of interpersonal relationships (e.g., attachment, coalitions, kin relations, social exchange). Similarly, an evolutionary approach can be used to understand how and why fear of death emerges, and what psychological and behavioral responses might emerge, as a result of other existing psychological mechanisms that evolved for other purposes.

Approaching the central problems of TMT from this perspective, however, leads us to have strong doubts about the centrality of the putative mechanism-maintenance and defense of shared worldviews-as a fundamental, species-wide feature of human psychology. One obvious problem that does not require an evolutionary perspective to see is that worldviews obviously vary in the degree to which they effectively combat death anxiety. Many Christian beliefs, for example, address the problem directly in terms of beliefs about life after death, heaven as a wonderful place, and so forth. At the same time, beliefs about hell, which vary considerably across denominations, would seem to have precisely the opposite effect. God and Jesus appear in the New Testament as generally comforting, nurturing figures similar to parents or friends, but the Old-Testament God or the God of the Apocalypse in the Revelation of John has a dangerous temper that leads adherents to be “God-fearing Christians.”

Examination of cultures outside Western, Christian populations casts even greater doubt on the claim that worldviews generally function in the manner postulated in TMT. The optimistic worldview of contemporary Christian beliefs is by no means typical as worldviews go. The anthropological record is replete with examples of belief systems in which misfortune is thought to befall individuals through no fault of their own, capricious supernatural entities murder children, crops fail because of witchcraft, the “evil eye” of envy causes catastrophe to befall successful people, and so on. For example, the Fang people of Gabon believe that an internal bodily organ can launch attacks against other people, drink their blood, and bring illness, harm or even death to the victims (Boyer, 2001), while life among the Azande of the Sudan has been described as rife with paranoia, fear, and suspicion due to a worldview saturated with witchcraft beliefs (Evans-Pritchard, 1937). In each of these and numerous other cases, pain, suffering, and death rain down upon people regardless of whether or not they live up to the standards of the given cultural worldview.

Far from being a secure buffer against existential anxiety, worldviews raise as many questions as they answer, and often forecast a less than optimistic future, even for those that follow the rules. This is true for both religious and secular worldviews, as secular worldviews such as those held by many in the peace or environmental movements can be every bit as apocalyptic and anxiety-producing as fundamentalist views. Indeed anthropologists are often suspicious of the notion that worldviews buffer anxiety, and instead argue that belief systems often bring tension and stress into everyday life, since not only do the living need to be attended to and appeased, but also the dead (e.g. Boyer, 2001; Evans-Pritchard, 1937). The TMT perspective on belief systems is one developed in the context of a 20th Century post-war milieu where ideological beliefs of the White North American middle class have become sanitized, egoistic, and much more comforting than was true in the past, or is true in most cultures outside of the U.S. today. Because TMT does not attend to the belief systems of non-Western societies, nor does it accurately characterize most Western belief systems when viewed in historical context, it provides a limited and ethnocentric approach to the function of worldviews. A North American Christian worldview of the late 20th Century is hardly an appropriate prototype in any theory that aims to describe a phenomenon which is purportedly ubiquitous across the panoply of cultures past and present.

### **An Alternative View**

TMT researchers might respond to these observations by pointing out their theory does not require that cultural worldviews are themselves explicitly comforting or anxiety-reducing; rather, they maintain that such worldviews function in symbolic ways more or less independent of their content. According to the theory, cultural worldviews provide a symbolic sense of immortality, connectedness with something larger than the self, and so forth. Consequently, mortality salience manipulations (but not other kinds of threats) cause people to increase their commitment to such worldviews, which can sometimes have related effects such as denigrating others who do not share these views and increasing liking toward ingroup members. TMT researchers have amassed a mountain of data consistent with this hypothesis.

It is therefore incumbent upon us, as well as other critics of TMT, to offer an alternative explanation for these effects that have been reliably demonstrated in hundreds of studies. In this section we outline a general approach to the problem from an evolutionary perspective, and suggest a specific alternative hypothesis rooted in this approach that we believe explains the bulk of the data regarding mortality-salience effects.

Perhaps most important, we hope that these suggestions will prove helpful in the design of new studies pitting TMT against our hypothesis.

### **The Evolved Psychology of Death-Avoidance**

So far we have argued that it is unlikely, for various reasons, that either a fear of death or a terror-management system reflects an adaptation evolved for the purposes claimed by TMT researchers. This by no means implies that questions about death anxiety cannot be addressed from an evolutionary perspective. Much of human behavior, particularly in modern Western societies, can be understood in terms of *by-products* of evolved psychological mechanisms. We suspect that the effects of mortality-salience manipulations in the laboratory reflect byproducts of other evolved systems designed for other purposes.

From an evolutionary perspective, we have argued, humans do not possess a generalized survival (or death-avoidance) instinct but rather numerous specialized psychological systems and mechanisms designed to solve the specific survival problems faced by our distant ancestors in their particular ecological contexts. A cursory review of the primary ways in which our ancestors would have been regularly threatened with death reveals that several such adaptive systems are sufficiently obvious to be (we presume) beyond controversy. Like all other living organisms, we possess specialized systems for avoiding death by starvation that involve identifying, locating, and ingesting particular kinds of foods, along with an internal state of hunger that motivates such behavior when nourishment is required. Similarly, we avoid death by dehydration by virtue of systems related to regulation of water intake and the correlated internal state of thirst. Perhaps the greatest threat to life in ancestral environments was disease, which is addressed by physiological systems such as the immune system but psychological systems which discourage us from coming into contact with (much less eating) potentially contaminated substances such as rotting flesh and feces (often accompanied by an internal state of disgust)—and, according to recent research, ethnocentrism (Navarrete & Fessler, in press).

This line of thinking leads to a variety of hypotheses about how specific death primes related to these particular systems might be expected to have domain-specific effects on a variety of dependent variables. For example, priming fears of death by starvation might be expected to influence food preferences, such as increasing positive attitudes or decreasing negative attitudes toward previously disliked foods, or partially suppressing disgust mechanisms towards food (but perhaps not other forms of disgust). Priming thoughts about death from contagious disease might similarly

be expected to influence attitudes toward sick people or enhance the sensitivity of disgust mechanisms. This is not to say that worldview-defense effects might not *also* be observed: One important way of obtaining food is to get it from other ingroup members, and one way of avoiding disease is to avoid outgroup members. However, demonstration of such effects would show that worldview defense is only one of many domain-specific responses to death threats, which can be explained in terms without reference to survival instincts or fear of death.

### **Coalitional Psychology**

Apart from the threats of starvation, dehydration, and disease discussed above, a key challenge to survival in ancestral environments—as is today in many environments—would have been the threat of harm from other people. Like our close chimpanzee cousins, humans live in groups that defend territory and compete with other groups, sometimes violently. Within these groups, coalitions and alliances shift over time and provide the primary means of attaining status (in contrast to most other species in which status is largely a matter of physical dominance). These coalitions, at both levels of analysis, also provide a primary defense against harm by outgroup or other ingroup members. In humans, shared worldviews provide an important symbolic means of identifying allies and enemies, ingroups and outgroups. For example, one central component of most religious belief and moral systems involves differentiating believers from heathens and other characterizations of us-versus-them, along with different prescriptions and proscriptions regarding how one should behave differentially towards them (see Kirkpatrick, 2004, for a discussion).

Because the benefits of social inclusion are particularly important in times of need (Baumeister & Leary, 1995), natural selection can be expected to have shaped human psychological systems such that, when confronted with situations that are best addressed using social support, individuals should exhibit a strongly pro-normative orientation in order to enhance the maintenance and formation of alliances. We argue that the contemplation of death elicits increased endorsement of the normative beliefs of the ingroup primarily because the likely common causes of death in ancestral environments (dire illness, disease, severe bodily harm, and starvation) were conditions in which successfully acquiring increased social support (and perhaps, avoiding outgroup members) would have had significant fitness consequences. We therefore propose that the mortality-salience phenomena documented by terror management researchers might be better explained as output generated by a system of adaptive mechanisms that facilitate the formation and maintenance of close relationships, coalitions and alliances.

So whereas TMT predicts that no stimuli or arousal short of those that elicit thoughts of death will lead to the increased defense of the normative worldview (Arndt, Greenberg, Pyszczynski, & Solomon, 1997; Greenberg, Simon, Harmon-Jones, Solomon, & Lyon, 1995), we predict that a range of stimuli should have this effect. More specifically, we predict that the eliciting stimuli will index situations that pose adaptive problems for the individual that could conceivably be effectively addressed using the support of allies.

TMT advocates have explicitly argued that mortality concerns are not merely a specific instance of a more general category of threatening events that could increase normative sentiments, and have gone to considerable length to demonstrate that exposure to some aversive thoughts unrelated to death, such as failing an exam or being forced to engage in public speaking, do not engender the effects elicited by mortality-salience (Greenberg et al., 1995). They have interpreted these findings as supporting their claim that the worldview defense effects found in their experiments are *uniquely* caused by the accessibility of death-related thoughts engendered by mortality salient primes (Greenberg, Solomon, & Pyszczynski, 1997). However, from our perspective, contemplating failing an exam or delivering a speech should not be expected to provoke the same shift in social cognition since these scenarios do not concern fitness-relevant challenges in which coalitions could conceivably be a part of an adaptive solution to the problem. Rather than speaking to the uniqueness of mortality salience, these results simply underline the need to view contemporary experiences with an eye toward the ancestral world in which our minds are designed to operate.

With these ideas in mind, we (Navarrete, Kurzban, Fessler, & Kirkpatrick, 2004) recently conducted a series of investigations in which participants contemplated scenarios that contained an adaptive challenge but did not elicit thoughts of death. Whereas advocates of TMT explicitly predict that the worldview defense effects found in their studies are uniquely caused by death thoughts, our perspective predicts that fitness-relevant stimuli unrelated to death can produce similar results, provided that the eliciting stimuli indexes an adaptive challenge that could be effectively addressed through social support. In six studies conducted in the U.S. and Costa Rica, we demonstrated that participants who contemplated death, theft of resources, social isolation, or soliciting help for a cooperative task all increased their support of a pro-nationalist author over a societal critic when compared to participants who contemplated a neutral theme (Navarrete, 2005; Navarrete et al., 2004). Inconsistent with the claims of the TMT advocates as to the universality of a terror management psychological system, mortality salience failed in three separate experiments to increase normative bias among Costa Rican

participants. Such results suggest that, holding the veracity of the claims to the existence of a terror management psychological system aside, the cross-cultural ubiquity of such existential concerns can also be called into question.

These results showed that worldview-defense effects can occur even when death is not salient, provided that the eliciting stimuli contain content that is relevant to fitness concerns that can conceivably be addressed (or could have been in ancestral environments) through the social support that coalition membership can provide. Social isolation, theft of resources, and a need for assistance in a cooperative task all require that individuals take steps necessary for social inclusion, and increasing one's pro-normative orientation facilitates success toward this end. While these results are striking, our research is not the first to demonstrate that normative bias rises in response to self-relevant threats that do not engender death-thoughts. Experimental manipulations that are unrelated to death but which share conceptual links to personal uncertainty or to threats of physical bodily-integrity have been found to increase ideology defense as well (Burris & Rempel, 2004; Fritsche, Jonas, & Fankhanel, 2006; McGregor, Zanna, Holmes, & Spencer, 2001). Because (a) others are often able to provide direction and aid in uncertain situations, and (b) threats to bodily self-integrity can be addressed through social support, these results are consistent with our thesis that increases in normative orientation are ultimately aimed at recruiting assistance.

### Cultural and Individual Differences

Our initial studies showed that social isolation-salience produced greater normative cognitions than did mortality salience among Costa Rican participants, but that the opposite was true among our North American sample (although the differences in the North American sample were not significant). We hypothesized that cultural differences in the importance of social relationships in confronting challenges might be the cause of these differences. Since rural Costa Ricans value interconnectedness and view their ability to meet life challenges as fundamentally dependent on their relationships with others, Costa Ricans may assess complete social isolation as a more dire challenge than do our more individualistic North American undergraduates. This reasoning suggests that individual variation within each culture in the perceived dependence upon others in meeting life challenges should correspond with the extremity of normative sentiments that are exhibited under conditions of threat or challenge. One such experiment (Navarrete et al., 2004; Study 4) produced evidence supporting this prediction, as we found that endorsement of normative beliefs rose as a function of adherence to collectivist values in response to exposure to coalition-relevant primes.

This finding was replicated among urban North American undergraduates in a second series of studies (Navarrete, 2005). Intriguingly, reversing the pattern found in Costa Rica, contemplation of social isolation produced smaller effects than did mortality salience (though again, the relative effect sizes did not differ significantly). These replicable findings of cultural differences are consistent with the notion that ideological reactions to self-relevant adaptive challenges reflect cultural differences in how such challenges are cognized. Various aspects of universal themes may be differentially cognitively elaborated or downplayed in different cultures (Levy, 1973), producing between-culture differences in the extent to which various scenarios are interpreted as posing a threat. Specifically, social isolation may be a more significant threat in societies that emphasize collective as opposed to individual responses to challenges, and existential mortality concerns may not be particularly salient to individuals in societies where religious beliefs and fatalistic attitudes make avoiding such content less troublesome than is the case for people living in complex industrialized nation-states where cultures emphasize secular life, longevity, personal safety, and personal self-efficacy (Durkheim, 1951/1897).

### **Worldview Defense and Coalitional Computation**

Findings from both classic and current research on social support are congruent with our contention that affiliation defenses are triggered by a wider variety of fitness-relevant threats than simply those that might invoke existential anxiety. Schachter's (1959) studies of the psychology of affiliation reveal that research participants increase their affiliative responses in response to a wide range of aversive stimuli that do not invoke mortality concerns. Such threats increased affiliation most markedly with others believed to be facing the same situation. Congruent with our premise regarding the adaptive utility of coalition membership in the face of threats, Schachter interpreted his results as indicating that such challenges "lead to a desire to be with others as a means of socially evaluating and determining the 'appropriate' and proper reaction."

Curiously, certain findings from the terror management literature itself betray the theory, forcing the authors to engage in acrobatic mental gymnastics in an attempt to square the data with the theory. For example, Harmon-Jones and colleagues (1996) examined the effects of mortality salience on minimal groups and found that study participants who contemplated death preferred ingroup members to outgroup members in arbitrarily assigned groups. The authors interpret these results as indicating that, when confronted with death, individuals who lack an existing and meaningful outlet on which to project their death anxiety will seize on ar-

bitrary or trivial factors with which to boost their personal sense of value and preserve their psychological equanimity.

We suggest that, because these results reveal that intergroup bias occurs in the absence of meaningful worldview distinctions, this investigation actually demonstrates that it is perceived coalitional membership, and not worldview defense, that is the key factor in mortality-salience phenomena. As noted above, while shared beliefs are important in determining group identity (i.e., who belongs and who does not), it is not the beliefs per se that are the relevant issue, but rather the group membership that is marked by a system of coalitional computation. Contrary to TMT claims, we hold that group identity does not function to assuage worldview defense needs, but rather, worldviews serve the purpose of facilitating intergroup and interpersonal relationships.

Wisman and Koole (2003) present a series of studies in which mortality salience consistently leads to increased affiliation strivings as demonstrated by a greater tendency to sit next to others rather than alone, and to sit with ingroup members compared to outgroup members. On their own, these initial results are consistent with both our approach to coalitional psychology and a TMT perspective on affiliation needs: Whereas we assert that affiliation with others is an important means of coping with threats to fitness, proponents of TMT argue that affiliation with social groups bolsters one's worldview and thus relieves existential anxiety, since social relationships are an important part of a meaningful, anxiety-buffering worldview (Florian, Mikulincer, & Hirschberger, 2002).

However, in contrast to predictions inferred from the TMT interpretation, Wisman and Koole also found that the affiliative response swamped worldview defense effects, as affiliation tendencies increased even when group members had threatened participants' worldviews, and when the group forced participants to attack their own worldviews. These effects occurred even though the participants' worldviews were personally relevant and highly accessible. Together, these results suggest that affiliative responses suffice to attenuate the need to bolster one's support for normative ideology, a pattern that contradicts the TMT view of the relationship between affiliation and beliefs. If, as TMT researchers claim, affiliation is relevant only to the extent that relationships are part of a meaningful worldview, then participants should not affiliate with those who go against their worldviews. In contrast, the results documented by Wisman and Koole is wholly understandable with the recognition that TMT mistakenly reverses the relationship between worldviews and affiliation. From our coalitional perspective, because affiliation is itself the goal underlying worldview defense, if affiliation can be achieved directly then the need for worldview defense is reduced.

## Conclusion

We have argued that the major tenets of TMT do not stand up to critical examination from a contemporary evolutionary perspective. We find it implausible that natural selection would have created a survival instinct in humans (or any other species) because such an instinct would be superfluous at best and maladaptive at worst. Even if such an evolved system did exist, it is implausible that natural selection could design any kind of terror-management system to reduce death anxiety without undermining the adaptive value of the death-anxiety system whose effects it is intended to ameliorate. Furthermore, even if survival instincts and terror-management systems potentially served some adaptive function, it is implausible that such a complicated, unreliable solution involving defending elaborate worldviews would evolve as the solution given the fact that much simpler and more reliable solutions are readily available.

Rather, it seems to us that the phenomenon of death anxiety, as well as various solutions humans have creatively invented to relieve it, are better conceptualized and explained in terms of by-products of other adaptive psychological systems that evolved for other purposes. From this perspective, the well-documented effects of many mortality-salience manipulations in the laboratory appear to reflect activation of psychological systems related to coalitional psychology, because (in ancestral environments) one's coalitions and alliances would have provided a crucial defense against death in the hands of other people. This perspective not only provides an alternative explanation for many experimental results produced by TMT researchers, but suggests a variety of directions for future research.

Although our focus in this paper has been on TMT *per se*, we are hopeful that our analysis illustrates some more general principles regarding the application of evolutionary theory to psychological phenomena. First, contemporary evolutionary theory is in some ways remarkably simple, but in other ways remarkably tricky. Small missteps can easily cascade into larger theoretical errors; it is one of those areas in which a little knowledge can be a dangerous a thing. As evolutionary approaches continue to mature and increase in acceptance in social psychology and related fields, researchers are increasingly inclined to attempt to "evolutionize" their theories. We strongly encourage this and are cautiously optimistic that an evolutionary perspective will eventually come to be normative for the field; indeed, we hope that "evolutionary psychology" will eventually cease to be identified as if a separate field or subdiscipline because all of psychology will be founded ultimately in the evolutionary thinking that integrates game-theoretic, computational and economic decision-making approaches to human behavior. However, it is incumbent upon such researchers to

become well versed in contemporary evolutionary theory and apply it with great care in order to avoid the minefield of traps and pitfalls into which it is so easy to fall.

Second, there are particular dangers associated with "retro-fitting" an evolutionary perspective onto existing theories and expecting those theories to remain unchanged. Sociobiologists and evolutionary psychologists have long been accused, sometimes fairly, of post-hoc theorizing. Evolutionary psychology need not be post-hoc, if it begins with knowledge about evolutionary processes and ancestral environments and uses deductive reasoning to develop testable hypotheses about human psychology. Social psychologists who attempt to add an evolutionary veneer atop a pre-existing theory can too easily become guilty of the very kind of post-hoc evolutionary theorizing to which they (appropriately) object. We strongly encourage researchers to reexamine their (non-evolutionary) theories from an evolutionary perspective, but this must be done with an open mind regarding the possibility, indeed, the high likelihood, that the theory will not hold up under proper scrutiny and will need to be substantively revised.

For many reasons, contemporary evolutionary psychology has the potential to revolutionize social psychology, providing theoretical organization that permits us to "carve nature at its joints" rather than arbitrarily and to guide our research hypotheses by identifying hypotheses that are implausible in principle and generating new hypotheses that would otherwise be overlooked. However, previous attempts to bring evolutionary perspectives to psychology have come and gone with limited long-term effect, because they were either based on incorrect understandings of evolution or because the ideas were not implemented carefully. It would be tragic for the field if the new wave of evolutionary psychology never realized its potential because it was done poorly. Evolutionary psychology well done has the potential to produce the best social-psychological research and theory possible, but its power can just as easily mislead us far astray.

## Notes

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