

Awareness of Death and Personal Mortality: Implications for Anthropogeny

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Responses to Death in Chimpanzees and Other Mammals

Dora Biro, University of Oxford

How non-human animals respond to dead or dying conspecifics, and what their responses may reveal about the extent to which a concept of “death” is present outside the hominin lineage, are questions currently generating intense scientific interest. Answers to these questions may help elucidate the evolutionary origins of a range of death-related psychological states and behaviours in our species, such as grief, mourning, understanding of mortality and mortuary practices. In addition, they raise welfare considerations in the case of captive animals, regarding the management of situations involving death or dying. I will describe a number of case studies from our closest evolutionary relatives, chimpanzees, together with a review of examples that have accumulated to date across a broad spectrum of mammalian species (including other primates, canids, ungulates, elephants, and cetaceans). Documented responses range from attending next to the deceased conspecific and vocal or behavioural indicators of distress, through focused curiosity directed at the body and active caretaking such as grooming, licking or carrying, to sexual behaviour and aggression. Drawing on this emerging body of evidence, I will explore what cues might elicit these responses, which factors might determine what combination of responses is exhibited, and what these may reveal about animals’ underlying psychological states. In doing so, I will present an emerging framework for interpreting such behavioural observations, and the care we need to take to neither overinterpret nor too easily dismiss them as being relevant to humans’ understanding of death.

Why do Corvid Birds Gather Around Their Dead?

John Marzluff, University of Washington

The discovery of a dead member of one’s own species is a profound, potentially emotional, and certainly informative experience. Social species, from insects to humans, seem especially intrigued by their dead. While mammals often attend to their dead for periods lasting from hours to days, most insect and bird responses are of much shorter duration. The responses of birds, which typically include large and conspicuous gatherings and displays, appear to be motivated by a need to displace or learn about a potential danger. I illustrate this with a combination of field and laboratory studies, conducted in collaboration with colleagues and students. We demonstrate that American crows (*Corvus brachyrhynchos*) respond immediately and strongly to the discovery of a dead crow. Upon discovery, they give scolding vocalizations, typically reserved for newly discovered predators, which quickly assemble a mob. Their response is nuanced by season and age of the dead. During the breeding season, the discovery of a dead adult crow summons a mob more frequently than does the discovery of a dead juvenile crow. Using PET neuroimaging, we demonstrate that the sight of a dead crow being held by a person activates the hippocampus of adult crows. When crows encounter people that were associated with a dead crow they scold the person and avoid the place where that person was encountered. Neuroimaging reveals that the sight of a dangerous person activates the crow’s amygdala. Together, these results suggest that crows gather around their dead in part to learn about dangerous settings and possibly novel predators. However, crows occasionally respond to their dead by bringing sticks, touching the victim, or even copulating with the corpse. Therefore, learning about dangers may just be one of many reasons why crows gather around their dead.

Understanding of Death and Mortality by Children

Paul Harris, Harvard University

Two different research programs have addressed children’s developing conception of death. On the one hand, children have been viewed as apprentice biologists who come to view death as an inevitable part of the life cycle. According to this view, which can be traced back to Piaget, children’s cognitive development moves toward an objective understanding. Piecemeal observations are increasingly coordinated into a coherent, theory-like organization. More recently, children have also been viewed as apprentice theologians who adopt a spiritual or religious view of death. Some investigators have suggested that young children are naturally disposed to assume

that certain processes continue after death. Others propose that children increasingly understand and endorse the particular claims about the afterlife that are characteristic of their community. In either case, this more recent research assumes that children's developing conception of death cannot be characterized in exclusively biological terms. It embraces various transcendent elements. I will discuss the extent to which these two conceptions, the biological and the religious, co-exist in the mind of any individual child. I will describe research showing that such co-existence is found and indeed increases with age.

What is Fear? And is Fear of Death Really A "Fear"?

Joseph LeDoux, New York University

Fear is generally considered a response to an immediately present threat. As a result, when scientists study fear they measure the way the brain detects and responds to threats. These responses are viewed as proxies for the conscious feelings of fear. But are they? In humans, so-called "fear" responses can occur without awareness of the stimulus and without any feeling of "fear." Further, in humans, different brain circuits underlie the conscious feeling of fear and the behavioral and physiological responses that also occur. This means that fear responses should not be viewed as reliable measures of circuits that give rise to fearful feelings. This conclusion has profound implications how we think about, do research on, and treat problems related to fear, and its partner, anxiety. The question of fear of death has to be evaluated in light of these considerations. In addition, the question of whether fear of death is actually a fear, or more a worry, that is an anxiety, needs to be addressed. Just as fear occurs when a threat is present, anxiety is the result of an uncertain threat in the future. Fear of death, except for one on their deathbed, should probably be viewed as death anxiety.

"Mind Over Reality Transition": The Evolution of Human Mortality Denial

Ajit Varki, UC San Diego

Some aspects of human cognition and behavior appear unusual or exaggerated relative to those of other intelligent, warm-blooded, long-lived social species—including certain mammals (cetaceans, elephants and great apes) and birds (corvids and passerines). One such collection of related features is our facile ability for reality denial in the face of clear facts, a high capacity for self-deception and false beliefs, overarching optimism bias and irrational risk-taking behavior—traits that should be maladaptive when they first appear as hard-wired features in individuals of any species. Meanwhile, available data suggest that self-awareness (knowledge of one's own personhood) and basic theory of mind (ToM, also termed mind-reading, intentionality etc.) have independently emerged several times, particularly in the same kinds of species mentioned above. Despite a long-standing opportunity spanning tens of millions of years, only humans appear to have then evolved an extended ToM (multilevel intentionality), a trait required for optimal expression of many other unusual cognitive attributes of our species, such as advanced linguistic communication and cumulative cooperative culture. The conventional view is that extended ToM emerged gradually in human ancestors, via stepwise positive selection of multiple traits that were each beneficial. A counterintuitive alternate possibility is that establishment of extended ToM has been repeatedly obstructed in all other species with the potential to achieve it, due to a "psychological evolutionary barrier". This barrier is claimed to arise in isolated individuals of a given species that develop the genetic ability for extended ToM. Such individuals would then observe deaths of others whose minds they fully understood, become aware of mortality, and translate that knowledge into an understanding of personal mortality. The conscious realization and exaggeration of an already existing intrinsic fear of death risk would have then reduced the reproductive fitness of such isolated individuals (by favoring personal survival over reproduction). The barrier would have persisted until hominin ancestors broke through via a rare and unlikely combination of cognitive changes, in which two intrinsically maladaptive traits (Reality Denial and Extended ToM) combined in the same individuals, to allow a "Mind over Reality Transition". Once the barrier was broken, conventional natural selection could take over, with further evolution of beneficial aspects of the initial changes. This theory also provides a unifying evolutionary explanation for other unusual features of humans, including recent emergence as the dominant species on the planet, and replacement of all other closely related evolutionary cousins, with limited interbreeding and no hybrids. While not directly falsifiable by experiment, the theory fits with numerous facts about humans and human origins, and no known fact appears to strongly militate against it. It is also consistent with most other currently viable theories on the subject including Terror Management Theory. Importantly, it has major implications for the human condition, as well as for many serious issues, ranging all the way from personal health responsibility to global climate change.

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The Archaeology of Immortality in the Ancient World
Colin Renfrew, University of Cambridge

Deliberate burials appear in the archaeological with archaic *Homo sapiens*, c.100,000 BP, cemeteries prior to the advent of agriculture (before 10,000 BP). Belief in immortality is difficult to document before the emergence of state societies and the construction of deities, although the attention accorded to some special materials (jade, gold) may suggest earlier notions of immortality.

Death as Celebration: Cross-Cultural Perspectives
Rita Astuti, London School of Economics and Political Science

Humans, like all other living organisms, are born and die. This is an incontrovertible and non-negotiable fact. However, because of their unique representational capacities, humans across the world imbue this fact with complex meanings, which transform the brute facts of biology. A recurrent feature of this transformation is to make death the *beginning* rather than the end of life. Through various processes of separation, purification and 'distillation' dead people are turned into forever lasting substance that gets recycled into new life. Death, in this way, is neither final nor a cause of despair. It can be a source of celebration.

Human Mortality Denial and Terror Management Theory
Sheldon Solomon, Skidmore College

In *The Denial of Death*, cultural anthropologist Ernest Becker argued that "the idea of death, the fear of it, haunts the human animal like nothing else; it is a mainspring of human activity—activity designed largely to avoid the fatality of death, to overcome it by denying in some way that it is the final destiny for man." Humans manage the terror of death by adhering to culturally constructed beliefs about reality that provide a sense that one is a person of value in a world of meaning, and thus eligible for either literal or symbolic immortality. The quest for immortality via death denial underlies some of humankind's most noble achievements. However, it also engenders some of our most ignominious affectations, including: hostility and disdain for people with different beliefs; indifference to, or contempt for, the natural environment; and, the mindless pursuit of material possessions—which, if unchecked, may render humans the first form of life responsible for their own extinction. I will present an overview of these ideas and empirical work in support of them.

The Lure of Death: Suicide as a Uniquely Human Phenomenon
Nicholas Humphrey, University of Cambridge

Once humans began to understand that death brings to an end a person's bodily and mental presence in the world, the possibility arose that in certain circumstances, individuals would deliberately *choose* this outcome for themselves. Suicide has, in fact, become an alarmingly common trait, responsible for more deaths than war and homicide combined. In this talk, I shall ask what this means for human biological fitness. While some suicides are arguably adaptive, the majority are clearly maladaptive. Nonetheless, the trait has been able to take hold because the suicide meme – to which humans have no natural immunity – easily infects vulnerable minds and is highly contagious.