



## Abstracts

### 1. *The Life-Review Experience: phenomenological, psychological and neuroscientific perspectives*

#### Abstract

Some people who come close to death report an experience in which they transcend the boundaries of ego and body and the confines of time and space (near-death experience, NDE). While the challenge that the NDE poses for the habitual sense of body and space, namely the out-of-body experience, has been extensively investigated in recent years, this research has not been conducted with respect to the alteration of time – the life-review experience (LRE). People with LRE usually describe seeing a “movie” of important segments of their own life. In a manner, LRE summarizes one’s life, for what is life if not the sum of one’s meaningful experiences? Notably, the cognitive research of autobiographical memory focuses mostly on discrete life-events rather than on the ongoing experience. LRE thus is significant not only for NDE but also for the nascent study of the human self and the subjective experience, and for the study of memory. In the proposed project we aim to investigate the LRE using widespread internet-based and patient-based surveys (phenomenology), in-depth qualitative analysis (narrative psychology), neuroimaging and advanced computational analyses (neuroscience). Phenomenology – we shall launch an internet-based questionnaire in order to characterize the LRE and its prevalence. We shall also screen neuropsychiatric patients at our institute. Psychology – we shall qualitatively interview several people with LRE in order to extract fundamental concepts in LRE, their relations to life events and the subjective experience. Neuroimaging – healthy subjects and people with NDE/LRE will be scanned by fMRI while being shown “movies” depicting sequences of their life-events in different scales, prominence and order.

Computational analyses – (1) following recent developments in fMRI signal analysis, spectral analysis will be applied in order to identify interconnected “gradients” of one’s life-experiences as represented spatially on the human brain. The “gradient” representation enables combinatorial interrelations between its components, as is indeed the case also in the represented life experiences; (2) viewing the brain as a dynamic network, we shall use network research tools to analyze brain patterns during the processing of continuous life- events.

We hope that this multimodal project will facilitate a better understanding of the LRE as a component of NDE and as an aperture to a new approach to one’s autobiographical memories and subjective experience as a succession, endured and interrelated on the phenomenological, psychological and neuroscientific levels.

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## 2. Afterlife beliefs and their cognitive mechanisms among the Chinese: Past and Present

### Abstract

Recent findings in studies of afterlife beliefs claim that belief in life after death is intuitive and founded on pan-cultural cognitive processes. In the past decade, researchers have established that as children increasingly understand biological death, they also increasingly attribute continued mental functioning to dead people and are less inclined to attribute continuing biological attributes to the deceased. Thus, Bering and others argue that natural cognitive mechanisms incline us to believe in psychological immortality. This work often assumes that the establishment of intuitive dualism supports the belief that what persists through death is our mind not our body. Recent work also connects religion/morality with afterlife beliefs: postmortem agents, conceived of as a super-knowing and on the side of morality, enforce pro-social behavior. Yet while Theory of Mind has been well established, it does not support an easy inference to intuitive dualism. Inferences drawn from intuitive dualism seem betrayed by empirical evidence that many cultures represent deceased agents as embodied (perhaps with spiritual, ghost-like bodies, but bodies nonetheless). Overall, the jury is still out on precisely what cognitive mechanisms are involved in the production of afterlife beliefs as well as the shape of afterlife beliefs themselves. Finally, little research has examined afterlife beliefs in Asian contexts, especially those alleged to be this-worldly, skeptical of an afterlife and nonreligious, and with a unique historical mix of Confucian humanism and political policies that discourage various religious practices. We propose to extend research on afterlife beliefs to Chinese populations with a set of three studies: one historical and two psychological. China is an important testing ground for afterlife beliefs and intuitive dualism for several reasons. First, given recent history, afterlife beliefs are actively discouraged in secular mainland China. Second, Chinese conceptions of the body and especially the emphasis on vital energy in Traditional Chinese Medicine may inform afterlife beliefs. Third, although ancestor worship has been discouraged in recent decades, filial piety is still important in Chinese culture and may have served to promote and shape afterlife beliefs in the past as well as in the present. The proposed research seeks to extend research on afterlife beliefs to mainland China. A deliberately secular and secularizing culture such as that of mainland China, would afford a strong test of whether afterlife beliefs are pan-cultural and intuitive. Moreover, it offers an empirical testing ground for the cognitive mechanisms involved in the production and shape of afterlife beliefs. Our project, falling under category 2, will involve three aspects, one historical and the other two socio-psychological. The historical study entails an examination of ancestor representations in pre-Qin texts.

The psychological experiments involve replication and extension of previous research on afterlife beliefs using a priming paradigm and death narratives. In order to assess the influence of culture on afterlife beliefs these experiments will be conducted simultaneously in mainland China and with mainland Chinese who have been in the United States at least three years.

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### 3. *The Immortality of Morality*

#### **Abstract**

We examine psychological immortality—the enduring perception of the minds and values of the deceased. As our research examines the psychological factors that dispose human beings to perceive immortality, it fits into the second question in the call for proposals. We outline three broad reasons why psychological immortality is cognitively tied to (im)morality. First, moral judgment is powerfully connected to emotional and spiritual experience. Second, moral and immoral deeds are likely to activate concepts of unfinished justice and heroism. Third, the morality of an act is likely to transform the minds of the deceased toward greater agency and power. We also outline individual differences likely to influence the link between morality and perceived psychology immortality, including religiosity, scope of moral content and baseline mind perception. Finally, we propose studies investigating the real-world consequences of the link between morality and immortality, specifically the ability of psychological immortality primes to increase pro-social behavior.

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#### 4. Identifying and Characterizing the Genes of Immortality in *Hydra*

##### Abstract

Immortality, i.e. lack of aging, among animals is rare. So rare that for a long time aging has been considered the unavoidable fate of all metazoans. Only recently have aging theories offered plausible explanations for negligible senescence and the cessation of aging. This project studies an animal species that does not age—the freshwater cnidarian *Hydra*. *Hydra* belongs to one of the most basal groups of animals with true tissue differentiation and neurons. Of the approximately eight species in the genus *Hydra*, one is particularly interesting, *H. oligactis*. Under normal culturing conditions *H. oligactis* does not show any signs of aging and thus is effectively immortal. However, individuals of this species can be induced to age by lowering the temperature of the culture. Thus *H. oligactis* offers the unique opportunity to examine aging and non---aging animals with the same genetic background, and compare them at the molecular level to identify the genes that are active in immortal animals but inactive in mortal animals.

This project will determine what genes are implicated in immortality in *Hydra oligactis* by comparing the transcriptomes (the entire set of genes actively being expressed) of aging and immortal animals using next---generation sequencing. We will examine transcribed genes from aging, immortal and control animals, and will then use a bioinformatics approach to determine which genes are involved exclusively in aging or immortality. By experimentally altering the expression of selected genes, we will determine the exact role of these aging or immortality genes in *H. oligactis*. Our work has important implications for human medicine, as the characterization of molecular mechanisms of immortality in *Hydra oligactis* has the potential to inform therapies for prolonging the human lifespan.

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## 5. *Death and the Self*

### Abstract

To determine the prospects for immortality, we must first determine what has to persist in order for an individual to have immortality. Obviously it's not the femur or the cartilage in the knee. Most traditions maintain that the self must persist, so to assess prospects for immortality we need to know the nature of the self. If the self is ephemeral and inconstant even in life, then the prospect of immortality is remote. Our project explores whether the belief in the mutability of self reduces the fear of death and belief in an afterlife.

First, we will conduct a cross-cultural examination of how religious traditions affect people's belief about the self and death. In Christian and Hindu religious traditions, the self is typically identified with a fundamental entity - the soul or atman - that persists after death. By contrast, the Buddhist tradition largely maintains that there is no persistent self even throughout life. On Buddhist views, the fact that there is no persistent self makes it irrational to fear death. In order to see whether these religious traditions actually affect people's beliefs about the self, we plan to conduct cross-cultural experiments on Hindus and Buddhists in India as well as Christians in the U.S. The experiments will measure beliefs about the extent to which the self changes and will analyze the relation between these beliefs and death anxiety, subjective meaning of life, charity, and the belief in immortality. This will provide evidence on the extent to which religious beliefs about the nature of the self directly impact attitudes about death.

We will also conduct experiments to determine whether changing people's beliefs about the self affects their attitudes about death. Recent work has shown that inducing beliefs about the extent to which the self changes affects people's economic decisions. In particular, if people come to think that the self changes a lot, they are more likely to take a smaller economic gain now, rather than wait for a larger one. This makes sense if people are thinking that the person in the future will bear a weak relation to the person they are now. We will adapt these kinds of interventions to explore death anxiety, health-related decisions about death, subjective meaning of life, and the belief in immortality. We will again conduct this work in Christian, Hindu, and Buddhist cultures. This will also enable us to determine whether people in some religious traditions are more receptive to these kinds of interventions.

Both Eastern and Western philosophers of the self have argued that the self changes fundamentally across development. Further, these philosophers maintain that if we come to recognize the ever-changing nature of the self, this will dramatically alter our attitudes about our future lives and about the relative significance of other people. In particular, we will be less fearful of death and more compassionate towards others. Our studies will help determine whether these attitudes do in fact emerge when people believe that the self is in constant flux.

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## 6. A Multi-Centre Pilot Study of the Mind, Brain, Consciousness and Near Death Experiences during Cardiac Arrest

### Abstract

A number of recent studies have indicated that 10% of cardiac arrest survivors report memories and thought processes from their period of resuscitation. A small proportion of survivors have also described the ability to “see” and “hear” details of their cardiac arrest. Even though the significance and mechanisms that lead to these experiences are not fully understood, nevertheless their occurrence may have significant implications for establishing clinical markers of improved brain resuscitation, as well as long term psychological support of cardiac arrest survivors. The occurrence of cognitive function during cardiac arrest also raises the possibility that patients may have received improved “cerebral resuscitation” leading to consciousness and the activity of the mind.

Through a variety of psychological and physiological tests as well as cerebral monitoring techniques, we aim to conduct a feasibility study examining the relationship between the human mind, consciousness and brain during cardiac arrest. Specifically, we aim to study the relationship between consciousness and the quality of cerebral resuscitation (as measured through non-invasive monitoring of brain oxygen levels and function). We further aim to conduct tests of consciousness by using independent markers designed to objectively examine the validity of survivor’s claims of being able to “see” and “hear” during cardiac arrest. An understanding of the nature of human consciousness and mental processes during cardiac arrest and its relationship with brain resuscitation may have significant implications for understanding the question of what happens when we die and the issue of immortality.

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## 7. *The Role of Near-Death Experiences in the Emergence of a Movement: A Quasi-Experimental Field Study of IANDS*

### Abstract

Most research on near-death experiences (NDEs) to date has focused on the phenomenology of the experience and its aftereffects; speculated on the religious and philosophical implications of such experiences; or presented medical and neuroscientific theories to account for them. Personal accounts provide most of the “evidence” for NDEs in the popular literature, and an entire NDE movement has emerged that frames such accounts as evidence for a wide spectrum of paranormal phenomena; this evidence serves to affirm the survival of human personality after bodily death and to transform the social landscape of death and dying. But until now there have been no ethnographic studies of the role that NDE-related accounts and experiences play in shaping and reinforcing the potency of afterlife beliefs in the NDE movement.

Our research combines ethnography and experiment to offer a more complete picture of how experience and group participation in the NDE movement influence beliefs in post-mortem survival, and how these beliefs affect high- and low-level cognitions and behaviors. Our research team does not attempt to characterize NDEs or the movement promoting them as religious or spiritual (or not) but rather focuses on: (1) the claims subjects make about their experiences, the meaning they ascribe to them, and general features of subjects’ cognitive processes that might differ from those not interested in such phenomena; (2) the practices they employ, if any, in order to cultivate, replicate, or develop such experiences; and (3) the use of literature and practices to generate a network of practitioners who are focused on near-death related experience.

By looking at the ways in which a movement both frames experiences and establishes practices meant to generate these experiences, we can focus on the interaction and relative importance of top-down (culture sensitive) and bottom-up (culture insensitive) processing in relation to particular experiences. The study of NDE-related experiences can therefore teach us about how proclivity and practice may shape reality monitoring.

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## 8. *Religious and Scientific Paths to Immortality: A Clash of Cultures?*

### Abstract

This research will explore the implications of the hope of indefinite extension of the human lifespan for people's pursuit of traditional modes of immortality involving religion, afterlife, national identification, and morality. Although for most of human history these traditional approaches to immortality were viewed as compatible and even intertwined with science, accumulating scientific discoveries that challenge the literal teachings of some religions have led some people to view science and religion as competing ways of understanding reality. Our research will explore this "clash of cultures" within the context of people's attitudes toward indefinite life extension, religion, traditional afterlife beliefs, cultural meaning systems, and morality. Our research will draw from Terror Management Theory (TMT; Greenberg, Pyszczynski, & Solomon, 1986) to explore: (1) psychological forces underlying various modes of immortality striving, (2) the effect of commitment to one mode of immortality on attitudes toward other modes, and (3) the impact of the plausibility of ILE on people's belief systems and commitment to morality.

TMT posits that awareness of death in an animal that desperately wants to live creates the potential for overwhelming terror. Early humans "solved" the problem of death by creating cultural systems of meaning and value to manage their terror. The potential for terror put a press on emerging explanations for existence so that people were more likely to invent and subscribe to belief systems that decreased anxiety by providing hope of either literally or symbolically transcending death. Literal immortality is provided by cultural teachings regarding an afterlife (e.g., heaven, reincarnation). Symbolic immortality is provided by cultural values and institutions that enable people to construe themselves as valuable, memorable contributors to larger entities that continue to exist after their death, such as families, communities, or nations. TMT posits that the fear of death lies at the root of the human need for meaning and self-esteem and consequently plays an important role in much that people do. A large body of research, consisting of over 500 studies conducted in over 20 countries has provided converging support for the fundamental propositions of TMT.

This program of research will take us beyond current conceptualizations of TMT and shed light on intriguing questions raised by the prospect of indefinite life extension through scientific discovery and medical technology. It will explore the role that existing religious beliefs play in attitudes toward these new technologies and how the increased plausibility of indefinite life extension affects traditional religious beliefs, commitment to cultural beliefs and values in general, and motivation to maintain a moral world in particular. We propose six experiments, using state of the art methods developed in previous TMT research to explore these issues. The findings of this research should help us understand: a) why some people embrace pursuing indefinite life extension while other people reject it; and b) how the prospect of being able to live on indefinitely changes people's investments in aspects of their religious and secular belief systems.

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## 9. Modeling Immortality in Immersive Virtual Reality

### Abstract

The fundamental goal of this project is to investigate how direct experience of (1) mortality (2) the possibility of post-death continued existence of the persona and (3) independence between the persona and the physical body, might influence the beliefs, attitudes, character and behavior of people. Since there is no direct experience nor scientifically acceptable evidence for the survival of the persona after death, belief in immortality is a matter of faith alone, and it is difficult if not impossible by definition to have evidence-based arguments about faith. Unfortunately, and increasingly in today's world, faith based arguments can often result in violence: there being no basis for rational discussion, the elimination of members of out-groups who follow a different faith is a simple if drastic means to acquire certainty in the sea of profound uncertainty surrounding our situation in the universe. Another way to put this is that there is no *model* to which we can refer, a model that is based on experience and evidence that can be shared and compared with that of others, nor results that are in some sense repeatable and consistent regarding this issue. Moreover, we do not even have personal experiential knowledge about our own mortality, which should at least include information about how events evolve amongst the group of people with whom we shared our lives in our absence. In this proposal we show how it is possible to exploit immersive virtual reality in order to construct a convincing model of birth, life, death and survival after death. This would be an experiential model, that can provide people with a way of conceiving both their own mortality, post-death survival, and knowledge of the evolution of events after their passing. The model also includes another essential aspect of the concept of immortality, that is, post-death survival of the persona - the idea that our consciousness can exist independently of our body, and be transferred to another body. Using this model we can, for the first time, manipulate an experience of post-death survival as an experimental variable, and examine its consequences in a controlled way for people's beliefs, attitudes and behaviors. In particular we will carry out a main experiment where we give people the experience of this model of immortality, compared to a control group who experience a similar virtual reality but with no aspects concerned with immortality. We further test the work by considering the paradigm of Terror Management Theory which proposes that people manage the terror of their finiteness by adherence to symbolic concepts that are greater than the self - such as patriotism, or even support for football clubs. We will carry out an experiment to examine the impact of our virtual immortality on prosocial behavior towards a normally despised member of a perceived out-group.

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