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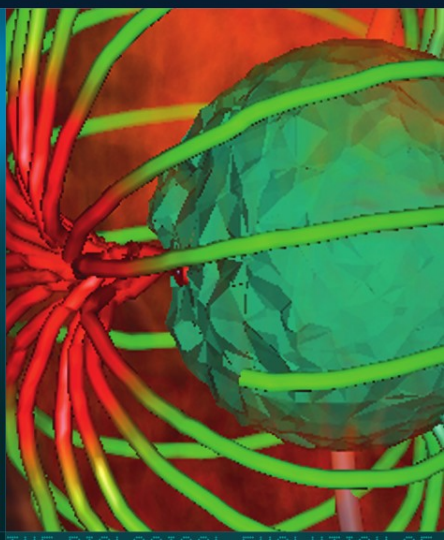

Eckart Voland
Wulf Schiefenhövel (Eds.)

THE BIOLOGICAL EVOLUTION OF RELIGIOUS MIND AND BEHAVIOR

Springer

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THE BIOLOGICAL EVOLUTION OF RELIGIOUS MIND AND BEHAVIOR

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Editors:

Prof. Dr. Eckart Voland
University of Giessen
Center for Philosophy and
Foundations of Science
Otto-Behaghel-Str. 10
35394 Giessen
Germany
eckart.voland@phil.uni-giessen.de

Prof. Dr. Wulf Schiefenhövel
MPI for Ornithology
Von-der-Tann-Str. 3
82346 Andechs
Germany
schiefen@orn.mpg.de

Series Editors:

Avshalom C. Elitzur
Bar-Ilan University, Unit of Interdisciplinary Studies, 52900 Ramat-Gan, Israel
email: avshalom.elitzur@weizmann.ac.il

Maximilian A. Schlosshauer
Niels Bohr Institute, Blegdamsvej 17, 2100 Copenhagen, Denmark
email: schlosshauer@nbi.dk

Mark P. Silverman
Trinity College, Dept. Physics, Hartford CT 06106, USA
email: mark.silverman@trincoll.edu

Jack A. Tuszynski
University of Alberta, Dept. Physics, Edmonton AB T6G 1Z2, Canada
email: jtus@phys.ualberta.ca

Rüdiger Vaas
University of Giessen, Center for Philosophy and Foundations of Science, 35394 Giessen, Germany
email: Ruediger.Vaas@t-online.de

H. Dieter Zeh
Gaiberger Straße 38, 69151 Waldhilsbach, Germany
email: zeh@uni-heidelberg.de

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Preface

Religious life appears to be as old as other features of human symbolic culture and appears to be inseparably interwoven with human nature. Nevertheless, a naturalistic understanding of religiousness is still in the early stages of development. Whereas Darwinian Theory was able to inspire the "major issues" of Western philosophy and to foster an evolutionary epistemology, evolutionary ethics, and even evolutionary aesthetics, a comparable "boost" with regard to religiousness has not been observed to date. It appears to be the last bastion of the anti-naturalists and is gladly used as evidence that the project of naturalizing human mind and its achievements is ultimately destined to fail. Evolutionary anthropologists and psychologists do not to accept this, in their view an unsatisfactory situation, and instead are attempting to reconstruct how religiousness came into the world from an evolutionary standpoint. For this purpose, scholars from various disciplines met at the Hanse-Wissenschaftskolleg (HWK, Institute for Advanced Studies) in Delmenhorst in September 2007, in order to combine their perspectives from evolutionary anthropology, psychology, neurobiology, cognitive studies, religious studies, and behavioral genetics. Basically, the issue was to find out with which theoretical and methodological tool a naturalistic research concept of religiousness and its evolutionary roots could be advanced. Some of the chapters in this book are revised and extended versions of presentations made at this meeting. Other pertinent contributions have been added, and all authors have taken care to present their ideas in a manner accessible to a broad readership.

Our very cordial thanks go to Professor Gerhard Roth, Director of the HWK, for his hospitality and to Uwe Opolka, Research Assistant at the HWK for his efficient organization of the conference on site. Once again, the HWK has provided a pleasant atmosphere in every respect and the perfect infrastructure, and thus, has laid the very important foundation for productive and successful scientific communication. Our hearty thanks are also to Dr. Ulrich Frey, who, in his capacity as Editorial Assistant, has endeavored to put what the authors supplied into shape. We also thank the Springer Verlag, the series editors of the Frontier Collection, and especially Dr. Angela Lahee for their interest in this project and for their excellent

cooperation in every phase of producing this book. Finally, we thank the HWK and the VolkswagenStiftung for their financial support of the conference.

Giessen, Germany — Eckart Voland
Andechs, Germany — Wulf Schiefenhövel
February 2009

Contents

Contributors

Wolfgang Achtner Transscientia Institute for interdisciplinary Research in Science, Philosophy and Religion, Steinkaute 15, 35396 Giessen, Germany, info@wolfgangachtner.de

Michael Blume University of Heidelberg, Institute for Religious Studies, Akademiestrasse 4-8, 69117 Heidelberg, Germany, mi.blume@email.de

Thomas J. Bouchard, Jr. Psychology Department, University of Minnesota, Minneapolis, MN 55455, USA, Bouch001@umn.edu

Martin Brüne Department of Psychiatry, Psychotherapy, Psychosomatics and Preventative Medicine, University of Bochum, LWL University Hospital, Alexandrinenstr. 1, 44791 Bochum, Germany, martin.bruene@rub.de

Ryan M. Ellsworth Department of Anthropology, University of Missouri-Columbia, 107 Swallow Hall, Columbia, MO 65211-1440, USA, rme8tc@mizzou.edu

Jay R. Feierman Department of Psychiatry (retired), University of New Mexico, P.O. Box 57088, Albuquerque, NM 87187-7088, USA, jfeierman@comcast.net

Detlef Fetchenhauer Department of Economic and Social Psychology, University of Cologne, Herbert-Lewin-Strasse 2, 50931 Cologne, Germany, detlef.fetchenhauer@uni-koeln.de

Ulrich Frey Center for Philosophy and Foundations of Science, Otto-Behaghel-Strasse 10C, 35394 Giessen, Germany, ulifrey@yahoo.com

Shihui Han Department of Psychology, Peking University, 5 Yiheyuan Road, Beijing 100871, People's Republic of China, shan@pku.edu.cn

Erica Harris Department of Neurology and Boston University School of Medicine, Boston VA Healthcare System, Jamaica Plain Campus, Boston, MA 02130, USA, erh8x@bu.edu

Jürgen Kunz Dörnbergstr. 3, 34119 Kassel, Germany; Fachbereich IV (Ethnologie). Universität Trier, Universitätsring 15, 54296 Trier, kunz.juergen@arcor.de

David C. Lahti Department of Biology, Morrill Science Center, University of Massachusetts, Amherst, MA 01003, USA, lahti@bio.umass.edu

Patrick McNamara Department of Neurology, Institute for the Biocultural Study of Religion, Boston, MA 06269–2176, USA, mcnamar@bu.edu

Craig T. Palmer Department of Anthropology, University of Missouri-Columbia, 107 Swallow Hall, Columbia, MO 65211-1440, USA, palmerct@missouri.edu

Benjamin Grant Purzycki Department of Anthropology, University of Connecticut, 354 Mansfield Road, Storrs, CT 02130, USA, benjamin.purzycki@uconn.edu

Rebekah A. Richert Department of Psychology, University of California, 900 University Ave., University of California, Riverside, CA 92521, USA, rebekah.richert@ucr.edu

Matt Rossano Department of Psychology, Southeastern Louisiana University, Box 10831, Hammond, LA 70402, USA, mrossano@selu.edu

Wulf Schiefenhövel Max-Planck-Institute for Ornithology, Von-der-Tann-Str. 3, 82346 Andechs, Germany, schiefen@orn.mpg.de

Erin I. Smith Department of Psychology, University of California, 900 University Ave., Riverside, CA 92521, USA, esmitoo6@ucr.edu

Richard Sosis Department of Anthropology, University of Connecticut, 354 Mansfield Road, Storrs, CT 06269–2176, USA, richard.sosis@uconn.edu

Lyle B. Steadman School of Human Evolution and Social Change, Arizona State University, Tempe, AZ 85287, lyle.steadman@asu.edu

Rüdiger Vaas bild der wissenschaft, Ernst-Mey-Str. 8, 70771 Leinfelden-Echterdingen, Germany, ruediger.vaas@t-online.de

Eckart Voland Universität Giessen, Institute for Religious Studies, Otto-Behaghel-Strasse 10C, 35394 Giessen, Germany, eckart.voland@phil.uni-giessen.de

Chapter 1
Introduction

Wulf Schiefenhövel and Eckart Voland

Abstract Religion and religious practices have existed throughout the human history, and persist today in every corner of the world. In most societies religion is a prime motivator of both individual and collective behavior. This can be "good" (charitable, unselfish) or "bad" (oppressive, cruel, wasteful) behavior. The influence of religion in society is to be found throughout the entire spectrum of human activity – from wars and worship to gender roles, eating habits, and art.

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What caused our species to develop this propensity for religious behavior or "religiosity" as we will sometimes call it? How would an intelligent explorer from outer space explain this pervasive yet seemingly illogical phenomenon? Whereas much of human behavior can be readily accounted for in terms of simple needs or more complex evolved strategies, an explanation of the origins and role of religious behavior proves – even for us Earthlings – to be more elusive.

Sociologists, psychologists, and philosophers have all sought to analyze and understand "homo religious" and have put forward various hypotheses to explain the strong and often contagious hold that religion has over human individuals and societies. Yet none of these attempts, although providing plausible reasons why religion can help in our daily lives, has so far led to a consistent naturalistic explanation for how religious behavior first developed and became established. If we wish to understand and assess the importance of religion and religious behavior in modern society, then it is imperative that we seek its biological roots and investigate how these could have facilitated the emergence and persistence of this omnipresent phenomenon.

W. Schiefenhövel (✉)
Max-Planck-Institute for Ornithology, Von-der-Tann-Str. 3, 82346 Andechs, Germany
e-mail: schiefen@orn.mpg.de

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The observation that religion is ubiquitous in all human societies, with the beliefs of one religion often in flat contradiction to those of the next, already gives us a strong hint concerning their natural origins. Indeed, the contradictory nature of different religions is also a main argument used in recent popular works that present religion as an irrational and harmful force. Several of these "new atheist" authors also draw attention to the need to explain why – despite its inherent contradictions and, in part, harmful side effects – religious behavior has evidently been such a successful human trait. Thus they too have helped to promote interest in the search for a consistent scientific explanation of the origins of human religiosity. It is this search, using the tools of science and rational discourse, but with no presuppositions about the validity, sense, or benefits of religious ideas, that occupies the editors and authors of the pages that follow.

The 18 further contributions to this book provide insights from a wide variety of perspectives, including evolution – theoretical, neurobiological, psychological, sociological, and historical. Together they lead to some preliminary answers about how natural selection could have favored individuals or groups engaging in religious activities. An alternative hypothesis – according to which religious behavior is simply a by-product of another adaptive trait – is also discussed.

The remaining paragraphs of this introduction touch upon the highlights of each contribution.

An impressive corpus of works of art, from anonymous accounts in oral history to paintings by great masters and to religion-inspired music, for example by Johann Sebastian Bach, tells of the motivational power exercised by religious beliefs and traditions. For many, the canon of sacred contents and teachings, such as those presented in the Bible or the Koran, must have come from outside our human sphere. In Chap. 2 Eckart Voland shows that a more parsimonious approach can be taken by viewing parameters such as spirituality, group identity, and following moral rules as biological adaptations. Religious metaphysics lies, according to him, outside the adaptational framework and represents a nonfunctional outcome of our general cognitive capacities.

What characterizes religion? Rüdiger Vaas (Chap. 3) lists seven main human traits, including transcendence, myth, morality, and rite. As they are present in all contemporary and past societies, a reasonable conclusion is that they are adaptive, evolved traits, not just a by-product of other cognitive capacities or a meme-like cultural institution. The advantage of evolutionary hypotheses is that they can be tested: universality, reproductive advantage, and heredity are among the criteria that need to be fulfilled. The author shows that an evolutionary explanation of religiousness is possible, but that there is not yet sufficient data to confirm the adaptation hypothesis. He raises the question whether modern disciplines such as evolutionary psychology and neurotheology can elucidate "belief," "hope," and "love," the three main pillars of Christian faith.

How can an argument be constructed that proves the evolutionary origin of religion? Jay Feierman's approach to this task in Chap. 4 is to break down religion into four components and to ask whether they in turn fulfill the requirements to be genetically transmitted to the next generation, the prerequisite for a process of natural

selection. Structural design features are identified that build up the four essential components: behavior, beliefs, moods, and feelings. The chapter also deals with the potential levels of selection (individual to group) of religiosity and ends by hypothesizing that belief in divine agents may have shaped the human mind – and not the other way around.

As is the case with other human capacities, our obviously hard-wired and hard-to-shed religiousness did not spring into existence de novo. David C. Lahti (Chap. 5) demonstrates that morality and religion have phylogenetic roots in the social behavior of our ancestors and changed in concert with the social transitions occurring in our hominid history. One motor for this, he argues, was the increased complexity of interactions taking place in groups of beings with an advanced brain and thereby complex perceptual and behavioral patterns. From nepotism and dominance, characteristic of many social mammals, evolution brought about, as suggested in an eight-step model, religion and, furthermore, the intellectual ability to reflect on moral and religious rules, including the possibility to overthrow the old and create new ones.

A key concept in Chap. 6 by Jürgen Kunz is cooperation. In contrast to hypotheses which hold that adaptive behaviors are brought about by religiosity and that the content of religion is shaped through natural selection, he argues that religions are "all-purpose-cooperation tools," which do not need adaptive functions to evolve and have come about as a result of signal evolution. Ideational aspects of religion would not necessarily translate into behaviors. In cases where they do, they can have negative effects (e.g., loss of fitness for catholic priests who take celibacy seriously). Trust, cooperation, and an obliging cultural value system are seen as the main building blocks of religion, with honest signals and supernatural witnesses serving to safeguard them.

All religions contain elements that are, to the mind of a natural scientist, exotic and counterintuitive, for example, the immaculate conception of St. Mary by her mother Anna and the parthenogenesis of Jesus himself, as well as the many miracles defying the laws of nature that have allegedly been brought about by God-like figures and prophets. Craig Palmer and colleagues focus their contribution (Chap. 7) on a much more down-to-earth factor, which they see as the prime mover toward religion: human communication. The function of speech is to influence others. In the same way the passing on of religious traditions must have had identifiable effects that would allow insight into the proximate mechanisms governing religiosity. Ultimate explanations may be found in the effects of religious concepts and behaviors passed on through generations: better cooperation among people with the same ancestry, willingness to be influenced by each other, and by the religious teachings of their forebears. Thus, strongly united groups were forged.

Increasing brain size and cognitive abilities of our ancestors is also the starting point of Michael Blume in Chap. 8. Cooperative tasks, including cooperative breeding, became possible in this process. Funerary rites and offerings, typical of *Homo neanderthalensis* and *Homo sapiens*, as well as the belief in supernatural agents whose attributed function is to watch over rules and norms, including those regulating reproduction and marriage, can be understood as behavioral traits that have convergently developed in phylogeny. Wrongdoers are believed to be punished by

these agents. Costly obligations function as honest signals, prevent free riding and defection, and create a strong sense of unity. Recent Swiss census data serve as a basis to infer that natural and sexual selection brings about religion-related dispositions and can foster successful demographic transitions.

When did the first member of the genus *Homo* start to exhibit religious behavior, that is, behavior that could be detected in the archeological record? Did Neanderthals bury their dead and place symbols of belonging and empathy in the graves? Matt Rossano (Chap. 9) provides a scenario for what could have happened about 80,000–60,000 years ago. In this time period *H. sapiens* had almost died out. Religion, argues the author, was a crucial factor that helped our species to become finally so successful that it was able to build civilizations in almost all regions of our planet.

Archaeology gives us, but little insight into the way early humans thought and behaved, into their cosmologies and religious ideas. Traditional societies with near-neolithic living conditions, such as the Eipo in rugged highland New Guinea, are good models to fill some of the gaps. Chapter 10 by Wulf Schiefenhövel describes their religious concepts and rituals and the recent change to Christianity. The new religion served as a mental and spiritual base for the new lives they had decided to embark on. The contribution argues that an important function of religion is to explain the bewildering world and, especially, to make sense of threatening events, which will otherwise deeply trouble the mind and psyche of people in a society without an advanced body of natural science. The group-binding function of religion is also an important part of the bundle of adaptive advantages that is likely to have caused religiousness and religion to evolve.

Studies of monozygotic twins reared apart are the most powerful instrument in assessing the relative strength of genetic–biological versus social–environmental inputs into our perceptive and behavioral system. By virtue of his large data base Thomas Bouchard (Chap. 11) is able to demonstrate that "traditionalism" (comprising authoritarianism, religiousness, and conservativeness, measures of which correlate with each other to a high degree) is a specific trait that may enhance Darwinian fitness and is likely to be connected with the evolution of moral intuition as well as with human docility. Whereas the tendency to obey authority can be exploited by religious authorities, this trait, which has possibly evolved as part of reciprocity, may still have adaptive value.

Children and juveniles are easily "imprinted" by religious convictions and by role models showing religious behavior. This fact is utilized by probably all denominations, which take great care that the next generation grows up in and with the right belief. Chapter 12 by Rebekah Richert and Erin I. Smith reports research carried out on children. Their concepts, for example of supernatural agents, creation, afterlife, and the soul, can be seen as the outcome of nonreligious cognitive mechanisms and serve as ontogenetic building blocks for later religious beliefs.

How strong is the role of culture, the way we are brought up, the social environment around us, in shaping functions of our brain? This question has kept generations of researchers busy and often led to hostility between the proponents of a predominance of either biological or social factors. Modern evolutionary biology and anthropology stress the fact that what happens always involves interplay between

nature and nurture. In Shihui Han's contribution (Chap. 13), recent results of brain imaging studies related to the concept of self are presented and discussed. He shows that there are clear differences between Chinese and Western individuals in how the self is experienced (more part of a family and more independent, respectively) and, particularly important in the discussion of possible psychosocial effects of different religious traditions, that individuals belonging to the Christian faith exhibit other types of brain activation, in some cases, and thereby different neurocognitive patterns than individuals who have a different religious background.

Specific, well-defined malfunctions of the brain can serve as heuristic approaches to understanding its normal functioning. Parkinson's disease provides such a window into neurocognitive processes and is the topic of Chap. 14. Erica Harris and Patrick McNamara have studied Parkinson patients and found that they report less religiousness than healthy controls. Patients are also less able to recall religious experience, and patients whose impairment is related to the right hemisphere report less detail with regard to religious rituals. The results support the notion that a depletion of dopamine in delimited regions of the brain, which is typical for persons suffering from Parkinson's disease, is responsible for their less developed religiousness.

Spiritual experiences, facilitated, for example, by mysticism and similar traditions and techniques, may provide valuable insights to some and may lie close to delusions for others. Psychiatry, as Martin Brüne shows in Chap. 15, has always had an interest in trying to understand the relationship between religiousness and religiosity on the one hand and possible psychopathology on the other. In his chapter he examines capacities such as evaluating evidence in support of or refuting hypotheses, propensity for causality, the ability to attribute mental states to self and others (the so-called theory of mind) and finds a continuum of trait variations from normal evaluation of one's beliefs and readiness to consider alternative hypotheses to extreme forms of religious delusions that "detect" divine interference in all spheres of life and resist doubt and re-evaluation. This condition can be described as "delusional religiousness."

As noted at the outset, religious systems are not free of inconsistencies, even of contradictions, and often have a weak basis, even concerning their most essential issues (e.g., for the Christian belief: the empty grave, Mary Magdalene seeing the "gardener" and the wanderers meeting "Jesus" on the way to Emmaus – not the strongest possible proofs of his resurrection). Which cognitive and psychological mechanisms make religions survive is the question that Ulrich Frey pursues in Chap. 16. He states that many of our intuitive assessments of the world, ascribing causality, etc., are part of primordial religiosity and support religious cosmologies. Specific cognitive steps ensure that beliefs in supernatural entities, once formed, will persist against counterevidence. Religiously motivated behavior serves, as has also been demonstrated by other scholars, as a very effective means of creating group cohesion and preventing the damaging acts of free riders. It becomes thus evident why religious systems have been quite a success in human history.

Keeping traditions seems a classic concern of religion, from those in animist cultures to the efforts of the Vatican and the sacred, unchangeable nature of holy

scriptures like the Bible and the Koran. Religion can, however, as Purzycki and Sosis argue in Chap. 17, be rather flexible in reacting to varying socio-ecological conditions by creating adaptive response patterns. This is, so the authors argue?, brought about by effectively utilizing cognitive and emotional mechanisms and by institutions that function to maintain social harmony and prosocial behavior, even when environmental and social conditions change.

Chapter 18 by Wolfgang Achtner deals with the historic and epistemic development of such concepts, especially with the question of how religion has been put into a functional, evolutionary, or quasi-evolutionary framework by thinkers of different periods, from ancient Greek philosophers to our contemporaries. The author proposes a model in which he combines essentially inherent features of religion with others that can be explained by an evolutionary approach.

In the last chapter, Chap. 19, Detlef Fetchenhauer addresses again some of the key questions which the authors of this volume have raised and which are currently being discussed by scholars of various disciplines. According to the author, an overarching, one may say "grand," evolutionary theory of religion is still lacking. He lists different possible approaches to such a goal and critically discusses arguments that have been put forward by a number of previous authors, namely whether group selection can explain religiosity and religion, whether religion really brings about reproductive gains, whether it is really costly, and why it causes people to believe in entities for whose existence proofs cannot be provided.

The aim of this volume is to discuss the evolutionary origins of religiousness and religion and to define the status quo of this endeavor. It is obvious that many other interesting aspects of religion(s) are missing: historical accounts of the formation of religions, for example, in the fertile crescent and around the Mediterranean sea; their borrowing concepts and symbols; their mutual syncretism; their political functionality; their role as powerful and exclusive ethnic markers (including fostering fanaticism); as institutions promoting social and moral behavior; and in bringing about the first academic institutions, thereby fostering philosophy and other sciences. This, however, would have exceeded the scope of our undertaking by far.

Also missing are positions that do not, to some degree at least, integrate evolutionary thinking. Religiousness, that is, the capacity of humans to emotionally connect to religious ideas and rituals, to think along the lines of transcendency and eschatology, and to form religious institutions, has, that is the claim of the two opposing schools of thought, come about in one of the two mutually exclusive ways: (a) by divine action and revelation or (b) as a result of adaptive traits that helped our ancestors to survive, have more offspring, and develop more cohesive groups. It is indeed fascinating that the first position is still, on a global basis, the predominant one by far and that many intellectuals are able to make peace with its basic statements.

An interesting question is whether this will change in the course of time, whether evolutionary, that is atheist or (in slightly milder form) agnostic, positions will become more widespread in the future. Europe, after the dramatic political changes of the late 1980s provides an interesting model. In all former socialist countries but one, religion is booming, churches are being renovated, new ones are being

built in amazing numbers (e.g., in Romania), and religious viewpoints are being expressed in parliaments and other public institutions. Former East Germany is the exception: 45 years of Marxism sufficed to produce a predominantly atheist society, even the communist version of the First Communion for Catholics or Confirmation for Protestants has survived; many juveniles celebrate their coming of age in the "Jugendweihe," a totally secular rite of passage.

One deeply troubling question plagues the minds of many who are convinced that religion is the product of human need rather than divine intervention: by what should it be replaced? Will an enlightened humanism be a sufficient and effective basis for the human societies on our planet? Or should one continue to adhere to religious dogmas and traditions, even when they are hollow, as is the case even for many believers, because the danger of creating a horrible vacuum is too great? This volume does not provide an answer; it tries to portray human religiosity in the light of the human evolutionary past.

The paradox of an evolutionary approach to religion is that it shows (convincingly, some would argue) how adaptive its deeply embedded basic neurocognitive mechanisms have been and still are for the human brain. Should we use its analytic capacity to surgically dissect these age-old adaptations, to finally overcome them? Would this not, in essence, constitute an anti-evolutionary stand? Many questions remain. We can only hope that readers will find the positions and answers in this book interesting, perhaps sparking off or renewing their own ideas about what religion really is.

Chapter 2
Evaluating the Evolutionary Status of Religiosity and Religiousness

Eckart Voland

Abstract Adaptations must meet three criteria: they are inherited, are the product of historical selective processes and thus show a special-purpose design, and they solve an adaptive problem or solved an adaptive problem at least at the time of their evolution. Central components of human religiosity (spirituality, group bonding, forming a personal identity, communication by honest signals and morals) meet these criteria. The exceptions are religious cognition and its product, religious metaphysics, which has to be understood as a non-functional by-product of mundane cognitive machinery, so that in summary, religious life and practice (mysticism, rituals, myths, ceremonies and taboos, fear of God, spirits or ancestors) are shaped to a very significant degree by biological adaptations.

2.1 Introduction

No human society appears to be without religion. In a far-reaching consensus, experts and laymen agree what the core phenomena of religion are. These phenomena exist in various forms in all human cultures. Without a doubt, religiousness is part of the canon of transcultural human universals (Antweiler 2007; Brown 1991). Religiousness is also very old. When exactly religiousness evolved cannot be precisely determined, because there are no paleo-anthropological fossils or archaeological remains of mental representations, of course, even if Rossano (this volume) has formulated an interesting hypothesis concerning the possible Upper Paleolithic temporal horizon of the evolutionary emergence of religiousness. Pre-Upper Paleolithic populations are assumed by this author to exhibit what he calls protoreligion (Rossano 2006). The use of ochre to paint the body and cannibalism could perhaps be linked with mental concepts which later developed fully into religious

E. Voland (✉)
Universität Giessen, Zentrum für Philosophie und Grundlagen der Wissenschaft,
Otto-Behaghel-Straße 10/C, 35394 Giessen, Germany
e-mail: eckart.voland@phil.uni-giessen.de

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metaphysics. Anyway, religiousness is at least as old as other features of human symbolic culture and is inseparably interwoven with human nature (Mithen 1996).

Now, the universal dissemination of a feature, such as religiosity, and its prehistoric origins are by no means sufficient criteria for a biological adaptation. The crucial question must be whether religiosity has evolved, because there are very direct and immediate fitness benefits associated with religiosity in the Darwinian competition, or whether the mental basis for religiosity has evolved for completely different reasons instead, and therefore, religiosity would tend to have to be understood as a biologically functionless by-product of originally non-religious mental adaptations. If this were the case, all those sceptics who have always claimed that religious behavior cannot be beneficial, from a biological point of view, would be right, because the effort associated with the exercise of religion in terms of time, resources and risks could never pay off in units of reproductive fitness. Even if it should prove to be the case, however, that religiosity cannot be assessed as a biologically functional adaptation, it will, nevertheless, be necessary to clarify from which evolutionary adaptations religiosity represents a non-functional by-product; i.e. which evolved mechanisms of the mind can be exploited by religions and for what non-adaptive reasons religiosity has historically persisted through thousands of generations.

At this point, there seems to be a need to clarify the terminology. In the following, religiosity is understood to be the mental ability to be religious. Religiousness is the individually varying psychic and behavioral manifestation of religiosity and religion is the local and culturally based symbolic niche, in which the development of religiosity to religiousness occurs. In accordance with this terminological classification, the question of the evolutionary status of religiosity, i.e. the human ability to be able to behave religiously, forms the heuristic foundation, on which further evolutionary analyses of religious behavior in different social, ecological and biographic contexts should be based.

2.2 Is Religiosity an Adaptation or a Non-functional By-Product of the Human Mind?

When evaluating the evolutionary status of religiosity, opinions diverge. Opinions holding that religiosity is to be understood as an adaptation contrast with those opinions, which merely classify religiosity as a by-product of an ordinary cognitive and emotional machinery evolved for non-religious, but mundane purposes. In my view of the discussions, the reasons for this lack of consensus are not primarily due to the differing evaluations of the sociobiological role of religiosity, but terminological fuzziness instead. The pertinent concepts – adaptation, exaptation, by-product and spandrel – are simply not used uniformly. For the most part, authors agree insofar as adaptations must meet three criteria: they are inherited, are the product of historical selective processes and thus show a special-purpose design, and they solve an adaptive problem or solved an adaptive problem at least at the time of their evolution.

On the other hand, there is much disagreement concerning the evaluation of a fourth criterion, which focuses on the functional history of the feature. Accordingly, an adaptation is defined by the fact that it has evolved for the same reasons for which it is now biologically useful (Ridley 2002). If this does not apply, one usually speaks of exaptations. Thus, the criterion for distinguishing between adaptations and exaptations, i.e. adaptations that were co-opted by new functions, is linked to a possible change in function. According to this view, it would be false, for example, to speak of bird feathers as adaptations for flying, because feathers originally came about for the purpose of heat regulation in dinosaurs that were unable to fly. Some authors subsume exaptations under the category of by-products, with the consequence that by-products can either be non-functional (standard example: the navel) or functional (exaptation).

In agreement with Thornhill (2003) and many other authors, I do not consider this distinction to be very useful. As is known, adaptation processes start with the building blocks that they find, i.e. the products of previous adaptation processes. Hardly any evolutionary change could be conceivable which did not occur through a change in the function of existing adaptive traits. This change in function is a constituent element of the process of adaptation and it makes little sense not to describe a naturally selected functional feature of an organism as an adaptation only because it had a different function in its earlier evolutionary history. Or would it make sense to not designate the inner ear as an adaptation for the perception of acoustic pressure only because it originated as the sense of balance? Does it make sense not to designate the bonding system of mammals as an adaptation for the regulation of sexual relationships only because it presumably originated from the mother–child attachment system?

These examples may serve to illustrate that the distinction between adaptation and functional exaptation is linked to the issue of whether natural selection had sufficient opportunity to assess a change in function. The ability to use modern technologies is not very likely to be described as a biological adaptation, because it is only a few generations old. The ability to write will also not necessarily be described as an adaptation. Even if this is likely to be 150 generations old perhaps, it is still too recent to have become evolutionarily fixed because of its genuine benefit. Accordingly, writing would be a functional exaptation. Religiosity is much older, however. Whatever biological adaptations were originally co-opted from this, the change in function coinciding with religiosity was being tested by natural selection for at least as long as the so-called “symbolic revolution” (Mithen 1996) and had sufficient opportunity to prove itself or fail from an evolutionary standpoint. In this sense, religiosity would have to be referred to as a biological adaptation, if it adequately fulfilled both of the criteria cited, namely “special-purpose design” and “function”. If the criterion of inheritance does not need to be dealt with any further, because the programmes for developing the brain, the site of human religiosity, are indisputably inherited, then the question regarding the evolutionary status of religiosity concentrates on the verification of these two criteria, i.e. those two criteria whose heuristic meaning for the identification of adaptations has been developed so lastingly by Williams (1966).

Religiosity has several components, namely a cognitive, a spiritual, a socially binding, an identity-forming, a communicative and a moral component. Therefore, it lends itself to structuring the question about the evolutionary status of religiosity according to this internal order and to deal with these six partial aspects of religiosity in detail and initially separately from one another. Let us begin with the role of cognitions in religiosity and question their special-purpose design and biological function.

2.2.1 Cognition

Religions make statements about ultimate truths; they produce metaphysics. In doing so, they necessarily have to rely on the whole range and breadth of the human mind which is the result of biological selection processes, so that metaphysical considerations always have to be biologically "earthed". The biologically evolved range of the human mind includes such phenomena as "naive dualism" (Bering 2006), "teleological thought" (Kelemen and DiYanni 2005), "psychological essentialism" (Gelman 2003), a "theory of mind", an "agency detection device" (Atran and Norenzayan 2004; Barrett et al. 2001; Guthrie 1993), "intuitive ontologies" (Boyer 1996) and a few more (cf. Frey this volume). When taken together and considering their interactions, this range ensures an adaptive mastery of many real living and survival problems. Children under the age of 5 years attribute omniscience to all of the persons in their immediate environment (Barrett and Richert 2003; Knight et al. 2004; Richert this volume). Only with the development of a "theory of mind" do children begin to understand that different sets of knowledge are at home in different brains. Children under the age of 5 years think teleologically: there are clouds so that it rains; and it rains, so that flowers can thrive (Kelemen and DiYanni 2005). Finally, younger children attribute mental states to dead individuals (Bering 2006). Therefore, they not only think dualistically, but at the same time, they store the assumption of a life after death. Interestingly enough, these cognitive basic attitudes of early childhood, namely the assumption of omniscient persons and a teleological and a dualistic way of thinking, also form the basis of crucial theoretical assumptions in many theistic systems of beliefs. Thus Bulbulia (2007, p. 632) concludes that "Children appear [to be] born to believe" and Kelemen (2004) summarizes that "Children are 'intuitive theists'". "Belief in God does not amount to anything strange or peculiar; on the contrary, such belief is nearly inevitable", is how Barrett (2004, p. 122) puts it, and elsewhere, "The design of our minds leads us to believe" (p. 124). Accordingly, religiosity would not first have to be arduously learned. On the contrary, religiosity would almost automatically result from the cognitive equipment of human beings, whereas the actual intellectual effort would consist of renouncing faith as a rationalist.

The unique features of the human mind also include what D'Aquili (1972) has designated the "cognitive imperative" (Newberg et al. 2001). The cognitive imperative forces one to constantly reflect on the regularities and rules of one's experiences. The cognitive imperative compels a plausible and coherent design of the

portrayal of world happenings, without any gaps in explanations, without any islands of irrationality. Human beings obviously cannot stand contingencies, irrationality or causal uncertainty, because what is not understood generates fear. To avoid this, reasons and causes are seen, even where there aren't any (cf. Frey this volume). The brain is a permanently working generator of stories. It not only sees rules where there aren't any, but also makes up stories, which allow these rules to appear to be more or less plausible. In this context, cognitive psychologists speak of the "need for closure" or "jumping to conclusions" (cf. Brüne this volume). Basically, Francis Bacon already knew this when he wrote in 1620,

> The human understanding is of its own nature prone to suppose the existence of more order and regularity in the world than it finds. (Bacon 1620, book 2, aphorism no. 45)

Viewed in this light, the metaphysics of religion are based on errors and false classifications of basically functional cognitive machinery. In this way, the basic metaphysical assumptions are merely unavoidable by-products, with consequences that tend to be biologically harmless, of the biologically evolved psyche that is aimed at coping with adaptive problems and which although efficient does not function without making mistakes (Atran and Norenzayan 2004; Boyer 2001; Kirkpatrick 2005). How perfectly the mind works is a question of the cost/benefit balance of error avoidance, especially the fitness risks, which come from cognitive errors. In this context, Nesse (Nesse 2001) has formulated the "smoke detector principle". If a greater harm comes from the non-recognition of a risk than from occasional errors in performance, the cognitive machinery should be adjusted to be super sensitive, just like fire alarms are. An occasional false alarm does not have any negative consequences, for the most part. However, overlooking a danger can be fatal. In this sense, it is more harmless, in terms of biological consequences, to occasionally err and to interpret the mere rustling of leaves animistically, then to go through life without an agency detector. It is more harmless to occasionally succumb to suggestions and to see the wrong thing in twilight than to live completely without any intuitive ontologies and not recognize risks or opportunities that really do exist. This fuzziness of the cognitive mechanisms is the breeding ground for a religious metaphysics, which is why they have to be classified as a non-functional by-product of cognitive adaptations.

2.2.2 Spirituality

Spiritual practice makes use of special mental states such as meditation, hypnosis, trance and ecstasy. Talented persons are able to achieve these mental states with the aid of special techniques and to explore special worlds of experience. The neurochemical processes which coincide with these mental states are associated with consequences for health and well-being: they reduce the perception of pain, regulate temperature, support the immune functions, reduce the loss of blood, mitigate the effects of psychopathological dysfunctions and activate the bonding system (McClenon 2002; Winkelman 2006). Mystical experiences and therapy are

obviously inseparably linked, and this is exploited by shamanism. Owing to the close connection between therapy and mysticism, it is debatable as to whether or not shamanism belongs to the history of medicine or to the history of religion. In any case, mystic elements in day-to-day living can improve one's physical and mental well-being and thus provide for improved mastery of contingencies. This connection has an interesting evolutionary feedback: to the degree that shamanism was therapeutically successful, it selected genotypes which tended to accept suggestions and precisely for this reason, they were also open to unusual experiences that we call religious (McClenon 2002).

There is an extensive literature on the correlation between religious practice and mastery of life events; not only have interesting single studies repeatedly found a positive correlation, but so have statistically reliable meta-analyses. Of course, there is also the "dark side" of religious fears and obsessions, which are definitely associated with significant health risks (Guthrie 1993; Magyar-Russell and Pargament 2006). Overall, however, the positive effects clearly predominate (e.g. Grom 2004; Koenig et al. 2001; McCullough et al. 2000, Newberg and Lee 2006; Powell et al. 2003), which is why religion proves to be extremely functional from a biological standpoint. Fear, stress and pain are fended off by mystical devotion to religious fictions. Therefore, a first biological benefit function for religious behavior is described: self-preservation through an improved mastery of contingencies.

2.2.3 Bonding

The function of spirituality is not limited to personal benefits, however. Joint participation in rituals lends it a social dimension. Not infrequently, ritual performances are very rigid, redundant, compulsory and oriented towards "useless" behavioral goals. The whole process is frequently supported by rhythms and ends in a kind of "emotional synchronization" of the participants (Hayden 1987; Winkelman 2006). Without rituals that have an emotional impact, religions would lack both an emotional depth and a motivating power. This means that rituals are used in particular when the intent is to demand collective efforts or special altruistic services from the faithful (war, competition or solidarity). Physiologically, this is done by activating the bonding system common to mammals (Kirkpatrick 2005; Winkelman 2006). Psychologically, this is done by a form of the loss of self, by the feeling of being at one with the universe (Newberg et al. 2001). Individuality and egocentrism are displaced in favour of collectiveness. Accordingly, collective rituals have a lot to do with social coordination and cohesion, with the bundling of forces and with enabling gains through cooperation. Ecological and social risks of life can only be successfully countered through coordination under certain circumstances, and in a Darwinian world of personal utility maximizers, the motive of social cohesion first has to be arduously implemented. Various empirical studies show a clear correlation in migrant groups (e.g. Van der Lans et al. 2000 for Moslem youths in the Netherlands) between finding one's personal identity through group cohesion,

personal well-being and religious practice. Thus, there appears to be a second biological benefit function of religiosity: strengthening the community by obligating its members to work towards common goals.

2.2.4 Personal Identity

Human history is characterized by the constant competition of autonomous groups for the chances for life (Alexander 1987). This situation also holds true for chimpanzees who engage occasionally in extremely violent group attacks (Wrangham 1999). Jane Goodall (1986) called these aggressive encounters "wars" and found them psychologically similar to human wars. A neutral encounter between two groups is practically unknown, there are only friends or enemies, and the accident of group affiliation lastingly determines the personal identity and biography of every individual. However, it is unclear a priori, who actually is a friend or an enemy. Reliable markers are required to make this distinction and it appears that the human language makes a considerable contribution here. Essentially, language fulfils two functions within this context. Because dialects serve as cultural and ethnic markers, the "we" is also externally recognizable from "the others". Due to social knowledge being exchanged, every participant in the linguistic exchange is informed about the social ties and tendencies of all other participants. Thus a common social network is created, with the consequence that all members of an in-group play their roles on the same stage and their well-being and lack of well-being depends, in various ways, on the well-being or the lack of well-being of the others. What non-human primates typically achieve through "grooming", humans are able to do much more efficiently through the linguistic exchange of social knowledge, namely the integration of the individual into the social web of roles, thus adding a social dimension to one's personal identity (Dunbar 1996). This is why the common experience with others and the resulting participation in a common culture of memories contribute to one's personal identity. This is precisely what myths do. Common stories, common memories and common truths endow a community with a social identity and serve to hold the group together (cf. Palmer et al. this volume). In short, myths contribute to designing and psychologically maintaining the so lastingly important distinction between "we" and "the others" in human history. This describes a third function of religiosity: by propagating myths and creating a social identity in this way, competitiveness is promoted in disputes between social groups.

2.2.5 Communication

With their ceremonial practices, religions co-opt the "handicap principle", an old biological communications system. In the animal world, "honest signals" about hidden qualities have evolved in three contexts (Zahavi and Zahavi 1997), namely in the interspecies communication between prey and their predators; in the social competition for positions of rank, where they help to negotiate hierarchies without the need

to fight battles; and finally, in sexual competition, where they permit conclusions to be drawn concerning the health qualities that a partner has. A special human feature is the implementation of the handicap principle in the field of morality (Voland 2003, 2004).

A pressing adaptive problem of early human history was, without a doubt, competition between neighbouring groups. As an adaptive response, in-group/out-group moral standards were developed that were as firm as possible, the essential function of which was to bond the members of a group into a social alliance and to commit them to a "feeling of togetherness". Like all public goods, however, group solidarity is also subject to the "free-rider" problem. In a conflict between self-interest and the well-being of the group, the probability is greater that self-interest will win out. Although one might be inclined to use the benefits of group affiliation to one's own personal best advantage, there are strong incentives, as personal utility maximizers, for avoiding costs accruing from the social alliance as far as possible. Not only can moral integrity not be seen, but it is even a priori unbelievable in a world of personal utility maximizers. This is why group solidarity always runs the risk of being exploited – unless its members and especially the newly joining members express their moral integrity with "honest signals". This function is assumed by rituals, ceremonies and taboos (Dunbar 1999; Knight 1998; Palmer and Pomianek 2007; Voland 2003). The fact that the "adaptive calculation" of the handicap principle really does work was able to be demonstrated in a series of studies by Sosis and his co-workers (e.g. Purzycki and Sosis this volume; Sosis and Bressler 2003; Sosis et al. 2007). In summary, it can be noted that religions offer a matrix for communication via honest signals. Ceremonies and taboos serve to establish reliability within a moral in-group completely in the logic of signal evolution. Religion thus provides another biological benefit. It combats the "free-rider" problem in shared-risk communities by compelling communicative honesty.

2.2.6 Morals

Religions aim to strengthen the moral standards within a group. For reasons which are discussed under the label of the "prisoner's dilemma", and for which there is a long history of economic and sociobiological research, cooperation does not occur spontaneously, however. Behavior that serves groups tends to be an improbable affair, because a recurring moral dilemma is inseparably associated with a social lifestyle. It consists of the fact that short-term self-interest stands in the way of long-term gains through cooperation. Internal moral standards that serve groups constantly run the risk of being opportunistically undermined. High internal moral standards must, therefore, overcome incentives for short-term self-interest, so that self-interest can be realized in the long run. This can be successfully done through social controls. Opportunistic breakers of the rules are recognized as such and can be punished. This makes immoral behavior expensive and thus reduces its incidence, reinforces the group and promotes long-term gains through cooperation. Social controls do not completely dissolve the prisoner's dilemma, however, because the punishment of the rule-breakers is an altruistic act by itself (Fehr and

Gächter 2002). Why should someone take the time, effort and risk to sanction a third party, if that someone does not have any immediate gain? Accordingly, social control is a form of altruism that cannot be evolutionarily stable.

Religiosity may have evolved in order to deal with this problem, namely the so-called second-order "free-rider" problem. When the Gods, spirits and ancestors sanction false behavior, the members of a group are released from the costs of a judicial review. Instead, the punishment for breaking the rules is internalized, by achieving conformity with the norms through a religiously fixed conscientiousness. Some cross-cultural findings support this hypothesis. Thus Johnson (2005) was able to show that the more strongly the members of a group cooperate with one another, the more distinctive the local ideas of all-seeing, omniscient and punishing and omnipotent Gods are. The findings of Roes and Raymond (2003) also fit into this picture; these findings show that the belief in a punishing God correlates with the size of the social group. This belief is practically unknown in simple subsistence groups. Experiments that show that priming God concepts increase prosocial behavior in economic games (Shariff and Norenzayan 2007) speak in favour of this point of view.

The idea that the fear of God could have evolved as the adaptive response to the problem of public goods will have to explain, however, how conscience was actually able to evolve as a moral regulatory instance. Why should someone "voluntarily" submit to the dictates of a conscience?

Regardless of such issues in detail, however, it really does look like religiosity helps to overcome the second-order "free-rider" problem (Johnson and Bering 2006). Sanctions of moral misconduct are internalized by exploiting the performance of a conscience.

2.2.7 Again: Is Religiosity an Adaptation, or a Non-functional By-Product of the Human Mind?

In Table 2.1, considerations about special-purpose design and function, regarding the individual components of religiosity, have been summarized. With the exception of the basic metaphysical assumptions of religions which are able to be understood as by-products of the biologically evolved human cognitive machinery that are useful in this life, all of the components of religious practice show biological utility, namely mastery of contingencies, identity formation, social-alliance bonding and the solution to the prisoner's dilemma on two levels.

When can it be claimed that a feature has a special-purpose design? If one takes Williams' (1966) criteria as the baseline, namely, efficiency, complexity and universality, then the question related to special-purpose design can in my opinion be answered in the affirmative for at least five of the six components. Religious metaphysics are generated by special cognitive modules, as discussed. Social rituals activate the attachment system. Self-awareness has been designed to form identity. The handicap principle and the conscience are surely subject to a special design, even if it is not fully clear yet what this looks like in detail. In my view, the only question left unanswered is whether the neuronal circuits of the frontal lobe that enable mys-

Table 2.1 Special-purpose design and function of religious components

Component	Religious practice	Special-purpose design of the mechanisms involved	Biological function of religious practice	Evolutionary status of religious practice
Cognition	Metaphysics	Yes (cognitive machinery, e.g. agency detection device, etc.)	No	Functionless by-product
Spirituality	Mysticism	?	Mastering contingencies	Adaptation?
Bonding (communion)	Rituals	Yes (attachment system)	Formation of alliances	Adaptation
Personal identity	Myths	Yes (self-awareness)	In-group / out-group distinction	Adaptation
Communication	Honest signals (ceremonies, taboos)	Yes (handicap principle)	Solution to the first-order "free-rider" problem	Adaptation
Moral	Conscientiousness, fear of God, spirits or ancestors	Yes (conscience)	Solution to the second-order "free-rider" problem	Adaptation

tical experiences show a special design for mysticism or not – hence the question mark in Table 2.1. On the whole, I personally think it safe to conclude that religiosity can be seen as a complex conglomerate of evolutionary adaptations and one by-product.

The question of a possible change in function remains unconsidered – as explained – in this diagnosis. Indeed, there are some indications that there could have been functional changes in the biologically evolved components of religiosity. For example, it seems as though the neuronal mechanisms which are used by mysticism and which essentially are reward mechanisms originally arose in connection with sexuality and were only co-opted by religiosity later on. It could be that the original benefit of sexually fed excitement is able to be exploited through meditation techniques. The similarity of orgiastic and mystical experiences speaks in favour of this interpretation (Newberg et al. 2001). Whatever the case may be, this does not affect the validity of the criteria of "special design" and "function". The

same applies to the handicap principle in analogy. It originally came about in the context of adaptive mate choice; however, it experienced an expansion in the direction of moral communication later on. In other words, there is much that speaks in favour of the fact that the individual components of religiosity have pre-religious, and evolutionary roots. The evolution of religiosity has surely not occurred without various co-options of functions that already existed, i.e. predispositions. However, this should not induce us to designate religiosity a by-product, because natural selection has had enough time during the course of hominization to reassess the results of the co-options itself. This distinguishes religiosity, for example, from soccer games or other modern activities. Even soccer co-opts evolved mechanisms; nevertheless, one would not want to label soccer as an adaptation, because natural selection has previously not had the opportunity to assess the biological consequences of playing or watching this kind of sport. In sum, the components of religiosity – at least to a significant part – can be recognized as special-purpose design endowed with biological functionality. This view leads to some interesting consequences.

2.3 If Religiosity Is an Evolutionary Adaptation . . .

2.3.1 Then We Can Expect that Religiosity Is Present in the Minds of Essentially All People

It is one of the typical features of adaptations that they are present in practically all members of a species (Thornhill 2003; Williams 1966). Of course, there are also sex- and age-linked adaptations, but apart from these special cases, the adaptations of *Homo sapiens* overall form what is called "human nature". However, both religiously obsessive and absolutely unbelieving persons can be observed. From the perspective of adaptation, it cannot be claimed that persons rejecting religion do not have the adaptations for religiosity, but that for reasons which would have to be studied their religiosity did not overtly manifest itself. Adaptations can be "conditional universals" (Gaulin 1997), such as corns or fever, which develop their adaptive logic only under very specific biographical circumstances. Or could it be that religiosity manifests itself in ways other than through traditional religiousness? Could it be that these adaptations generate behavior in day-to-day lives that are not directly and immediately recognized as being religiously motivated? What about the fanatic fans of a sports club, a revolutionary movement, an ideological basic conviction, a lifestyle, a pop culture, of parapsychology or pseudoscience? In short, is there religiosity without religion?

2.3.2 Then We Can Expect Special Design in Ontogenetic Development of Religiousness

The characterization of religiosity as a biological adaptation and religiousness as its manifestation raises the question of whether we are not dealing with a case that

is analogous to language here. Languages, like religions, have a cultural tradition and differ from one another historically. This process of passing down either a language or a religion occurs through the individual acquisition of a language/religion through learning processes that are "similar to imprinting", which is why Pinker (2000) refers to the "language instinct" and Söling (2002) to the "God instinct". All of this is done on the substrate of a biologically evolved ability to speak or to be religious.

Taking this perspective seriously means that religions are taken over ontologically in a specially designed way. Just like the individual acquisition of language preferably occurs during specific sensitive phases, during which the prepared brain seeks specific inputs in order to develop linguistic competence, it can be expected that the takeover of the local religion also occurs in prescribed timeframes. Alcorta and Sosis (2005) see in adolescence a critical period for the learning of emotionally valenced symbolic systems and the *rîtes de passage* as the practice hereof. Should it prove to be the case that the individual takeover of local religious practice actually is based on domain-specific learning mechanisms, this would indeed be the best argument for the hypothesis of religiosity as a biological adaptation. From the point of view of the by-product hypothesis, religion would only be learned by the way and in a non-specific manner, comparable to a memetic infection – without the brain assembling specific modules for taking over precisely this content.

2.3.3 Then We Can Expect Genetics of Religiosity

Adaptations are inherited, i.e. their genetic basis is passed on from one generation to the next. Because adaptations exist in all members of a species, they have a hereditability which approximates zero (Thornhill 2003):

> Heritability is a term that describes the extent to which the variation among individuals in a phenotypic trait . . . is caused by genetic, as opposed to environmental, variation among individuals. (Thornhill 2003, pp. 15–16)

The adaptive perspective supports the hypothesis that human variation in religiousness arises primarily not from genetic differences, but from differing conditions affecting the adaptation, i.e. from environmental and condition-dependent experiences. The experience may involve the past, as in the person's ontogeny or upbringing, or it may be solely due to cues of the moment. Accordingly, different levels of religiousness would be the condition-dependent manifestation of the adaptation, so the question is: What specific circumstances and experiences contribute to the development of religiousness?

However, the variance of religiousness is not completely able to be explained by differential milieu influences, because it seems that religiosity, like other personality traits, also has a remarkable hereditability (cf. Bouchard this volume). What does this observation mean for our topic? Is religiosity an example of selection in progress? Or is the ratio of religiosity to non-religiosity regulated by frequency-dependent selection? "Religion survives because it produces children, not because it

is true" is something that the rationality sceptic and Economics Nobel prize winner Friedrich-August von Hayek (as cited by Vaas 2006) already knew. Like Blume et al. 2006 (cf. Blume this volume, for Germany and Switzerland), Adsera (2006), Frejka and Westhoff (2008) and Zhang (2008) were able to show for Spain or the US that religious commitment actually correlates with fertility. Accordingly, it appears that religious people, even in modern, enlightened societies, are more successful than others in overcoming the personal barriers in having children. However the correlation between religiosity and differential reproduction might have come about, religious persons are often observed to overreproduce. Of course, fertility does not equal fitness, but is only one of its components. Survivorship and social placement of the offspring in the community are other components. Whether differential reproduction by religiousness is linked to genetic differences is unclear. This could be the case if, for example, genetic personality factors predispose religiousness. This does not have to be case, however, because the same genotypes occupying varying social niches could utilize varying opportunities for reproduction. Correlations of fertility and religiousness could simply be confounding effects. At the moment, it is still completely unclear whether differential fertility by religiousness is related in some way to directional selection in progress.

However, it could also be that religious commitment is associated not only with selective advantages but also with significant costs, the amount of which depends on the ratio of believers to atheists in a society. This would then be a case of frequency-dependent selection. Although no case study has been developed to date, to my knowledge, to find out which costs specifically these could be and how they would be reflected in the pay-off matrix for religiousness, the model of frequency-dependent selection could offer a better explanation than the assumption of targeted selection, as to why there are actually so many liberal atheists.

2.4 Conclusion

To answer the question regarding the evolutionary status of religiosity and religiousness, we have varyingly extensive and reliable knowledge at our disposal. It is becoming increasingly clear that the constituent mental elements of religiosity, that is, the ability to be religious, show a special-purpose design and that its practice in religious day-to-day life (be it in the form of mysticism, rituals, myths, ceremonies and taboos, fear of God, spirits or ancestors and conscientiousness) is biologically functional on average. This is why religiosity can be regarded as an evolutionary adaptation which belongs to universal human nature as a genetically fixed component. The biological function of religiousness, i.e. the individually varying manifestation of religiosity, is less clear, however. Behavioral ecology theory makes a few predictions here (e.g. it predicts a correlation between the investment into honest signals and intergroup competition), but empirical reviews of evolutionarily inspired theses on differential religiousness are absolutely scarce. All these considerations lead to the conclusion that it is no longer a matter of verifying an evolutionary perspective on religiosity, but of closing the gaps in sociobiological research with

regard to the individual, ecological and cultural differences in the manifestations of religiosity in religiousness.

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Chapter 3
Gods, Gains, and Genes

On the Natural Origin of Religiosity by Means of Bio-cultural Selection

Rüdiger Vaas

Abstract Religiosity can be characterized by seven main traits: transcendence, ultimate relatedness, mysticism, myth, morality, rite, and community. Why is it ubiquitous today and throughout human history? It might be an evolutionary adaptation in terms of natural or sexual selection, and not a mere by-product of other traits or exclusively a cultural phenomenon, describable for instance, by memetics. If so, the following conditions must hold: universality, reproductive success, heredity, realization, and selective advantage. A brief review shows that current data are consistent with the adaptation hypothesis, but not sufficient to confirm it; and there are also conceptual and empirical problems. Finally, what can evolutionary psychology and neurotheology tell us about the three main sources of religious beliefs and whether those beliefs are true?

3.1 The Challenge

"Religion constitutes the greatest challenge to human sociobiology and its most exciting opportunity to progress as a truly original theoretical discipline," wrote Edward O. Wilson, addressing the difficult task of a biology of religiosity (Vaas and Blume 2009), back in 1978 (Wilson 1978, p. 175). And this is a challenge in both directions! For evolutionary theory, the challenge is to explain the seemingly surplus luxury of religiosity, given that, from an economic perspective, the time and effort expended on it could be saved and better invested in seeking food and mates and raising one's own offspring or the progeny of close relatives. For religion, if one accepts that it is a product of biological evolution or a by-product of mundane cognitive processes, the challenge is to cope with naturalistic (and even reductive) explanations and their ontological implications (Vaas and Blume 2009).

If everything we perceive, think, feel, plan, and do is based on neuronal processes (Vaas 1999a), then this is also the case for religious experiences, convictions, and

R. Vaas (✉)
bild der wissenschaft, Ernst-Mey-Str. 8, D – 70771 Leinfelden-Echterdingen, Germarny
e-mail: ruediger.vaas@t-online.de

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actions. And if man is a result of biological evolution (the capability to develop culture included), then religiosity might have selective advantages or could at least be a by-product of faculties that are adaptations to the natural or social environment (cultural modifications included). Thus religious belief could be useful even if supernatural entities are an illusion. Whether there are specific biological foundations of religiosity should be taken as an empirical question which cannot be answered by logical reasoning or philosophical speculation and therefore is a subject for scientific research.

Man could be a "mammal by the grace of God" (Lüke 2006), or God could be a figment of the imagination – this is a philosophical (metaphysical and epistemological) issue which transcends the scientific methodology. But without science, no intersubjectively convincing evidence will be found either for an explanation of religiosity or for certain premises of philosophical reasoning. As Daniel Dennett has pointed out:

> It might be that God implants each human being with an immortal soul that thirsts for opportunities to worship God. That would indeed explain the bargain struck, the exchange of human time and energy for religion. The only honest way to defend that proposition, or anything like it, is to give fair consideration to alternative theories of the persistence and popularity of religion and rule them out by showing that they are unable to account for the phenomena observed. (Dennett 2006, p. 70)

And this is not just an issue of anthropology and ontology. It is of dramatic importance for the life and future of mankind.

> Now that we have created the technologies to cause global catastrophe, our jeopardy is multiplied to the maximum: a toxic religious mania could end human civilization overnight. We need to understand what makes religions work, so we can protect ourselves in an informed manner from the circumstances in which religions go haywire. (Dennett 2006, p. 72)

3.2 The Seven Main Characteristics of Religion and Religiosity

"Religion is nothing but the shadow cast by the universe upon human intelligence," Victor Hugo once said. And, one might add, to define religion is a challenge for our intelligence. As early as 1912, James H. Leuba complained that there were more than 50 different definitions (Leuba 1912). In the meantime, many more have been proposed. Some even argue that because of this, the field eludes any serious study – at least concerning the evolution of religious behavior. But, however, confusing the situation may be, there is no need to give up. The vagueness of the term "religion" is one that it shares with many other fundamental concepts. Try "matter," "energy," "life," or "time" for instance, or ask a philosopher about the meaning of "philosophy." Like many other concepts, "religion" is an umbrella term, bundling together different meanings on the basis of a family resemblance. Thus an operational cluster definition might suffice, covering both substantial and functional aspects. It has been suggested (Vaas 2006a, 2007a; Vaas and Blume 2009) that there are seven main characteristics of religion:

1. Transcendence: belief in extra- or supernatural power(s).
2. Ultimate relatedness: feeling of attachment, connectedness, dependence, and obligation as well as a feeling of ultimate purpose and meaning both for individuals and for societies or the whole world.
3. Mysticism: experience of the holy; feelings of unity with this power or even with everything.
4. Myth: explanation, legitimation, and appraisal of the world, extending even to promises of salvation.
5. Morality: transcendent justification of values (rules and prohibitions) to guide the thoughts and behavior of individuals.
6. Rite: symbolic objects and actions (ceremonies), for example, to heal, to avert evil, to sanctify, or to mark initiations and passages.
7. Community: social attachment through the shared and bequeathed system of beliefs, the experience and expression of these beliefs, their teaching and propagation, their interpretation and confirmation, culminating in organizations and institutionalizations.

These main characteristics are always associated with the belief in the existence of transcendent entities, such as Gods, spirits, or demons. (This is true even for religions like Buddhism, whose doctrines do not, strictly speaking, introduce such beings, because the majority of believers do not share such sophisticated ideas in practice (Slone 2004)). It is important to keep such ontological assumptions in mind, because otherwise there would be confusing intermixtures: There are secular kinds of dogmas, belief and forms of ultimate relatedness (e.g., in racist ideologies), ecstatic experiences (e.g., under drug influence), rites (e.g., consecration of youth or flags), communities (from parties to football fan-clubs), and their value systems. Religion is, therefore, not compatible with naturalism – though not every antinaturalism is a religion, of course.

Not all of these characteristics of religion are equally important nor realized in every religion, and their relative emphasis varies. They might not be complete, but are nonetheless sufficient for most practical purposes, including the synchronic and diachronic description of religion as an intercultural phenomenon and its scientific exploration. They are not a necessary premise but a starting point that might be amended in the course of further investigation. This is the usual "heuristic spiral" in a conceptually reflected branch of a young and rapidly growing research field.

However, religion by itself is not the main topic in evolutionary studies of human religious mind and behavior, because the thousands of known religions are all products of human culture (though they might show some signs of environmental adaptations (Reynolds and Tanner 1995; Fincher and Thornhill 2008)). And religious affiliation is not biological either (there are no Catholic or Buddhist genes, for example), but depends mostly on the belief of parents or other persons to whom someone is closely attached. Religiosity on the other hand – the mental predisposition to be religious, to affiliate oneself to a religion – has a biological foundation. (This is also true for religiousness, the individually varying manifestation of religiosity, if one wishes to draw this further distinction (Voland this volume), but this need not be

considered in the following). To investigate religiosity from an evolutionary point of view, one should account for all seven main characteristics of religion.

The "additive" definition of religion makes it clear that religion and religiosity are not strictly and rigorously definable and not necessarily a unified, quasi-monolithic phenomenon (Vaas and Blume 2009). They are not a single feature and therefore it is unlikely that they can be viewed as a single adaptation (if adaptive at all) with only one (if any) biological function. Thus it is possible and even probable that there is no unified, universal explanation of all characteristics within the framework of a single psychological, sociological, neurobiological, or evolutionary perspective. That is, each main feature has a different status and function, a different realization in the brain, a different kind of conscious experience and social effect.

This has important implications for evolutionary studies: If such a main characteristic is adaptive, either a product of natural or sexual selection, it does not imply that all the other features are adaptive, too. Nor does it mean that all characteristics, if they are adaptive indeed, have the same kind of evolutionary advantage. It is therefore an open question whether human religiosity can be treated as a unified phenomenon, even approximately, and whether there are different kinds of explanations necessary for its main features. Perhaps, some of them are adaptive and some are not. But these are empirical questions which cannot be answered or decided by conceptual analysis or pure speculation.

3.3 Explanations for Religiosity – The Main Contenders

"It is better to debate a question without deciding it than to decide it without debating it," Joseph Joubert once remarked. This is also true for the biology of religiosity. There are three main possibilities: (1) religiosity could be adaptive, thus being a direct product of biological evolution; (2) religiosity could be a by-product of traits which are biologically adaptive, thus having no direct selective advantage; and (3) religiosity could be exclusively a cultural product. (Its genetic foundations, if there are any, would be evolutionarily neutral and would change their frequencies only by genetic drift, that is chance, but not due to the influence of selective pressures.)

One can argue, however, that this idealized distinction is too sharp and simplistic. It does not consider the dynamics and interactions of these possibilities. And it leaves out the complexity and different levels of description of religiosity. Furthermore, "adaptation" is an ambiguous term, whose meaning can be more historical or more functional (Williams 1966; Lauder et al. 1993). What makes a trait adaptive depends on the full (abiotic and biotic, including social) environment. Gills, for instance, are adaptive underwater but not on land.

It is still controversial whether selection acts at the level(s) of species, groups, individuals, cells or genes, because selective advantages can be described at different levels. But throughout many generations, relative frequencies of genes and gene combinations are crucial (Dawkins 1976, 1982). This is the ultimate level of description. This successful reductive approach, however, does not exclude proximate descriptions, and selection does not "operate" on genes directly, but on their determined traits and, hence, individuals – and perhaps sometimes groups of

such individuals. Therefore, higher-level explanations have an important pragmatic and heuristic value in research, despite disagreements about how adequately they represent the "real" processes. It remains an open problem whether group selection (Bergstrom 2002; Boyd and Richerson 2002; Sober and Wilson 1999), or "multi-level selection" in general (Bijma et al. 2007a, 2007b; Wilson and Wilson 2008), is of any significance (or even makes biological sense). Here religiosity might be a crucial test case, because it can unify and distinguish different groups competing with each other for resources (Wilson 2002). In prehistory (and in today's remaining "primitive" societies), humans lived mainly within small groups. Depending on specific boundary conditions, some such groups may have formed "adaptive units" with different survival and reproductive rates. Altruistic behavior benefits the group as a whole and, therefore, most of its members, but goes against the immediate egoistic interests of the member concerned. In this case, the selective forces on individuals within a group oppose those acting on the whole group. The result of egoistic tendencies is often exploitation of common goods and impoverishment (Hardin 1968). Religiosity has played and still plays perhaps an important role in individual and group rivalries by enforcing reciprocal altruism (see below).

In conclusion, though distinctions and tests of the three main hypotheses (adaptation, by-product, and cultural product) deserve more conceptual clarifications, not all of those hypotheses can be applied equally to each trait: Some are, in some respects, true and, thus, the others are wrong. Finding out what is the case is a huge challenge – in general, but also in the case of religiosity (Table 3.1). However, competition is good for business and a motivation for more and better research.

Table 3.1 The struggle for truth

Religiosity is adaptive	Religiosity is not adaptive
Individual selection: advantages for individuals (compared with other individuals competing within the same group or in general) due to natural or sexual selection	By-product ("spandrel") of traits, which are adaptive in non-religious circumstances
Kin selection: advantages for genetically close relatives (compared with more distant relatives)	No adaptation in the modern world, even if there were selective advantages in prehistoric times
Group selection: advantages for groups (compared with other groups)	Neutral traits, which may or may not be the subject of cultural evolution
Cultural symbiosis (bio-cultural coadaptation): mental and behavioral features ("memes") benefit from the selective success of those who spread them	Cultural parasitism (misleadingly called "maladaptation"): "memes" spread without selective advantages for individuals or groups and could even have disadvantages

Note: Traits are either adaptive, having a direct evolutionary selective advantage, or they are not. This is also true for religiosity. The table summarizes the main hypothese in a rather simplified way – leaving out the different and perhaps independent components of religiosity, different levels of descriptions, and temporal change. Thus the possibilities are not mutually exclusive in every respect. Furthermore, the two columns are not the opposite of each other (adapted from Vaas and Blume 2009).

3.4 Conditions for Adaptivity

A biological trait is adaptive and, hence, a product of natural or sexual selection, if at least the following conditions are met (Vaas and Blume 2009):

- Universality: The established trait (unlike a recent mutation) must be present in (almost) all members of a species, although its realization might vary.
- Reproductive success: The trait must lead, at least in the medium term, to a higher biological fitness. Thus individuals with the trait should have more offspring on average than their intraspecific competitors without that trait or with a weaker realization of it. And their offspring must produce, on average, more offspring, too, and so forth. (Just having many descendants is not enough if they themselves do not reproduce, because this would be an evolutionary dead end.)
- Heredity: The trait must be – at least partly – genetically determined. For only what is inherited can be the subject of selection. Traits that are acquired by learning, or by environmental influences in general, cannot enter the germline. Admittedly, this does not mean that inherited traits are always independent of the environment. On the contrary, particularly cognitive and behavioral abilities and skills depend strongly on environmental conditions. The human faculty of speech, for instance, is innate but cannot develop without a linguistic environment. Language acquisition occurs rapidly and without much effort, given the right (adequate, specific) stimuli.
- Realization: To some extent the trait must have a genetically determined physical foundation. Otherwise it would not be part of nature and, thus not accessible to the methods of natural science. Cognitive and behavioral traits must be instantiated by neural processes. Their realization – which can be described at different levels (genetic, biochemical, neurophysiological, anatomical, psychological, and behavioral) – is the proximate mechanism on which selection acts.
- Selective advantage: The adaptive value of the trait must be recognizable. This is, of course, not a condition for an evolutionary adaptation because that already means being selectively advantageous. However, it must be shown, not only stipulated, that a trait is selectively advantageous. Thus it should be demonstrated that the trait is useful for its owner and how it contributes to reproductive success. This refers to the mechanism or evolutionary function. (Sometimes this is called "special purpose design," but this metaphorical notion is problematic, because according to evolutionary theory there is neither a "design" nor a "designer" in or behind nature.) The adaptation need not be optimal by the way (and often there is even no convincing criterion for measuring this); furthermore, sexual selection is usually in opposition to natural selection, weakening the survival probability, but this disadvantage is outweighed by the higher probability of finding mates and reproducing.

In conclusion, if there are selective advantages of religiosity in general or at least some of its main characteristics, then there must be convincing evidence for their

universality, reproductive success, heredity, physical realization(s), and evolutionary adaptation (s). Is this the case?

3.4.1 Universality

Religions are spatially and temporally ubiquitous in all known human societies. Thus they can be seen as a human universal (Murdock 1967; Brown 1991; Antweiler 2007), although religious phenomena by themselves are quite diverse (Boyer 2002). A distinction between holy (numinous, sacred) and profane entities is as common as the belief in supernatural agents. Burials were performed at least 100,000 years ago (by both *Homo sapiens* and *Homo neanderthaliensis*), and symbolic art, which can be interpreted as religious in a broad sense, is more than 35,000 years old (Lieberman 1991; Mithen 1996; Wunn 2005; Sjöblom 2008). Thus man can be seen as a "praying animal" (Alister Hardy). It is quite possible that the beginning of *homo religiosus* is an outcome of the development of I-consciousness (verbalizable, reflective self-consciousness) and death awareness (Vaas 1995, 2002a).

Despite its ubiquity – which decreases if one uses narrower definitions – religion could be seen as a product of culture, like writing. Today, writing is common globally and (almost) universal in this respect. Nevertheless, the ability to write is not a (direct) adaptation, albeit its advantages are enormous. Thus, even if religiosity is almost universal, this is an indication for its evolutionary adaptation, but not its proof.

3.4.2 Reproductive Success

"Be fruitful and multiply" were God's first words to mankind according to the book of Genesis (1:28, cf. 9:1; see also Quran 24:32). And indeed, religiosity is correlated with reproductive benefits all over the world (Vaas and Blume 2009; Blume this volume) (including nomadic hunter -gatherers like the !Kung San). Adults have more children if they confess strong faith, if they pray more often, attend religious services more frequently, or have very religious parents; and having children is more important for religious than for less religious persons. This at least has been the case in recent decades and cannot be explained by other factors alone, such as wealth or education, though they have a much bigger effect. The larger number of children is due to the religious doctrines themselves, as well as social and psychological factors (family bonding, social support, better coping with stress, a more trusted mate).

These data show an interesting and reliable correlation. Whether it held in the past (and will do in the future) is an open question. Such higher reproductive rates alone are not a sufficient argument for adaptation, for it may be a cultural phenomenon (caused via religious imprinting) which need not necessarily entail a significant increase of specific gene frequencies causing a higher religiosity than average across many generations. But the demographic data are at least consistent with there being a selective advantage.

3.4.3 Heredity

There are indications that religiosity is genetically determined to a significant degree, up to about 40–60%, according to twin studies. First, there is quite a strong correlation between religiosity, authoritarianism, and conservatism – that is certain views about the organization of nature, family, and society – which greatly influences mate choice (Koenig and Bouchard 2006; Bouchard this volume). This refers both to extrinsic and intrinsic religiosity (Bouchard et al. 1999). Extrinsic religiosity is mostly socially determined (parent's religion is the strongest determinant of child's) and more about rules than feelings. But there is also a high correlation, about 50%, for intrinsic religiosity, especially spirituality (D'Onofrio et al. 1999; Hamer 2004; Kirk et al. 1999; Koenig et al. 2005). Spirituality is a basic personality trait (Cloninger 2000). It has to do with mysticism: self- transcendence – that is creative self-forgetfulness (transcend self-boundary when deeply involved in work or relationship; frequent "flow state" or "peak experiences"; creativity), transpersonal identification (feeling of strong connections to the entire world and everything in it; idealism), and spiritual acceptance (e.g., of miracles, extrasensory perception, telepathy, vitalization).

There is even a candidate gene identified, the VMAT2 gene on chromosome 10 (Hamer 2004; Vaas 2005c): People with at least one C (cytosine) at nucleotide position 33,050 instead of A (adenine) seem to be significantly more spiritual. The gene encodes for the VMAT2 Vesicular Monoamine Transporter. This protein puts monoamines such as dopamine into synaptic vesicles, making them available for neural processing, including emotional (and mystical) states. It has been pointed out, however, that at least 50 more genes with the same effect would be required to explain the twin studies data (Hamer 2004).

The search for "God genes," a very misleading term, is only at the beginning, but the twin studies demonstrate a surprisingly strong inheritance. However, genes correlated with religiosity are, by themselves, not sufficient for proving adaptivity. (Even fully inherited traits like eye colors could be selectively neutral). But the data are consistent with a weak adaptation at least (for a strong adaptation the variability might be too large, because strong selection often reduces it). And religiosity could be just a by-product of inheritable traits like authoritarianism and conservatism while spirituality may even decrease reproductive interests.

3.4.4 Realization

Neurotheology (Ashbrook 1984; Persinger 1987; McKinney 1994; Saver and Rabin 1997; Joseph 2000; Alper 2001; Newberg et al. 2001; Joseph 2003; Vaas 2005a, 2005b; Drewermann 2007; Müller 2007; Vaas and Blume 2009), a misnomer in some respects, seeks to find neural correlates of religious experiences, thoughts, and action. There is no consensus yet, but there are already a lot of promising candidates:

- Superstition has a physiological basis: Proneness to gullibility, belief in paranormal phenomena, and to "seeing" things, faces, for example, in random patterns are tendencies that are associated with higher levels of dopamine in the brain or can be increased by the intake of L-dopa, a dopamine precursor (Brugger 2007a, 2007b; Brugger et al. 1993, 1994, Brugger and Graves 1997; Leonhard and Brugger 1998; Mohr et al. 2006). Dopamine decrease in the prefrontal cortex of Parkinson patients reduces their religiosity (Harris and McNamara 2008). Dopamine might also mediate superstitious behavior, a kind of accidental associative conditioning and incorrect assignment of cause and effect, in the temporal lobe which leads to weird actions also in humans (Skinner 1948; Ono 1987; Vyse 1997; Burger and Lynn 2005). It is also a matter of debate whether there is a connection between superstitious behavior, scrupulosity, religious rituals, and the neurological symptoms of obsessive-compulsive disorder (Higgins, Pollard and Merkel 1992, Turbott 1997, Greenberg and Shefler 2002, Sica, Novara and Sanavio 2002, Tek and Ulug 2001, Abramowitz et al. 2004, Zohar et al. 2005).
- Some drugs create spiritual experiences with long-lasting effects (Pahnke 1967; Doblin 1991; Griffiths et al. 2006, 2008). Psychotropic substances have been used for religious purposes probably since prehistoric times and still influence ceremonial practice and spiritual orientations (Ruck et al. 1979; Shanon 2008). Visual hallucinations are especially intense and can also be triggered by endogenous neurophysiological processes, which are the cause, for example, of the aura preceding a migraine attack (Sacks 1992).
- Spiritual experiences (unio mystica) during meditation are associated with an increased activity of the prefrontal cortex and a decreased activity of the object-association area in the parietal lobe (Newberg et al. 2001, 2003) and other areas (Beauregard and Paquette 2006, 2008). Brain activity becomes more synchronous (Lutz 2004; Brefczynski-Lewis et al. 2007), empathy is enhanced (insula activation, etc. (Lutz et al. 2008)).
- Hearing voices, often interpreted as messages from God, are common in schizophrenia (Frith and Johnstone 2003).
- Temporal lobe epilepsies are frequently associated with hyper-religiosity (Ramachandran and Blakeslee 1998) to the point of extremism (Persinger 1997). Many founders of religion could have been temporal lobe personalities (McKinney 1994).
- Artificially created "micro-seizures" (temporal lobe transients) produced by transcerebral magnetic stimulation cause a "sensed presence" of God, an angel or an alter ego (Persinger 1983, 2003a, 2003b; Persinger and Koren 2005).
- Out-of-body experiences can be triggered experimentally via electrical stimulation (gyrus angularis) (Blanke et al. 2002) or virtual reality illusions (Ehrsson 2007) as can the "appearance" of ghosts (temporo-parietal junction) (Arzy et al. 2006). They all disrupt the body representation in the brain (Lenggenhager et al. 2007).
- There is an association between pictorial representations and concepts of God and the reading/writing directions of holy scriptures with or without vowels

asymmetrically represented in the brain's hemispheres (Linke 1999; Vaas and Blume 2009).
- Strong religious convictions and associations, for example of evangelical believers, correlate with frontal and parietal lobe activation (Azari et al. 2001).
- Frontal areas (McNamara 2001) are also involved with decision-making, emotional evaluations, moral judgments, and altruistic behavior (Vaas 2008). Experiments in cognitive psychology have shown that religious attitudes have some influence here (Bateson et al. 2006; Shariff and Norenzayan 2007).

In conclusion, it is very likely that belief has neural and cognitive foundations, some aspects of which have already been discovered. However, neural correlates are still controversial (Vaas 1999a) and, as cognitive properties, not necessarily specific to religiosity or its main characteristics. The existence of distinct brain processes is not a sufficient condition for adaptivity: For example, there are specific neural correlates of writing and reading capabilities, and certain types of brain damage can cause these to fail (as in agraphia and alexia). But these capabilities are not an evolutionary adaptation.

3.4.5 Selective Advantage

How could religiosity be adaptive? Many hypotheses try to answer this question, and most are compatible with one another. However, the situation is quite confusing, because speculations are numerous whereas convincing data are still rare. One can distinguish between advantages for individuals and for groups, but even these are not mutually exclusive. And the advantages under consideration – many of which are controversial! (Vaas and Blume 2009) – are not helpful for each group member.

- Explanations: One function of myths (and some rites) was – and for some people still is – to understand things and events in nature. Causal attributions are a powerful way to cope with a world that displays a degree of predictability, and magical thinking as well as superstitious beliefs and behavior are a spillover of this advantageous cognitive stance (Foster and Kokko 2009). Though meanwhile science can do much better regarding phenomena like earthquakes or thunderstorms, there remain questions which cannot be explained scientifically. For example: Why is there something rather than nothing (Vaas 2006b)? Why is the world the way it is (Vaas 2004)? What is the meaning of everything (if there is one) (Fehige et al. 2000)? Believers think that transcendent entities might be helpful in this respect. But more important for most, is the following aspect:
- Meaning and consolation: Religion promises the mastering or acceptance of contingency (Lübbe 1986; Wuchterl 1989): helping, for instance, to cope with death, illness, injustice, and "Weltangst." Religion postulates meaning, order, orientation (as opposed to blind chance or fate) and, thus, relief and distraction, a protection from absurdity and an unpleasant reality (Vaas 1995; Schuster et al. 2001; Sosis 2007).

- Happiness and health: There are indications that religious contingency mastering, a kind of psychic placebo, and the social bonding in religious communities often increase psychological and physical health, life-expectancy and happiness, while decreasing depression, drug abuse, divorces, and suicide rates (Ellison et al. 1989; Galanter 1989; Guthrie 1993; Koenig 2005; Koenig and Cohen 2002; Koenig et al. 2001; Koss-Chioino 2005; Levin and Koenig 2005; McGrath 2006; Strawbridge et al. 2001; Williams and Sternthal 2007; Wigger et al. 2008; Zwingmann 2005). But rigid religiosity can also have negative effects like depression (Asser and Swan 1998; Buggle et al. 2000; Braam 1999; Chatters 2000; Magyar-Russell and Pargament 2006; Moser 1976; Pargament et al. 2001; Petts and Jolliff 2008; Sorenson 1995).
- Shaping of behavior: Rulers can gain, justify, and keep their power (note: more powerful people have, statistically speaking, more children). Sometimes this even transcends their death, and ancestor worship probably played a major role in the origin of religions (Steadman and Palmer 2008). Moral rules can be more easily justified and enforced if they come along with religion. People can be motivated and manipulated – even as far as martyrdom (which, if there were no group selection advantage, would appear to be a dysfunctional extreme) and "holy wars" (which might be eerily advantageous as a result of the looting of resources and rape (Lehmann and Feldman 2008)).
- Group stabilization: Intra-group conformism and inter-group demarcation (Wilson 2002).
- Cooperation: Increase of reciprocal altruism, which is beneficial (for instance, in food sharing, trade, hunting, warfare, defense, division of labor) as long as it is not exploited by free riders (Alexander 1987; Ridley 1999). (Even celibacy could be adaptive in some way, for instance due to inclusive fitness or group selection (Vaas and Blume 2009)). Thus religion might be good for intra-group loyalty, strengthening commitments between members, because public religious activities (for example, excessive prayer, food taboos, abstinence, pilgrimage, flagellations, circumcision) serve as costly or hard-to-fake signals (Rappaport 1979; Rappaport 1999; Irons 1991, 1996, 2001, 2008). They can help to avoid situations like the "prisoners dilemma" (Sigmund 1995; Axelrod 2006; Le and Boyd 2007) or the "tragedy of the commons" (Hardin 1968) by deterring free riders, making it too expensive for them to fake the signals just to attain the group privileges. Public display of costly signals increases trustfulness and reciprocal altruism by helping to identify credible partners for cooperation (so do not costly, but otherwise hard-to-fake signals: displays of emotions (Frank 2001; Bulbulia 2008)). Indeed there are some empirical studies demonstrating this effect (Soler 2008; Sosis and Ruffle 2003; Ruffle and Sosis 2007; Sosis et al. 2007; Vaas 2007b). Moreover, it has been shown that religious groups are more stable and long-lasting than secular ones, especially those that make great demands on their members, that is insist on costly signals (Sosis and Bressler 2003). Also the widespread belief in an omniscient, watching and punishing God or in still present ancestors reinforces reliability of partners via fear and remorse (Bateson et al. 2006; Johnson 2005; Johnson and Bering 2006; Steadman and Palmer 2008) (Table 3.2).
- Sexual selection: This is a special case of cooperation and another kind of selective factor in addition to natural selection. It is mainly driven by female choice

Table 3.2 Controls for cooperation

	Problems for cooperation	Solution	Ritual
1	Cheats, free riders	Secular punishment	Ostracism, court
2	Second order free riders, lack of prosecution	Secular or supernatural punishment	Ostracism, court, worship
3	(Secret) Unbelief	Costly signals of commitment	Sacrifice, initiation
4	Hypocrisy	Hard-to-fake emotions (autonomic displays of commitment)	Ecstasy, fear
5	Self- delusion	Internalized costs and benefits of belief	Soul-searching, confession

Note: Reciprocal altruism is advantageous, but in the long term only stable if it can be protected against free riders. Religions might play an important role here, decreasing the probability of higher-order defections (Schloss 2008; Vaas and Blume 2009).

(Kirkpatrick 1982; Alcock 2005). While natural selection is about survival, sexual selection is directly about reproduction. In human evolution the importance of paternal investment increased – together with the development of bigger brains, higher intelligence, and an ever more complex culture – because of the "physiological prematurity" (Adolf Portmann) of infants and the extended early childhood period (Miller 2000, 2007; Vaas 2002c). Therefore, it has been suggested that women use religion for manipulation of males: food-sharing, decrease of intra-sexual competition, and an increase of sexual fidelity (Sommer 2000). Also, religiosity can be seen as a fitness indicator according to the handicap principle (Zahavi and Zahavi 1997). Empirical data support the role of religiosity for sexual selection (Irons 2001; Euler 2004; Pyysiäinen 2008; Slone 2008; Vaas and Blume 2009): There are more believing women than men; religion is more often practiced in public by men but more appreciated and experienced by women; there are more women in religious communities than men, and women gravitate more strongly toward religious groups that emphasize family values and faithfulness; furthermore, religious women have more children, often a religious spouse and there is a lower probability of them being single mothers. Thus, from an evolutionary and reproductive point of view there is some wisdom in the "Gretchen-Frage," as it appears in Goethe's tragedy "Faust." Margarete (Gretchen) asks Faust:

> "How is't with thy religion, pray? / Thou art a dear, good-hearted man, / And yet, I think, dost not incline that way?" – and Mephistopheles later comments: "The girls have much desire to ascertain / If one is prim and good, as ancient rules compel: / If there he's led, they think, he'll follow them as well."

In conclusion, probably there are advantages of religiosity, especially for enforcing cooperation between group members (reciprocal altruism) and mates. This is compatible with the adaptation hypothesis. Whether it goes with a genetic basis for

religiosity is an open question. And if there really are selective advantages, it would be important to know whether it is a balanced selection (not too much and not too little religiosity is best) or a directed one (the more religiosity the merrier).

3.5 Discussion

Arguments against religiosity as an adaptation (Kirkpatrick 2005, 2006) emphasize that religiosity is not a coherent functional property, but a bundle of different properties with changing importance, some of them even being absent. And there are no genes (discovered so far) that are specifically responsible for religiosity. There are some indications that religious and spiritual preferences are inherited, but they have a large variability; this can be seen as an argument against a direct adaptation, because vital organs and functions like lungs and breathing cannot be based on too much genetic variability. Of religiosity might be a consequence of (inherited) authorianism. Furthermore, there are no specific and very constrained cognitive domains and neural processes generating religiosity. Thus, it was argued that religiosity must be a by-product of selected traits based on adaptive cognitive features like folk physics, biology, psychology as well as altruism and sexuality (Boyer 1994, 2008; Atran 2002; Kirkpatrick 2005) or as a product of cultural evolution (Dawkins 1976; Boyd and Richerson 1985; Dawkins 1993). Compare the patellar reflex (knee-jerk): It is ubiquitous, but not an evolutionary adaptation; for its neural circuits were selected for other functions. One can also argue that religiosity does not so much resemble the capability for language (which is widely taken as an evolutionary adaptation (Vaas 2001)), as the capability for writing (which is globally ubiquitous by now, almost universal, has many advantages, might be expedient for reproductive success, is based on quite specific cognitive and neural mechanisms for which some genes are already identified – but writing is nevertheless a cultural product).

If religiosity is a by-product of other processes and capabilities, and thus no evolutionary adaptation per se, it could be nonetheless indirectly adaptive. For example, there might be inheritable side-effects that correlate with religiosity, but otherwise have nothing to do with religiosity proper. If female choice prefers religious males because of a higher fidelity probability, this might select certain (inherited) male hormone concentrations or other physiological boundary conditions which in turn determine escapade rates. (There are already some hints that pair-bonding and marital quality has a genetic basis where, for example, the gene for the vasopressin receptor 1a seems to have an influence (Walum et al. 2008)). Religiosity could be a kind of symbiont due to bio-cultural co-evolution. But it could even be dysfunctional, a "virus of the mind" (Dawkins 1993), and nevertheless not eliminated by evolution, because with it other very useful properties will be lost, too. For instance, religiosity might exploit rules such as "obey authorities," especially related ones (like parents), and "believe, without question, whatever your grown-ups tell you" (Dawkins 2006, p. 174). Or, religiosity once came along with useful world models, especially (inborn) agency detection; Gods and spirits might be excess products of folk psychological agency and teleology devices ("intentional stance"), and error tolerance is useful (as are occasionally false alarms of smoke detectors) as long as there is a cost/benefit balance (Nesse 2001). So

> religious behavior may be a misfiring, an unfortunate by-product of an underlying psychological propensity which in other circumstances is, or once was, useful (Dawkins 2006, p. 174).

If so, it is analogous to moths flying into candle flames because they are adapted to navigate by celestial light compasses like the moon, whereas the recent arrival of artificial light fatally deceives this adaptation. As long as such hypotheses are not ruled out, the adaptationist perspective on religiosity keeps having hard times. From a philosophy of science perspective, however, this is not a bad situation, because adaptationist approaches are more predictive and, thus, easier to test than by-product scenarios. So they deserve rigorous criticism to judge how well they hold their ground.

Notwithstanding these briefly sketched problems, the hypothesis of religiosity-as-an-adaptation is not falsified – there are, on the contrary, too much explanatory suggestions, not too little (Table 3.3, see also Soeling and Voland 2002; Voland this volume). And the hypothesis of religiosity-as-a-by-product also motivates the search for biological foundations. Even if religiosity is not a direct adaptation, leading to advantages for individuals or groups in the long term, this does not mean that evolutionary studies are irrelevant for a better understanding of religious belief. For even if it turns out to be a purely cultural phenomenon, there is still a need to explain why religiosity is selectively "neutral" or disadvantageous (as a "memetic" parasite) – that is, why religiosity has not already been eliminated by selection. On the other hand, if religiosity is a by-product of adaptive traits, then one should identify those traits and understand their evolutionary advantages. Furthermore, one should explain to what extent religiosity is necessarily accompanied by adaptive traits, or instead, why religious belief as a by-product has (still) not been jettisoned.

The difficulties partly come from the fact that the concept of adaptation in evolutionary biology has still not been worked out precisely enough. Inheritance, selective advantages, and functionality are widely accepted as criteria. Exaptation (functional

Table 3.3 Suggested adaptations of religiosity

Main characteristics of religiosity	Possible evolutionary function
Transcendence	Orientation/explanation, mate seeking
Myth	Orientation/explanation
Morality	Cooperation/altruism, mate seeking
Mysticism	Health, contingency mastering
Rite	Orientation, group cohesion, free rider avoidance (handicap), mate seeking
Ultimate relatedness	Group cohesion, free rider avoidance, mate seeking
Ultimate purpose	Health, contingency mastering

Note: Different selective advantages might exist, but they are not mutually exclusive (Vaas and Blume 2009).

change) is controversial. If it is not accepted, however, feathers of birds could not be considered as an adaptation for flying, because they developed from ratite dinosaurs, allowing a better heat regulation. In general, most of the evolutionary achievements are based upon a functional change of already existing traits. If religiosity – or its components – are, or at least were, adaptive, too, then it originated as a by-product of earlier traits and could possibly still be understood as a by-product, although additional and new advantages came along with them. Therefore, the adaptation and by-product hypotheses are not necessarily even mutually exclusive, nor are the by-product and culture hypotheses. Because even if religiosity, like religion, is purely cultural, without any evolutionary function or fitness, it nevertheless depends on biological instantiations, that is neural and behavioral processes, which were ultimately selected – so their (ab)use would be, in some sense, a by-product of their adaptive fundamentals.

It is also possible – and perhaps the demographic data are an indication for this (Vaas and Blume 2009) – that religiosity acquired some selective advantage only within the last few centuries. The social environment changed dramatically; in earlier times, secular or naturalistic worldviews were not widespread and, thus, were not biologically relevant distinctive features. In any case one should explain how religious convictions and practices differ from secular ones. For it is not just a difference in content whether one believes in Mickey Mouse or Moses, or espouses Marxism or Monotheism, respectively (Atran and Norenzayan 2004).

3.6 (The Need for) Philosophical Reflections

One must not confuse the question "Why do men believe in God?" with "Does God exist?" The former can be a subject of natural science; and evolutionary psychology is one approach to answer it. The latter cannot; it is beyond the scope of science, which cannot decide experimentally, for instance, whether (a non-physical) God is a figment of the imagination or whether God gave us the ability to sense His presence. Religion and religiosity are, in the first place, an issue of subjective "Fürwahrhalten" (holding something to be true), and not of psychology, neuroscience, genetics, or evolutionary biology. The context of religious interpretations is within the "Lebenswelt" (lifeworld). However, even if some religious and theological statements about the supernatural are not testable in principle, the question about religious truth is not a priori irrational or obsolete. But it requires the methods, argumentative standards, and knowledge of philosophy (anthropology, philosophy of science, epistemology, ontology). And here it would be ignorant or naive not to include the knowledge of evolutionary psychology and neurotheology. Thus, empirical results are philosophically relevant.

3.6.1 Ambivalent Implications

The hypothesis of religiosity as a widespread adaptation, selected by evolution, is important not only within a scientific context, but also for anthropological and

philosophical issues. The implications for humanity as a whole are barely foreseeable. Like the whole of evolutionary theory, this hypothesis might be an annoyance, a provocation, or an abasement for religious people. Alternatively, and in contrast, it might strengthen hopes about being part of a "great plan." Therefore, evolutionary studies are quite ambivalent for believers. An adaptive value of religiosity might be a threat for faith or a confirmation of the belief that everything obeys a meaningful, transcendent, designed purpose or an inherent teleological force; or it might make believers feel embedded within this "great chain of being." For proponents of naturalism the evolutionary prospects are ambiguous, too: On the one hand beliefs, taken as illusions, might have mundane advantages (therefore, enlightenment and criticism of religion reach their limits quickly) – on the other hand, the ubiquity of religions (not only as an opium of or for the people) might become comprehensible at last and the gross irrationalism could be explained. So atheists and agnostics may take the religiosity-as-adaptation hypothesis as an argument for their view that religion is just an illusion – but perhaps a reproductively useful and, thus, pertinacious one.

In conclusion, it appears already that the adaptation hypothesis, though still far from being accepted, makes an impact way beyond biology; it has philosophical relevance and implications. And because philosophy is always a kind of "thinking ahead" it should start to fathom the implications of scientific insights and speculation early on and criticize their false conclusions and (pseudoscientific) misuse.

Of course, there is no direct incompatibility between science and religion if the latter respects the insights of the former. There were some eminent biologists indeed, like Alfred Wallace and Theodosius Dobzhansky, who stuck to their religious beliefs. And it is always possible to embed the results of empirical research, like evolutionary studies, into a sophisticated or weird metaphysical framework or to found the latter on them – but this is beyond the scope of natural science, thus philosophical justifications are necessary (Vaas 2004). And the burden of proof lies with those who stipulate richer or more complex ontologies, especially when it comes to transcendent entities like those in religious faith. (Of course, religious believers need and often do not argue for their convictions, but then they refuse a rational philosophical discussion.)

3.6.2 Three Sources of Faith and Their Criticisms

One can argue (Vaas 2005a) that there are only three main sources of faith:

1. Social imprinting: The influences especially of family members, the group(s) one lives with, and the lifeworld in general.
2. Personal experience: Quite diverse influences like spiritual or mystical states of consciousness, revelations, studies of holy scriptures, or aesthetical experiences of art and nature (for example, as creation).
3. Rational analysis: The hermeneutical studies of (mostly written) sources and philosophical arguments, most rigidly the "proofs" or arguments for God's existence.

So the question is: How reliable and objectifiable are those sources?
And the answer is: Not very!

Personal experience and rational analysis are based on interpretations. All interpretations are embedded in a historical–cultural context and contain elements of social imprinting. Sources of religious faith are, like every source of belief and knowledge, fallible and limited, not immune to errors, not complete, and not ultimately justifiable. Experience and reasoning are essential for the formation of religious convictions. Social imprinting by itself does not guarantee the truth of religious statements, because tradition depends on sources of religious faith. Rational analysis is based on premises and assumptions. They are coming from subjective experiences or postulates and from the cultural context. Even the – logically usually perfect – "proofs" for God's existence are based on assumptions which are very problematic; that is why they are all controversial and not generally accepted (in contrast to most mathematical proofs). Personal experiences are not to be criticized as such, but their interpretations are. And this is where the controversy begins, because here the question of truth comes in again.

Biological studies of religiosity cannot straightforwardly refute the three sources of faith. But many of these studies do help us to understand how and why social imprinting works; they demystify unusual personal experiences (for example, explaining them as a neurophysiological lapse), supporting naturalistic interpretations; and they weaken rational arguments for believing in transcendent entities, because combined with philosophical reasoning, they offer exciting alternatives.

Neuroscience cannot prove whether the human brain is a creation of God or vice versa, so philosophical arguments are needed too (Vaas 2005a; Vaas and Blume 2009). Naturalism does not support the former view. Brain imaging techniques show no snapshot of nirvana, and it is not likely that there is an inbuilt hotline to heaven within the temporal or frontal lobes, a transmitter to God. Conversely, religious experiences from temporal lobe epilepsies or artificial stimulations, which were interpreted as supernatural influences by helpless victims or socially imprinted believers, are probably just a chimera. Speaking of a God module inside the brain, which might be deficient in atheists or could be cut out by a "Godectomy," is funny, but misleading. However, future stimulation techniques might create iGods – a kind of postmodern origin of fantasized super beings by means of cultural selection (Vaas 2008).

Many powerful philosophical arguments provide strong support for the claim that there is no God beyond our imagination (Dahl 2005; Everitt 2004; Flynn 2007; Grayling 2007; Hoerster 2005; Le Poidevin 1996; Mackie 1982; Martin 1990, 2007; Onfray 2005; Vaas 1999b). This should hardly surprise anyone who is not ideologically blindfolded, because – as Richard Dawkins once remarked – we "are all atheists about most of the gods that humanity has ever believed in. Some of us just go one god further" (Dawkins 2003, p. 150). But despite centuries of critical discussions and scientific progress, faith and religious convictions are still widespread. This pertinacity – probably a result of wishful thinking, shirking in the face of blank absurdity, or strong imprinting during childhood – indicate that

there are other forces than enlightenment, reason and skepticism at work. Nature is stronger than insight, and

> the human brain is, in large part, a machine for winning arguments, a machine for convincing others that its owner is in the right – and thus a machine for convincing its owner of the same thing. The brain is like a good lawyer: given any set of interests to defend, it sets about convincing the world of their moral and logical worth, regardless of whether they in fact have any of either. Like a lawyer, the human brain wants victory, not truth; and, like a lawyer, it is sometimes more admirable for skill than for virtue (Wright 1994, p. 280).

3.6.3 "Useful" Means Neither "True" Nor "Good"

Although the truth of religious faith cannot be demonstrated (or even need not and must not be demonstrated, as many believers claim, for otherwise it would not be existential belief anymore), it is often said that religiosity and religion are at least useful. This might be true for gaining power, wealth or consolation and in the restricted context of biological evolution if religiosity enhances reproductive fitness. Thus religious belief and behavior seems to be a profitable illusion like the assumption of a strong (libertarian) kind of free will (Vaas 2002b). But, of course, it would be a logical and naturalistic fallacy to infer truth or moral values from this. Usefulness is not equal to truth nor is it an ethical accolade! (Besides, exponential human reproduction might, in the not too distant future, even destroy the biosphere due to overpopulation and its many devastating effects.)

So it might not be surprising that religions are widespread, because

1. for many people, especially the desperate, religion is a source of hope or relief – a drowning man will clutch at a straw (even if it is just a self-delusion or the manipulating promise of others) – religious doctrines can motivate believers to persevere and sometimes even to change power relationships,
2. religions strengthen social support and propagate rapidly with the reproduction of their adherents, who often indoctrinate their offspring in early childhood, and
3. religions, if sufficiently well established, are used and enforced by the potentates, not only among their followers, but also outward (proselytization).

These three factors interact and depend crucially on social and ecological boundary conditions. From this perspective, though it is a very crude sketch, one can understand why religions are so common: It is due to a kind of quasi-Darwinistic self-organization – including meme competition – and independent of whether or not religiosity is an adaptation.

It is often said, "If God does not exist, everything is permitted" (with Fyodor Dostoevsky – though he did not write it that way, it is just a paraphrase of the fictional Ivan Karamazov's attitude (Cortesi 2000)), meaning that morality requires religion as a source or justification of moral values. This is clearly not the case, however (Alexander 1987; Ridley 1999; Gazzaniga 2005; Hauser 2006; Voland 2007; Vaas 2008); moreover, religious persons do not behave ethically better than

non-believers, as many studies have shown (Vaas and Blume 2009). And even if religion was useful or advantageous in the past, it might be harmful and detrimental nowadays or in the future. The main problem is that ideological dogmas – and there are not only religious ones! –, claiming to own absolute, infallible truths, can and often did motivate people to dehumanize and debase others. As Steven Weinberg once wrote (Weinberg 2001, p. 174),

> with or without religion, good people would tend to behave well and bad people would do evil things, but the peculiar contribution of religion throughout history has been to allow good people do evil things.

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Chapter 4
How Some Major Components of Religion Could Have Evolved by Natural Selection?

Jay R. Feierman

Abstract Religion is a broad concept that is difficult to define, as each definition has exceptions. As a result, it is difficult to ask how religion as a whole could have evolved by natural selection. An alternative is to divide religion into its components – behavior, beliefs, values, moods, and feelings. One can then ask the same question of these components individually. However, there are problems. These components of religion are composed of forms and functions but only forms which have structure can be passed across generations in DNA and evolve directly by natural selection. Therefore, in order for a component of religion to evolve by natural selection it has to contain structural design features. The chapter therefore searches for structural design features in the various components of religion. As will be seen, this is easier to do for some components of religion than for others. However, in the end all the components of religion are accounted for. The chapter also addresses the level of selection from the individual to the group where natural selection could be acting. Finally, the chapter presents evidence for the counter-intuitive proposition that belief in God may have been what created many parts of the human mind– "gifts" as some would say.

4.1 Introduction

The term "evolve" derives from the Latin *evolvere*, which means to unroll. When applied to biology it means to develop or arise primarily by the evolutionary process of natural selection. However, random processes, such as genetic drift due to population migration, can also play a minor role in non-adaptive evolutionary changes in the frequency of structures in populations over time. There is evidence that membership in a religious group and having religious faith increases one's chance of biological survival and reproductive success (Reynolds and Tanner 1983). This chapter

J.R. Feierman (✉)
Department of Psychiatry (retired), University of New Mexico, P.O. Box 57088, Albuquerque, NM 87187-7088, USA
email: jfeierman@comcast.net

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is concerned with how some major components of religion could have evolved by natural selection in order to do this. For religion to have evolved by natural selection at least some of its major components would have to be or have been what are called adaptations. Otherwise, religion would have to have come into being as an indirect by-product of natural selection or not related to natural selection at all. The major components of religion are religious behaviors, beliefs, values, moods, and feelings. The chapter will begin by defining a few important bio-behavioral terms. It will then address methodology and then search these major components of religion for that which would be necessary for these components to have evolved through natural selection. Lastly, the chapter will consider whether these components *could have* evolved at the individual or group level by natural selection.

The question of whether or not religion in general or the components of religion in particular evolved by natural selection is related to the even more important question of whether or not human beings evolved at all. If the religious minded reader can accept the scientific evidence that human beings evolved from non-human primate ancestors (Dowd 2007), it should not be difficult to at least consider if some of the major components of religion also could have evolved by natural selection. Other than inter-individual submissive behavior, social reciprocity, and some precursors of morality, non-human primate species do not have other elements of human religion in their behavioral repertoires (de Waal 1996). Therefore, religion came into being somewhere in-between our primate ancestors and modern humans.

The inquiry will start by asking the general question, "Are any of the major components of religion (behaviors, beliefs, values, moods, and feelings) *adaptations*"? An adaptation is a structural design feature, which when possessed, confers a reproductive advantage (also known as "fitness" or survivalvalue) to its bearer in a specific environment. A structural design feature is that which has static or moving architectural mass by which it can be defined. According to evolutionary theory, individuals in a population who have adaptive, structural design features will have relatively more reproductive success. As a result, they will become over-represented in a population. There are two types of adaptations: phylogenetic and cultural (Eibl-Eibesfeldt 1979). Phylogenetic comes from phylogeny, which means evolutionary history. A *phylogenetic adaptation* is an intra-individual, structural design feature which is passed across generations through DNA (genes) and which confers increased reproductive success upon its bearer in a specific environment.

Structural design features can also be acquired as well as be passed across (and within) generations through social, observational/imitation learning, hereafter just called social learning. Culture can be thought of as those structural design features which have been passed across (and within) generations by social learning. Some but not all of the structural design features that can be passed across (and within) generations by social learning are cultural adaptations (Boyd and Richerson 1985). A *cultural adaptation* is an intra- or extra-individual, animate or inanimate, structural design feature which when possessed, confers increased reproductive success upon its bearer (i.e., a specific individual) in a specific environment. The structural design features which are cultural adaptations also exhibit variation whether they are intra-individual (i.e., a learned behavior) or extra-individual (i.e., a useful material

object). The structures which are cultural adaptations are neither pan-cultural nor universal. They are often found in one social group and not in another.

It is important to emphasize that only that which is structural and has form can be a phylogenetic or a cultural adaptation. What about characteristics which are only definable by their function? The term *adaptiveness* means a structurally or functionally defined characteristic, which when possessed and if associated with increased reproductive successin its bearer, allows the non-movement, structural design features which are its proximate causes, if predictably associated with the characteristic, to be the "objects of natural selection" and be treated as phylogenetic adaptations.

Although there are many definitions of *religion*, when the word is used in this chapter it means a set of behaviors with an accompanying set of beliefs, values, moods, and feelings, which exist within a loosely defined breeding population. The behaviors, beliefs, values, moods, and feelings have to relate to a supernatural power, agent or deity, hereafter simply referred to as "God." In addition to exaltation and glorification of God, religion has to also include at least some submissive-like deference to God; in return, favors in life and sometimes after death are expected. Such favors from God require one to follow prescribed and avoid proscribed behaviors set forth either in the religion's oral traditions or codified in written narratives, canons, and salvation theologies.

A required characteristic of God in this chapter is the supernatural power to answer petitioning prayer and grant favors. The capacity for divine intervention is one of the most universal attributes of God across religions (Hinnells 1997). This includes the granting of mercy, including mercy from divine punishment from Gods which or who are conceptualized as angry and punishing.

4.2 The Evolutionary Process of Natural Selection

This chapter is about how structural design features in some major component of religion could have evolved by the Darwinian process of natural selection, which is the mechanism of adaptive change in living structures elucidated by Charles Darwin in 1859. Natural selection allows for a scientific understanding of the origin, diversity, and radiation of life (Darwin 1859). Briefly, in evolution by natural selection there is variation in the structural design features possessed by living forms, whether the structural design features are acquired by the individual through genes (DNA) or by social learning. In more modern times, within what is called the modern synthesis (Dobzhansky 1970), it is known that some of the variation in intra-individual structural design features is caused by random genetic mutation, linkage, crossing over, etc. There is also variation in the structural design features passed across generations by social learning. In certain environments individuals possessing certain variations of structural design features survive better and have more reproductive success than individuals who possess alternative structural variations. This difference in survival is called survival of the fittest. The more fit individuals will therefore become

over-represented in succeeding generations. The structural design features which contributed to this success are called adaptations, either phylogenetic or cultural, depending upon how the information for creating them is passed across generations.

4.3 Methodology

This section addresses what to study and how to study it.

4.3.1 What to Study?

As previously mentioned, religion is a complex phenomenon that is difficult to understand how it could have evolved in its entirety. It is easier to divide religion into its major components and then make separate searches for the presence of structural design features within each of these components. Appreciate that when religion is divided into its major components – behavior, beliefs, values, moods, and feelings – that beliefs, values, moods, and feelings become the proximate, contributing causes of the religious behavior.

First, a discussion of behavior in more detail is warranted. In this chapter behavior means "the movement of individuals" (Martin and Bateson 1986). Anatomical parts of the individuals which move through space and time are structures. However, once the anatomical structures start moving, they become a fleeting state, which is an emergent, design feature which has to be considered separately from the structures whose movement is the behavior. As has been developed in detail in a recent publication (Feierman 2006), behavior can be defined on the basis of its structure and function or only its function. However, for convenience many behaviors which are structurally definable or describable are often referred to by their function.

Type I (Human) Behavior is definable by structure and function in a natural environment and is species-universal in form. It is seen in all animals with backbones (vertebrates). Although there are two types of Type I behaviors, reflexes and coordinated motor patterns, this chapter will only be concerned with coordinated motor patterns. They are in-between reflexes and more flexible human behaviors. The threshold for release of coordinated motor patterns but not reflexes is mood dependent. Examples of Type I behavior include the human smile, coy behavior, and submissive behavior. These behaviors can only be modified in timing, orientation, and function but not in form through learning. Type I behaviors are inherited across both species and generations in same way as static anatomical structures. Because they are structurally defined they can act as natural selection proxies for the specific genes which determine and coordinate them. Their function can change through both ontogeny (development) and phylogeny (evolutionary history) (Lorenz 1981).

Type II (Human) Behavior is describable by structure and definable by function in a natural environment and not species-universal in form. Its threshold for release is more independent of mood than Type I behavior. It includes all behavior modified

in form by any type of learning. Other examples are all behaviors transmitted across generations by social learning, behaviors which are strategically motivated tactics, and many behaviors which are the products of reasoning, creativity, and higher intelligence. Also included are the behaviors in humans by which symbolic language is actualized, either by vocalization or by writing. Type II behavior has been observed in relatively few taxonomic groups, such as primates, some sea mammals, and some birds. It can be seen in one local population and not in another. It often requires a culturally acquired component to be actualized. Because it is only definable by function, it is not a structural design feature that could be a phylogenetic or cultural adaptation. It can, however, have adaptiveness. Because it is functionally defined behavior there are not specific genes which are dedicated to directly causing or coordinating it. Rather, the phylogenetic adaptations within the brain which are predictably associated with and secondarily cause it, such as neural networks associated with motivation, can be "objects of natural selection." As such, Type II behavior can act as a natural selection proxy for motivational, brain neural networks one or more steps removed from specific, behavior-related or coordinating genes (DNA). For this reason Type II behaviors are more "flexible."

4.3.2 How to Study it?

In this chapter the methodological approach to understanding how some of the major components of religion could have evolved deviates somewhat from the standard methods used in Human Ethology (Eibl-Eibesfeldt 1989). All ethological inquiry starts with behavior per se. It then asks four questions which were developed by Nobel Laureate Niko Tinbergen, one of Ethology's founders: (1) what is the behavior's phylogeny (evolutionary history)? (2) what is its ontogeny (development)? (3) what are its (proximate) causes? and (4) is the behavior an adaptation or does it have adaptiveness (Tinbergen 1951)? Rather than starting with religious behavior and then asking these four standard questions (Feierman 2009), this chapter is organized differently because it is asking different questions. This chapter systematically explores how the major components of religion – behavior, beliefs, values, moods, and feelings – could have evolved. To have evolved directly by natural selection, these major components of religion would have to contain structural design features. As the various components of religion are considered in the chapter, it will be seen that some do (Type I behavior, religious beliefs, and religious values) and some do not (Type II behavior, religious moods, and religious feelings). The implications of these differences for religion's evolution by natural selection will be discussed.

4.3.3 Why Study Structural Design Features?

The concept of "structural design feature" does not appear in the classical anthropological literature on comparative religion (Lessa and Vogt 1979) or in the modern,

cognitive anthropological literature on the religious mind (Atran 2002). However, from a bio-behavioral perspective if there are structural design features within the major components of religion, they and only they could be the "objects of natural selection" to pass across generations through genes as phylogenetic adaptations or through social learning as cultural adaptations.

Having covered what to study, how to study it, and why study structural design features, the next four sections of the chapter will explore if there are structural design features embedded in Type I and Type II religious behaviors, religious beliefs, religious values, and religious moods and feelings.

4.4 Are There Structural Design Features Embedded in Type I and Type II Religious Behavior?

4.4.1 Type I Religious Behavior

The definition of religion in Sect. 4.1 requires that at least some submissive-like deference has to be shown to God. The author believes that this deference-like behavior is seen most clearly in the non-vocal aspect of petitioning prayer. It is a local variation of make-oneself-lower-or-smaller-or more-vulnerable behavior, which derives from Type I behaviors which have historically been associated with submission. Based on the non-human animal literature, fear is the mood which reduces the threshold (thereby increasing the physiological impetus) for execution for these submissive-like behaviors to be expressed (Misslin 2003). One of the environmental stimuli which release submissive-like behavior in virtually all ground dwelling vertebrates is imminent or actual punishment or deliberately inflicted pain from an overwhelming and more powerful, angry member of one's own species where escape is not possible. Submissive-like behaviors are seen in the context of ritualized agonistic behavior where they have also been linked to depression and anxiety/fear in humans (Price and Sloman 1987). In virtually all societies if one sees someone engaged in some variation of the make-oneself-lower-or-smaller-or-more-vulnerable behavior and this behavior is not being oriented toward a more dominant living individual in close proximity, one is almost certainly observing the non-vocal aspects of petitioning prayer to God.

There is an old dictum in Ethology that coordinated motor patterns (i.e., Type I behaviors) in non-human vertebrates are not structurally modifiable in form by individual learning (Brigandt 2005). However, they change through maturation and can be modified in timing, orientation, and function through learning. How is it then that the various major religions of the world – Judaism, Christianity, Islam, Hinduism, and Buddhism– employ locally different, recognizable variations in form of the make-oneself-lower-or-smaller-or-more vulnerable behaviors used in the non-vocal aspect of petitioning prayer?

In the lower vertebrates – fish, amphibians, and reptiles – imminent or actual punishment or deliberately inflicted pain from a larger and stronger member of the same

species leads to very predictable behavior that has little variability. As one moves up the phylogenetic scale of the vertebrates one sees more variation in a single species in how submissive deference is shown. For example, in the domestic dog there are a number of different, aggression-deescalating, coordinated movements used to display submission. First, just the tail gets lowered. Next there is sitting, then sitting with the head lowered, then lying down with the head up, then lying down with the head on the ground, and finally turning on the back often with accompanying high pitched, puppy-like yelps.

Humans also exhibit many different behaviors as well as auditory emissions which are used as gradations of submission. The first indication is often the volume of one's voice diminishing. One responds to but does not initiate vocalization. One has less eye contact. One tilts the head. The shoulders get squeezed inward. A facial affect of fear appears. The empty, weaponless hands come together in front of the body. One drops to the knees. The empty hands extend over the head. The torso and previously canted head tilt even more to one side making one even smaller and off balance. High-pitched vocalizations are emitted. Therefore, based on all of the above, *the Type I behaviors that are used in the non-vocal aspect of petitioning prayer contain structural design features which could be phylogenetic adaptations*.

4.4.2 Type II Religious Behavior

Specific examples of Type II religious behavior are the religious rituals: the behaviors which produce the vocal aspect of petitioning prayer, recitation or reading of sacred narratives in the local language, taking communion, sprinkling holy water, baptism of infants, singing hymns, circumcision, marriage and funeral rituals, rain dances, animal sacrifices, exorcisms, etc.

These behaviors are often initiated "appetitively" when a desired religious goal or resource is blocked or thwarted by a species-novel obstacle and where the specific instructions for getting around the obstacle are not contained within human DNA. Searching for "releasing stimuli" has been known as appetitive behavior in Ethology for almost a century (Lorenz 1981, p. 67). In reference to religion the desired goal or resource (in this case the "releasing stimulus") is the fear-reducing favor (beneficence) from God. A human's direct access to God to petition for favors is blocked or thwarted by the species-novel barrier of either invisibility (e.g., the monotheistic Heavenly God of the Abrahamic faiths) or even when visible the lack of immediate responsiveness to being petitioned (e.g., a sacred rock, mountain, statue of a saint, or an idol). Therefore, humans engage in a variety of Type II religious behaviors which are directed toward this end. Most religious rituals are composed of Type II religious behaviors which are solicitation displays directed toward the consummatory act of communion with and receiving fear-reducing beneficence from God. Because *Type II religious behaviors* are functionally rather than structurally defined and therefore do not contain predictable structural design features, they *cannot be phylogenetic or cultural adaptations* and cannot be the "objects of natural selection." As a result,

to understand at least in part how Type II religious behaviors could have evolved, one has to look at their non-movement, proximate, motivational causes, which are religious beliefs, values, moods, and feelings.

4.5 Are There Structural Design Features Embedded in Religious Beliefs?

Religious beliefs are units of information (that which causes thermodynamic changes of structure/mass-energy) which are necessary to make decisions (Loewenstein 1988). The electrical–chemical structures in the brain which change upon contact with religious beliefs could be phylogenetic adaptations. For the same reason that "package tours" of a new country are more decision free and energy efficient than independent travel, there may be a small thermodynamic-efficiency advantage to the brain and body in having decision rules (religious beliefs) which have predictably biased certain categories of behavior. However, such a gain in the brain and body's energy efficiency is easily offset by the high energy costs of religious rituals. Nevertheless, because information is transformational–physical (structure/mass–energy), and because specific religious beliefs, such as "I believe Jesus is the Son of God," are semantically coded units of information which are passed across generations by social learning rather than by DNA, (the semantic content of) *religious beliefs contain structural design features which could be cultural adaptations*. What about phylogenetic adaptations? *The capacity to believe in God in general* (rather than a specific God in particular) *could be a phylogenetic adaptation*. Genetics account for some of the variance in religiosity (Koenig and Bouchard 2006). Belief in a specific God could be acquired by a mechanism similar to how a specific language is acquired (Chomsky 1998). The innate structure/grammar could be/is present but it requires a culturally acquired component (e.g., exposure to Christianity or Islam) to be actualized.

Appreciate that religious beliefs, as structural design features, can be non-movement, motivational, proximate causes of Type II religious behaviors. It is therefore the religious belief, rather than the functionally defined behavior for which the religious belief is a contributing cause, that is the structural design feature which is under natural selection pressure. If individuals who engage in certain Type II religious behaviors (e.g., a religious ritual) are at a reproductive advantage, natural selection would "act" on the phylogenetic adaptations in the brain which have been modified through contact with the belief and which generate the motivation for biasing the behavior in a predictable way. Natural selection would also "act" on the cultural adaptation, which is the social-learning-acquired specific, semantic information content of the belief itself. Through this process the type II religious behavior, although not an adaptation, would be said to have adaptiveness. As a result of natural selection "acting" on the belief itself, certain fundamental religious beliefs, such as "I believe Jesus is the Son of God," especially when acquired prior to puberty, have an almost imprinted-like resistance to being altered after puberty that

is similar in some way to the influence of one's native tongue on any subsequently learned language after puberty. Such fundamental beliefs create many well worn and familiar paths through much of life's landscape upon which current behavior often prefers to travel.

4.6 Are There Structural Design Features Embedded in Religious Values?

Values can be conceptualized as the hierarchical rank order given to specific beliefs. The hierarchy is called a value system. A belief's rank order in a value system determines the relative influence the belief will have in biasing behavior (movement) in a predictable way, especially during periods of motivational conflict. The relative hierarchical rank order of specific beliefs (which are structural design features) within religious value systems often derives from the religion's oral or written sacred narratives.

Religions are breeding population. For individuals within the breeding population to function harmoniously there needs to be agreed-upon beliefs concerning fair reciprocity which can govern in-group social interaction (Axelrod 1984). Such beliefs are often given the highest rank order in a religious value system, as in the so called "Golden Rule" in the Christian Bible (Matthew 7:12 and Luke 6:31). Similar beliefs about fair reciprocity are found in the sacred narratives and writings of almost all other religions (Hinnells 1997). There is evidence that the highest rank order of "Do unto others as you would have others do unto you," which forms the basis of fair reciprocity, derives from a phylogenetically acquired belief. One finds rudiments of this belief (not coded semantically in symbolic human language) in our non-human primate ancestors (de Waal 1996).

People who pray together tend to lay together, as individuals marry other individuals of the same religion more than by chance alone. Common religious values facilitate this process. Someone who belongs to a religion which "puts a lot of value" on a certain belief can be predicted to engage in certain Type II religious behaviors which facilitates a sense of in-group belonging. Many religious values therefore are passed across (and within) generations by social learning. Based on all of the above, *religious values contain structural design features which could be either phylogenetic or cultural adaptations*.

Because beliefs are structures, how the beliefs are hierarchically arranged in a value system is itself a structure. Religious values (the hierarchical rank order of beliefs) are also subject to natural selection when specific (functionally defined) Type II behaviors which have adaptiveness occur. Natural selection could "act" on both the structural framework (value system) within which religious beliefs are hierarchically arranged (phylogenetic adaptation) as well as on the social-learning-acquired semantic content of the belief itself (cultural adaptation). The content of a belief, if it predictably biases behavior in a way that leads to an increase in reproductive success, can as a cultural adaptation, lead to selection for the phylogenetic adaptations in the brain which acquire, hold, and actualize beliefs in general. It can

also lead to selection for the phylogenetic adaptations in the brain that create value systems in general. The implications of this for religion's evolution by natural selection as well as the evolution of what has been called "many parts of the mind" are discussed in Sect. 4.10.

4.7 Are There Structural Design Features Embedded in Religious Moods and Feelings?

4.7.1 Moods in General

Because mood is a *specific* internal readiness to act it cannot be observed directly. Rather, mood in humans is inferred by observing specific intentional behavior (e.g., praying), specific expressive behavior, non-verbal body language (Scherer and Ekman 1982), such as a smile (Ekman and Friesen 1975), and the self-report as to how one is feeling. As functions, moods are the result or outcome of one set of structures (e.g., pre-synaptic neurons) interacting with another set of structures (e.g., post-synaptic neurons) in space and over time. The interactions must lower the threshold of post-synaptic neurons to fire, thereby creating the *specific* internal "readiness" to act. The neural tissues which generate specific moods must then send an electro-chemical signal to other areas in the brainwhich lower their thresholds for firing. There also are reciprocal inhibitory functions associated with moods as well, such as between fear and anger.

4.7.2 Feelings in General

If feelings are a self-perception of mood, this puts feelings into the realm of subjectivity, which is usually thought to be out of the reach of empirical science. To get around this problem, self-perception needs to become (epistemically) (MacLean 1990) objectified by re-conceptualizing it to mean that the part of the brain which is the reference point for self is perceptive and consciously aware of what is occurring in another part of the brain. If the part of the brain which is the reference point for self can be perceptive of information coming in from the sense organs, it is reasonable that the same part of the brain could be perceptive of information coming in from those parts of the brain which generate different moods. For example, someone could be aware (i.e., have feelings) of his or her mood to want (i.e., have an internal readiness) to pray.

4.7.3 Moods, Feelings, and Proximate Causality of Behavior

Since moods are functions, they cannot directly cause behavior. For example, an angry mood per se does not directly cause behavior. The neural tissues whose

function is the production of an angry mood would be the contributing, proximate-causes of the behavior. Human feelings can also not cause behavior (movement) directly, as feelings are only a subjective self-perception of moods. Yet, it is known subjectively through introspection that an awareness of one's sometimes fleeting feelings can at times influence and be a contributing cause of some of one's behavior. How do feelings do this and how can this be conceptualized without reverting to Cartesian dualism? The information self-perceived as a subjective feeling must be epistemically *transduced* into information which can then, for example, be used to formulate strategy and behavioral tactics. A transducer converts a signal from one form to another. This transduction process may be similar to the ethological concept of the *Innate Releasing Mechanism* (IRM) with which a specific sensory releasing stimulus is transformed into a specific coordinated motor pattern (Lorenz 1981). In this case there would be an Innate Transducing Mechanism (ITM) by which information known perceptually as a feeling gets converted into a form that can influence behavior in a causal way.

4.7.4 Moods, Feelings, and Phylogenetic and Cultural Adaptations

Since only structural design features can be phylogenetic or cultural adaptations, *neither religious moods nor religious feelings contain structural design features which could be phylogenetic or cultural adaptations*. Therefore, neither can be the direct, "objects of natural selection" through which religion could have evolved.

Having shown that some major components of religion (Type I behavior, beliefs, and values) contains structural design features which could be phylogenetic and cultural adaptations and that Type II religious behavior as well as religious moods and feelings could have adaptiveness, the next question is at what level (individualor group) natural selectionwould be "acting."

4.8 Evolution of Religion at the Level of the Individual

4.8.1 Through Phylogenetic or Cultural Adaptations

In this scenario individuals within a breeding population who exhibit more Type I religious behaviors (e.g., non-vocal aspect of petitioning prayer) and who have more religious beliefs and values and who are more in touch with their religious feelings would be at a reproductive advantage over other individuals within their in-group with less of these characteristics. These characteristics would also include the ability (through transduction) of religious feelings to influence and be contributing causes of Type I and II behaviors through the positive emotions of spirituality – awe, love (attachment), trust (faith), compassion, gratitude, forgiveness, joy, and hope (Vaillant 2008). This could occur through natural or inter-sexual selection (Fisher 1930).

4.8.2 Through By-Products of Phylogenetic or Cultural Adaptations

An argument has been made that components of religion evolved as by-products of numerous phylogenetic and cultural adaptations whose functions did not relate directly to religion (Pinker 2006). One specific argument relates to the attachment system (Kirkpatrick 2004). Another relates to our evolved ability to reason and to generate personal rational choices in "the religious marketplace" (Young 1997). This chapter did not address other than in passing the indirect mechanism by which the major components of religion could have evolved, as the emphasis in the chapter was on the evidence by which the major components of religion *could have* evolved directly by natural selection.

4.9 Evolution of Religion at the Level of the Social In-Group

An argument also has been made that religion could have evolved because it would have conferred benefits at the group level (Wilson 2002). These benefits range from mutual trust to better in-group reciprocation, cooperation, and inter-sexual selection for potentially adaptive, phenotypic traits, such as intelligence (MacDonald 1994). The argument is that in-group breeding populations which have more trust, reciprocation, and cooperation would be more competitive with groups who have less of these characteristics. For group selectionto have a major effect on evolution the variance in extinction rates (calculated from birth and death rates) across different groups would have to be greater than the variance in extinction rates across different individuals within the groups. If that condition were not met, group selection would just be a minor contributing cause of evolutionary change under what is called multi-level selection. This is the most likely scenario (Wilson 2002).

Breeding in-groups, such as specific religions, also have to have what are called in-group markers by which individuals within the in-group can recognize one another. The best in-group markers are structural physical characteristics such as skin tone, facial features, and permanent, society-wide bodily mutilations, such as scars, piercing, and circumcision. Another very good in-group marker is spoken language (which includes accent and regional dialect) with which religious sacred narratives are recited or read. An excellent in-group marker should be costly and/or hard to fake, as costly and/or hard to fake markers make being a free-rider, who takes more than he or she gives back to the in-group, more difficult (Sosis 2004). Type I and Type II religious behaviors and certain religious values are fair in-group markers. Religious moods and their self-perception as feelings are very poor in-group markers as they are most likely identical across religions. Religious beliefs along with the behaviors they predictably bias are fair in-group markers. In addition to predictably biasing behavior, religious beliefs also can be expressed as self-reports. Often incredulous to members of another religion (Irons 2008), they have the potential to create a sense of in-group for "true believers." However, self-reports

of religious beliefs are very easy to fake. Nevertheless, based on the above, there are enough phylogenetically and culturally acquired design features embedded within the major components of religion which are at least average in-group markers. They could facilitate religion's evolution at the group level of selection.

Group selection as a mechanism by which religion could have evolved is also a double edged sword. At the group level of selection phylogenetically and culturally acquired, structural design features embedded within a particular religion as in-group markers, which were adaptive at one point in time, can very quickly become phylogenetic and cultural mal-adaptations at another point in time. Group selection theories about religion's evolution have many unresolved challenges.

4.10 Conclusions

To answer the question of how some components of religion could have evolved this chapter began by introducing and defining a few bio-behavioral terms. The chapter then discussed what to study, how to study it, and why it should be studied. The two requirements for a component of religion to evolve by natural selection are (1) the component has to contain a structural design feature that could be an adaptationand (2) the demonstration of present (or past) increased reproductive success to the bearers of this particular structural design feature that would make (or would have made) it an adaptation. This chapter primarily dealt with the first of these two requirements by searching the components of religion – behavior, beliefs, values, moods, and feelings – for embedded structural design features which potentially could be adaptations. The search for embedded structural design features included those which are phylogenetically acquired and which are transmitted across generations in DNA as well as those which are culturally acquired and which are transmitted across generations by social learning. The chapter ended by addressing the question of whether the structural design features embedded within religion would or could be affected by natural selection at the level of the individual, the group, or both.

Although there is strong evidence based on twin studies that being religious is partially heritable (Koenig and Bouchard 2006), one should not conclude, based on this evidence, that it is just the genetically heritable design features which could account for any adaptiveness found in religion's major components and by which the major components of religion could have evolved by natural selection. As has been shown in this chapter many of the structural design features embedded within religion's major components, such as (the semantic content of) beliefs and values, are acquired culturally through social learning. As such, they are candidates for being cultural adaptations, which when possessed, would increase the reproductive successof their bearers at multi-levels of selection in specific environments.

Steven Pinker in writing about the evolutionary psychology of religion and reflecting the widely held by-product of selection view of religion, suggests

that "religious psychology [may be] a *by-product* of many parts of the mind" (Pinker 2006, p. 8). His suggestion may, in effect, be backward. The alternative, counter-intuitive proposition is that "many parts of the mind" may be by-products of religion's evolution. Since Type II religious behaviors are structurally describable and therefore functionally defined, natural selection cannot "select" for the specific behaviors (movements) used to execute them. Rather, natural selection "selects" for some of the phylogenetic adaptations in the brain which motivationally cause them. These phylogenetic adaptations include those which are structurally modified through contact with specific beliefs, which create values, structurally modify behavior through learning, generate reasoning, allow one to experience feelings and be both spiritual and creative. These are what in psychological terminology Steven Pinker is calling "many parts of the mind." As such, and in psychological terminology, a belief in God may not have been created by the human mind at all. Rather, our ancestors' belief in God may have been what created many parts of the human mind – "gifts" as some would say. That is the take-home message of this chapter. It is a message which could be disquieting to those who have prematurely dismissed religion's value (Dawkins 2006).

Based on what was presented in this chapter, it is reasonable to conclude that some of the major components which make up religion *could have* come into being by the evolutionary process of natural selection and that some of the structural design features embedded within religion's major components could be phylogenetic and cultural adaptations as well as have adaptiveness. However, "could have" and "could be" are not the same as "did." There is nothing in this chapter which is definitive evidence that evolution by natural selection is how the structural design features embedded in religion's major components came into being. The indirect, by-product of selection mechanism is equally tenable. Such evidence for the direct "selection" of some of religion's major components can only come from inductive scientific research which shows a positive correlation between potentially adaptive, phylogenetically and culturally acquired, structural design-features embedded within religion's major components and reproductive success in their current or past bearers. There are such empirical studies which have been done, primarily in pluralistic modern societies (Koenig et al. 2001). More needs to be done. The evidence for how religion in general evolved most certainly will not come from simply using or making up evolutionary scenarios to explain religion's evolution. Such scenarios, often called "just so stories" (Gould and Lewontin 1979), make up much of the current literature on religion's evolution. To show that religion came into being by the evolutionary process of natural selection, either directly or indirectly, one has to use theoretical propositions to make counter-intuitive predictions about the major components of religion. These counter-intuitive predictions can also not be made by simple observation and deductive reasoning.

There is very good reason why religion's evolution needs to be understood scientifically at this time in history. Currently, the world is dangerously divided on the basis of religion. Neither science nor religion can bridge this divide alone. With science and religion working together there is some chance of success (McNamara 2006). Such success need not diminish our sense of awe as to religion's majesty

and its powerful and mystical influence on so many aspects of human behavior, some of which we are just beginning to appreciate and understand from a scientific perspective.

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Chapter 5
The Correlated History of Social Organization, Morality, and Religion

David C. Lahti

Abstract Morality and religion have evolutionary and cultural roots in the social behavior of our ancestors . Fundamental precursors and major features of morality and religion appear to have changed gradually in concert with social transitions in our history. These correlated changes involve trends toward increased breadth and complexity of social interaction, leading to a stepwise extension of the scope of human sympathies to more inclusive social categories, and eventually the universalization of moral and religious concepts, practices, and explanations. These changes can be integrated provisionally into an eight-stage model of human social history, beginning with nepotism and dominance that are characteristic of many social mammals, and culminating in the intellectual ability and (sometimes) social freedom of modern human individuals to examine moral and religious conventions, to modify or reject them, and even to propose new ones.

5.1 Introduction

In the last 2 million years, several unique traits have evolved in the human lineage: extraordinary intelligence, an unprecedented capacity for cultural transmission of ideas, morality, and religion. These traits are unlikely to have arisen by coincidence in the same species over the same period of time. In fact, evolutionary biologists have recognized important functional relationships between these traits (Alexander 1979). If a consensus is emerging as to the evolution of these features of modern humans, perhaps it can be encapsulated as follows: human intelligence evolved as a social tool, facilitating cooperation within groups in order to more effectively compete between groups; the ensuing intellectual arms race selected for rapid cultural innovation and transmission of ideas; cooperative norms within social groups were formalized into the institution of morality; and religion grew out of obedience

D.C. Lahti (✉)
Department of Biology, Morrill Science Center, University of Massachusetts, Amherst, MA 01003, USA
e-mail: lahti@bio.umass.edu

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to social authority and fostered group solidarity (Alexander 1990; Tomasello 1999; Irons 2005; Flinn et al. 2005). Much of the theory and empirical work to support this developing picture is based on traits in contemporary human societies; whereas all of these traits presumably evolved by small steps from ape precursors in a sequence that is much less well understood.

In this chapter I relate this functional analysis of morality and religion to the evolutionary history of human sociality. I consider morality to be the individual cognitive faculty of setting, modifying, and (sometimes) following ultimate standards or priorities for life and thought. Religion I consider to be the faculty of entertaining ultimate explanations for morals, life, and often the rest of the universe, especially with respect to their essential nature and purpose. Thus I consider cooperation to be a fundamental aspect but not definitive of morality (Lahti 2003), and a belief in the supernatural to be a common element but not definitive of religion. Moreover, I broadly define morality and religion as individual traits, while recognizing that they gain most of their content and currency not individually but in social groups. My goal is to present a provisional account of the gradual formation of morality and religion in a changing social environment. This proposal is guided by three expectations: (1) that morality, religion, and human social structure function in a mutually compatible way at each stage of human evolution; (2) that the form of these traits at each stage be consistent with the anthropological and archaeological record; and (3) that each major change in morality and religion in our lineage be facilitated by a particular change in social environment.

Presenting such a general sketch requires simplifications of human evolutionary history and cultural traits. For instance, I present a single trajectory of trait change with the benefit of hindsight from an endpoint in contemporary urban civilization; this lineage-specific focus neglects many human groups past and present. Moreover, I ignore the question of the mechanism of trait change. We can assume that human traits have changed more via genetic evolution over long and ancient periods and more via nongenetic cultural modifications over short and recent periods. For example, the capacity for modern social intelligence surely arose by biological evolution, whereas the modern tenet that that all humans are created equal arose through nongenetic cultural change. I do not attempt to distinguish between these modes of change here, and indeed we know too little to make many specific conclusions of this sort in the large gray area between these two examples. In this chapter, then, I use the term “evolution” in a very broad sense, encompassing changes in genes as well as changes in experience including social learning. Incidentally, we can explore possibilities for an environmental fit, or adaptive value, of human trait changes regardless of the mechanism of change. Thus a particular social modification can be adaptive in a biological sense (i.e., beneficial, and ultimately conferring reproductive advantage, in a particular environment), even if it arises and spreads solely by nongenetic means such as social learning. In fact, we might expect widespread socially learned traits commonly to be adaptive if human plasticity has evolved for the same kind of reason as it has in other living things: as a way to behave adaptively in a rapidly changing or unpredictable environment.

5.2 A "Bottom–Up" Hierarchical Model of Human Social Evolution

I propose that as human social environments change, the nature of conventional morality changes with them, followed closely by changes in conventional religious attitudes and behavior. Thus a central hypothesis here is that "lower" cultural traits such as social aggregation and cooperation have been the predominant drivers of change in the "higher" traits of morality and religion; and that moral change has been the predominant driver of religious change. The rationale behind this hierarchy follows from the developing picture of the adaptive functions of these traits. The natural environment, a social group's neighbors, and a group's own cultural history are likely to most directly influence basic social features such as the distribution of wealth, means of subsistence, social group size, mating system, number of children, and the degree and kind of cooperative and competitive activities. These in turn are the raw material for morality, which tends to institutionalize and foster rules that resolve conflicts between and within people with respect to these features (Alexander 1992). Presumably, the operation of morality can only change the external influences on a group very gradually; so for morality to continue to serve anyone's interests in a changing environment, it must instead keep pace with environmental change. Ultimately, the deepest explanations and purposes that underlie social relationships and moral codes – the stuff of religion – will follow suit, harmonizing the new social environment and its moral dimension with the people's conception of the universe and their place in it. Despite the predominance of this causal hierarchy, synergistic changes and feedback loops among all of these traits may also be important.

This rationale does not imply that changes in morality and religion are smooth or necessarily follow the interests of all the individuals whose ideas are changing. Rather, power differentials are likely to play a major role here just as in more basic behaviors such as finding food and mates (Lahti and Weinstein 2005). Accordingly, the distribution of the benefits of moral and religious change among individuals will be skewed, just as biologists talk of reproductive skew associated with mating systems (Summers 2005). Perhaps, the most important limit to these power differentials is the dependency of even the most powerful people on their social groups. Theory suggests that group stability becomes fragile under excessive within-group competition, and powerful individuals stand to lose all if they compromise the stability of their social groups in the face of external threats (Lahti and Weinstein 2005).

5.3 Categorizing the History of Morality and Religion

Two important axes in the history of morality and religion are the forms of the relevant behaviors or ideas, and the scope of moral consideration. With respect to form I suggest that much of morality is rooted in *premoral sociality*, a broad category including any tendency to cooperate with other individuals (Fig. 5.1).

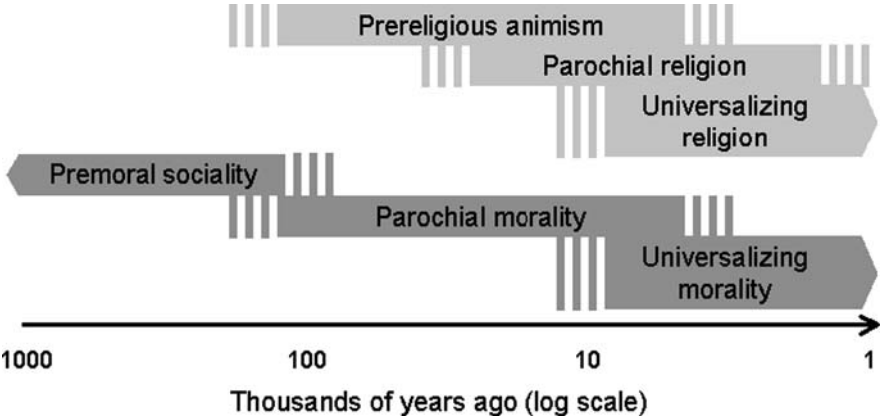

Fig. 5.1 Hypothesized timeline for the history of broadly categorized forms of morality and religion and their precursors. Both *prereligious animism* and *parochial morality* are likely to have arisen with the evolution of language; *parochial religion* likely arose later as indicated by social group dynamics, burial practices, and art; and *universalizing morality and religion* probably spread with increased intergroup communication, population density, and control over nature associated with the agricultural revolution. Points of extinction of trait forms are particularly speculative, so each bar should be seen as representing the time period over which each trait form may have characterized a significant proportion of the human population

Many social organisms express this trait to some extent. At its most intense, premoral sociality can involve radical self-sacrifice in service to the social (kin) group, when such behavior contributes to the maximization of the individual's genetic representation in subsequent generations. Regardless of the intensity of cooperation, we have no reason to believe that nonhuman organisms consciously prioritize life goals or construct, share, and follow explicit rules (de Waal 1996). Morality, on the other hand, is a more cognitively demanding suite of traits apparently restricted to humans that involves the conceptual formulation, explicit communication, and mutual enforcement of rules or priorities for attitudes and behavior (Lahti 2003). In *parochial morality*, these standards are perceived as arising within a social group and having relevance only within that group. The bases or motivations for adhering to guidelines in parochial morality are limited to practical concerns such as reputation, appeasement of the powerful, and group stability. On the continuum of *universalizing morality*, on the other hand, the origin and basis of moral standards are considered to transcend the social group to some extent, and so moral standards are considered to apply outside of the group. Although practical bases or motivations can still be significant or even overwhelming, universalizing morality makes possible the rationalization of moral standards, their integration into a general world-view, and even a skeptical investigation of their importance and relevance.

Broad categories in the evolution of religion can be laid aside those relating to morality. Parochial morality can simply involve following the dictates of group

members; however, it is also compatible with *prereligious animism*, where people recognize inscrutable entities or powers that may require appeasement. *Parochial religion* is a further development where unseen powerful entities, especially dead ancestors at first, become a resource for explanations for their demands as well as for natural events and objects. Coincident with the universalization of morality is *universalizing religion*, where a favored deity or power emerges, eventually becoming the single arbiter or author of the universe in both its natural and moral aspects for the great world religions. Fully universalized religion generally entails that religious entities and the explanations and moral norms they provide should apply in all times and places.

With respect to the scope of moral consideration, a longstanding perspective in the history of ideas is that our moral obligations are diverse and organized into social levels. As Cicero wrote,

> Part of us is claimed by our country, part by our parents, part by our friends. . . The union and fellowship of men will be best preserved if each receives from us the more kindness in proportion as he is more closely connected with us. (Cicero *De Officiis*, I.xvi).

Darwin enlarged upon this view by proposing that the history of morality and its ancestral social instincts has been characterized by the gradual extension of our sympathies to ever more inclusive social categories (Darwin 1871):

> Finally the social instincts, which no doubt were acquired by man as by the lower animals for the good of the community, will from the first have given to him some wish to aid his fellows, some feeling of sympathy, and have compelled him to regard their approbation and disapprobation. Such impulses will have served him at a very early period as a rude rule of right and wrong. But as man gradually advanced in intellectual power, and was enabled to trace the more remote consequences of his actions; as he acquired sufficient knowledge to reject baneful customs and superstitions; as he regarded more and more, not only the welfare, but the happiness of his fellow-men; as from habit, following on beneficial experience, instruction and example, his sympathies became more tender and widely diffused, extending to men of all races, to the imbecile, maimed, and other useless members of society, and finally to the lower animals – so would the standard of his morality rise higher and higher. (p. 282)

In the scheme that follows, I build upon Darwin's idea of the extension of sympathies to ever larger social circles (Fig. 5.2) but I provide a different perspective on the mechanism . Darwin, in Victorian moral progressivist fashion, implied that once "small tribes are united into larger communities," the diffusion of sympathies is the result of unbiased social learning and reason in an apparently constant and stable social environment (Darwin 1871). I hypothesize instead that each important and widespread extension of moral scope is facilitated by a particular change in social environment, and that humans as a rule have broadened their scope of moral consideration only when it has become adaptive to do so (Fig. 5.2). By "social environment" I mean primarily demography and resulting patterns of social contact. Thus I propose that factors such as group size and density affected the criteria for

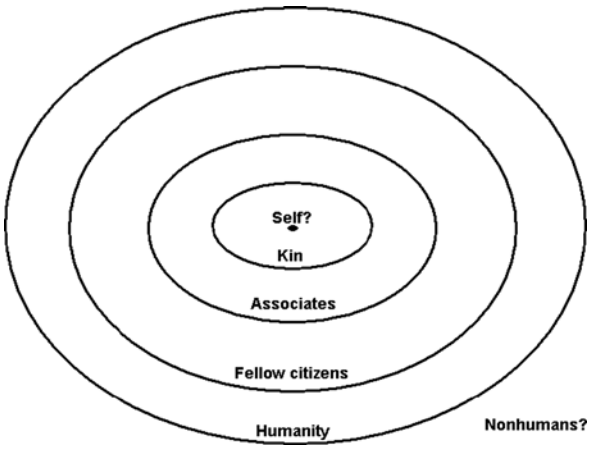

Fig. 5.2 Hypothesized schematic of the extension of social and (eventually) moral sympathies to ever more inclusive social categories in humans and their ancestors. The circle of *kin* would have been the operative social group until mutualism became advanced in the great apes (as well as other lineages) and resulted in cooperation with *associates* with only limited regard to kinship. Subsequently in the human lineage, social group size increased, cooperation grew in complexity, and parochial morality arose; however, the circle of moral consideration probably did not expand again categorically until human social groups began to establish group alliances, creating a category that may be loosely termed a *fellow citizen*. The notion of duties to *humanity* was likely introduced with the increase in communication across social groups and the freedom of some individuals to communicate (especially in writing) their philosophies about the basis of moral norms. Also since that time, two further loci of moral consideration have occasionally been argued: one's *self*; and *nonhuman* entities such as sentient animals, living things, or nature

membership and status in a group, and the degree and nature of interaction with other groups; and that these in turn influenced the nature of cooperation, and ultimately aspects of morality and religion for these groups. Moreover, to a lesser extent, these changes in morality and religion may have prompted adjustments in demography and social interaction, resulting in a mutually reinforcing correlated history of social organization, morality, and religion. Certain individuals, especially in a stable and wealthy situation, may of course extend their own moral scope at will, as Darwin suggested, regardless of their social organization. However, I argue that major moral reforms or revisions have generally transformed human society only when the social environment renders such changes adaptive or advantageous to individuals in that society (especially powerful individuals). Incidentally, my suggestion that each stage in the evolution of morality and religion is functionally appropriate to a particular social environment lends no support for the idea that one stage is morally or otherwise superior to others in an objective sense. I follow many other researchers in proposing, from the vantage point of our current culture, that social evolution has tended to proceed in a particular order. Nonetheless, extant human

groups today may reside at various stages, their morality and religion being likely appropriate to respective features of demography and patterns of social interaction.

5.4 An Eight-Stage Model for the Correlated History of Social Organization, Morality, and Religion

5.4.1 Nepotism and Dominance in KinGroups (Premoral Sociality)

Perhaps, the most ancient of behaviors that hindsight would place in the ancestry of morality is aid to close relatives. Humans have always lived in kin groups and spent much of their lives aiding kin, a trait we share with many other organisms including invertebrates, thus placing its origin on the order of hundreds of millions of years ago. In terms of emotional bonds, mammalian nepotism seems to derive from the mother–offspring bond, which would have coevolved with lactation and is thus at least 135 million years old (Clutton-Brock 1991). Thus one could argue that the eponymous trait of mammals, maternal care of offspring, is a major reason why advanced sociality and morality eventually evolved in the mammalian lineage rather than in lizards or fish, for example. In the primate lineage, kin groups have grown larger and nepotism more complex (Chapais and Berman 2004). In many monkeys and the great apes, kin recognition at least of maternal relatives up to the level of half-siblings and grandmothers–granddaughters ($r = 0.25$) can function in social interactions. Major further advancements in nepotism, however, do not appear until after our split with the chimpanzee lineage about 6–7 million years ago. Since that time, for instance, our ancestors evolved to recognize, and to cooperate differently according to several gradations and pathways of relatedness beyond the 0.25 level, including aunts, uncles, cousins, grandparents, and grandchildren of both sexes. Care of offspring by fathers is also derived in the human lineage among apes. To the extent that a move toward monogamy is indicated by reduced sexual dimorphism and in turn facilitates paternal care, the intensity of paternal care likely evolved gradually over the last 6 million years. Increased paternal certainty would have increased the likelihood of nepotism toward paternal as well as maternal relatives during this period (Alexander 1990; Reno et al. 2003).

In many social mammals dominance relationships play a large role in determining behavior, and these relationships in the great apes are the ancestral foundation for the hierarchical power structures evident in human societies (de Waal 1996). Moreover, these relationships can interact with nepotism; for instance, individuals may prefer to associate not only with kin but also with others of a similar age-rank (Chapais 2001). Appeasement behaviors and the systematic manipulation of benefits from others, which together form another important evolutionary root of human cooperation, are known in the other great apes as well as other primates (Ghiglieri 1987).

5.4.2 *Mutualism and Reciprocity in Nomadic Bands* (Premoral Sociality)

The first major extension of social sympathies from the kin group was cooperative interaction with associates in dyads or small groups. Initially such interactions would have occurred among close relatives, but subsequently mutualisms would have evolved that did not require kinship. The simplest "by-product" mutualisms, where individuals benefit each other incidentally while pursuing their own benefit, are widespread in the animal world. These situations evolve greater complexity and cooperation when individuals *invest* in those incidental benefits because of the dividends they return (Connor 1995b). Many instances of primate cooperation can be explained as two or more individuals cooperating to gain a benefit none may gain otherwise, and where benefits to all are simultaneous and the risk of being cheated is negligible (Reeve 1998). Even cooperation between closely related individuals may have evolved not only by kin selection, but also because siblings are preferred collaborators due to their familiarity. Recent research shows that chimpanzees are adept at choosing associates in complex cooperation on the basis of compatibility or efficacy in collaboration (Langergraber et al. 2007; Melis et al. 2006). This kind of cooperation involving "partner markets" (Hammerstein 2003) among nonrelatives is thus at least 7 million years old in the ape lineage, although mutualistic relationships in modern human groups obviously represent a vast increase in complexity from the chimpanzee form.

Not all cooperative ventures in a social species can provide simultaneous benefits to all individuals. Grooming of necks and heads, for instance, requires that one individual be a recipient and one be a donor at any given time. In these situations, which are present in many primate species and some other animals such as ungulates, social conventions can evolve to minimize the risk of cheating. For instance, benefits are given in small doses (parceling) and an individual must first groom in order to be groomed (Connor 1995a). This can be seen as a rudimentary form of reciprocity or exchange of benefits where there is a delay between the investment and return (Trivers 1971). In this simple form where cheating is not a significant risk, reciprocity is likewise many millions of years old because we share it with grooming apes.

More advanced or high-stakes reciprocity where interactions are risky because of the possibility for taking a significant benefit without returning it is apparently restricted to humans. A plausible explanation for the transition from chimpanzee to early human intensities of reciprocity is the following: Social groups were likely maintained in our lineage by selection at first for predator avoidance, and later for cooperative group-hunting (Alexander 1989). Early Australopithecines were similar to chimpanzees in relative brain size, and probably were chimp-like also in that survival and reproduction were strongly limited by both predation and competition with conspecifics. It is also parsimonious to expect that, again like chimpanzees, our early ancestors would have had a "second inheritance system" besides the genes. Traditions in social interaction and practical technology would have been innovated and transmitted by social learning (Whiten 2005). The combined

dangers of predation and competition within and between hominid species would have fostered an increase in intelligence, which must eventually have permitted socially learned traditions to accumulate over time: the formation of a cumulative culture. Perhaps, it was when our ancestors' innovations were able to build up in this way that they accomplished what chimpanzees still have not: They reduced their susceptibility to predation and between-species competition to the point where conspecifics became the main determinant of an individual's reproductive success (Alexander 1990).

This situation would have produced a cascade of interacting effects. As competition among human groups became the primary function of group living, selection would have ever more strongly favored cooperation within groups in order to foster group solidarity in the face of competition with other groups (Alexander 1990). Service to the group would have become adaptive, and would have rendered otherwise risky cooperative ventures less so, since all members of a competing social group were likely to share a common fate (Alexander 2005). Chimpanzees may have embarked on this trajectory as they regularly engage in murder of nongroup members and occasionally war group against group (de Waal 2005). The intensity and stakes of these phenomena increased greatly in our lineage, however. For instance, group extinction is much less common in chimpanzees than it appears to have been for early humans, where it may have been routine (Bowles 2006). Intense group competition would have favored not only more cooperation but also larger group sizes. As group sizes grew, the complexity of social interactions and the intensity of competition within groups would have increased as well, moderated by the need for group stability for effective between-group competition (Lahti and Weinstein 2005). Competition with conspecifics would have fostered a "Red Queen" situation where natural selection for outwitting and assessing one's fellows would have intensified in the species, resulting in a steep increase in intelligence (Humphrey 1976). The extent to which within-group competition vs. between-group competition contributed to this intellectual bloom is an open question, but certainly within-group competition would have been tempered by relatedness and the benefits of cooperation, whereas between-group competition would have been relatively unfettered to the extent that groups were nomadic and forged few confederacies with other groups.

The explosion of tool use in early *Homo* around 2 million years ago (Susman 1994) also marks the beginning of the first acceleration of brain size in our lineage (Ruff et al. 1997). This suggests that nomadic bands of the period may have been experiencing fiercer competition than their ancestors, selecting for increased intellect and technology (Flinn et al. 2005). It is plausible that along with these innovations an increase in the complexity and integration of cooperation also evolved, perhaps including direct reciprocity. Perhaps, only with such enhancement of our cognitive faculties could our ancestors process and retain the information required for high-risk delayed-benefit reciprocity to function (Hammerstein 2003). Group members would have been repeatedly encountered, and with advanced facial recognition and a long-term memory of past interactions, one could effectively choose reliable associates and friends among a large pool of

group members, and could retaliate against or avoid those who fail to cooperate (Trivers 1971).

A still more advanced form of reciprocity is indirect, where multiple communicating individuals interact such that rewards for cooperating and punishments for defecting can be administered by any other individual in the group or the group as a whole (Alexander 1979). The most common vehicle for the return of these rewards and punishments today is reputation, but in its early form a general, infectious emotional disposition toward or away from certain people on the basis of their actions would have been sufficient. I suggest tentatively that indirect reciprocity in a basic form could have operated with limited nonverbal communication and third-party observation and copying, and so may have been well established 500,000 years ago, when homes became more lasting and social groups consequently more stable (Potts 1992; Brace 1995). From this time onward, our lineage experienced the second great acceleration of brain size evolution (Flinn et al. 2005), suggesting that major intellectual advancements accompanied these social changes. As humans grew in social intelligence and sympathy and began to accumulate and act on impressions of others, an implicit trust would have emerged in close-knit groups, multiplying the opportunities for mutually beneficial interaction with associates; no longer would cooperation have been strictly confined by the relatedness of aid to kin, the equivalence and immediacy of benefits from mutualism, nor the risk assessment involved in direct reciprocity. For instance, 100,000 years ago, humans had probably switched to big game hunting and certainly embarked on long distance travel (Key and Aiello 1999), two behaviors that must have intensified between-group competition, requiring cooperation with high stakes, significant communication, and strong interpersonal relationships. The growing importance of communicating social information in the context of indirect reciprocity around this time may have been a major selective factor driving the evolution of our complex language.

5.4.3 Persisting Rules in Hierarchical Bands (Parochial Morality, Prereligious Animism)

Three major social changes likely to be relevant to morality and religion appear to have been important between about 100,000 and 70,000 years ago: an increase in the complexity of language, burial of the dead (perhaps with ceremony) and the strengthening of hierarchies or leadership within social groups (Dunbar et al. 1999). Although the evidence for the precise timing of these developments is scarce, their coevolution with each other and with early morality and prereligious animism is plausible.

As humans achieved the ability to represent people, objects, actions, and attitudes in language, previously vague and ephemeral commands with little symbolic content could eventually be formulated as general rules for behavior with increasing clarity, specificity, and permanence. This rule-following would qualify as (parochial)

morality, especially insofar as rules were viewed as communally accepted standards instituted by leaders, as opposed to self-serving demands of the leaders (i.e., rules enhancing group stability rather than rules deriving from dominance relationships, although these certainly would have overlapped). Labels could be attached to people in the form of names and relationships, facilitating kin recognition and deepening the complexity of nepotism and the ease with which family membership and precise pathways of relatedness could be assessed. Indirect reciprocity, which would have promoted the development of rules of behavior, would also have been more effectively practiced with the evolution of language (Alexander 1979). Individuals would be able to share and store much more social information than they could ever observe, including assessments of the relative commitments of others to cooperation and group service. In this situation, rewards for a good reputation (and punishments for a bad one) could be more far-reaching and accurate than previously. As these rewards and punishments grew in intensity and pervasiveness, behavior in service to the group that would previously have been sacrificial would return ever-increasing benefits through enhanced reputation. Moreover, since primate social group size seems to be limited by the mental capacity to monitor social relationships within the group (Barton 1996; Aiello and Dunbar 1993), each increase in the power and complexity of language probably increased the number of individuals that could be monitored, resulting in larger group sizes and subsequently a greater need for leadership. This having been said, the scope for the action of indirect reciprocity at this stage would have been somewhat limited, since people still lived in close-knit kin groups.

Before the advent of complex symbolic representation, communication about arcane powers or spirits would have been difficult. Individuals may have had capacities for imagination, but not until language formation would imaginations have become cumulative and communal, likely leading almost immediately to some form of prereligious animism – that is, an animism that recognizes powers or spirits but does not yet consult them to answer deeper questions of existence. In line with much animism in the historical period, these entities were probably perceived as mysterious agents, potentially either hostile or friendly, before the rise of ancestor worship, but they would have had no particular recognized leadership role that would have competed with the elders – such an extra-group source of leadership would have been unprecedented.

Burial practices may originally have protected the group from disease or wild animals, but between 100,000 and 70,000 years ago burial patterns appear to have taken on a greater significance (Smirnov 1989). Some have claimed that the use of red ochre and other ritualistic burial practices indicate the belief in an afterlife. Modest ceremony and limited decoration might also indicate merely a reverence for the life of a social group member or an awe of death, which would not imply the presence of beliefs (Chase and Dibble 1987). These attitudes may have resulted from increasingly formalized rules of cooperation and group service, since respect for the dead may correlate psychologically with respect for the living. It is likely that our ancestors were fascinated, as we are today, with death and the loss of loved ones (Pinker 1997). Once sentiments like these arose, they can be expected to have

left a trace in the disposal of the dead, especially considering the increased ability to communicate emotions.

5.4.4 Ancestor Worship (Parochial Morality and Religion)

An evolutionary perspective on traits tends to follow Darwin's dictum that evolution proceeds by small steps. Therefore a working assumption in an evolutionary anthropology should be that radically new traits such as religion descended gradually from functional precursors. I suggest that the crucial cultural step in the evolution of religion was not the sudden recognition of previously unknown spiritual entities, but rather a subtle psychological slide from remembrance of and reference to the dead, to the concept of an afterlife. The conceptual distinction between "Grandfather *would have wanted* you to do this" and "Grandfather *wants* you to do this" would not only have been slight in a linguistically simple culture, but community norms would be much more effectively upheld by the stronger latter claim. As soon as elders began to be perceived as remaining powerful and offering advice *post mortem*, the society can be considered to have entered upon parochial religion by the definition offered here (Steadman et al. 1996). This development would have further strengthened the community not only by ensuring the maintenance of traditional rules with reference to a past leader, but also by rooting them in a person who was to some extent superhuman. Thus I argue that religion has not co-opted moral norms, as some social theorists claim; rather, moral norms themselves favored the evolution of religion, and in its most rudimentary state religion's social function was not primarily as a source for explanation of events or existence, but rather as a basis and bulwark for morality (Roes and Raymond 2003). Nevertheless, once leaders suggested that ancestors could be consulted, the matters on which they would have weighed in would have extended to the future and the humanly unknowable. For this reason I defined religion earlier in terms of the provision of explanations for the biggest questions, rather than the supernatural per se.

When ancestor worship first arose is debated, but perhaps the best indication is grave goods. Valuable objects buried with the dead suggest that the people might have believed the objects would be used in an afterlife. Grave goods appear first to have become important between 40,000 and 30,000 years ago (Gowlett 1992), and it is possible that ancestor worship in a less developed form arose even earlier.

5.4.5 Fellow Citizens and Gods in Priest-Led Tribes (Parochial Morality and Religion)

Between-group competition is expected to have intensified in modern humans throughout the Pleistocene – with each other in Africa and Asia, and also with Neanderthals in Europe. Land and large mammals were among the resources that

would have brought groups into direct competition with each other, especially as technological advancements, art, and perhaps larger group sizes tended to keep groups in one place. Contact between our species and Neanderthals in Europe may have been the cause of their extinction by 30,000 years ago (Mellars 2004), the last of several hominid extinctions that may have been the result of niche overlap with our species and its ancestors (Alexander 1989). War would have become an increasing determinant of survival in human groups across the world. In the historical period, war has been perhaps the strongest stimulant to technological growth, and apparently the Paleolithic was no exception: stone tool technology advanced at a tremendous pace between 40,000 and 10,000 years ago (Jurmain et al. 1997).

Not all contact between Paleolithic human groups was hostile; in fact, in a growing population new groups would form by fission and their members would be related. Consequently, one important development in this period was the formation of alliances between neighboring groups, which would have mitigated competition and perhaps facilitated communal defense against other groups (Alexander 1978). The result was a loose-knit society of interrelated kin groups in a regional population linked by marriage and meetings for rituals and hunting (Landers 1992). Furthermore, as similar groups in the historical period indicate, leadership in such a society may have depended somewhat less on inheritance, and competition for leadership would have become increasingly important.

I suggest that the rise of a multigroup society resulted in the first major categorical increase in the scope of moral consideration that *Homo sapiens* had ever undertaken (Fig. 5.2). Although the nature of cooperation had changed tremendously – indeed, morality had evolved – since the ancestors of humans diverged from the other apes 6–7 million years earlier, the fundamental social level at which sympathies were appropriate had always been the clan or band, within which all individuals would have been known by all others (Landers 1992). It is likely that neighboring groups, especially if they had formed by fission, would have been tolerated to some extent throughout human history. However, not until approximately 30,000 years ago, when humans had spread throughout the globe and art and ritual were widespread and rapidly advancing, has evidence indicated systematic contact and corporate relationships between groups. This social situation would require a standard of treatment for people in affiliated bands, a novel category of those to whom some duties, though fewer than to one's own group, were required. I suggest that the concept of a "fellow citizen" (although etymologically associated with cities rather than loose regional populations) adequately reflects the moral status people would have given members of these other groups. The mutual expectations would likely have included aid in war and other emergency, tolerance of religious differences, some participation in shared ceremony, respect for each others' leaders, and acceptability as mates. Indirect reciprocity and the role of reputation would have been vital in this new situation, for instance in ensuring that daughters were married into good families, and that individuals in neighboring groups could be trusted in hunting or war parties.

Ancestor worship generally evolved into or coexisted with an emerging polytheism, with magic and local spirits common. I suggest that this development was predictable, given the social and moral changes that were occurring. With the weakening of hereditary leadership and the increased contact between groups, the ancestors of one group would not necessarily continue to hold sway, and so they would have to gain power or else be supplemented or replaced by other powers. As ancestors "broke the ice" for belief in supernatural persons who were interested in human affairs and could be consulted for leadership, local and regional gods could have taken their places, or ancestors could even transform into them. Magic, including shamanic medicine, would have attracted and strengthened commitment to these spirits. Spirits could be appropriated for all aspects of life, as witness the proliferation of fertility figurines. Shared rituals between groups could invoke spirits that all participating social groups revered, cementing social relationships and a common moral commitment. Thus, with an increase in the extent of communication among social groups, both morality and religion became accordingly less parochial, which I suggest is a general theme on the whole of human social history.

5.4.6 Favored or Chief Gods in Agricultural Societies (Parochial to Universalizing Morality and Religion)

The agricultural revolutions that began to occur about 11,000 years ago resulted in population centers with a greater diversity and number of interacting people, and a greater degree of control over nature than had ever been customary for humans (Hole 1992). One of two alternative cultural strategies could have been adopted in these situations: isolation or integration. Smaller regional groups that were not at the helm of the new agricultural civilizations but lived near or within them may have chosen to preserve their traditional social and moral structures by avoiding external influence, strengthening old dispositions to mistrust outsiders and to associate preferentially with those who are closely related. A ruling state, however, would have found greater advantage to being integrationist, as its culture would spread and strengthen by influencing and incorporating more groups (Lahti 2004).

As for social structure within the agricultural society, leaders would have been relatively ineffective if they depended on kinship ties to give weight to commands in a cosmopolitan social environment, so political expediencies were necessary to facilitate social order. A strong social hierarchy or class system appears generally to have been imposed (Twiss 2007). Moral and legal standards were more generalized and less parochial than those of tribal cultures, a trend that became especially evident upon the development of writing. For instance, most of the laws in the Sumerian Hammurabi Codex (c. 1760 BC) begin with the generality "If any one. . .," although some are class-specific ("If a chieftain. . ." or "If a slave. . ."). Citizens of city-states would encounter and depend upon various kinds of people,

including many known only by name and reputation. Therefore, indirect reciprocity in such a cosmopolitan situation would have assumed paramount importance in the enforcement of moral standards in a community of peers (Alexander 1979). Leaders and their law codes could encourage and intensify indirect reciprocity by enhancing public dissemination of social information, ensuring its accuracy, and formalizing reputational rewards and punishments. For instance, the Code of the Assura (c. 1075 BC) lists "ruining of reputation" as one of three nonlethal forms of punishment for breaking laws (I.57). Likewise, the *Teaching For Merikare* (see Table 5.1) demonstrates that indirect reciprocity was so central by 4,000 years ago in Egypt that the impacts of reputation even after one's death were considered a primary reason for being good in this life.

A variety of gods associated with local cultural or natural entities gradually gave way to a more generalized pantheon where gods represented less parochial objects (such as the sun, fertility, or the harvest), although these ideas were undoubtedly present in local traditions earlier (Leeming 2005). Leaders also tended to consecrate a chief god, or a god devoted to the civilization. A culture's most significant rituals would generally be in service to this chief deity, and moral codes were most likely claimed to proceed from that deity as well (Smart 1976). Often this deity was a glorified local god, a deified ancestor king (or living king!), or a transformed favorite god in a preexisting cosmopolitan pantheon. The favoritism of a single deity above others, and the attribution of an increasing proportion of natural events and features to that deity, marks a transition from the picture of nature as chaotic and controlled by many forces (the animistic -polytheistic view) to a picture of nature as regular and reliable, as if controlled by a single personality or power. Thus a cosmopolitan social environment and increased human control of nature would have led neolithic agricultural societies at least part of the way toward monotheism and the universalization of religious and moral ideas.

5.4.7 One World, One God, One Good (Universalizing Morality and Religion)

Any culture that favored the view that nature was orderly and understandable, and that humans from different lineages could (at least in principle) agree to abide by similar moral and legal guidelines in a society, might not rest comfortably at any parochial understanding of morality or religion. A favored god could only maintain an orderly universe if competing gods had no say or no existence. Divergent human groups could only be morally similar if they shared a common origin and purpose. If this is true, it is not surprising that from perhaps 4,000 years ago, the chief god of some societies began to transform into an only god, generally responsible for creating the universe and its value structure, and establishing human life and its purpose. The earliest written evidence of such monotheism is some passages from the *Bible*, the *Vedas*, and Akhenaten's *Great Hymn to the Aten*, all likely to have been written in the second millennium BC but probably stemming from older traditions.

Two general processes seem to have been employed to universalize religion and morality at the cultural level. Primarily in the West, the favored gods of different peoples either metamorphosed into or give way to a single universal god (e.g., Yahweh, Allah). Primarily in the East, the differences among many gods faded into the background of the religion, which placed less and less importance on distinguishing them; the emerging single entity became an over-soul or a value-laden essence of the universe (e.g., Brahman, Tao). By either process, the crucial aspect of this cultural transition is that the god is now universal and ultimate, and either above or at the heart of the universe.

Table 5.1 Classic examples of traditional moral pronouncements operating at different social levels

Duties to self	"Above all things, reverence yourself." – **Pythagoras**, in Diogenes Laertius, **Lives of Eminent Philosophers.** "If I am not for myself, who will be for me?" – Hillel, **Mishnah Aboth** i.14. "One must learn to love oneself – thus do I teach – with a wholesome and healthy love." – Friedrich Nietzsche, **Thus Spake Zarathustra** lv.2.
Duties to kin	"It is upon the trunk that a gentleman works. When that is firmly set up, the Way grows. And surely proper behavior to parents and elder brothers is the trunk of goodness." – Confucius, **Analects** i.2. "If any provide not for his own, and specially for those of his own house, he hath denied the faith." – **Bible,** I Timothy v.8. "Nothing can ever change the claims of kinship for a right thinking man." – **Beowulf,** line 2600.
Duties to elder kin and ancestors	"Your father is an image of the Lord of Creation, your mother an image of the Earth. For him who fails to honour them, every work of piety is in vain. This is the first duty." – **Janet** (Hindu) i.9. "Honour thy father and thy mother." – **Torah/Bible,** Exodus xx.12. "When proper respect towards the dead is shown at the end and continued after they are far away, the moral force of a people has reached its highest point." – Confucius, **Analects** i.9.
Duties to associates (community of reciprocity)	"Wretched is he who has bound the land to himself. . . a fool is he who is greedy when others possess. Life on earth passes away, it is not long; he is fortunate who has a good remembrance in it." – **The Teaching for Merikare** (21st century BC, Egypt), par.6. "Manifest plainness, Embrace simplicity, Reduce selfishness, Have few desires." – Lao-tzu, **Tao te Ching,** 19. "It is more blessed to give than to receive." – **Bible,** Acts xx.35.

Table 5.1 (continued)

Duties to fellow citizens (e.g., of a nation)	"It is sweet and honorable [dulce et decorum] to die for one's country." – Horace, **Odes** ii, line 13. "Do we wish men to be virtuous? Then let us begin by making them love their country. – Jean-Jacques Rousseau, **A Discourse on Political Economy** (1755). "Ask not what your country can do for you: Ask what you can do for your country." – John F. Kennedy, Inaugural Address, 20 Jan 1961.
General beneficence (to humanity)	"If I am virtuous and worthy, for whom should I not maintain a proper concern?" – Confucius, **Analects** xix.3. "I am a man [Homo sum]: nothing human is alien to me." – Terence, **Heauton Timoroumenos,** line 77. "We hold these truths to be self-evident; that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness." – Thomas Jefferson, **Declaration of Independence** (1776).
Respect for sentience, life, or nature	"Consider frequently the connection of all things in the universe and their relation to one another." – Marcus Aurelius, **Meditations** v.38. "The question is not, Can they reason? nor, Can they talk? but, Can they suffer?" – Jeremy Bentham, **An Introduction to the Principles of Morals and Legislation,** "Limits Between Private Ethics and the Art of Legislation" (1780). "A man is ethical only when life, as such, is holy to him, that is, the lives of plants and animals as well as the lives of men." – Albert Schweitzer, **Out of My Life and Thought** (1932).

Morality would be transformed by this monotheism or monism; the moral guidelines would be perceived as created by a Supreme Being and thus inherent in the nature of the universe rather than proceeding from a social group or its leadership, whether human or supernatural. Thus, leaders in such a situation would no longer be able to assume divinity, but would have to claim a special connection to God or the universe in order to deliver moral commands. In fact, moral or religious leaders (Buddha, Jesus) would no longer need to be political leaders (much to the chagrin of the political leaders), as long as the political leaders did not have such complete authoritarian power that they could enforce the religious, and thus moral, allegiance of the populace.

The fact that in all of the world's universalized religions the standards of morality proceed from the god of the religion might imply the admittedly intuitive conclusion that universalized religion was the primary cultural innovation, and the moral pronouncements were consequently adopted as universals. An evolutionary consideration of all previous major changes in the society/morality/religion trait suite would suggest the opposite, however: a cosmopolitan social environment rendered a

universal morality advantageous to individuals in that environment, necessitating a universal giver of morals. These morals are likely to relate to a meaning or purpose of human life, and of the universe whose order was increasingly recognized. These ideas would suggest that the lawgiver was also the universal creator. In a society for which a universalized morality would not be advantageous, I suggest that we should not expect a universal creator-god.

The universalization of morality and religion is more consistent than any previous stage with an extension of moral considerability to all humans. However, such an extension is not a foregone conclusion of universalization. In fact, universal religions need not abandon a hierarchical view of the moral value of humans, and indeed the universalizing religions arose in civilizations, all of which appear to have had strong class systems. The recurring prediction in this chapter is that humans will tend to adopt an extension of the circle of moral considerability when it is in their interests to do so, especially in terms of social organization. Perhaps, the increasing communication and migration among human groups is facilitating that advantage for contemporary humans in at least some societies today (Pettigrew and Tropp 2006). Regardless, some societies today, including all of the major developed nations, profess to be in the process of expanding moral considerability to all humans.

5.4.8 Individual Exploration of Morality and Religion

Although morality and religion were both defined at the beginning of this chapter as individual traits, all of the transitions above have been discussed at the cultural level, as if individuals are automatically conventional, or at least kept conventional by the coercion of powerful individuals and the mutual enforcement of indirect reciprocity. In fact, however, at least from the advent of writing and almost certainly long before that (as our intellectual capacities would have changed negligibly in a few thousand years), individuals have had the ability to question and investigate the form and content of morality and religion. *The Gilgamesh*, for instance, is at heart the story of a man of the third millennium BC yearning for an explanation of the human condition, for which the high goddess Ishtar was ultimately unsatisfying. At any point in the history of morality and religion among intellectually modern humans, there were likely many individuals inclined to philosophize and derive their own moral and religious conclusions. The degree to which they were free to develop these interests would depend on their status in the community, the restrictiveness of the political and religious leadership, and standards of education and health. In several societies in the last 2,500 years, the ideas of such individuals have made notable contributions to the cultural evolution of morality throughout the world. The range of such exploration includes, of course, an orthodoxy practically indistinguishable from that of unquestioning devotees, as well as the possibility of a wholesale rejection of religion, and thus the replacement of an older transcendent basis for morality

(e.g., will of God, essence of the universe) with another, such as functional (e.g., social contract) or psychological (e.g., emotivism).

Two further extensions of the circle of moral considerability have been proposed, but each remains somewhat controversial. The first is the possibility that, irrespective of effects on other people, what one does to oneself is a morally sensitive matter. This is a feature that is present in all of the great world religions, and is occasionally represented in the history of philosophy (Kant 1785; Moore 1903); the focus of contemporary secular moral pronouncements on concepts such as consent and liberty appear to leave little room for such moral relevance, however (Rawls 1971). The second proposed extension is to nonhuman entities such as sentient animals, living things, or nature as a whole. Darwin proposed that this would be the ultimate end of the expansion of our moral sentiments (Darwin 1871). Not many modern social groups appear to have accepted the intrinsic moral value of nature, but this idea has been argued strongly by a few thinkers, particularly in the last 100 years (Leopold 1949; Rolston 1988).

5.5 Conclusions

This provisional scheme charts the general trajectory that social organization, morality, religion, and their precursors may have taken over the course of our history. The hypothesis underlying the entire argument is that these three complex human traits have tended to evolve in a correlated fashion, with social environments rendering certain moral changes adaptive, and those moral changes rendering certain religious changes adaptive. I suggest that this hypothesis may explain some major aspects of moral and religious evolution, mainly those I have highlighted. Even if the hypothesis is explanatory, however, it is not likely to be the exclusive explanation, as morality and religion are both complex phenomena and appear to have different aspects that serve distinct functions (Lahti 2003; Lahti and Weinstein 2005).

Two major trends are evident in this scheme. The first is a progression from premoral sociality to parochial and then universalizing morality, coupled with a progression from prereligious animism to parochial and then universalizing religion. The second is a stepwise broadening of our moral sympathies to more inclusive social spheres. Unfortunately, I suggest that neither of these trends is indicative of an inherent moral improvement in society. Rather, I suggest that our ancestors tended to universalize morality and religion and broaden moral sympathies because new social environments rendered these changes advantageous to them, due to increased communication and association with distantly related people. Thus, I would predict that members of extant insular societies and even subcultures within cosmopolitan societies, though not intrinsically less moral, nevertheless may not have universalized their religion or morality or extended their scope of moral considerability to the extent that this scheme would suggest for our time period. Moreover, I would predict that if for some reason a change in social environment rendered a contraction of moral sympathies adaptive, such a society would promptly "regress."

Still, human interaction across the globe will likely continue to intensify and spread as means of travel and communication continue to develop, resulting in ever more social pressure to universalize prosocial moral norms. We live in an uncertain age for religion, however. Many societies today seek to encourage commitment to shared moral norms, but without reference to a universalizing religion that would give them greater weight. A pressing cluster of questions follows, such as whether or how religion should operate in the public sphere, or whether the longstanding coevolutionary partnership between morality, religion, and social structure ought to be partially or completely severed, and how these alternatives would affect society. The silver lining in our present situation is the availability of the eighth stage, above: today probably a greater proportion of people than at any other time in human history are free to explore difficult moral and religious questions.

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Chapter 6
Is There a Particular Role for Ideational Aspects of Religions in Human Behavioral Ecology?

Jürgen Kunz

Abstract In their book *The Biology of Religion*, Reynolds and Tanner present the argument (also in the current discussion of existing biological origins of religion) that religions do indeed induce adaptive behavior. The content of religions is accordingly developing through natural selection and will be considered maximizing as a cultural extension of genetic fitness. The essay at hand is intended to show that instead, religions are the result of signal evolution and are to be considered as an all-purpose-cooperation tool, with which direct adaptive benefits do not otherwise necessarily have to be connected. Many ideational aspects of religion are not behavior-relevant. Nevertheless, behavior-relevant aspects can be reproductively disadvantageous. Religion evolved through its potential to create trust and to increase the willingness for cooperation among believers. In order to achieve this, religion utilizes hard-to-fake signals and supernatural witnesses. It thereby allowed individuals to present themselves as reliable cooperation partners. The alleged adaptive information is, on the one hand, tied to the time of origin of the religious concept and, on the other hand, it presents a marginal phenomenon, since religion addresses not only the cognitive and psychobiological inference systems but also the cultural values-conducted inference systems.

6.1 Culture and Reproductive Success: The Theory of Reynolds and Tanner

Reynolds and Tanner in a nutshell: religion – defined as the overly individual belief in an invisible authority, which presents values and symbols to which the quality of a higher order reality is attributed – would offer orientation for reproductive behavior, since it reflects ecological conditions. This approach, based on the culture and reproductive success hypothesis by Irons (Irons 1979), utilizes the model

J. Kunz (✉)
Dörnbergstr. 3, 34119 Kassel, Germany; Fachbereich IV (Ethnologie). Universität Trier, Universitätsring 15, 54296 Trier
e-mail: kunz.juergen@arcor.de

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Table 6.1 Reynolds and Tanner. r- and K-selection and the life cycle (Reynolds and Tanner 1983; Reynolds 1997)

Life Cycle	K-Selection	r-selection
Conception	Few better	Many better
Infanticide	Approved of	Disapproved of
Marriage	Late marriage	Early marriage
Divorce	Remarriage disapproved of	Remarriage preferred
Death	Shock	Acceptance
Disease	Intervention and cure	Resignation

of r- and K-selection (Reynolds and Tanner 1983) of behavioral ecology: in regions with instable ecological conditions, religions support early and frequent reproduction. In contrast, in stable environments, religions influence humans in the opposite direction, to have fewer children, and to invest in their development, endowments, and education, to prepare them for competition regarding resources (Table 6.1).

These perspectives are supported by empirical data concerning world religions. Reynolds and Tanner place Islam and Hinduism at the end of the r-selection, Protestantism, on the other hand, at the K-selection end of the reproductive continuum, Buddhism and Judaism between these two poles. Thus, the authors could clearly determine differences between Hindu and Islamic countries, on the one hand, and the protestant-populated countries, on the other hand, in relation to birth rates, total fertility rates, life expectancy at birth, and infant mortality rates at a significance level of $p=0.0001$. On the other hand, there is no significant difference regarding these demographic parameters between Roman Catholic and Buddhist countries. The reason is therefore seen by the author in the "doctrines, dogma, and rules" of the universal religions, because these contained information about the age of marriage, the use of contraceptives, expected family size, abortion, and remarriage (Reynolds 1997).

This intuitive plausible-appearing association, nevertheless, provokes the question of why human beings need the support of religion for their reproductive decisions. Namely, there are already a number of potential adaptive non-religious behavioral-controlling mechanisms: know the meaning and consequences of a particular form of behavior (Durham 1991), behave like your peers, conformism in general or orientation toward parents and/or successful people (Henrich and Boyd 1998; Boyd and Richerson 1985), for example. Even Reynolds acknowledges that cultural change does not occur through the clergy but stems from the socio-economic circumstances of ordinary people (Reynolds 1997). People obviously find adaptive solutions without having to orientate themselves toward religion. Thus, poorly socially integrated young adults and the underprivileged show a tendency for "short time horizons" (r-selection), and indeed independently of the culture (and religion) in which they live (Wilson 2007). The intercultural survey also shows that in ethnic

groups in which the standard of living falls into decline, more aggressive and rather r-selective behavioral patterns are to be found (Ember and Ember 1997). The psychobiological endowment of *Homo sapiens* hence also allows a flexible reaction to environmental change. What then can religion add that would justify its especially significant cost? If the primary reason was to supply adaptive guidelines for everybody, why would it then not be satisfactory to simply refer to local knowledge or to Grimms' tales?

6.2 The Religious Occupation of the Human Mind

Religion is not necessary for reproductive decisions. The reason why Reynolds and Tanner, nevertheless, associate some of the ideational aspects of religion with the increase in reproductive fitness is due to the central characteristic of religion: it encompasses the existing psychobiological and even cultural inference systems of humans. The cultural anthropologists Lawson and McCauley (1990, see also Malley & Barrett (2003)) were among the first who were able to evidence this association for a central component of religion, namely rituals. A clear structure – which is totally independent of religion – can be assigned to rituals. Religion exploits this capacity in that it simply integrates supernatural participants and/or something "Holy" at one point during the ritual procedure.

However, there is not only evidence for rituals for such a demand through religion. The cognitive anthropologist Boyer (2001) and the cognitive psychologist Barrett (2004) show that the imagination of supernatural participants can also be derived from simple everyday cognitive mechanisms, i.e., that they are thus "natural." There are some examples for this: in the dangerous environments of our ancestors – in which man and animals were predator and prey – natural selection favors, in cases of doubt, people who assume the presence of a predator. This leads to an oversensitive recognition system for hidden players. This is why humans everywhere tend to see eyes in their environment– or "faces in the clouds," as described by Guthrie (1993) in his directional approach, who understands religion as a result of anthropomorphism. Inevitably, many of these "imagined" participants remain invisible, and often they do not even exist. Furthermore, the human brain permanently produces explanations for events and designates experiences to already existing ontological categories. Consequently, imaginations result in contributing awareness, emotions, and intentions to these invisible participants (Boyer 2001).

For that reason also, the childlike imagination of death supports concepts of supernatural participants. For foragers it is necessary to intuitively know whether an animal is actually dead or whether danger is still to be expected. Although children can imagine that a dead person can no longer move, be hungry, or feel pain, it is much more difficult for them to understand that the dead no longer have desires and needs. Their life after death as ancestors or spirits is at least a plausible solution for this cognitive discrepancy between awareness (persons are no longer present) and cognition (persons have continuing needs and pursue goals) (Boyer 2001; Bering 2002). For the existence of a creator, obviously, cognitive processes are also respon-

sible. Children are intuitive creators, since they perceive the natural environment as created by a supernatural power – and not by humans (Barrett 2004; Barrett et al. 2001; see Richert and Smith this volume).

An additional example of the occupation of cognitive processes through religion is the principal of reciprocity, which is based on the *social contract algorithm* according to the theory of evolutionary psychologists (Cosmides and Tooby 1989; Sommer 1993; Burkert 1996). Reciprocation provides the means for humans to reciprocate a gift with a return gift. Also, the submission to authorities (Burkert 1996; see Feierman this volume) and the principle of "purity and danger" are to be named here. The latter is associated by Douglas (1966) with a complexity decreasing effect and by Boyer (2001) with the necessity to handle dead animals and humans with care because of infection risks.

Religions furthermore activate emotions like love, hate, or jealousy. The philosopher Dennett, for example, postulates that religion above all exploits the evolved capacity for romantic love (Dennett 2006). Religion also attends to human existential anxieties such as death, disease, catastrophes, pain, loneliness (e.g., find imaginary companions as children often do (Taylor 1999)), injustice, not being wanted (e.g., by parents), or loss (Atran 2002). In addition, most religions stimulate the senses of their followers: architecture, music, candles, and smell, such as incense, for instance (Dennett 2006).

If religion so comprehensively addresses emotional and cognitive inference systems, it is only logical that this is also true concerning the knowledge, values, desires, and the problem awareness of the humans affected. Producing intuitive certainty (Boyer 2001) – this "aura of factuality" as Geertz (1966) called it – is one of the central characteristics of religion. Especially the ubiquity of religious incidents supports the intuitive certainty of the existence of imaginary worlds. In order to be successful and to reach people, religions must use multiple mental features, including the mental representations of culture! In this way, the cultural fitness (cultural fitness: measure of degree for the suitability of cultural constructions for replication (Durham 1991)) of the ideational aspects of religion depends on the need to also illustrate ecological conditions.

This becomes particularly clear by the fact that religious conceptions can be derived from socio-ecological facts. Thus, the imagination of witches, for example, correlates positively and shamanism negatively with social stratification. High God conceptions correlate positively with pastoralism and the importance of ancestors with resources such as the holding of estates (Murdock 1980). Religion potentially reaches into all areas of life and equips the values transported by it with a superordinated requirement for validity. Therefore, all the universal religions – in contrast to "traditional small-scale societies," in which not seldom statements are made that something like "Religion" is completely unknown, since these are inextricably connected to the "profane" world (Tanner 1997) – produce, above all, the illusion that they would offer a closed, complex, perennial, and behavior-directing network of meanings that would not exist without religion. This construction of a superordinated requirement for validity lets common world views, local knowledge or behavioral solutions – that generate themselves out of the psychobiolog-

ical equipment of humans – appear primarily as religious (see Wilson's (Wilson 2002) discussion of the evolutionary history of one central Christian principle: forgiveness).

When Tanner furthermore discusses "how religious information manage[s] technological change" (Tanner 1997), they overtax the subject, since they mistake the religion-associated ideological aspects with the actual phenomenon of "religion." The word "religious" can in this sentence be deleted. Religion uses and accompanies local knowledge, rather than being its origin.

Besides that, social and ecological change leads to the fact that the cultural values transported by religion can, if necessary, depart quite considerably from adaptive solutions for the believers. Ideational aspects of religion are mostly local knowledge from the past. The social and ecological conditions under which Christians, Hindus, Muslims, and Buddhists live did not remain stable over the centuries. If religions should thus actually have a crucial influence on the life style of humans, then they must also lead inevitably to reproductive dysfunctional behavior (except for religion adapting itself permanently to the current conditions).

Reynolds and Tanner postulate that the entirety of the ideational aspects of the respective Christian denominations has a larger pro-natal influence on Catholics than on Protestants. But in today's Europe, the superficially more pro-natal Catholic countries Italy and Spain are characterized by lower reproduction rates than Protestant countries (Kohler et al. 2002). In changed socio-ecological environments, the Catholic religion is apparently not by any means associated with r-selective reproductive behavior in relation to the Protestant religion.

Certainly, there is also still another interpretation. Religion is therefore not only unnecessary, but also does not suffice to explain reproductive decisions on the proximate level. Regarding their reproductive decisions, humans depend only partially on religion.

6.3 Culture, the Ideational Aspects of Religion, and Their Impact on Behavior: The Example of Infanticide

The ontogenesis of behavior is understood in behavioral ecology as a result of a gene/environment interaction. This makes it impossible to divide behavior into genetic and milieu-based types of behavior (Voland 1993). That humans master their subsistence problems also through their ability for culture – which is the result of natural selection –, leads behavioral ecologists to deny the cultural dynamics that goes beyond the functionality directly serving the reproductive success or to at least ignore these dynamics. The ideational aspects of culture were – according to the behavioral ecologist Cronk (1995) – for a long time regarded as part of the human phenotype, for example in his essay, "Is there a role for culture in human behavioral ecology?" The title of the essay at hand is oriented toward this study. Although culture is thereby defined as information, it is treated as behavior.

An extracorporeal conceptual existence of culture was explicitly rejected (Durham 1991). By doing so, Cronk does not argue that culture is an ethereal, immaterial phenomenon completely independent of behavior. Contrary to the interpretive approaches – called "ideational theories of culture" by Keesing (1974, see also Cronk (1995)) – he regards ideational aspects of culture rather as a functional unit, which can be used strategically in the contest for resources. This aspect of culture evolved as humans developed a mental representation of culture, thus also a conception of the mental representations of other group members and the interests of other people. With these group members humans share a conceptual reality, which helps to form human behavior, according to Cronk, however, is to be separated logically and empirically from culture, since culture to a significant extent comprises public pronouncements (Cronk 1995; Durham 1991).

Reynolds and Tanner, however, argue that with the ideational aspects of religion cultural values are transported, since these lead to successful reproductive behavior. This everybody-can-profit approach postulates compellingly a connection between ideational aspects of culture and behavior. The distinction between culture and the manifestations of culture – behavior, especially behavioral commonalities and their material products – demanded by Cronk, hence avoids two ultimately unsupportable assumptions. On the one hand, the circular conclusion that what is empirically detected is adaptive under local conditions and, on the other hand, the conception that humans are passive recipients of their cultural environment. Since they did not make this distinction, most behavioral ecologists did not care for the ideational aspects of culture at all. They probably had overlooked that the evolution of *Homo symbolicus* introduced a completely new dimension of the Darwinian contest for resources. They did that, although Dawkins and Krebs (1978) already in 1978 referred to the fact that biological signals are also the result of the coevolution of manipulative signal senders and signal receivers, who encounter this manipulation by the social selection of hard-to-fake signals. Thus, communication takes mostly place in the conflict area of different interests. Therefore, no absolute congruence with behavior is to be expected for ideational aspects of culture.

This discrepancy between culture of imagination and culture of behavior has been discussed for quite some time in cultural anthropology (Schneider 1976; Antweiler 1988; Goodenough 1981; D'Andrade 1992; Leach 1954). Thus, Geertz observed that "culture is best seen not as complexes of concrete behavior patterns but as a set of control mechanisms – plans, rules, instructions – for the governing of behavior." He compares culture with computer programs (Geertz 1973). These can be used by humans congruously, depending on the situation and/or need.

In this way, Cronk at least partly defuses the scientific dispute between behavioral ecology and the "ideational theories" of cultural anthropology by determining that the interaction within and the availability of symbolic worlds not only serves to pass on fitness-increasing information. It is also a platform of image cultivation, access to information, and it makes it possible to manipulate other humans for one's own benefit. The evolution of the ability for cultural and symbolic interaction thus also led to the ability to develop a mental repre-

sentation of collective conceptions. The readiness to signal, to act in the interest of the cooperation partners or in the interest of the community can mean the difference between success and failure in a social environment, which makes cooperation inevitable. Here, it is not only of central importance to act accordingly to certain (cultural) guidelines, but rather to master social situations. According to Cronk, the symbolic world is the substrate – a cultural environment – in which behavior takes place. It does not, however, compellingly reflect actual behavior.

Cronk presents a multiplicity of examples gathered by cultural anthropologists and sociologists, which show how extensive the discrepancy can be between the statements made by humans and their behavior, and also between cultural values and actual behavior (Cronk 1995). For example, Indian peasants stressed to Caldwell et al. (Cronk 1995; Caldwell et al. 1988, see Cronk 1995) the importance of the support of the elderly by their children. The authors found that this is particularly relevant if parents are in the possession of resources. But if they possess resources, why should they need the support of their children? Especially people without resources are in need of the support of their children. Analogous to this, Christian professionals care for older people, especially if they are in possession of material resources (Dennett 2006).

The heuristic value of this discussion is the finding that to a great extent religions also do not exhibit behavior-relevant content, whereas the behavior-relevant aspects of religion are particular signals directed to other persons. In terms of evolutionary biology: they are not the result of natural selection, but they rather originate from signal evolution for honest signals (Zahavi and Zahavi 1997). The ideational aspects transported by religions therefore primarily represent a cultural tool, which permits humans to address the interests of the signal receivers.

This can be shown by the example of handling infanticide. Its rejection – just like the support of old people specified above – in the view of Reynolds and Tanner becomes a part of the life-affirming orientation as provided by Christianity. Thus, this represents the K-selection that is orientated toward quality. Infanticide is a very common phenomenon in humans and animals. Children who were born to an unfavorable, or in an unfavorably felt time, were and are subject to the high risk of being put to death. Also, children living in bad health conditions were (and still are) frequently killed by their parents. From the perspective of genetic fitness maximization, this behavior can be quite adaptive, since these parents receive the opportunity to concentrate their resources on the remaining children with a better chance for survival. From the time of the Middle Ages up to modern times, infanticide was very common in Europe. With the rise of Christianity in Europe, the practice of infanticide came under pressure, since it became regarded as a sin (Hrdy 1999). Reynolds and Tanner must now allow for the question as to whether it is adaptive from the perspective of the culture-and-reproductive-success approach to kill children if this leads to a larger number of grandchildren. Or is it adaptive to follow the laws of Christian religion to raise children, who have only a small chance of survival? The answer to these questions was supplied by the Christians themselves. Many Christians of medieval Europe and later times found some ways of avoiding

Christian values. One example is the practice of interpreting some children as being a *changeling*. Sickly babies were labeled as non-human demons or as goblin babies, which were exchanged for the actual human infants. This type of infant became an *enfant changé* in France, a *Wechselbalg* in Germany, and a *fairy child* or *changeling* in England (Hrdy 1999).

Moreover, even in the context of the practice of wet-nursing, Christians found an opportunity for infanticide. Hrdy could show that in eighteenth-century Paris 95% of all babies were nursed by a wet-nurse. Fifty percent of these infants were born into the middle class, in which infants were mostly raised by a wet-nurse. However, instead of having their children raised by a wet-nurse living in their vicinity, many mothers decided to give them to distant living nurses in the countryside. This was a special form of infanticide, because most of these children died (Hrdy 1999). In this case, neither the ideational aspects of religion thus led to adaptive behavior, nor does the result of the behavior of these Christians conform with the values of their religion. They found a way to symbolically reconcile the practice of infanticide with Christendom without changing their practical behavior. Religion is thus often the exact opposite of a guide to adaptive behavior. Religion requires (reproductive) offerings of the believers, which can be used as cooperative signals to other persons and/or the community.

Furthermore, many conceptions of universal religions are not accepted despite their uselessness (and often even because of their teachings that are absolutely not realizable), but rather because of their uselessness. Useless features are perfect ingroup/outgroup signals (Atran 2002). Although ideational aspects of religions such as myths are as "religious language" (Eller 2007) – like languages in general – identity-furthering to a high degree; however, they are, on the other hand, not necessarily connected with actual consequences. In a permanently changing world, those must be particularly stable ideational aspects of culture, which do not exert the behavior of humans or influence it to only a small degree. This is because behavior is exposed to the permanent pressure of (genetic and) cultural selection processes (Cronk 1995). Only for this reason can religious conceptions be transported over thousands of years.

This runs alongside the fact that many believers in their daily lives not only pay little attention to their religion, but often do not know major parts of it (Dennett 2006; Buggle 1992). Therefore, the everyday behavior of humans not only differs within one religion from region to region, but also substantially within one society.

As an intermediate result, it can now be stated, that religions can contain information which leads to adaptive behavior. The reason, however, lies above all in the fact that religions illustrate human knowledge, values, desires, and consciousness of conflicts during the time religions were formed or created. Apart from this, some religious aspects do not have any influence on behavior, others, on the other hand, contribute decisively to life style. These, however, do not compellingly benefit inclusive fitness, such as the rules concerning infanticide or the hostility of Christianity toward education and science in historical times, for example. This is cause for the assumption that the guidance to adaptive behavior does not represent the core of religious tasks.

6.4 The Behavioral Relevance of the Ideational Aspects of Religion: The Examples of the Couvade and Early Christianity

One of the numerous components of religious behavior – the conception of supernatural participants – was, as described above, identified by cognitive anthropologists as a natural phenomenon and a byproduct of human cognitions in everyday life. A second component of religion is that the supernatural participants have the potential to punish certain behavior. Here also, already existing psychobiological mechanisms are integrated in religion. Punishment and altruistic punishment (altruistic punishment: the punishment of socially deviating behavior although the punishment is costly for the norm controllers and yields no material gain (Wenegrad et al. 1996; Fehr and Gächter 2002; Boyd and Richerson 1992)) are in many cultures social tools that are closely linked with the evolution of cooperative behavior (Wenegrad et al. 1996; Fehr and Gächter 2002).

Additional components of religion, such as spirituality, imagination of supernatural participants as virtual witnesses and religious rituals can be best understood through their inspiring trust and their effect of increased cooperation. The basis for the evolution of spirituality (defined as the emotional aspects of religion, such as experience of another world, the feeling of being associated with an ultimate reality as well as the feeling for meaning) is the trust-increasing effect of emotions. Thus, Frank et al. were able to show (Frank et al. 1993) that even after a short acquaintance test persons could already recognize defectors with better than twice chance accuracy in a one-shot prisoner's dilemma. The authors could furthermore show that emotions create a sympathetic connection between persons, which goes alongside with a high degree of willingness to cooperate. Characteristic emotions and facial expressions make it possible to signal receivers the prognoses for the future behavior of the transmitter (Frank et al. 1993; Frank 2002; Irons 2001). The evolution of confidence-creating emotions probably facilitates the initiation of relationships in the context of tit-for-tat strategies (strategies in which people are repeatedly confronted with each other and the result of the present or previous confrontation(s) will be used as a basis for further behavioral decisions) in repeated prisoner's dilemmas. According to Frank (2002), humans who cooperate with one another have the commitment problem to prove that they will in the future behave cooperatively, although they have short-term advantages as a result of non-cooperation. This also makes spirituality a capacity which can be used as a signal for credible cooperative intentions.

The effect of spiritual emotions is extended through the imagination of supernatural agents that have access to intimate knowledge of the believers. This can already be seen in children at the age of 3–7 years. Within the framework of the development of the so-called *theory of* mind children learn to imagine what other persons could know and what not. Prior to this capability, they believe adults to be all-knowing. Barrett et al. found that parallel to this development children consider supernatural participants to be all-knowing further on, for example, that they do not develop

a *theory of mind* for these beings (Barrett et al. 2001). They look at supernatural participants as a completely different type of being, not, as is often suggested, as humans with special characteristics (Knight et al. 2004). In this process, supernatural agents possess the potential to function as virtual witnesses, whereby in cases of clerical manipulation, the term "social spies" is certainly appropriate.

This is consistent with the findings that supernatural agents increase prosocial behavior in the anonymous dictator game. Here, a test person, for example, receives money, which he/she is allowed to keep provided he/she shares a minimum amount with other test persons. Subjects allocate more money to anonymous people when God concepts are involved than when neutral or no concepts are present (Shariff and Norenzayan 2007). Furthermore, a person who takes part in intensive religious rituals has shown that he/she is ready to give to the community. Game-theoretical computer simulations and a multiplicity of tests also evidenced that the willingness to cooperate with these persons is particularly high (Nowak and Sigmund 1998). Thus, religion also exploits the principle of indirect reciprocation to establish moral systems (Irons 2001; Alexander 1987). In addition, game-theoretical dilemmas are solvable, if the kind of use of the common property is associated with the reputation of the user (Milinski et al. 2002). Supernatural witnesses can do this job; this is why the crucial role as supporter of cooperative behavior can be designated to them.

With societies ever more expanding, the human brain is overextended with the processing of information about the behavior of all group members and their trustworthiness. This limits the problem solution potential of spiritual emotions specified above. For this reason, Dunbar postulates, that societies comprising more than 150 persons fall apart without appropriate social glue (Dunbar 1999).

As Sosis (2003; see Purzycki and Sosis this volume) shows, religion further addresses the solution of this problem – again in already existing psychobiological mechanisms: in order to avoid cognitive dissonance, humans tend to adapt their attitudes to their behavior. Rituals demanded by the believers, and the thereby connected ideational aspects, thus exert a strong psychological pressure on humans. Persons, who exercise intensive religious rituals, without believing in the conceptions transported along with them, are therefore confronted with higher opportunity costs than believers.

This point of view of the evolutionary origins of religion outlined here has, in contrast to the theory of religion as a byproduct of cognitive processes, extensive consequences for the role the ideational aspects of religion play in human interactions. These cannot per se represent a behavior-relevant final horizon. Only the symbolic actualization with the conflict and cooperation tool of religious emotions and rituals make them an obligatory orientation size. If religion succeeds in enabling humans to commit themselves to certain cultural values – meaning certain ideational aspects of religion – it is particularly interesting for humans as a general-purpose-cooperation tool. Therefore, they are not the consulted mythological and ideational aspects by Reynolds and Tanner – and thus also not the classical religious texts – that form human behavior to any considerable degree.

The term "adaptive" used by Reynolds and Tanner is also perfectly unsuitable to characterize ideational aspects of religion, since these represent trade-offs between

the interests of the parties involved. An additional behavioral ecological characteristic of communication worked out by Krebs and Dawkins (Krebs and Dawkins 1984) shows this self-interest-motivated character of religion: if the interests of the parties involved are congruent, communication should be quiet and simple. If the interests are, however, opposing, the transferred information should be loud and remarkable as well as often repeated. For the understanding of this communicative difference, Krebs and Dawkins recommend bringing before the mental eye the "subtle signals passed between a couple at a dinner party that it may be time to leave" and the "oratory of a revivalist preacher" (Krebs and Dawkins 1984; Cronk 1995). Thus, if the ideational aspects of religion are merged in frequently repeating liturgies and expensive and complex rituals, one can assume they are intended to convince in an atmosphere of different interests.

The Couvade and early Christianity show these religion-typical methods to valorise profane content to essential truths and to illustrate specific interests. In both cases, those reproductive interests of women and thereby in particular those ideational aspects of religion, are of central significance, which also determine the behavior of men.

In many societies, during pregnancy and a culture-dependent different period after childbirth, intensive taboos are demanded of men. This phenomenon termed Couvade can be regarded as a typical game-theoretical dilemma. Men in Couvade societies are confronted with an optimization problem between paternal investment and for their own – not, however, for their female partners –fitness-furthering outside the family. In this situation, the intensive taboos of the Couvade serve as hard-to-fake signals, which put the readiness of men for paternal investment to a test. The reason for the behavior of men worldwide is to protect the children from illness and death through the negative influence of supernatural participants, who can see how these men behave (Kunz 2003). Confidence-creating religious emotions now permit showing that they actually believe in the consequences of spiritual aggression and mystical retribution. In this simple form of the belief in the power of the supernatural – a religious self-organization, which does not require any religious specialists – undesired everyday events as well as problem solutions anticipated by humans are associated socially effectively with invisible participants. If it has been observed that children without the support of the biological or social father have a lesser chance of survival (or can be less successfully integrated into society), the reproductive success of women depends significantly on the willingness for cooperation of their partners. Thus those ideational aspects of religion which enhance paternal investment are those that are transported by religious-ritual behavior.

A similar connection can be shown for early Christianity. Contrary to the Couvade, at which the spiritual aspects are more or less in the foreground, this universal religion serves to provide solutions of Sosis' coinage. Early Christianity had, according to the sociologist Stark (1996) and Wilson (2002), many facets: the creation of a social welfare system, minimization of interethnic conflicts through the principle of forgiveness, constitution of a community in a Durkheim sense, and the establishment of a health system. Nevertheless, despite this capacity oriented to public welfare (see Wilson's (2002) approach that religion has the capacity to

implement cultural group selection), the success of this religion existed, above all, in serving the reproductive interests of the believers through corresponding ideational aspects. In the non-Christian Roman population, the male striving for status was extremely strongly expressed. Marriage and family life was less attractive for males. Female infanticide was commonly far more widespread due to a male dominated society and strongly marked lineage competition (Stark 1996; Wilson 2002).

Most likely it was for this reason that primarily women converted to this new religion. These women were not in the position to change their status and situation without a new and above all reliable community. This is because behavioral changes always affect the interest of other persons, too. For the individual, the leaving behind of closed symbolic systems is extremely difficult. The reasons for this lies in the human tendency for conformism (Henrich and Boyd 1998) as well as the ingroup/outgroup function of religion and the associated social consequences with this that outsiders have to count on. The practice of altruistic punishment (Wenegrad et al. 1996) strengthens these difficulties substantially. In this type of situation, it can be of central importance to find cooperation partners, who find a way to demonstrate their reliability – in other words, persons who can convince others that they will behave in the same way as they promise. As in the case of the Couvade, female choice (Female choice: since women warrant their reproductive success – except for kin selection – exclusively through her own born children, they invest more into the upbringing of these children, and select their partners also to a greater extent according to behavior-related criteria (Trivers 1972; Small 1993)) is one driving force behind the success of the Christian religion. Only if the ideational aspects of the Christian religion were behavior-relevant and obligated males bindingly to a form of behavior which led to outlawing of abortion and infanticide, and the creation of status for women, was the conversion indeed worthwhile. Also, in this case, it is the ideational aspects of religion which are the crucial criteria. Thus, there was a time during which the suppression of infanticide was favorable for reproductive fitness, at least for women, even if it, as described above, was no longer the case during later times.

6.5 Concluding Discussion

Is there a particular role for ideational aspects of religion in human behavioral ecology? Yes, there is, because religion makes cultural information more reliable in a world where people do not really behave in the way the mental representations of their culture promise. However, first and foremost, it is the combination of a supernatural agent, who possesses intimate knowledge about the believers, with spiritual experiences and ritual action (see Harris and McNamara this volume), which makes the belief content of religion behavior-relevant. Otherwise, religions are a Rube Goldberg ("any device that is unnecessarily complicated, impracticable or ingenious," according to the American cartoonist Rube Goldberg; McCauley 2004) and also a Jack-of-all-trades phenomenon. The more complex and sometimes the more contradictory, the better it is. Everybody can pick his/her own information,

and find justification for his/her behavior (Dennett 2006; Malinowski 1948). Religions provide tool for different people in different situations with different needs. This is also true for those who are in search of orientation in difficult situations, just as for those who legitimize authority and social order, question this order symbolically or like to mystify it, and those to whom logically impossible worlds serve as ingroup/outgroup markers (Atran 2002; Eller 2007).

Nevertheless, religious concepts – like culture in general – do influence the awareness, values, and decisions of humans (Durham 1991). However, a defining culture for adaptive reproductive behavior cannot be derived from them. To stress the ideational aspects of religion as reproductive success enhancement is a scientific illusion. Rather, cultural environments are created by means of religion (symbolic niches that can be the starting point of further cultural developments); that is why the term "adaptive" here is completely displaced. In some cases, ideational aspects of religion are the opposite of an increase in fitness, as is demonstrated with the example "infanticide." Religions integrate the values, the goals and the appreciation of the problem of humans concerned in the developing phase of the religions. Thus, it is not surprising that the Roman Catholic religion, which began its career in Roman cities, is rather K-selectively oriented, contrary to the Islamic religion. That also holds true for Buddhism, which started as an upper-class religion in Ashoka's times.

The examples of early Christians and the Couvade show that the conflict between female and male reproductive strategies is one possible starting point for religious interventions for certain ideational aspects. The influence of religion on the reproduction success of the believers is, however, temporarily limited, since culture, social conditions, and environmental conditions are subject to a continuous change. Like cultural information in general, religious teachings are signs of the past. Also, the ideational aspects of religion are under permanent pressure of selection, which can clearly be observed in the universal religions. This pressure is expressed either in a semantic reorientation of religions (Graf 2000) or in the fact that the churches forward some of the religious teachings and denouncing others (Wilson 2002). The persons responsible for guidance and meaning, however, can be in positions of power and socially influential, motivated by their own special interests. That is another reason why the principle quality as adaptive behavior control cannot be attributed to religion.

Those religions, which accept the current social challenge through flexible ideational aspects – and thereby are not propagating yesterday's solutions – are those which successfully support the reproductive behavior of believers. This cannot only be demonstrated for early Christendom, but also for today's active religious communities (see Blume this volume) and it is an example of the character of religion as a variable all purpose-conflict-and-cooperation tool.

Boyd and Richerson (1985) and Richerson and Boyd (2005) have shown that evolved behavioral strategies can be disadvantageous for reproduction, especially if, for example, humans show frequency-dependent behavior (dependent on how many people behave in this way). In this case, they can be culturally successful, but unsuccessful in terms of genetic fitness. This "conformist fallacy" can be deactivated

by the building of cooperative communities as a major religious capacity. The philosopher Hayek (1988) assumes that religion can deter people from following dysfunctional psychobiological behavior instructions. The essay at hand illustrated that not only Darwinian algorithms can be suppressed (as for example, the tendency to commit infanticide), but it can definitely also be warranted to follow those if one's own social environment expects conformist but reproductive disadvantageous behavior (e.g., in the case of female decisions, for the selection of a partner during early Christianity).

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Chapter 7
Talk and Tradition: Why the Least Interesting Components of Religion May Be the Most Evolutionarily Important

Craig T. Palmer, Ryan M. Ellsworth, and Lyle B. Steadman

Abstract Many evolutionary explanations of religion tend to focus on the strange and exotic aspects of religion assumed to be the result of weird beliefs in things that do not exist. In contrast, we propose that religious behavior is distinguished from non-religious behavior by one of the most familiar and mundane of human behaviors: talk. Specifically, we suggest that it is the making, and communicating acceptance, of supernatural claims that distinguishes religious behavior. Given that talk is a form of communication aimed at influencing the behavior of others, we propose that proximate explanations of religion focus on the identifiable social effects of religious behavior. Given that the talk identified as religious was almost certainly transmitted from ancestors to descendants during recent human evolution, we suggest that ultimate explanations of religion focus on the consequences of traditional religious behavior transmitted through a multitude of generations. Our hypothesis is that religious traditions were perpetuated because they increased cooperation among co-descendants by communicating the willingness to accept the influence of each other and their common ancestors.

7.1 Introduction

The conference from which the papers in this volume were drawn began with the projection of the image of an eerily realistic reindeer mask, complete with antlers, worn by a drum-beating figure clad in animal hide (Voland 2007). The image worked, capturing the attention of the audience much like the original shamanic performance captured the attention of our ancestors thousands of years ago as they struggled to survive and reproduce in the harsh environments of evolutionary adaptedness. The projected image enhanced the ability of the speaker to influence those attending the conference much like the costume had originally enhanced the

C.T. Palmer (✉)
Department of Anthropology, University of Missouri-Columbia, 107 Swallow Hall, Columbia, MO 65211-1440, USA
e-mail:palmerct@missouri.edu

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shaman's ability to influence the behavior of those gathered around him. It also left those attending the conference to ponder the intriguing question: What could possibly have caused the original participants in the shamanic ritual to believe their claim that the clad figure was actually the spirit of their long-dead totemic ancestor?

Despite its effectiveness as a tool of communication, such imagery is so stimulating to the human brain that it may detract our attention from asking questions about less exciting aspects of religion. This is unfortunate because less exciting aspects of religion may be precisely what humans use to distinguish religious behavior from non-religious behavior, and thus the key to explaining the universality and evolutionary significance of religion.

The gathering of scientists at this conference can be used to illustrate this point. The opening scene of our conference was like the religious shamanic rituals of our ancestors in many ways. In addition to the image of the costume of the shaman just described, people were gathered together and facing one particular person, individuals were dressed in ways appropriate to the occasion, and participants engaged in ritualistic behavior such as simultaneous applause at specific times. And yet, shamanistic performances are labeled "religious," but the opening talk of the conference was not. This implies something is different between the two sets of human behavior patterns. Something that occurred in the shamanic rituals of our ancestors, and is identifiable to human senses, make us label it "religious," but this must be absent from our conference because we label it "non-religious." The imagery that we find so interesting cannot be the environmental cue that we use to distinguish things we label religious from those we do not because it is present in both cases. It must be something else, but what?

7.2 What Do People Use to Distinguish "Religious" Behavior from "Non-religious" Behavior?

Standard answers to the question of what distinguishes religious behavior from non-religious behavior usually point to something even more interesting than the behaviors just described: the *beliefs* in supernatural beings and forces assumed to be the cause of the behaviors. In the example previously described, it would be asserted that it is the *belief* on behalf of the people attending the shamanic performance, and perhaps also on behalf of the person wearing the mask, that the masked figure is actually a supernatural being (i.e., the spirit of their clan's totemic ancestor) that leads us to label it religious. We reject the hypothesis that such alleged supernatural beliefs are what people use to distinguish religious behavior from non-religious behavior because we reject the *assumption* that people actually hold such beliefs. We reject the assumption of belief, not because we are convinced that individuals do not believe the supernatural claims that they make, but simply because there has yet to be found a way to determine if people believe their supernatural claims or not. As anthropologist Rodney Needham wrote over 30 years ago, "Clearly, it was one thing to report the received ideas to which a people subscribed, but it was quite another matter to say what was their inner state (belief for instance) when they

expressed or entertained such ideas. If, however, an ethnographer said that people believed something when he did not actually know what was going on inside them, then surely his account of them must, it occurred to me, be very defective in quite fundamental regards" (Needham 1972).

Although religious beliefs may play a significant role in religious behavior, our inability to identify whether or not other humans actually hold the religious beliefs they claim to hold, rules out these alleged beliefs as the stimulus humans use to distinguish religious behavior from non-religious behavior. Furthermore, the unobservable quality of belief necessarily deems it an unacceptable subject for the scientific (empirical) study of religious behavior. This is because all of the activities identified as religious could be performed by a non-believer and no one would be able to tell (Steadman and Palmer 1995; Palmer and Steadman 2004). This problem cannot be solved by claiming to have a "scientifically acceptable" degree of certainty (e.g., 95%) about the probability that an individual believes the supernatural claims they make. Such probabilities could be calculated about the claim that the identifiable behavior of making a supernatural claim (e.g., saying "I believe Jesus Christ is the son of God") will be followed by subsequent identifiable patterns of behaviors (e.g., attending a Christian Church Service within the following month), but determining the probability of correlations between two such observable behavior patterns tells us nothing about the probability that the individual in question does or does not actually believe Jesus Christ is the son of God.

As an alternative, we have proposed that religious behavior is distinguished from non-religious behavior, neither by colorful masks nor grueling rituals nor beliefs in supernatural beings and forces, but by one of the most familiar and mundane of human behaviors: talk. That is, a certain type of talk, and only a certain type of talk, distinguishes what people label as religious behavior from what they label as non-religious behavior. For example, the only thing that identifiably distinguishes a religious ceremony from a non-religious one is the occurrence of certain talk.

There are several reasons why talk has received little attention in attempts to explicitly identify exactly what stimulus people use to identify something as religious. Not only is it easy to overlook something that is so ubiquitous and familiar as human speech, there is also a tendency to refer to this human behavior as "just talk." This phrase implies that talk is trivial in comparison to such alleged mental phenomena as religious beliefs, ecstatic emotions (Sosis and Alcorta 2003), anomalous or distinctive brain states (Winkelman 2004), or repetitive (i.e., ritualized) body movements, especially when the bodies are decorated with intricate patterns of color or made to resemble an animal (e.g., a reindeer). Such a view of talk as trivial is misguided because talk is a form of communication aimed at influencing the behavior of others, and perhaps nothing has greater impact on the survival and reproduction of humans than the ability to influence, and be influenced by, the behavior of others. As Pinker and Bloom state, "Humans everywhere depend on cooperative efforts for survival. . .Language in particular would seem to be deeply woven into such interactions" (Pinker and Bloom 1992). The conclusion that a certain type of talk, rather than the identification of belief, distinguishes what humans label as religious from what they label as non-religious was also reached by Rappaport over 30 years ago.

Rappaport recognized that what distinguishes religious ritual from non-religious ritual are supernatural claims, or what he called "unverifiable propositions." To illustrate what he meant he stated, "a religious ritual *always* includes an additional term, such as a statement about or to spirits " (Rappaport 1979).

We suggest three revisions to Rappaport's definition. First, we suggest replacing "unverifiable proposition" with the more familiar *supernatural claim*(note that supernatural claims are by definition unverifiable propositions). The use of the more familiar phrase makes it more accessible to attempts to falsify the definition with non-conforming examples.

The second modification is much more important. The making of supernatural claims is an obvious place to start an attempt to identify exactly what kind of talk is considered religious, but when a person makes a supernatural claim we do not necessarily conclude he or she is engaging in religious behavior. We may, for example, label the behavior of someone claiming that they are surrounded by unidentifiable creatures "crazy" or "delusional." We propose that it is only when other people communicate their acceptance of that supernatural claim, that the word "religious" is used to label the behavior. Does communicated acceptance of another person's supernatural claim imply belief ? Of course not. Communicating acceptance is identifiable behavior, such as shouting "Amen" after someone makes a supernatural claim, and can be seen as a promise to behave in a certain way in the future. Hence, the sincerity of the communication will be judged by the receiver, and others, in the same way we judge any sincerity – by subsequent behavior, not by identifying beliefs.

The third modification to Rappaport's definition is that the communicated acceptance of the supernatural claim be made by adults, whether or not children communicate acceptance of the supernatural claim. This criterion is necessary to account for why supernatural claims that only children communicate acceptance of (e.g., fairy tales, Santa Clause) are not labeled as "religious." Thus, we propose, as a testable hypothesis, that religious behavior is distinguished by, and hence can be defined as, the *communicated acceptance of a supernatural claim (that at least one adult communicates acceptance of to another adult)* . That is, this identifiable pattern of behavior constitutes the necessary and sufficient elements for identifying behavior as religious. This definition can be tested by examining what criteria people actually use to label some observed behavior as religious or not religious. If this definition can withstand skeptical evaluation of other uses of the word "religion," the essential task in the study of religion will be to account for the communicated acceptance of supernatural claims.

There are several points to keep in mind when evaluating this definition. First, people sometimes call something religious without experiencing this specific kind of talk at that exact moment and place. This, we propose, is because they have experienced that kind of talk associated with stimuli similar to the current environmental stimulus in the past and are guessing or assuming that such talk sometimes occurs in association with the current stimulus. If this is the case, people should quit labeling the activity religious once they have been informed that their assumption is incorrect because such supernatural talk is not actually associated with the current

stimulus. For example, someone looking at the wall of a building might see a vertical line crossed slightly above its mid-point by a shorter horizontal line and label it a "religious" symbol. This is because they assume that people claim that the marking represents how "the son of God" was crucified (a supernatural claim that people frequently communicate acceptance of). If, however, the person was informed that the marking is simply the letter "t" left over from a sign once saying "the . . ." that had lost the rest of its letters, they would change their conclusion and label the marking non-religious.

On the other hand, when people learn that the communicated acceptance of a supernatural claim is associated with something they had previously labeled as "non-religious," because they had not experienced such talk associated with the stimulus in the past, we predict they will start to label it "religious." Someone might call a small hand held Tibetan *mani* a "child's toy" that has nothing to do with religion, but would call it "religious" once hearing people communicate acceptance of the claim that the device is a way of spreading "spiritual" (i.e., unidentifiable, and thus supernatural) blessings. Indeed, knowing that the word "prayer" implies the widely accepted claim of being able to communicate with the supernatural, the person would label the device religious as soon as they were told it was a "prayer wheel."

A related point to remember is that the term "religious" is often extended in ordinary usage to include activities that tend to be associated with the communicated acceptance of supernatural claims, but which are not themselves distinctively religious. For example, certain activities like spinning a prayer wheel, or taking communion, are almost always accompanied by supernatural claims. But if the assumption that supernatural claims are associated with these activities were found to be false, as in the previous example, the behavior accompanying the supernatural claims would cease to be labeled "religious." For example, what was previously claimed to be a prayer wheel would be labeled a toy and what was previously labeled communion would simply be called a meal. Thus, while the communicated acceptances of supernatural claims are used to distinguish religious behavior, activities merely associated with supernatural claims are not themselves religious.

Another way to test our definition involves situations where claims previously considered supernatural turn out to be verifiable by the senses. Since a supernatural claim is a claim which, on the basis of the observer's senses (which is all one can depend on), is not demonstrably true, this definition implies that if such a claim did turn out to be demonstrably true, it would no longer be supernatural, and hence the communicated acceptance of such a claim would no longer be labeled "religious."

7.3 The Identifiable Effects of "Religious" Behavior

This view of religious behavior as talk leads us to propose that proximate explanations of religion should focus on the identifiable social effects of religious behavior (i.e., the effects of making and communicating acceptance of supernatural claims). We propose that the explicit, communicated acceptance of a claim that cannot be

verified by the senses communicates *a willingness to suspend skepticism;* to suspend the critical use of the senses to examine the accuracy of an assertion. The communicated acceptance of a claim whose truth cannot be demonstrated communicates *a willingness to accept another person's influence non-skeptically*, without regard to one's own senses. This in turn promotes the formation of cooperative social relationships since such relationships are distinguished by the mutual acceptance of influence. This is consistent with the assumptions of the branch of evolutionary theory known as "signaling theory" which holds that "signals are best seen as *attempts to manipulate, rather than inform*, other organisms" (Cronk 1994, emphasis added; see also Dawkins and Krebs 1978; Palmer and Wadley 2007). In the case of religious behavior, we say that the goal of the manipulation (i.e., influence) is the promotion of close kin or kin-like cooperation, and that this is the primary effect of religion (Steadman and Palmer 2008).

This effect of religious behavior could have been of evolutionary importance even if such behavior occurred only sporadically and in an unsystematic way, randomly increasing cooperation here and there over the last several thousand years of human existence. Although we can imagine a species with this form of religious behavior, it is clearly not a description of the occurrence of religious behavior among humans. Religious behavior among humans has been highly patterned because it has been extremely traditional. Communicating acceptance of specific supernatural claims has been a pattern of behavior copied from parent to offspring for many generations in all known cultures. Any explanation of religious behavior must explain the strong tendency of religious behavior to be traditional.

Thompson asks, "Why, if we are believers, is the one and only true god the God of our parents and grandparents?" (Thompson 2001). By avoiding the untestable assumption of belief, we can rephrase this question to read: "What were the identifiable consequences of communicating acceptance of traditional supernatural claims over many generations, that caused selection to favor people engaging in such traditional religious behaviors over people that did not?" Our hypothesis is that such traditional religious behavior increased cooperation among co-descendants over many generations by communicating the willingness to accept the influence of each other and their common ancestors.

One indication of the importance of traditional supernatural claims during the last few thousand, or tens of thousands, of years is indicated by what appears to be the most common supernatural claim found in traditional societies. Anthropologists have long realized that religious behavior takes place in all known human societies. Wherever people have managed to survive and reproduce, they have communicated acceptance of supernatural claims. What has not been realized is that not only do humans everywhere communicate acceptance of some supernatural claim, it is possible that in every traditional human culture known to anthropology, individuals have communicated acceptance of the essentially the same supernatural claim: the claim that *dead ancestors can influence the living and/or be influenced by the living*. At the very least implicit references to claims of communication between dead ancestors and their living co-descendants appears to be at least nearly universally found in the ethnographic literature. For example, such behavior is not only reported

in all of the ethnographic descriptions of societies coded by Swanson (1964) as having "ancestor worship," but also in every society coded by Swanson as *lacking* ancestor worship (Steadman et al. 1996).

Why, out of all the myriad supernatural claims possible, would individuals in all known human groups make – and communicate acceptance of – this particular claim? We suggest the answer to this question can be understood by viewing supernatural claims about dead ancestors within the larger context of the importance of ancestors, traditions and kin during recent human evolution. Ancestors not only provide us with our genetic material; they are also the source of traditions and kin, resources essential to human survival and reproduction everywhere. In fact, in traditional societies, kin are often the most important resource for survival and reproductive success (Irons 1979). Starting at least several tens of thousands of years ago the social environments of our ancestors required two types of traditions: (1) the identification of large numbers of kin, required giving offspring some kind of symbol indicating that they are your descendant, such as a descent name, and (2) influencing your offspring to copy your behavior (Palmer and Steadman 1997). When, and only when, this type of tradition exists and is copied relatively perfectly over many generations can "large lineages or clans ... grow up over time as the descendants of the original ancestor /ancestress" accumulate (Fox 1967). Influencing these large numbers of identified descendants to cooperate with each other required a second tradition. This second tradition consisted of influencing your offspring to cooperate with individuals identified as kin and to copy that behavior (Palmer and Steadman 1997). The existence of this second tradition is succinctly demonstrated by the Lugbara of Africa saying that, "the rules of social behavior are the 'words of our ancestors'" (Middleton 1960).

By encouraging respect for ancestors, ancestor cults promote both respect for living kin and the transmission of traditions between them (Steadman and Palmer 2008). Traditions in general help to prevent deviations from patterns of behavior proved to be successful in leaving descendants (Palmer 2008; VanPool et al. 2008). Traditional ancestor worship rituals, by requiring cooperation among co-descendants in their performance, encourage future cooperation among both the current set of co-descendants, and when repeated in subsequent generations, the descendants of the current co-descendants. Religious rituals that focus on ancestors thus strengthen kinship ties and the traditions on which they depend:

> Evidently the family-cult in primitive times, must have greatly tended to maintain the family bond: alike by causing periodic assemblings (sic) for sacrifice, by repressing dissensions, and by producing conformity to the same injunctions (Spencer 1972, p. 96).

As part of such rituals, the claim that ancestors can influence the living and/or be influenced by them would strengthen kin ties and the transmission of traditions in two ways. First, the reference to long-dead ancestors provided a means of involving many more co-descendants than the few who could trace their common ancestry through only a few generations (Palmer and Steadman 1997). Second, as Rappaport points out,supernatural claims – such as that dead ancestors influence the living or are influenced by them – establish "the quality of unquestionable truthfulness"

(Rappaport 1979, p. 262). Such claims about ancestors promote the acceptance of traditions because "although one can argue to a point with an elder, no one questions the wisdom and authority of an ancestor" (Lehmann et al. 2005; see also Fortes 1969). The cost of questioning what dead ancestors are claimed to say is usually prohibitively high because of the rejection of both traditions and kin such skepticism would imply (Wadley et al. 2006).

Traditional supernatural claims about ancestors are typically called myths. The relationship between myths, ancestors and traditions, as well as the ability of myths to create cooperative social relationships among co-descendants was summarized by Malinowski,

> Myth . . . is the statement of an extraordinary event, the occurrence of which once for all had established the social order of a tribe [co-descendants of the ancestor who started the myth] . . . It justifies by precedent the existing order and it supplies a retrospective pattern of moral values . . .It fulfills a function *sui generis* closely connected with the nature of tradition . . . with the continuity of culture, with the relation between age and youth and with the attitude toward the past. The function of myth is to strengthen tradition and to endow it with a greater value and prestige by tracing it back to a higher, better, more supernatural and more effective reality of initial events (Malinowski 1979, p. 45).

Myths (Steadman and Palmer 1997) as well as traditional stories in general (Coe et al. 2006), told by elders (Coe and Palmer in press) are one of the major ways ancestors encourage altruism (Palmer et al. 2006), and other forms of moral behavior (Coe and Palmer 2007), among their descendants. Myths are often accompanied by traditionally encouraged ritual sacrifices (Palmer et al. 2006) that encourage cooperation by signaling a willingness to sacrifice for co-descendants. The potential consequences of traditions of descent names,myths and rituals encouraging cooperation among kin being copied over a great many generations, is evident by the fact that the axiom of kinship amity "applies to all of the Tiv" (Fortes 1969) where "the whole population of some 800,000 traces descent by traditional genealogical links from a single founding ancestor " (Keesing 1971).

There is one other way in which the shamanic image used at the start of the conference was appropriate for the study of the evolutionary significance of religious behavior. Although best known for their dramatic costumes, altered states of consciousness, use of hallucinogenic drugs, ventriloquism and sleight of hand tricks, perhaps the most common attribute of shamans is their claimed association with ancestors. Shamans commonly, if not universally, claim to visit or in some other way communicate with the dead ancestors of their followers, usually bringing back instructions from the ancestor for how their living descendants should behave (Steadman and Palmer 1994).

Finally, relatively recent so-called "world" religions are so designated, not because they necessarily exist in every part of the world, but because they are not confined to one specific locality. The significance of this fact is that the membership of the religion is not confined to people who consider themselves actual kin with one another. World religions are not confined to individuals who consider themselves to be actual co-descendants of a common ancestor. Hence, world religions might be more accurately referred to as non-kin, or perhaps multi-kin, religions. World

religions do, however, often form their own traditions that create social relationships among non-kin that are very much like the kinship relationships found in kin-based religions (Palmer et al. 2008). The reason why religious groups tend to create deeper, more enduring social relationships than are found in other social groups is because the relationships created are like those between kin in a family; they are based on trust, commitment,sacrifice, altruism, and the unquestioning acceptance of their prophet's or ancestor's parental-like guidance. Hence, frequent references to and metaphorical use of kin terms in world religions (Steadman et al. 1996).

7.4 Conclusions

Evolutionary explanations of religion have followed previous theoretical approaches in two ways. First, they have tended to focus on the strange, exotic and seemingly bizarre aspects of religion. Second, they have assumed that these strange behaviors are the result of even stranger beliefs in supernatural beings and forces that do not actually exist. This has led to research on such topics as the cognitive psychology of delusion (Dawkins 2006), the imaging of brain activity during trance states, the neurobiology of memory associated with grueling rituals (Newberg et al. 2001), and evolutionary scenarios about why natural selection favored the cognitive mechanisms producing the supernatural beliefs assumed to underlie all forms of religious behavior (Boyer 1992). When the findings of such studies are discussed in relation to political topics like religious fundamentalism, the war on terror, and suicide bombers, evolutionary explanations of religion may be as piquant as any aspect of current science.

Many, if not all, of the current areas of study just described may help explain important aspects of behaviors sometimes associated with religious behavior. We suggest, however, that focusing on these exotic and bizarre subjects has diverted researchers from explaining what may actually distinguish religious behavior from non-religious behavior. This is important because any scientific study of religion must begin by making implicit or explicit assumptions about what sensory stimuli are used by humans to distinguish and label some behaviors as religious and other behaviors as non-religious. The failure to make one's own assumptions about the definition of religion explicit can lead to the mistake of thinking that an accurate definition of religion (i.e., a definition that succeeds at predicting how people use the word "religion" literally) is a tautology. For example, if our explicit definition proposing that it is a certain type of talk that people label religious is accurate, it might look like a tautology simply because our definition is commensurate with the behavior that people have learned to label as religious. Far from being a tautology, an explicit definition of religion that is commensurate with what people have learned to label "religious" would constitute a major contribution to the scientific study of religion.

In this chapter we have not only presented a testable hypothesis about the nature of the stimuli people have learned to label as religious but also provided an evolutionary explanation for why this distinctively religious behavior has come to exist.

At the proximate level, we propose that the clearest identifiable effect of religious behavior is the formation of close kinship-like cooperative social relationships. At the ultimate level, we prose that the strong tendency of religious behavior to be traditional means that ancestors who were able to originate or perpetuate religious traditions promoted increased cooperation among many generations of their descendants, and thus enjoyed more descendant-leaving (i.e., evolutionary) success.

Although our approach differs from all of the other approaches in this volume in its focus on talk instead of belief, it is very complementary to many of the other chapters.

Our view of religious behavior as a descendant-leaving strategy is very consistent with Blume's evidence of religious behavior still being correlated with reproductive success in some modern populations (Blume, this volume). Our view of religious behavior being distinguished by behavior that communicates the acceptance of another person's influence in a way that is similar to a child's acceptance of a parent's influence is consistent with Bering's work on the behavior of children in response to supernatural claims made by adults (Bering 2007), Bouchard's association of religion and "obedience," (Bouchard, this volume) and Feierman's observation that religious behavior is often associated with body posture's that communicate "submissiveness" (Feierman, this volume). Our model of the ability of religious traditions to increase the size of the network of identified and cooperating co-descendants as they are transmitted from one generation to the next also provides a potential mechanism for Lahti's observation about the expanding circles of human cooperation during recent human evolution (Lahti, this volume).

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Chapter 8
The Reproductive Benefits of Religious Affiliation

Michael Blume

Abstract As the brain of early humans expanded, they gained increasing abilities of considering cooperative tasks – finally including reproduction. The subsequent, probably convergent evolution of religious beliefs and related behaviors such as burials and offerings among *Homo sapiens* and among *Homo neanderthalensis* illustrates that religious abilities evolved as a logical consequence: perceived supernatural agents like ancestors or Gods are experienced as observing streams of tradition conferring values and communal trust, rewarding cooperative adherents and punishing transgressors. They advocate reproductive motivation as well as marriage. Believers may signal their trustworthiness to each other by costly obligations and rituals dedicated to the supernatural agents. Religion-related genetic dispositions as well as demographically successful traditions are thus favoured by direct and kin selection and by sexual selection, as shown by the Swiss Census 2000 and international demographic data.

8.1 Old Game with New Rules: Pondering Reproduction

In 1838, a young man took a paper, titled it with "That's the question" and drew a line on it. Then he assembled arguments regarding marriage. In doing so, he noted, he would lose liberties to choose his whereabouts and friends. He would probably never be able to visit America and learn French and he would have to carry the financial costs of children. The list of arguments favouring marriage was started with "Children (if it's God's will)", having a "nice woman" around when enjoying books and music and not being alone when old. His decisive thoughts initiated by a written "My god" he finally concluded, "Marry, Marry, Marry".

But of course, the young man needed a cooperative partner to fulfil his plans. So he visited his cousin, Emma Wedgwood. They talked, but although the young man

M. Blume (✉)
University of Heidelberg, Institut für Religionswissenschaft, Akademiestraße 4-8, 69117 Heidelberg, Germany
e-mail: mi.blume@t-online.de

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was known to have inherited a fortune, Ms. Wedgwood took special interest in his religiosity. Only after being convinced that her suitor was a faithful Christian, she agreed to become his wife and to have children with him.

This young man weighing up biographic, economic and reproductive arguments was named Charles Darwin. Randal Keynes republished these and other details recently – one of the great-great-grandsons of Darwin who would not have been around if his ancestor had decided otherwise (Keynes 2001).

The exciting fact about this biographical record is that we are confronted with a contradiction. On the one hand, we know about Darwin's tentative assumption that mankind may be driven by a Malthusian, reproductive imperative like all other animals (Darwin 1871). And on the other hand, we read about a biographical Darwin who went through rational decision making, calculating benefits and costs of marriage and children – citing religious terms in the process. Many theorists of human evolution still tend to ignore or downplay the difference between genetically fixed and human reproduction strategies, assuming that the results must somehow be the same. But are they?

Darwin has not been alone in deciding reproductive matters. Ethnologists have found plenty of evidence among recent hunters and gatherers regarding cultural marital constraints to sexuality, the use of contraception and even infanticide (e.g. Lee and Devore 1999). Affluent and free human populations like those of Germany, Switzerland and Japan have begun to shrink due to low-birth rates, especially affecting wealthy and educated strata. Chinese politicians enforced lower-birth rates, affecting the reproductive behavior of millions of people with some success – and some consequences of people's subsequent decisions not intended, like prenatal diagnosis and the subsequent abortion of girls. Started by orthodox rabbi Joseph Ekstein in Brooklyn in the 1980s, religious organizations like Dor Yeshorim offer genetic testing before marriage, successfully reducing rates of genetic disorders like Tay-Sachs in their communities (George 2004).

Humans "play" the same biological game of reproduction as animals, but they are able to weigh up paths in advance, their range of choices shaped by knowledge and culture. After numerous failed attempts to explain human reproduction the Malthusian way, scientific demography shifted to sociology and economics for decades. Today, demographic models are firmly based on humans calculating costs and benefits of parenthood in different settings. Studies compare the attributed "values of children" across countries and cultures (Nauck 2006).

But entering reproductive decision making, humans also have to solve motivation problems (births are known to be painful and sometimes dangerous, children are costly, etc.) and pending dilemmas of sexual cooperation, as they realize that they could be betrayed by unfaithful partners. Religiosity, understood as believing in supernatural guidance and surveillance of all parties involved, evolved (and evolves) as a biological and highly successful solution. Humans who are members of religious communities show statistically higher motivations towards marriage, children and family values, more cooperative orientation and finally higher reproductive success than their secular contemporaries.

8.2 Religious Activity and Reproductive Advantage

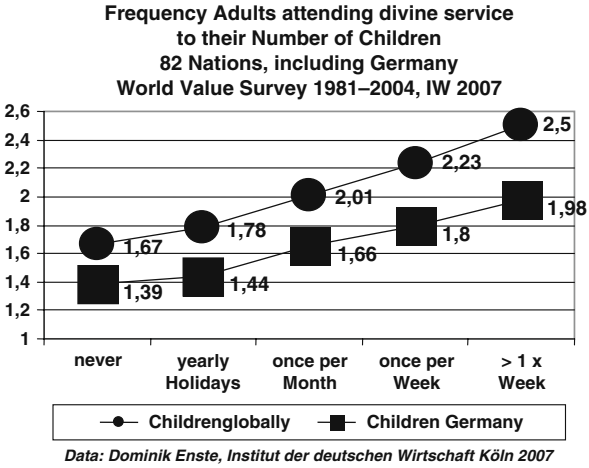

Fig. 8.1 Global correlation of worship attendance and number of children (Enste 2007)

There are obvious examples linking religious affiliation to reproductive success: orthodox Jewish communities attain far higher-birth rates than their secular neighbours in Israel or abroad. US-Amish and Hutterites have far more children than their rural contemporaries. National surveys allow probing into the influence of education or income – showing that the reproductive benefit of religious affiliation even tends to increase among the educated and wealthy risking more biographic options (cp. Birg 2004; Blume et al. 2006).

But there is even stronger data. Switzerland has been the only European country spared by any war for 160 years, becoming one of the wealthiest nations worldwide. Thankfully, the Swiss Statistic Office opened its treasure troves of the last census, conducted in the year 2000. It included a non-discriminating question relating to religious denomination, which was answered by 6,972,244 individuals amounting to 95.67% of the Swiss population.

We may compare the birth rates per woman of all religious denominations differentiated by the Swiss Statistic Office with more than 10,000 adherents. And in order to check two possible alternative explanations, we will test as well if these birth rates among religious communities might be determined by education or income levels of its members (Table 8.1).

The results are highly significant: women among *all* denominational categories give birth to far more children than the non-affiliated. And this remains true even among those (Jewish and Christian) communities who combine nearly double as much births with *higher percentages of academics and higher income classes* as their non-affiliated Swiss contemporaries.

Table 8.1 Birth rate per woman and religious denomination

Swiss Census 2000; denominational category	Births per woman	% Academic education	% Higher occupational class
Hinduism*	2.79 (1)	17.0% (12)	7.4% (14)
Islam*	2.44 (2)	11.4% (15)	6.1% (15)
Jewish	2.06 (3)	42.7% (1)	42.4% (1)
Independent protestant	2.04 (4)	20.1% (5)	19.2% (6)
New pietism/evangelical	2.02 (5)	19.2% (6)	17.9% (8)
Pentecostal	1.96 (6)	17.1% (11)	15.7% (10)
Other (smaller) Christian	1.82 (7)	39.1 (2)	31.8% (2)
Did not answer	1.74 (8)	19.1% (7)	5.3% (16)
Christian-orthodox*	1.62 (9)	18.0% (10)	9.8% (13)
Swiss average	1.43	19.2%	19.6%
Buddhist*	1.42 (10)	20.3% (4)	13.4% (11)
Roman catholic (M)	1.41 (11)	16.8% (13)	18.5% (7)
New apostolic	1.39 (12)	13.9% (14)	17.6% (9)
Protestant-reformed (M)	1.35 (13)	18.9% (8)	22.3% (4)
Yehova's witnesses	1.24 (14)	6.8% (16)	11.2% (12)
Christian-catholic	1.21 (15)	18.4% (9)	22.2% (5)
Non-affiliated	1.11 (16)	30.6% (3)	26.7% (3)
Spearman rank correlation (r)	–	0.054 (n. s.)	–0.269 (n. s.)
Data source – BFS 2004	p. 43	p. 117	p. 115

Categories marked by * are dominated by first-generation immigrants to Switzerland. Categories marked by an (M) have more than one million adherents.

Tested with the Spearman rank correlation coefficient, there remains *no* rank conjecture relating to the percentage of academics, as the Jews and some protestant minorities have begun to win and hold educated strata.

There is a slight negative rank correlation relating birth rates and career positions. Even as they have climbed the same educational classes as their secular contemporaries, religious parents seem to have sacrificed occupational options for the sake of children. That this does not indicate relying to traditionalism only is highlighted by the fact that very traditional and centralized communities like Yehova's Witnesses and the New Apostolic Church performed low in reproduction, whereas young and demographically thriving protestant minorities featured record rates of part-time working mothers (BFS 2004, p. 46).

As Friedrich August von Hayek, a Nobel Prize winner in economics was the first to assume (von Hayek 1982): religious communities tend to incorporate those "streams of tradition" which bestowed "reproductive benefits" to their adherents. These successful strategies emerge "not intrinsically, but historically" as a result of constant competition between religious communities and fractions in the fields of demography (von Hayek 1991). Wherever religious freedom is secured, thriving religions evolve and test new reproductive adjustments to changing environments, including family models, developments in gender relations and institutions of child care (cp. Adsera 2004). Under certain circumstances, family-oriented institutions upheld by celibate functionaries helped to improve mean reproduction and survival rates (Qirko 2004; Berman et al. 2007; Blume 2008).

8.3 The Religious Mind Promoting Reproductive Strategies

E.O. Wilson wrote, "that the brain exists because it promotes the survival and multiplication of the genes that direct its assembly. The human mind is a device for survival and reproduction and reason is just one of its various techniques." (Wilson 1978).

Regarding planning abilities, it is not only the brain size that matters. Our brain volume is exceeded by whales and elephants by far. Uniquely large is the prefrontal cortex, the region above the eyes. As neurobiology discerned, our prefrontal cortices relate to calculating actions and delaying impulses, weighing strategic and moral dilemmas, guilt and remorse, acting socially oriented ("theory of mind") and constructing biographic identities. People who are affected with frontotemporal dementia (Pick's disease) lose social, lingual and emotional skills and happen to change their political and religious worldviews abruptly. Neuroimaging techniques observing people while praying or reading Holy Scriptures as well as studies related to effects of medical drugs and symptoms of Parkinson's disease also support the thesis of a close connection among the prefrontal cortex and religious activity (Zimmer 2006; Harris and McNamara 2008; Harris and McNamara this volume).

What's more, since the middle paleolithic, as the prefrontal cortices evolved along with biographic calculation and tool-using cultures among *Homo sapiens* and *Homo neanderthalensis*, both human species convergently evolved religious behavior like ritual burials and offerings (Stringer and Andrews 2005). The fact that recent Twin Studies discerned a moderate to high heritability coefficient of religiousness among recent *H. sapiens* supports the thesis of adaptive abilities evolved (and evolving) into human brain architecture (Koenig and Bouchard 2006; Harris and McNamara 2008; Bouchard this volume).

We might assume that early *H. sapiens* and *H. neanderthalensis*were beginning to face the very question of choices Darwin had to cope with.

During his biographical decision making, his religiosity (which he would partly abandon later in life) did not relate to any competition for survival, but to his personal motivation to reproduce. The young Darwin cited God as he pondered to have a family. This rings not only with the demographic data, but also with the fact that God's first biblical words to mankind are "Be fruitful and multiply" (Gen. 1, 28), forming the first of all 613 commandments according to Jewish tradition.

Religious communities preaching family values with some success might be observed in everyday as well as in political life. Higher-birth rates of religious affiliated have been empirically verified globally (e.g. Inglehart and Norris 2004; Birg 2004; Newman and Hugo 2006, Philipov and Berghammer 2007; Frejka and Westhoff 2008; Pew 2008). For example, according to a representative survey conducted among younger people aged 16–29 years in Germany in 2006, 42% of the respondents who described themselves as non-religious said it was "important" to them to "have children ". Among the religious respondents, children were valued that way by 61% (Allensbach 2006).

Of course, there have also been communities hindering or even forbidding reproduction, e.g. the Shakers. At first glance, they seem to have a competitive advantage

as they could invest more resources into missionary work to win converts. But in the long run, mass conversions happen to be the historic exception, not the rule. Most of the time, only fractions of populations tend to convert from the religious mythology handed to them vertically by their parents (cp. Inglehart and Norris 2004; Stone et al. 2006) and they convert into different directions. But communities who start to lack young members also tend to lose their missionary appeal to other young people. Therefore, the Shakers inevitably over-aged and deteriorated. In contrast, the Mormons still flourish by having many homegrown members and sending them to missionary quests abroad. Orthodox Jews, Amish and Hutterites even stopped active proselytizing centuries ago, nevertheless growing in numbers by their high, reproductive performances. As assumed by von Hayek, the cultural history of religions is very closely linked to demography, contradictions being short-lived variants in religious competition.

The assumption that religious belief in supernatural truths and agents evolved in order to combine reproductive motivation with adaptive cooperation strategies converges fully with theses tracing early mythologies to exaggerated telltales and parental teachings (e.g. Dawkins 1976; Boyer 2001). But these random, biocultural epiphenomena became reproductively beneficiary by demographic competition, spreading successful aspects of lore and related neuronal preferences through thousands of generations (cp. von Hayek 1982; Boyer 2001; Blume 2008). As a consequence, anthropologists rightly deciphered established religious traditions as "descendant leaving strategies", which intensified and expanded kin cooperation to larger groups of adherents as they were referring to shared (and later mythological) ancestors (Palmer and Steadman 2004; Palmer this volume). Even religions that abstain from calling God a parent (e.g. Islam) or are not theistic in orthodox theory (e.g. Buddhism, secular ideologies) frequently borrow familial terms like brother, sister, mother, father, uncle, etc. in order to emphasize kin-like, cooperative bonds. And burials remain the first archaeological traces of religious behavior, indicating faith in the enduring, supernatural existence of deceased.

Psychological experiments confirmed that children tend to believe in post-mortem existences intuitively – a concept which they partly lose with age and secular education (Bering et al. 2005). As adults were unconsciously primed with religious or civil religious terms, they tended to act more generously in dictator games (Shariff and Norenzayan 2006).

But these very results also highlight why religious minds and motivations cannot be biologically successful in isolation: reproduction itself, keeping the children alive, handing traditions abroad and building a favourable environment for subsequent generations are cooperative tasks from the very start. Individuals have to get access to reliable, communal sources of "streams of tradition" and to secure their religiously motivated, costly investments.

By deflecting exploiters and building trust, religious obligations and ritual behavior network the individuals into distinct communities, usually offering and rewarding competitively successful descendant leaving strategies, communal child-care and education and other cooperative gains (cp. Wilson 2002; Sosis and Bressler 2003; Newman and Hugo 2006; Berman et al. 2007).

8.4 Religious Behavior as Honest Signals

As any mammalian reproduction is associated with heavy costs and risks especially to the mothers, biologists are used to comprehend animal reproductive strategies by investment games leading retrospectively (that means: by relative success) to Evolutionary Stable Strategies.

But as soon as humans began to decide their pairing and reproduction strategies in advance, the setting changed to the prisoner's game with uneven stakes (McCain 2003). For women, the risk of defecting partners seeking reproductive chances otherwise instead of staying and contributing to the children has been a constant topic of human history. Men had to struggle with a certain insecurity of whether the children they were raising were their own offspring (cp. Voland 2007). Wrong choices could be crucial, as Johann Wolfgang von Goethe described in his classic "Faust". His young Margarethe (fondly called "Gretchen") was depicted after Susanna Brandt, whose death sentence Goethe had witnessed being a lawyer in Frankfurt. Lacking any supporting family or group, the orphan had been seduced and left by a travelling suitor, finally executing infanticide to her newborn in despair.

And what question did Goethe's Gretchen pose to Faust in order to assess his loyalty? "How is′t with thy religion, pray?" – inviting disaster as she accepted Faust's blend of non-affiliated agnosticism and pantheism. It is Goethe's devil Mephistopheles, who clearly sees the correlation of "catechised" (that is, communally approved) religion to marital loyalty. Annoyed, he scoffs (Chap. XVI),

> I've heard, most fully, how she drew thee.
> The Doctor has been catechised, 'tis plain;
> Great good, I hope, the thing will do thee.
> The girls have much desire to ascertain
> If one is prim and good, as ancient rules compel:
> If there he's led, they think, he'll follow them as well.

We might remember that Emma Wedgwood probably would not have accepted Darwin if he had not been religious at the time of his courtship. Marriage contracts are cultural institutions to secure cooperation and to prevent betrayal. And among almost all cultures, marriage vows are accompanied by religious rites, regularly involving supernatural as well as natural witnesses.

And if there are communities around whose marriage vows are blessed by all-knowing, transcendent beings like the living dead or Gods punishing unfaithfulness in this life or the next, the "social control" is expanded and deepened beyond secular possibilities (cp. Bering et al. 2005). Therefore, women's preferences of religious communities and their sexual selection towards "catechised" men turns out to be evolutionary adaptive. We may test this by comparing all religious denominations not predominated by immigration in the Swiss Census 2000 (Table 8.2).

Swiss women not only dominate memberships in *all* major denominations. They significantly prefer those communities, where living together means to marry, where pairs tend to have children together and where divorce rates are low.

Table 8.2 Denomination and female membership

Swiss Census 2000 denominational	Female members (%)	Pairs married (%)	Pairs living with children (%)	Single parents (%)
Yehova's witnesses	57.4% (1)	99.3% (1)	53.3% (4)	5.2% (6)
Protestant-methodists	56.4% (2)	97.1% (5)	49.8% (8)	3.0% (1)
Smaller Christian	54.9% (3)	93.9% (6)	51.2% (6)	6.8% (7)
Pentecostal	54.6% (4)	98.5% (3)	63.8% (2)	5.1% (5)
Independent protestant	54.6% (5)	97.8% (4)	59.4% (3)	4.2% (4)
New apostolic church	54.1% (6)	91.1% (8)	44.6% (9)	5.9% (10)
Christian-catholic	53.9% (7)	89.4% (10)	41.7% (11)	5.6% (9)
Evangelicals	53.5% (8)	98.9% (2)	65.6% (1)	5.9% (10)
Protestant-reformed (M)	52.7% (9)	88.2% (11)	44.0% (10)	5.4% (7)
Roman catholic (M)	51.6% (10)	89.8% (9)	51.4% (5)	5.5% (8)
Judaism	51.0% (11)	93.9% (7)	51.0% (7)	6.3% (11)
Swiss average	51.0%	89.0%	48.5%	5.8%
Non-affiliated	45.9% (12)	81.5% (12)	40.0% (12)	7.8% (12)
Spearman rank correlation (r)		0.696* ($p < 0.05$)	0.622* ($p < 0.05$)	0.378 (n. s.)

Categories marked by an (M) have more than one million adherents.

In contrast, the non-affiliated form the single category dominated by men, featuring the lowest percentage of married couples, the lowest percentage of pairs with children and (although characterized by the lowest rate of marriages and births) having the highest percentage of divorcees and mothers raising children alone.

Therefore, we should not be too surprised to find women attracted to religious movements like patriarchal monotheisms, which did not and do not exactly promote self-actualization and gender mainstreaming. Men might perceive religion as a stage to earn status and therefore to win economic and reproductive chances. But women tend to prefer communities and prospective husbands sending honest signals of familial cooperation. We might be fascinated by the Kung San-Num healing dancer role only accessible to men by long, demanding and dangerous initiation. These costly requirements secure the trustworthiness of the dancers, as obligations and rituals secure the longevity of religious communities abroad (Sosis and Bressler 2003). But we should not overlook the fact that the women behold the performers, sitting in the middle, singing and clasping the tune. Although the Bible clearly indicates that Adam "recognized" Eve, she thanks God for the birth of her child (Gen 4, 1). The Lord is even reported to have slain two sons of Judah before humiliating the patriarch himself while siding with a foreign woman, Tamar, for rightfully insisting on her marriage contract (Gen 38).

Evolutionary findings linking religiousness to survival gains of health, power, trust-building and economic enhancements are complementary to this thesis. But as the communal decline of the long-lived, healthy and economically prosperous Shakers shows, religions inevitably perish if they deviate too long from their main task: competitive, reproductive performance. From an evolutionary perspective, survival without reproduction is a dead end.

8.5 Conclusion

After the Scopes Trial in 1925 and the subsequent establishment of evolutionary theory in state schools in the United States, there was a broad conviction among educated Westerners that the defeat of anti-evolutionist fundamentalism and probably all religion was a matter of time. But to the great surprise of many, religious activity including Creationism and Intelligent Design today enjoy a worldwide resurgence. The reason is simple: evolutionary theorists brought up far more scientific arguments – but committed believers in supernatural agents brought up far more children.

There is a certain irony in here: creationist parents unconsciously defend the reproductive success of their children and communities against evolutionist teachings, whereas some naturalists are trying to get rid of our evolved abilities of religiosity by quoting biology. But from an evolutionary as well as philosophic perspective, it may seem rather odd to try to defeat nature with naturalistic arguments.

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Chapter 9
The African Interregnum: The "Where," "When," and "Why" of the Evolution of Religion

Matt Rossano

Abstract Anatomically modern humans (AMH) emerged about 200,000 years before present (ybp) in Africa, initially differing little from other hominin species. Sometime after 100,000 ybp, Neanderthals displaced AMH from the Levant region of the Middle East, ending their first excursion out of their African homeland. About 60,000 ybp, a more socially sophisticated strain of AMH expanded once again out of Africa and replaced all resident hominins worldwide. A crucial aspect of their increased social sophistication was religion. It was during the time between their retreat from the Levant to their conquest of the world (The African Interregnum) that religion emerged. Using archeological, anthropological, psychological, and primatological evidence, this chapter proposes a theoretical model for the evolutionary emergence of religion – an emergence that is pin-pointed temporally to the ecological and social crucible that was Africa from about 80,000 to 60,000 ybp, when *Homo sapiens* (but for the grace of God?) nearly vanished from the earth.

9.1 In the Levant 100,000 Years Ago

Anatomically modern humans (AMH) emerged sometime between 200,000 and 150,000 years before present (ybp) in Africa (Relethford 2008; McDougall et al. 2005). About 100,000 ybp, the first evidence of AMH venturing out of Africa is present. A drama unfolded in the Levant region of the Eastern Mediterranean, an area that includes parts of Lebanon, Syria, Jordan, Israel, and the Sinai Peninsula. Around 130,000 ybp evidence from Tabun Cave in Israel indicates habitation by Neanderthals (Shea 2006). Around 100,000 ybp, other sites in the region (Skhul and Qafzeh caves) show evidence of habitation by anatomically modern or

M. Rossano (✉)
Department of Psychology, Southeastern Louisiana University, Box 10831,
Hammond LA 70402, USA
e-mail: mrossano@selu.edu

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near-modern humans. Their presence was short lived. About 30,000 years later the humans are gone and Neanderthals again occupied the Levant. It is difficult to know the exact nature of the interaction between the two species. Shea (2006) maintains that there were probably brief episodes where Neanderthals and modern humans directly competed for space and resources. More often, however, climate probably stacked the deck in favor of one or the other such that direct confrontation was negligible. Warmer conditions gave the advantage to humans, colder conditions to Neanderthals. As conditions changed, either one or the other probably sensed it was time to move on.

The initial emergence of AMH is marked by no dramatic alteration in the archeological record, nothing that clearly separates them from other hominins. Indeed, their ordinariness was only reinforced by their Levantine failure and near subsequent extinction. Physically, the AMH who re-emerged later from Africa were basically the same as their less successful predecessors. The significant change was far more social/cognitive than skeletal/morphological. The time between their banishment from the Levant to their definitive expansion from Africa – the African Interregnum – was one of revolutionary social transformation. This transformation produced more socially complex, cooperative, and therefore competitive social groups. The AMH who marched back into Levant and then across the world were no more *individually* fit than the archaic hominins they replaced. They were, however, *collectively* more fit and this made all the difference.

In the sections to follow, I argue that social sophistication was the key to the success of AMH. Furthermore, religion was central to the evolution of this social sophistication. I will do this by addressing three questions: (1) How do we know that the '2nd wave' AMH were more socially sophisticated? (2) Does social sophistication matter in hominin evolution? and (3) How does religion increase social sophistication?

9.1.1 How Do We Know That the "2nd Wave" AMH Were More Socially Sophisticated?

Converging lines of archeological evidence support the hypothesis that the social world of AMH grew dramatically in the late Pleistocene. There is considerable evidence showing that by the Upper Paleolithic (about 35,000 ybp) the campsites of AMH are larger, more frequent, more intensely used and occupied, and more spatially structured compared to those of archaic species (Dickson 1990; Stringer and Gamble 1993; Bar-Yosef 2000; Hoffecker 2002). Furthermore, many of these sites show evidence of seasonal aggregation, larger group size, and increased social complexity and stratification (Hayden 2003; Mellars 1996; Vanhaeren and d' Errico 2005).

Upper Paleolithic humans may have engaged in more strategically cooperative hunting than their archaic counterparts (Klein and Edgar 2002; Mellars 1989; Straus 1992). For example, the Upper Paleolithic marks the first evidence of ibex hunting

in the European archeological record. Straus (1992) contends that this particular species requires "elaborate strategies, tactics, and weapons," for successful capture. A recent study (Adler et al. 2006) examined the putative differences in hunting strategies between Cro-Magnons and Neanderthals in the eastern Caucuses. Somewhat surprisingly, the results failed to uncover substantial differences in hunting strategies. Instead, AMH gained an advantage via greater social networking. The range of lithic raw materials procured by AMH indicated more far ranging foraging activity and the existence of wider, more extensive trading networks.

Evidence of expanded trade among AMH, however, pre-dates both the Upper Paleolithic and the 2nd wave expansion out of Africa. The "precocious" Howiesons Poort and Mumba tool industries, which emerge around 70,000 ybp, feature fine-grained, non-local, microlithic artifacts. The non-local origin of these artifacts suggests more extensive trade among local populations (Ambrose 2002). Ecological degradation, possibly associated with the massive Toba eruption (around 73,000 ybp), may have compelled human groups to establish wider trade networks in an effort to more effectively utilize dwindling, more highly scattered resources. While evidence of trade networks can be found among AMH, it is lacking among archaic hominins (Feblot-Augustins 1999; Soffer 1985).

9.1.2 Does Social Sophistication Matter?

That one group might be larger and better organized than another only matters if there is inter-group competition. Evidence suggests that group competition played an important role in hominin evolution. The AMH/Neanderthal jockeying over the Levant is but one potential example. Tens of thousands of years later, when AMH entered Europe, they coexisted for thousands of years with Neanderthals. At various times and places this coexistence appears to have involved some degree of direct competition (Stringer and Gamble 1993; Mellars 1996; Lewis-Williams 2002). Additionally, competition among various AMH groups also seems highly probable.

The massive Toba eruption contributed to a population bottleneck among AMH in Africa around 70,000 ybp (Ambrose 1998). So devastating was this event, that human populations may have dropped to as low as 2,000 breeding individuals – as close to extinction as humans have ever come. However, genetic studies also indicate that particular AMH sub-groups began a rapid population expansion at around this same time (Mellars 2006). Mellars argues that a socially and technologically advanced group of modern humans expanded precipitously at this time, absorbing or replacing both adjacent African hominin populations and, in time, archaic hominins worldwide. Evidence of ethnic marking among hominins may go back as far as 200,000 ybp suggesting that group competition may have been present even before the demographic shifts associated with the Toba crisis. This conjecture is consistent with what we know about more recent traditional societies (Richerson and Boyd 2005).

A well-documented example of group competition was the nineteenth century near-decimation of the Dinka of Southern Sudan by the Nuer. Though the two tribes were descended from common stock and shared much in terms of lifestyle, subsistence practices, and technology, a key cultural difference divided them (Kelly 1985). Unlike the Dinka, the Nuer kept bride-price payment distributions tightly constrained along patriarchal lines, thus fostering strong clan-based allegiances. These allegiances proved decisive in their conflict with the Dinka. The Nuer/Dinka conflict does not appear to be an isolated event. Evidence from traditional societies in both North American and New Guinea indicates that inter-group conflicts were not uncommon (Richerson and Boyd 2005). Soltis et al. (1995) report average 25-year extinction rates for tribes in various regions of New Guinea ranging anywhere from just under 8% to over 31%. A world-wide sampling of hunter-gatherers shows that 64% engage in warfare at least once every two years and only 10-12% could be considered "peaceful" (Ember, 1978).

These historical/ethnographic data are complemented by recent laboratory findings showing that when people can freely choose which groups to associate with, groups that actively punish "freeloaders" out-compete others that do not (Gurerk et al. 2006). This provides an empirical demonstration that group norms matter. A group with a cultural norm of cooperation coupled with active punishment of non-cooperators can win out in direct competition with a group possessing more individualistic norms.

9.1.3 How Does Religion Increase Social Sophistication?

Recently, it has been argued that the mechanisms explaining cooperation in non-human species, (e.g., kin and reciprocal altruism) are inadequate for understanding human cooperation and that a form of group-level cultural selection may be required (Fehr et al. 2002; Gintis 2000; Sterelny 2003). For cultural group selection to work the benefit of individual selfishness must be kept below the gain in individual fitness achieved by being a cooperator in an altruistic group. To achieve this, within-group cooperation must carry little individual cost ("cheap" altruism) otherwise it will quickly lose out to selfishness. Cheap altruism requires two conditions: (1) defection (non-cooperation) must be punished by effective, cohesive, broad-based coalitions, where the cost to individual coalition members is low, and (2) defections must occur infrequently so that the need to punish is rare (Sterelny 2003). These conditions can be rephrased (and reverse ordered) in ways that are more religion-relevant: (1) people must conform to social norms and (2) they must be motivated to punish those who do not follow those norms. By putting it this way, images of commandments being handed down from mountain-tops or Puritans displaying people in stocks in the village square fall powerfully into place. But divine laws and inquisitors' racks were not the first nor even the most effective tools in religion's arsenal for compelling conformity. In its earliest evolutionary stages, religion simply took advantage of a very natural and very potent mechanism of behavioral control – the public eye.

When people know their actions are under public scrutiny they adhere more scrupulously to group norms, and behave more reasonably, courteously, generously, honestly, and bravely (especially for men) compared to when their actions are concealed (Burnham and Hare 2007; Rossano 2007; Andreoni and Petrie 2004; Rege and Telle 2004). So powerful is this effect that only the barest hint of public observation is necessary to compel people to behave more pro-socially – an image of a robot face (Burnham and Hare 2007), a picture of human eyes (Bateson et al. 2006), or just the suggestion of a ghost in the vicinity are all enough to do the trick (Bering et al. 2005). Our reaction to the presence or even the mere suggestion of public scrutiny is deeply primal – mediated by unconscious mechanisms honed by eons of evolution.

The AMH who emerged from Africa 60,000 ybp found ways to work together that were unprecedented in evolutionary history. Creating these more complex and cooperative groups required getting people to put group interests above individual ones. An effective strategy for doing this is to increase public scrutiny of behavior. The close-knit nature of hunter–gatherer life probably made the idea of constant social observation a natural one. Even so, *human* social scrutiny has its limitations – you just cannot watch everyone all the time. No, *you* cannot, but the gods can. The AMH who emerged from Africa 60,000 ybp were not only more socially sophisticated they were also religious and their religion was crucial in their achievement of uniquely human levels of cooperation.

9.2 Upper Paleolithic Religion: "Every Step You Take. . ."

Three elements of religion – shamanism, ancestor worship, and animism – appear to be "primitive" in the sense that they are universal (or near-universal) among traditional societies and they also have deep evolutionary roots (Rossano 2007). While it is impossible to tell if these constitute religion's original traits, evidence suggests that they may be religion's oldest documented traits. Evidence for all three of these traits can be found in the archeological record of the Upper Paleolithic. Furthermore, shamanism very likely pre-dates the Upper Paleolithic. Thus, there is good reason to suspect that religion was already part of the social/cognitive make up of the AMH who emerged out of Africa about 60,000 ybp. Of even greater significance is that their religion represented a "supernaturalizing" of social life. Shamanism, ancestor worship, and animism all entail an extension of the social world into a supernatural realm. This supernatural layer of social life brought with it a "spiritualizing" of social scrutiny – ever-vigilant eyes constantly monitoring for proper behavior, adherence to tradition, and avoidance of taboo.

9.2.1 Ancestor Worship: Archaeological Evidence

Upper Paleolithic burials provide some of the first evidence of ancestor worship. While there is (disputed) evidence of intentional burial prior to the Upper

Paleolithic, burials unambiguously associated with grave goods (e.g., body ornaments such as head dresses, beaded necklaces, armbands) increases significantly in the Upper Paleolithic (Riel-Salvatore and Clark 2001). Burial sites such as Sungir (White 1993), Dolni Vestonice (Klima 1988), and Saint-Germain-la-Riviere (Vanhaeren and d'Errico 2005) attest to the presence of an elite class whose members were laid to rest with great ceremony and copious grave offerings.

The Upper Paleolithic people associated with these burials had transitioned from being purely egalitarian hunter-gatherers (such as the !Kung San) to complex hunter-gatherers (Dickson 1990; Hayden 2003; Vanhaeren and d'Errico 2005). Complex hunter-gatherers typically use more sophisticated technologies for harvesting and storing seasonally abundant resources (e.g., nets or traps to catch large quantities of fish during spawning season). The Upper Paleolithic marks the first presence in the archeological record of hunting technologies such as traps, snares, and weirs used for harvesting large quantities of game (Hoffecker 2002) and storage facilities for keeping surpluses (Soffer 1985). In contrast to egalitarian hunter-gatherers, ancestors play an increasingly prominent role in complex hunter-gatherer societies as protectors of resource-rich territories (Hayden 2003). Among more recent complex hunter-gatherers, lavish burials with abundant grave offerings usually occur under the expectation that the deceased will soon become a powerful ancestor (Hayden 2003).

9.2.2 Shamanism: Archaeological Evidence

In traditional societies the shaman's role is to enter an altered state of consciousness wherein he/she connects with spiritual forces in order to gain knowledge or effect cures. The shaman is the community's spiritual emissary and ritually induced trance is his/her main tool. Shamanism is one of the world's oldest forms of religious activity (Lee and Daly 1999). Upper Paleolithic art and imagery provide support for the presence of shamanism in these societies.

A number of researchers have argued that Upper Paleolithic cave art reflects the experiences and rituals of early shamanism (Dowson and Porr 2001; Hayden 2003; Lewis-Williams 2002). Therianthropic images (human/animal chimera) found in many deep cave sites, such as the "sorcerer" image from Les Trois Freres or the "bird-man" image from Lascaux, are consistent with the shamanistic theme of "soul flight" where, in the midst of trance, the shaman's soul leaves his/her body and unites with that of a spiritually powerful animal (Dickson 1990; Davenport and Jochim 1988; Townsend 1999; Vitebsky 2000). Other evidence such as the acoustic properties of many of these deep cave sites, the lack of evidence for routine use, the symbolic and animal imagery often present, and the handprints of children and adolescents, all support the notion that these deep cave sites were used for consciousness-altering rituals possibly of initiation or passage (Hayden 2003; Lewis-Williams 2002).

Two recent finds push the origins of shamanism to before the Upper Paleolithic. A 35,000 ybp image of what appears to be a person in the antlered headgear of a shaman was recently uncovered in the Fumane cave of northern Italy (Balter 2000). An even older and more intriguing find is that of a 70,000 ybp ritually modified snake rock recently uncovered in a deep cave site in the Tsodilo Hills of Botswana (Minkel 2006). The boulder's natural appearance had been intentionally enhanced so that incoming natural light gave the impression of scales on its surface while firelight gave the impression of undulating movement. These modifications strongly suggest use of the site for consciousness altering rituals. Significantly, this find suggests that shamanism was present during the very heart of the African Interregnum and was transported to wherever they trekked.

9.2.3 Animal and Natural Spirits: Archaeological Evidence

Evidence for animal cults takes a number of forms in the archeological record of the Upper Paleolithic. First, Upper Paleolithic cave art contains thousands of animal depictions including the therianthropic images mentioned earlier. Second, at both Les Trois-Freres and Chauvet caves there are chambers that appear to be dedicated to specific animals or their spirits (Hayden, 2003). The "Lion Chapel" at Les Trois-Freres contains a large feline mural along with the remains of a fire surrounded by apparently deliberately placed bones. In the "bear chamber" at Chauvet Cave, there is a bear skull carefully placed atop a large limestone block. Below the block are the remains of a fire and more than 30 other bear skulls that seem to be intentionally placed.

Third, at the Dolni Vestonice site in the Czech Republic, fragments of clay-baked animal forms dated to around 23,000 ybp were uncovered that seem designed to explode when heated. Hayden (2003) argues that these were probably used in some ritual associated with the celebration of animal spirits. Taken together, this evidence has compelled many investigators to argue that animal and other natural spirits played a prominent role in Upper Paleolithic religious practices.

9.2.4 Ancestor Worship, Shamanism, and Animism: Supernaturalizing Social Life

The critical point about religion's primitive traits–ancestor worship, shamanism, and animism – is that they represent the addition of a supernatural layer to human social life. For example, the ancestors are typically thought of as fully participating members of the social community who play a critical role in the health, prosperity, fertility, and future fortune of their earth-bound tribe (Parrinder 1976; Boyer 2001;

Harvey 2000). Ancestors are ever-watchful, "interested parties" whose goals and concerns (especially regarding the observance of tradition and avoidance of taboo) must be considered in the everyday affairs of the living (Parrinder 1976; Boyer 2001; Harvey 2000). Likewise, the shaman is the spiritual world's earthly messenger, relaying critical information about the spirits' desires and demands. Often these demands focus on proper recompense for violations of taboo and the necessity of practicing ritual and upholding tradition for the well-being of the community (Harvey 2000). By nurturing and repairing the tribe's relationship to the supernatural and by binding supernatural authority to social norms, the shaman strengthens community and discourages deviance – or as Vitebsky (Vitebsky 2000) puts it "The mystic is also a social worker."

Finally, an animistic view of the world incorporates nature into the human social world. There is considerable evidence that a sacred orientation toward the land and its resources can curb exploitation and enhance human cooperation over the sharing of scarce resources (Harvey 2000; Atran 2002; Lansing 1991). Examples as diverse as salmon fishing among Native American tribes of the Upper Klamath River Valley (California), the use of patchy resources among Australian aborigines, and rice cultivation in Bali show that scarce resources can be effectively managed among competing communities using ritual and spiritual sanctions. Furthermore, in many of these cases traditional religious regulations have proven more effective than modern bureaucratic/technological ones.

By at least the Upper Paleolithic (and very likely earlier), we have evidence that religion is present. The supernatural world is well established in human social life. The spirits are watching. The ancestors are vigilant against violations of taboo. The shaman is on call to render spiritual adjudication. This pervasive social scrutiny reinforced social norms and curbed insidious individualism producing more cohesive, cooperative, and competitive groups.

9.3 What Happened During the Interregnum?

AMH were banished from the Levant 100,000 ybp. About 30,000 years later, they re-emerged from Africa as a more socially complex and recognizably religious species. The elements of their religion–shamanism, ancestor worship, and animism – added an ever-vigilant spiritual "stare" to their social lives motivating them to adhere scrupulously to social norms. In this section I take up the question of what happened during the African Interregnum that prompted religion's emergence. I argue that two critical events took place: (1) children "invented" the supernatural as a cognitive mechanism for acquiring greater social intelligence as adults and (2) adults retained supernatural thinking, incorporating it into already-present rituals of social bonding, intensifying those rituals and transforming them into rituals of individual and community healing.

9.3.1 "And a Child Shall Lead Them. . ."

If religion was an extension of social life to include the supernatural – from where did the idea of the supernatural arise? The tendency toward supernatural thinking has probably been a feature of childhood cognition even before the advent of AMH. However, it was only during the African Interregnum that retaining this form of thinking past childhood became selectively advantageous.

A body of work in developmental psychology indicates that children have a natural inclination to think supernaturally. This inclination appears to serve an adaptive purpose: it helps them hone the social reasoning skills essential for successful functioning as an adult. Childhood supernatural thinking became selectively advantageous as the complexity of the hominin social world increased beginning about 100,000 years ago. Among our ancestors, those adults who were the most socially skilled were the ones who as children tended to think supernaturally.

Developmental research has documented evidence of childhood supernatural thinking in a number of different forms:

1. Twelve-month-olds treat computer-animated images as intentional objects with desires and goals (Gergely and Csibra 2003). Six-month-olds make primitive "moral" judgments based on the inferred intentions of those objects (Hamlin et al. 2007).
2. Infants treat an inanimate object that coordinates its movements with that of the infant as a true social partner (Johnson 2003).
3. Children aged 2–6 years display anthropomorphized/teleological reasoning – claiming that the sun shines in order to "keep me warm," or the wind blows "to help me fly my kite." (Piaget 1929). Older children readily link natural events with moral behavior, such as bridge collapsing, because the children on it behaved badly earlier (Piaget 1932/1965).
4. Seven- and eight-year-olds prefer teleological explanations for natural objects' properties (rocks are pointy so animals won't sit on them) even when specifically told that adults apply physical explanations like erosion (Kelemen 1999).
5. Cross-culturally, children prefer God as the cause of the existence of animate and inanimate objects over other causes (Evans 2001; Gelman and Kremer 1991; Kelemen and DiYanni 2005).
6. Children form a theory of mind about God prior to forming one about other humans (Barrett et al. 2001).
7. Cross-culturally, imaginary friends or pretend play partners are common among children and are associated with increased social competence, greater empathy, better coping skills, and better performance on theory of mind tests (Seiffge-Krenke 1997; Taylor 1999; Taylor et al. 2004).

Kelemen (2004) argues that childhood teleology is a reflection of human social intelligence. Thinking in terms of goals and intentions is highly functional in the social realm, so it is not surprising to see it over-extended into the natural realm

during childhood. A key task of childhood is to prepare the child to successfully navigate an adult social world saturated in intentionality. In this regard, the imaginative processes that lie behind childhood anthropomorphism, teleological thinking and pretend companions may be analogous to the over-extensions that facilitated language development.

Once children had envisioned a world teeming with life, purpose, and intentionality, what did adults do with that vision? I have already reviewed evidence indicating that religion – through the mechanism of enhanced social scrutiny – served to increase social cohesion and cooperation. These benefits, however, would only seem to accrue after supernatural thinking was well-established within a group. How can we explain the *initial* retention of supernatural thinking in adults? An immediate, tangible, and direct individual benefit would be necessary for the first adult to decide that some retention of childhood supernaturalism was a good idea. This immediate benefit is actually not hard to find – the supernatural, it turns out, is good healthy fun.

9.3.2 Enhancing Ritual

About every 2 weeks, the !Kung San of Southern Africa gather for a traditional healing dance (Katz 1982). These eagerly anticipated events have about them the air of a community festival. The shamans who instigate healing claim that when they enter *kia*, the altered state of consciousness that produces healing power, it is an emotionally intense experience of utter transcendence. They claim to be more fully alive, more fully themselves when in *kia* than during their normal conscious state (Katz 1982). Furthermore, this feeling of transcendent joy is not reserved for just a few – among the !Kung more than half the men and 10% of the women are shaman/healers. And while these shaman/healers are achieving *kia*, everyone else is singing, dancing and getting healed. It is a good time for all at the !Kung healing dance.

The rhythms of group dancing, singing, and chanting can have powerful analgesic and healing effects (Mithen 2006). That fact that rituals of social bonding such as grooming, group pant-hooting, and mutual embracing are present among our primate cousins indicates that these and probably even more elaborate and well-coordinated social rituals were very likely present among our hominin ancestors (Goodall 1986; Smuts and Watanabe 1990). Moreover, ritualized behaviors such as these are known to affect consciousness both in humans and non-human primates (Rossano 2007). Thus, it is likely that consciousness-altering, health-enhancing social rituals were present in our hominin ancestors long before the arrival of the supernatural. These rituals provided a natural touch-point for incorporating the supernatural into the adult world. Evidence suggests that the supernatural would have enhanced and intensified these ritual experiences.

Two recent studies have found that adding a spiritual element to meditative/contemplative pratices significantly increases the pain tolerance, anxiety reduction and mood elevation associated with those practices (Wachholtz and Pargament 2005; Wiech et al. 2008). If ritual is good, then "supernaturalized" ritual is even

better. During the African Interregnum our ancestors discovered exactly this: by incorporating the supernatural into their already established (and enjoyable) social rituals, those rituals became even more effective in promoting individual health benefits and community/social bonding. This provided the foundation for traditional forms of ritual healing.

Healing practices involving shamanistic rituals and altered states of consciousness are ubiquitous among traditional societies. The positive physical and psychological effects of healing rituals documented among extant hunter–gatherers offers support for the notion that shamanistic healing served an important adaptive function in our ancestral past (Katz 1982). McClenon (2002) has marshaled considerable evidence indicating that those of our ancestors who were most susceptible to the beneficial physical and psychological effects of shamanistic rituals had a selective advantage over others in surviving illness or injury, overcoming debilitating emotional states, and enduring the rigors of childbirth. This "ritual healing" theory is based on a number of converging lines of evidence, including (McClenon 2002):

1. The universality (or near-universality) of ritual healing practices across traditional societies.
2. The fact that ritual healing always involves hypnotic processes and altered states of consciousness.
3. Evidence showing that hypnotizability or the ability to achieve a mental state highly prone to suggestion is measurable, variable, and has heritable components.
4. Evidence showing the effectiveness of ritual healing for maladies involving psychological factors including chronic pain, burns, bleeding, headaches, skin disorders, gastrointestinal disorders, and the discomforts and complications of childbirth.
5. The evidence from comparative and archeological studies indicating the existence of ritual, altered states of consciousness, and care of the sick among our primate and hominin relatives.
6. The fact that the earliest medical texts (from Mesopotamian and Egyptian civilizations) closely connect healing with religious ritual.
7. The finding that anomalous events associated with ritual, such as "miraculous" healing, are effective in inducing supernatural beliefs. Thus, healing rituals would have reinforced supernatural beliefs among our ancestors and encouraged their expansion.

It is not hard to imagine that our *Homo sapiens* ancestors were engaging in social rituals around a blazing campfire. At times these rituals may only have involved group chanting, dancing, or hypnotic silence before the flames (the benefits of which should not be casually dismissed). At other times these rituals may have involved intensely dramatic shamanistic rituals where soul flight, supernatural encounters, and "miraculous" healings took place. More than likely, it was the immediate positive psychological (ecstatic emotions/social bonding) and physical (placebo-based health benefits, "miraculous" healings) effects of these rituals that provided the

motivation for their enactment. While these rituals pre-dated the supernatural, once included in them, the supernatural had immediate, potent practical value. This value was both fitness-enhancing and self-reinforcing: it encouraged the expansion of both the rituals themselves and supernaturalism behind the rituals.

9.4 Summary and Predictions

The proposed model can be summarized as follows:

1. Prior to their retreat from the Levant, our hominin ancestors already possessed the capacity for consciousness-altering rituals of social bonding.
2. During the African Interregnum, roughly 90,000–60,000 ybp, ecological degradation forced our ancestors to form more complex social groups and more extensive trading networks.
3. In this more complex social world, children's natural tendency toward supernatural thinking became selectively advantageous as those children grew into more socially adroit adults.
4. Adults incorporated supernaturalism into their already present rituals of social bonding, intensifying them, making them even more effective as both social bonding and healing mechanisms.
5. Those whose brains were most capable of attaining a health-enhancing ritually induced altered state of consciousness gained a fitness advantage, thus progressively deepening our ancestors' experience of the supernatural and their belief in it.
6. Furthermore, those groups with the most effective supernatural rituals achieved a fitness advantage over other more "secular" groups by virtue of stronger intragroup cohesion and cooperation due to the belief in constant supernatural social scrutiny.
7. These highly cooperative, sophisticated, competitive and religious social groups broke forth from Africa and conquered the world.

The proposed model leads to a number of testable hypotheses such as (1) the social/emotional bonding functions of religion preceded and are more basic than notions of supernatural agency, (2) shamanism preceded and is more basic than ancestor worship, and (3) religion is fitness-enhancing. Space limitations preclude a thorough examination of these hypotheses, but supportive neuroscientific, comparative, anthropological, and psychological evidence is already present (Rossano, 2010).

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Chapter 10
Explaining the Inexplicable: Traditional and Syncretistic Religiosity in Melanesia

Wulf Schiefenhövel

Abstract The phenomenon of universal religiosity and its possible functions is explored by using ethnographic data from fieldwork with the Eipo in Highland New Guinea from 1974 to the present. Their religious beliefs are described as well as the transition to Christianity. The core of all religions, as that of the Eipo and other ethnic groups in Melanesia, can probably be seen as an evolved mental adaptation to cope with the bewildering magnitude of phenomena which plague the exceptionally large human cortex. Our ancestors needed rituals to interact with the supernatural powers who were believed to have created and to be in control of the world. Helplessness, stress and anxiety were reduced through belief and ritual. It is no wonder that we are, by our very nature, *Homo religiosus*. The Eipo are a case in point as they understood that they had lived in a time bubble, isolated from the rest of the world in which a competing religion was providing seemingly better cosmogenetic explanations. Their rather radical solution was to accept the Christian belief brought to them by missionaries as a means to adapt to the ways of the new world and to have their children educated, no matter how difficult this would prove.

10.1 Introduction

It is indeed an interesting finding that human groups everywhere are and most probably during all times were religious, have or had a sophisticated belief system and a similarly complex and rich inventory of sacred rituals. Whence does this universal religiosity (Murdock 1955) arise, which functions does it serve? Questions like these are addressed in this volume. Without evolved adaptive functions religiosity as the biopsychological building block for culturally instituted religion most probably would not exist.

W. Schiefenhövel (✉)
Max-Planck-Institute for Ornithology, Von-der-Tann-Str. 3, 82346 Andechs, Germany
e-mail: schiefen@orn.mpg.de

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I will explore some of these possible functions by using ethnographic data from my own fieldwork in Melanesia (from 1965 to present) and material from other anthropologists who have worked with the same or neighbouring groups.

The Eipo and their direct neighbours within the Mek family of cultures and languages (Schiefenhövel 1976, 1991), straddling the West New Guinean part of the mighty central cordillera, east and west of the 140° eastern longitude, were classic mountain Papua with villages between 1,600 and 2,300 m, horticulture as main subsistence strategy (sweet potatoes, *kwaning*, and taro, *am*, as main carbohydrate sources and several leafy greens as main protein providers) accompanied by mainly female gathering and male hunting. Pigs *(basam)* and dogs *(kam)*, both transferred, non-autochthonous animals, were domesticated; the former had great religious importance in many rituals as well as in cosmology.

The social structure like elsewhere in New Guinea was consisting of onion skin-type layers with decreasing altruism and investment: nuclear family with virilocal residence, extended family, exogamous patriclan, agnatic relatives; men's house communities; villages, politico-strategic alliances of several villages as units in intergroup warfare. Armed (bow and arrows) conflict was common and, as intragroup fight, rather bloody: 25% of all men were killed (Schiefenhövel 1998, 2001a). The men's houses *(yoek aik)* were the religious centres of the villages and taboo for females, the women's houses *(barye aik)* were the places for menstruation (which was thereby quasi public), birth and puerperium and taboo for initiated males. These women's houses were sacred places as well, shielding the enigmatic events of female fertility and reproduction from the men. The Eipo society, as that of other Papuan groups, was characterized by marked sexual dichotomy, e.g. sex-specific genital cover (small skirts vs. penis gourd) and partially sex-specific (work, behavior, role in rituals and politics, etc.) and outright sexual antagonism (male fear to be contaminated by female sexuality, especially by menstrual blood)– still, everyday life and the cooperation of men and women usually functioned well.

Our interdisciplinary project (funded by the Deutsche Forschungsgemeinschaft and involving many disciplines, from geology to ethnomusicology and human ethology) started in mid 1974. Until then, the Eipo had been visited by just a few groups of outsiders (Hariono 2003). No mission work had yet begun. The Eipo lived, therefore, in quasi neolithic conditions: all tools were of stone, bone or wood (no metals), there was no wheel, no pottery, no writing, no formal education (except for the short period of the first initiation, *kwit*, for boys; see below), no larger political structure than the village alliances (except for one type of religiously meaningful feast, a ceremony to ensure the fertility of all gardens, for which people from a large area came together, including enemies). The villages had populations from about 50 to 200, people lived in a classic face-to-face society. The horizon of first-hand geographical knowledge ranged about 3–4 days walking; beyond that distance one had no relatives any more and, thus, feared to be in danger of not being fed or mistreated or killed. With regard to their material culture and their social and political structures, the Eipo can be seen as, "modern models of the past".

10.2 Animistic Universe and Deistic Entities: The Conceptual Framework of Eipo Religion

For the Eipo the whole world was filled with beings, normally invisible. Their word for these " spirits" or "souls" is *isa*. Below are some terms and phrases in the Eipo language (cp. Heeschen and Schiefenhövel 1983, p. 107, 108) exemplifying the concept:

- *isa, ise* = spirit, soul, spirit of the deceased, nature spirit
- *isa alamak* = (the deceased) turn into spirits, go to the spirits' abode in the high mountains
- *weinang isa* = spirit of a corpse which has been placed in a tree (traditional funeral custom)
- *isa dib* = soulof a deceased (lit. true spirit, as opposed to *souls*/spirits of the ancestoror of animals)
- *isa bata* = magic bundle to ward off spirits
- *isa nuksilyak* = the spirits could distribute it (disease, bad luck) to us (said as a warning to respect the norms, otherwise one will get sick)
- *isa sisibsulul* = the spirits could call our name (warning to respect the norms, see above)
- *isa talebmal* = a spirit takes possession of her/him
- *isa ulmoromna* = spirits who dwell at the entrance of the house
- *me bolamak isa talentalen taleblul*= the spirits who take away children would touch us again and again (metaphor for and explanation of sterility)
- *isa kikin dongob-* = to put offerings for the ancestors in the places where they live or appear
- *ise kil bok-* = to ritually hand over (the initiates) to the spirit woman (in the *kwit* initiation, the first of three; after passing the *kwit* the boys are said to not belong any more to their biological mothers, who cry because they lost them; the potentially dangerous spirit woman, *ise kil*, is symbolized by a bundle of wood)
- *isenang* = the spirits, metaphorically: people of the enemy in the Famek valley

Despite the fact they could sometimes be helpful, the *isa* were basically perceived as dangerous, harmful entities who could (and still can, despite meanwhile formal acceptance of Christianity), but must not attack the living and inflict all kinds of harm – mainly affecting health by causing disease, injury or other mishap, but also causing damage to garden crops and the pigs *(basam)*, the important domesticated animal. That the hereditary enemies in the valley to the west were given the same name, indicates how much they were despised, feared and dehumanised – a classic element of intergroup propaganda throughout the world and, very probably, throughout history (cp. Eibl-Eibesfeldt 1997). Since 1976 the pax christiana, generally greeted as a relief, has so far (2008) rooted out all armed conflict.

The belief that violating social norms was likely to be punished by supernatural powers through sending disease, accident and other bad events which had a direct

damaging effect on the transgressing person, her/his family or immediate kin or important resources for him, combined the religious and the juridicial system to a constant potential threat for one's physical integrity and wellbeing or of that of closely related persons. This is a very different theological concept than that of religions in which sanctions for misbehavior/"sin" are not believed, as in the case of the Eipo and other animistic societies, to come into effect right after the breach of a norm, but only after one's death or even as late as at the Day of Judgement.

isa are attributed to the following classes:

- souls/ spirits of the dead
- spirits of important ancestors, especially the ones still remembered by name and biographical details; they were venerated and sometimes present, in the form of their skull or other relics, in the sacred men's houses
- spirits of wild animals in the forest
- spirits of certain large trees, rocks, etc.
- spirits of cultural heroes, who could also be called deities; they were thought to have shaped the land in which the Eipo live and to have given humans profane and sacred knowledge; some of these entities were thought to be still alive and active, some others to be defunct.
- *Yaleenye*, literally the "One Who Came from the East" is the most important deity and prominently represented also in the religion of the Yali, who are the western neighbours of the Eipo (Zöllner 1977). He made, when he roamed around in the mountains, valleys with his feet and the beds of smaller rivers with his hands. He taught the first humans, who had dug, with their foreheads, their way from underground to the surface of the earth and were therefore dirty and ugly, to use specific leaves to clean and beautify themselves and to use pig's fat and ochre to put on their faces. In the *kwit* initiation and during other, less ceremonial occasions this event was repeated.

10.3 Kwemdina Kamathe Holy Digging Stick

In November 1974 the sacred *Binalgegebnaik* men's house, the main religious centre of the upper Eipomek Valley (named after the 4,500 m high *Binal* mountain, the mythical origin of some of the first spirit beings and humans) was renovated (Koch and Schiefenhövel 1987). It was then that the most sacred object of this region was exposed in public: the *kwemdina kama*, the sacred digging stick, stemming, as was the conviction, from the very early days of human existence. It was taken from its resting place inside the men's house and carefully placed against one of the surrounding houses before the old *Binalgegebnaik* was torn down to be built up again by a large group of men from several villages. When the new "temple", as one may call this kind of sacred men's houses, was near ready, with its thatch roof put on and its plank walls finished, Kaberop, the ceremonial leader and one of the "big men"

of Munggona, was the first to move the venerated object back to its abode. He did this in extreme slow motion and with utmost care. Should he stumble or only shake the ceremonial digging stick a little bit, a terrible storm or other natural catastrophe would happen. The object moved, in an orchestrated fashion, through the hands of many leading men, always with painstaking care not to cause any shaking, let alone drop, until it was finally secured in its place at the wall opposite the entrance of the men's house. The *kwemdina kama* was a large stick with pointed ends, about 160 cm long, that is longer than an Eipo man's body height, and wrapped with leaves (which had partly come off). This protection was thought necessary, because the power embedded in this object was considered to be so "hot" that it would harm the hands and bodies of those who handled it. Its large size exceeded that of normal digging sticks by far. It was thus quite obvious that it was likely to represent not just a copy of an ordinary garden tool, but a symbol.

In my view, this sacred object in the shape of a digging stick represented the transition from hunting gathering to agriculture, which began about 8,000 years ago in the highlands of New Guinea with the domestication of Taro *(Colocasia esculenta)*, sugar cane *(Saccharum edule)* and some other plants which the ancestors of today's Papuan people have grown since then and have given to the world. Ancestral Mountain Papuans thus created one of the few centres, worldwide, where a neolithic "revolution" took place, in this case the domestication of some important food plants; in this respect also, the Papuan cultures are truly remarkable. The *kwemdina kama* as a symbol could stem from this period of transition from hunting and gathering (which still plays a role in Eipo subsistence strategy today, especially the collecting of insects and their larvae by women) to horticulture. The then living ancestors of the Eipo might have felt that this transition marked a really decisive change and they might have created the first sacred digging stick in that time as a sign of this revolutionary innovation.

It is interesting that this symbol, probably shaped after its predecessors, was believed to possess tremendous power. In this, it was thought to be sacredly alive and in essence similar to the deities of primeval times still influencing nature and the fate of humans. This reveals part of the concept of the sacred which was typical for the Eipo: certain objects contain, quasi below their visible outside shape, supernatural power as do the spirits who are normally hidden from the eyes of normal humans. Because these agents own particular, usually destructive and disruptive powers, they must be placated by strict adherence to religious tradition, i.e. specific ritualized forms of behavior, so typical for all religions in the world.

10.4 Memnye, the Giant Earthquake Spirit

On June 26, 1976 an earthquake exceeding a magnitude of Richter 7, rocked the central region of West-New Guinea with an epicentre near the Mek area. It was, also for us white people a most scaring event. I was sure that the world would come to its end, so massive were the movements of the soil, the usually firm fundament of human existence, so scary was the rumbling noise coming deep from the belly of

Mother Earth. Many inhabitants were killed by landslides and the village of Munggona, the religious and political centre of the upper Eipomek Valley, was covered by massive earth and mud waves. None of the houses was visible any more. With them, the *Binalgegebnaik*, the most sacred "temple", vanished. The holy digging stick was irretrievably lost. On October 28 of the same year a second earthquake of an even higher magnitude struck again, killing more people.

These tragic events are likely to have sped up the accepting of Christianity. The first airstrip which had been built under my supervision was made unusable by landslide. David Cole, the missionary of Bime who was also responsible for Eipomek, built a new landing field and established a mission station there. The local people felt that this was a good thing. They were not left alone in this period of crisis. The protagonists of the new religion had stood by them.

Important in the context of this paper is the traditional concept: earthquakes, *motukwe lulukna*,were thought to be caused by *Memnye* (The Forbidden One), a giant who was thought to sleep deep down in the earth. Normally, his body stayed quiet, but occasionally (New Guinea is part of the "Ring of Fire") he moved in his sleep and then a tremor (quite a frequent event) or, in the worst case, a devastating earthquake was the consequence. Wegener's theory is much more comforting. After the first deep emotional shock and experiencing that the quake had stopped after a few minutes, we white people resorted to this modern geological theory and trusted that once the tension was out of the system, there would be an end to the massive aftershocks and less violent tremors. The *Memnye* hypothesis does not provide such console – it could well be that the giant is plagued by increasing restlessness and that the quakes get bigger instead of smaller.

It does not matter that the Eipo theory is not really explaining earthquakes well, the important fact is that the belief in *Memnye* provided an explanatory framework. Without this, the scare for the local people would have been even bigger. The *Memnye* might move more and cause even worse destruction, but at one stage, so one could hope, he would go to sound sleep again, as in normal times. The important thing is, that people "knew" what was causing the catastrophe, and that is much better than just being exposed to it and having no idea as to its origin.

It was very interesting how the Eipo coped with the disaster. Almost all of them managed to flee from the village before it disappeared under a massive cover of ground and stones, like people in many in other villages who were sometimes swept away in toto by massive landslides. The Eipo took refuge on roundish hilltops in the vicinity where they quite rightly assumed that due to the geological feature of these places even more shaking of the earth would not create serious danger. My colleague Paul Blum had spent the night of the earthquake in the forest above the settlements to collect animals and learn about Eipo ethnozoological concepts. He was impressed how composed the men and boys were after the first reaction of deep fear. One of the men, Kayab, placed a stick in one of the clefts which had formed during the quake and monitored its angle to see whether the ground at this spot was moving away or not. A rather scientific approach. Notwithstanding this, many religious ceremonies were carried out to placate *Memnye* and get the "mountains" (their concept of the Earth) stable again.

One of the important primeval myths tells of *Yaleenye* (see above), how he places stones and rocks into the then still swampy, wobbly and unstable Earth, thus making it firm and able to support forests, gardens, villages and humans. The Earth made hospitable is a recurring topos in the myths of the Eipo and their neighbors. Various ceremonies like planting the sacred *yurye, Cordyline terminalis*, the holy plant of the Pacific, were carried out in repetition of these earliest events in the history of their land. The Eipo ancestors knew that life in their region was endangered by the forces of nature: cold temperatures, seemingly endless rain (more than 6,000 mm per year), difficult terrain, famine and disease. Religion as a means to explain and rituals as means to cope helped them to survive from their first arrival 50,000–60,000 years ago at the New Guinean coast until now.

10.5 Religious Concepts to Understand Some of the Characteristics of the White Visitors

In the beginning of our stay, the Eipo were not fully sure whether we represented real humans or some kind of spirit beings. People thought that Grete Schiefenhövel, my wife, was going out on nightly expeditions to secure human flesh for the four males of the team. An action quite similar to what spirit women do, who can enter the bodies of people and eat them from inside, thus causing marasmus, the consequence of chronic, wasting disease.

Once the Eipo had fully accepted that we were humans there was still uncertainty as to where we came from, where our home region was. They knew that we had arrived by small plane at the airstrip of Bime (there was no concept of the sea or the coast where the provincial capital is situated). We tried to explain that before that we had arrived by a bigger plane further away in the west, and that to get there we had to spend 2 days and a night in yet bigger planes which had brought us from our home very, very far away in the north-west. They could not fit this information into the framework of the world known to them. One day a woman told me, “I am sure you come from where the *im bona* grows, the tree which carries the sky. You must live at the bottom of this tree”. I was struck by this. The Eipo have indeed the same basic idea as ancestral Germanic people who thought that *Yggdrasil*, a gigantic ash tree, is forming the ceiling of the earth and growing into the sky. The Yali have the same concept as the Eipo (Zöllner 1977). The woman and others thought that we, so very different from them and thereby special, had to come from a special place. Our origin, *(kwemdina*, a concept which combines the physical with the sacred) and thereby part of our character had been explained.

In a similar way the Eipo tried to understand the fact that we were able to talk, via single-side-band radio, to far away places: mission stations, some of which the Eipo knew, but also places like the provincial capital Jayapura of which they had no concept of, and the pilots of the mission planes. Outside my house at the edge of Munggona village a long dipole-antenna was spread out between two trees and connected to the radio. The general belief was that, similar to the spirits of animals

who climb up into the nightly sky on invisible lianas hanging down from there and connecting the earth and their nocturnal abode, the voices of people using the radio would move along the visible antenna wire and then disperse into the sky by way of the lianas to descend at the antenna of another radio. Quite a reasonable hypothesis, given their world view.

10.6 Rituals to Bring About Success and to Cure Disease

Everyday life was a close intertwinement of profane and religiously meaningful acts. If one were to chop down a tree for firewood or other purposes (not an easy task with a stone adze), one would carry out a short ritual hoping that this would render the action successful. When a female pig was killed, her small offspring were placed on the dead body of their mother to ensure that the vitality of the sow would be transferred to them in this way and make them grow into big, fat animals.

Religious rituals believed to ascertain gardening success (in the anthropological literature often termed "garden magic") were also common. One particular incident demonstrated the importance of involving the sacred domain in this field of life. The inhabitants of Talim, a village about $1\frac{1}{2}$ h walking distance north of Munggona suffered a serious food shortage. The reason for this remained unclear; perhaps some mistake in planning the preparing and planting of the respective garden plots was responsible. The villagers of Munggona and further up in the valley decided to carry out a major assistance action. They carried large amounts of sweet potatoe and other garden produce to the hungry neighbors in Talim. But this was seen only as a short term relief operation. The most important part of the activities of this particular day was to conduct rituals in the Talim gardens to make sure that from now on they would again be fertile and able to feed the population. The local belief was that the Talim villagers had committed some serious offense against the supernatural powers, who punished them for this misconduct by rendering their gardens less fertile than usual. Accordingly, sacred ceremonies needed to be carried out by the people from that part of the valley which had not been affected by diminished garden fertility and, thereby, obviously enjoyed a good relationship with the supernatural agents responsible for crop fertility. This double help, bringing food and carrying out the necessary rituals, was much appreciated by the people of Talim.

Hunting also required religious rituals as well as keeping specific taboos, e.g. not having sex before one left the village to hunt or trap in the higher regions of the moss forest or further up in the alpine zone. This was thought to be a necessary precaution, making the hunter less vulnerable, because the souls, *isa*, of the prey animals (usually nocturnal marsupials of the genus *Phalanger*, the biggest game in that altitude) were angry with the hunters and tried to prevent them from having success or punishing them. One of the men of Munggona one day presented himself with a very acute and painful conjunctivitis of his left eye. He and the others attributed this to the fact that he was, during a night-hunt at full moon, when the marsupials can be seen better against the lit sky, "shot" into his eye by a *phalanger*

spirit. I found a very small beetle under his lower eyelid. When I removed it and placed it on a bit of white tissue, so that it could be seen better by the patient and the surrounding people, there was sudden silence. Then one of the man addressed me: "We always knew that you are *asing ketenenang!*", i.e. someone whose eyes are "sharpened" so that he can see and do things others are unable to perceive. The idea was that I had been able to transform the invisible arrow into a small beetle. From that time on, I accepted being put into the class of seers. It was too difficult, at that time, to explain to them why my usual treatments, e.g. intramuscular injections of oil penicillin, were so effective against many dangerous diseases.

Birth *(me delina)* took place in the women's house *(baryeik*, literally the outside house, indicating its position outside the centre of the village but also outside the routine of everyday), in some aspects the counterpart of the sacred men's house (see above). Access for initiated males was forbidden, lest they were called by the women to carry out a religious ritual in case delivery was difficult (my chance to be present during birth). A number of different rituals performed to facilitate birth were documented (Schiefenhövel 1988). Bundles of leaves were used to gently hit the parturient's body – at the back in the first stage of labour, at the abdomen in the second stage, i.e. there, where usually most pain is felt. In one case, the mother of the laboring women pulled the leave-bundle through her armpit, thus transferring her sweat and smell onto it. She then touched the body of her daughter with the thus fortified ritual instrument. The idea behind this is that the spirit who is believed to block the child's passage in the pelvic channel can be moved out of there. Other rituals involved stroking and massaging the abdomen, actions which have a straightforward physiological and biopsychological effect as well, e.g. uterine contractions can be triggered in this way. After delivering the baby (a very smooth and non-assisted process, usually surprisingly easy and natural) there were other rituals.

In one case (observed by Paul Blum, the ethnozoologist of the team) the husband of the woman who had given birth went to the high forest to hunt a specific bird, the female of *Lophorina superba*, one of the many spectacular birds of paradise endemic to New Guinea. He brought this bird to the fringe of the women's sacred area where it was received by one of the women assisting the mother and child during the puerperal period and handed it over to her. The custom was to prepare this prey at the fireplace in the women's house and to smear its fat on the mother's breasts and on the baby. Milk production as well as health and growth of the newborn were believed to be fostered by this. Parents, especially mothers, were and are very concerned about the wellbeing of their children, especially when they are small. In case they thought something was wrong, e.g. the child did not grow well, was frequently sick, etc. a strengthening ritual was performed which involved smearing the blood of a freshly killed pig (a symbol of vitality) on the child's body.

Curing rituals *(ninye kwetene)* were generally common. They embodied the kind of symbolism so often found in traditional society. In one type *(foana)*, the healer rhythmically moved a piece of sacred pig's fat away from the place of the body where the sickness was felt, reciting a very intense chant by which the spirit was hoped to be driven out. The swiftly moved piece of fat *(basam kalye*, a formerly tabooed word) was supposed to lure the spirit away from his seat in the sick person.

The texts of these chants were partly in an obsolete version of the Eipo language. The whole ritual was, also for a foreigner, quite impressive in its intensity.

Another healing ritual, which was practiced by a female healer was called *lone*, i.e. "untying/loosening" the grip of the spirit of the sick person. In this form, a ring made of ratan (*sekna, Calamus* species) was moved over the body of the patient, thus freeing, as the belief was, her/him from being possessed by the spirit. The symbolic, analogy-type character of the healing rituals became particularly obvious in another treatment: twigs were repeatedly broken over the patient, symbolizing that the power of the spirit was broken in the same way.

10.7 Naming and Behavior Taboos in the Alpine Zone

When one moved, from the relative safety of the villages, the zone perceived to be shaped, if not controlled, by humans, into the high mountains (up to 4,000 m above sea level) with night temperatures around freezing point and occasional snow, one had to adhere to strict naming taboos. The cassowary (*Casuarinus* sp.), for instance, could not be called by its normal term *kwitmak*, i.e. the bird connected to the *kwit* initiation, but needed to be named *dabotam mak*, i.e. the bird of the lowland – where it actually lives. Many other terms had to be avoided by the same kind of taboo. It seems obvious that this practice is reflecting respect and fear of the dangerous alpine zone; one has to behave in a special way, because the environment up there is threatening. *Moke baibubuk*, someone dying exposed to rain and cold in high altitude, is the epitome of a very much feared way of dying – whereas dying in the village, surrounded by one's family, is perceived to represent a good death. When, during a recent field-visit in 2008, our group of 15 Eipo women and men and 4 Germans walked in this region close to the central cordillera, I was quickly corrected when I used a tabooed term. Christianity, which was formally accepted around 1979 (see below) has not changed these deep rooted concepts, taboos and avoidance practices. In the same way our friends warned us, not to speak near particular lakes in the high mountains because they still believe that ancient nature spirits and founder deities reside there and must be left in peace, undisturbed by human voices. When we arrived at one of the rock shelters *(gil deya)*, the only places where one can (without tents, sleeping bags, etc.) survive, our guide, a man of about 65 years of age, stopped to pray, asking God to take away all possible evil spells from the place. In the same way, the spirits which believed to hunt those shelters were placated in the old days, at that time by pagan rituals.

10.8 Initiation Rituals for Males

Male initiation was a complex process involving three distinct steps:

- the *kwit* initiation of small boys, during which they had to spend a night in the forest and had to endure all kinds of hardship. They were instructed about

core elements of Eipo religion and hence were allowed to enter the sacred men's houses, at the same time many foods became taboo for them, as for adult men. The *kwit* was, in essence, the rebirth of boys into a fundamentally new and different status. The boys were transformed: they had to shed their maternal mode of existence, having grown in their mother's body, received her breastmilk and loving care, to adopt the male mode, i.e. being in the company of males, eating the food typical for them and doing the things which were done by men. One of these was being a warrior. Other risky activities were going on hunting expeditions into the high mountains, building bridges over roaring rivers or hosting large groups of guests during the big dance feasts which were designed to strengthen the ties to groups living on the other side of the Central Cordillera and who were crucially important as trade and marriage partners; it was therefore vital that nothing went wrong.

- the second initiation step was a ritual in which the boys, once they had passed puberty received belt *(deyatenga)* and penis gourd *(sanyum)*, the visible signs of manhood. Religious rituals accompanied this ceremony.
- the third and last step was the bestowing of the *mum*, a particular lancet-shaped decoration which was either woven into the hair or hung from the head to the upper part of the back. The *mum* was a penis symbol and was worn daily by most of the unmarried men and by all males during the large dance feasts *(mote)*. This body ornament signaled that its bearer was now an adult man ready to find a sexual partner and found a family.

In Highland Papuan cultures it is a common concept that as one informant put it, "Girls will grow into real women by themselves, we don't have to do anything about them. With boys, it is different. We, the men, have to take them and form them. Otherwise, they can't become real men". In the Eipo culture there was, accordingly, no initiation for girls. First menstruation had, as pregnancy and birth, religious significance, but there were no comparable public rites de passage to accompany them.

I believe that this as well as other hallmarks of a very pronounced sexual dimorphism and sexual antagonism (Schiefenhövel 2001b) betrays a male inferiority complex: Men are trying, it seems, to compensate their lack of biological-reproductive power by creating a cultural superstructure to regain superiority.

10.9 Accepting Christianity

In 1976 a UFM (Unevangelized Fields Mission) missionary arrived in Eipomek and preached, standing on the sacred village ground near the two holy men's houses. It was the first Christian sermon in the village. The missionary talked about some core elements of Christian belief, that there is only one God (who is, also in Christian terminology, somewhat paradoxically called "Allah" throughout Indonesia) and that those who do not follow him will burn in hell. At the end of his long and intense sermon, evoking apocalyptic images, he told one of the helpers who came with him,

to pull out some especially valuable axes from a bag. An elderly Eipo came forward and said, "Bol kurununnang (the term for white people, literally "one with rose-like skin"), put those axes back into the bag. If we want something, we'll ask our German friends". Quite a decisive move. Obviously, the Eipo did not want to be bought into changing their religion.

When the missionary had left, the Eipo asked me to join them in the *Binalgegebnaik* men's house: "Don't bring any camera or notebook, because this time you will be the one answering questions". I sat on the bark floor, near the central sacred fire place. All the leading men assembled. "Is it true what this man has told us? Is there Allah in the sky who has made everything and who knows everything?" "I don't know whether it is true what this man has said. I have been in many 'mountains'. People have many *kwemdina yupo*, cosmologies, creation myths, and beliefs about the world and about humans. You have your own, and I find it very interesting. The cosmology, the white man talked about, has its origin in Palestina". When I said this, there was a general murmur of relief: "Falesina, Falesina! The Dobtere says that *kwemdina yupo* is coming from Falesina!" This single information took the pressure off the situation, characterized by the strong impact the sermon of the missionary had created and by a general feeling of insecurity. Hearing that the white man's Christian religion (later termed *Allah Yupo*, God's Speech) actually had a local origin and was one of many creation myths relieved them at that moment.

Around 1979, that is 3 years later, the Eipo started to accept Christianity; a baptizing ceremony and burning their remaining sacred objects took place in 1980. The village communities went through this process *in toto*. This was, as I see it, a politically motivated rather than a religious decision. The Eipo had more and more understood that they had lived in an isolated corner of the world and that their set of ideas and, particularly, their technology were becoming obsolete. They wanted to benefit from the material wealth which obviously was out there somewhere (in that respect, their turning to the new faith contained some element of "cargo cult", (cp. Lawrence 1964, but this has, in contrast to some of the neighboring regions, never been a strong force; see below) and they wanted to participate in the life around them of which they had remained ignorant for so long. In consequence, they turned to the new religion which had become available to them. They did it in a concerted action. It was not, as in many other regions of the world where pagan people are baptized and transformed into Christians, individuals deciding that they wanted to follow the gospel. More or less over night all Eipo changed the very fundament of their lives, exchanged their old religion with the new one. They decided that this was the right path and there were hardly any dissidents. The Eipo exchanged their ancient ancestral sacred formulae and chants for prayers, the healers did not conduct their curing rituals any more, taboos were opened, like that of refraining from pork for the clan whose ancestor the pig was thought to be, no more sacred symbols were venerated.

Even the women's house, place for menstruation and birth (both formerly thought to represent religiously deeply important events) and a sanctuary for women in conflict with their husbands, rather a practical institution, was given up. Mortuary rituals were changed completely, now the dead bodies are put into graves; before, there was

a three-step process: fixing the corpses in trees where they mummify, then putting them in garden houses and, finally, keeping the skulls and long bones under rock shelters. Generally, all old verbal rituals were replaced by prayer-type ones. Also the very strict, religiously grounded postpartum coitus taboo disappeared, which, together with physiological sterility during prolonged breastfeeding, had helped to keep the population stable. In 2008, the sheer number of children is staggering. Birth intervals have shrunk from about 3–4 to about 2 years and less. All this happened, despite its speed, rather smoothly. Everyone in the Eipo villages, it seems, went along with the decision and in 2008 there are no "pockets of resistance". Almost everybody got a new name. At first, they were taken from the Bible, albeit in localized orthography, soon, however, a whole range of new names, invented by the parents of newborn children, came into use. New names are, as in similar conditions of accepting a new religion, one of the strong signals of change.

The fact that the UFM opened up new perspectives, especially new career options for younger people, must have played a big role. Many of our early informants who had deeply impressed us with their intelligence and general competence, took the chance to enter the new world. They went to school, first in Langda, at the southern side of the Central Cordillera where many had relatives, or in Wamena, the administrational centre of the highlands of the Propinsi Papua, that meant, at least 6 days walk and hardly any related person there to take care of the school "kids"; usually, they were about 9 or 10 years old, when they attended first class. Quite a large number of those who bet on the opportunities of the new careers actually had success.

10.10 The Situation in 2008

In August and September 2008 I spent 4 weeks in the Eipomek Valley and the alpine region to the south. After the UFM mission had established itself after 1976 the Eipo are running their religious affairs basically alone today. The North-American missionaries who were staying there in former years rarely return to their post. The station is managed, very efficiently, by Pilipus Nabyal. He was one of those intellectually motivated informants who explained their complicated language and their complex world to us foreigners. He is now around 50 years old and one of the influential leaders of his community, in and outside church.

Sunday service, following the basic structure of liturgic practice in reformed protestant communities, takes place in a spacious wooden church. The attendance would make any German pastor jealous, even though not everybody is present. Some men share the different ceremonial functions: "gembala", (literally, in Bahasa Indonesia, "shepherd"; they are non-paid evangelists) who lead some prayers, "pendetta" (pastor) who preaches, and members of the steering group. Most of the prayers inside and outside church are contextualized and personalized individually phrased communications with God. Some few prayers, like "Our Father in Heaven", have fixed texts. The songs, often accompanied by a guitar and quite pleasant to

hear, are new inventions, representing blends of English hymns, Indonesian and Papuan musical elements. Yet, in every service and sometimes in ceremonies outside, a new type of song is performed, usually by a small group of (in the cases I saw) male singers; they build on traditional musical elements and are in the local Eipo language. This seems to be, as far as I can judge, the only syncretism officially accepted.

Prayers are said before meals, especially when there is a group of people. Prayers accompanied us during our long, often exhausting and sometimes dangerous hike along the Central Cordillera. Thanks for protection from accident and bad weather were expressed in this way as well as request for sufficient food, health and strength.

In this situation of being exposed to the forces of nature, facing tough climbs and often slippery rock faces where a fall would mean death or severe injury, I felt the power of such religious ritual. We were, indeed, grateful that all of us arrived each afternoon in a dry rockshelter, could light a fire and had food and company. And we surely hoped that the rest of our trip would be under the same lucky auspices. Difficult, even for the atheist, not to get drawn in. The human mind and psyche go along so well with entrusting oneself to a higher being, especially when there is danger. The urge to believe is strong, indeed.

So well established seems Christian belief and practice among the Eipo that one is a little shocked when pillars of their old belief unexpectedly become visible. When trying to catch up with the lives of those who were our informants and companions more than 30 years ago, we often got the sad news: "deibuk" (she/he died). Inquiring about the circumstances of death, I usually got the answer: *"kire dobuk"* (he/she was victim of sorcery). Pilipus, this very intelligent man who seemed to have embraced not only Christianity but also modern thinking, said: "In the times you were here, *kire* was not so common. Now it is all over the place "

Here appeared the syncretism which, of course, is to be expected. When it comes to explaining severe disease and death, the old topoi are still existing, not even tinged by the new faith. It is not God, who has called the deceased person to him as a Western Christian would say, but it is somebody deeply vicious and antisocial who has performed a *kire* ritual to cause suffering and death. And it is also not Satan who, according to some brands of Western-influenced Christianity, enters the body of people and makes them sick. The Eipo do not have much space for the devil in their new cosmology – their malevolent *isa* are still fulfilling his function.

Pilipus and Enus, also one of the so vitally important informants in the beginning of our research in 1974, both explained, with some pride, that the way to handle cases of suspected *kire* had changed from the times before. We had been on the scene in 1976 when a woman was killed, who was accused by her own fellow villagers (!) to have caused the death of a small boy through *kire*. Her corpse was drawn to the bed of a nearby river, shot at and stoned. I was shocked by this brutality, which was different from the aggressiveness we had witnessed in their fighting and war faring. In those days, this was the punishment ("moralistic aggression" as I would call it in an ethological term) for persons who were believed to have caused death by secret harmful rituals. Something perceived as outrageously antisocial.

"We don't kill the sorcerers any more", the two informants explained, "we slap them by our hands and then they die or we tell them to commit suicide and they do that". This referred to two cases, a man and a woman who had been accused to have been responsible for a large number of deaths. Both allegedly publicly admitted that they had carried out *kire* because they were angry with the people in their villages. The man had died by himself and the woman had committed suicide. How strong must social pressure have been to bring about these results?! And is this a more Christian way to solve the problem or would it not be better to shed the belief that disease and death are brought about by angry spirits and malevolent humans? Academic questions. The Eipo today live in a new society which has been formed in a rather dramatic and incredibly fast transition from the stone age to modern times in one generation. Their new society is not perfect – just as anybody else's is not.

The new religion and the new way of life have opened a variety of options which were non-existent before. Since 1976 there is no war any more. People can now freely move to areas which were formerly out of reach. As mentioned above, the horizon of first-hand geographical knowledge was confined. Now, approximately 150 pupils and students live in Sentani, a suburb of Jayapura, the provincial capital at the northcoast, 250 km straight line away from their home. They have rented small houses where 30–40 of them live. Not everyone who stays in the city is actually following a formal education, but quite many do and there are even Eipo students enrolled in university courses.

One young man, 24 years of age, is doing his master thesis at the Institute for Governmental Science in Jakarta. A starker contrast is hardly imaginable: Village life in Eipomek with no electricity or any other of the modern amenities here and life in one of the world's metropolis there. This student's social manner, academic knowledge and ability to cope with all the bewildering aspects of life in the electronic era are truly amazing. The government wants to send him to the USA or an English speaking country so that he can acquire a third language; his Bahasa Indonesia is perfect. It was interesting to note how deeply he is attached to the Christian religion. He attributes, for instance, his stunning biographical success to the fact that God helped him. Like the other students I met he neither drinks alcohol nor smokes. And he is very determined. It is quite likely that these young men will have success and become local and regional leaders or academics with positions as teachers or university professors one day. Girls less frequently pursue their academic careers beyond secondary education – to get involved in risky life situations far from home is still considered to be male enterprise. But this will change. Young women from other regions of Papua are serving as role models for the ones in more remote areas. Already now they have positions as qualified health workers and teachers.

Accepting the new religion and the new way of life has turned out, so far, to be the right decision for by far the majority of the Eipo and their neighbors in the mountains of this Indonesian province. The question will be whether there is going to be a backlash one day. A common path of events is, as Peter Lawrence (Lawrence 1964) has described for Papua New Guinea, disillusionment with the new faith and more or less drastic actions sparked off by the feeling of non-fulfilled hope: the

classic political movements which are the second part of "cargo cults". First, the local inhabitants embrace Christianity in the hope that their lives will change and they will have access to the goods ("cargo") of the outside world. When this turns out not to be an automatic consequence of changing religion, protest and rebellion can follow. Local "prophets" arise (often men who have experienced the modern world), who call upon the people to destroy their gardens and villages in an ill-conceived expectation that the own ancestors, core elements of the old religion, can thus be forced to step in and provide material goods and change towards modernity. Around Wamena incipient cargo cult type movements swept through the Dani region, but seem not to have made a great impact. A faint echo of these ideas, examples of classic millenarian utopia, reached the Eipomek Valley, but were squashed by Pilipus and some other church leaders (Heeschen, personal information).

It seems that the Eipo have understood that success hinges on individual and community performance, academic and professional success and that they should not expect God nor the ancestors to step in with miraculous acts of providing goods or services. Time will tell whether this pragmatic approach will prevail and progress in the political process of granting autonomy and funds to the autochthonous Papuan population in this Indonesian province will continue, thus fulfilling some of the hopes for a better life or whether there will be backlashes, revivals of the old religion and political rebellion as in other regions of Melanesia.

10.11 Discussion

Two of the cultures adjoining the Mek region have been researched especially with regard to traditional religion, both times by European missionaries. The monograph of Siegfried Zöllner (1977) *Lebensbaum und Schweinekult. Die Religion der Jalî im Bergland von Irian-Jaya (West-Neu-Guinea)* is the result of detailed ethnographic stocktaking and describes Jalî (or Yali, as it is written now) religion in its complexity and conceptual richness. Zöllner, a pastor of the reformed German "Vereinigte Mission" church rightly points out that there cannot be any difference between "magic" (a term so often used in anthropological writings) and "religion". Sybil Hylkema's book of 1974 *Mannen in her Draagnet. Mens en Werelbeeld van den Nalum (Sterrengebergte)* (Hylkema 1974) has a wider scope, but also centres on cosmology and world view. His account breathes a kind of loving understanding of his hosts and lays out, as Zöllner's work, the religious underpinning of Nalum daily life in great detail. It is no happenstance, I think, that these two academic treatments of traditional religions in the New Guinea mountains are written by trained theologians. Their times are over now. It can be hoped that the new generation of local church leaders who were trained by persons like Hylkema and Zöllner, will one day write their own accounts of their beliefs, old or new.

Yali and Nalum religion as well as that of other cultures in this part of the highlands of West-New Guinea (Heider 1991; Jorgensen 1991; Schorl 1991) had many things in common with that of the Eipo. Creator figures (like the *Yaleenye,*

Jeli/Yeli in Yali religion) and various other deities, among them important and powerful female ones, played a role as bringers of life, initiators of central rituals and instructors of the earliest humans. These cosmologies and religious systems as probably those of any contemporary or extinct culture, posit the existence ofsupernatural powers.

Only in this way can the world be explained and understood: as the consequence of acts by those mighty powers who have set everything in motion, shaped the earth, made it habitable, revealed the secret of how to make fire, gave rocks from which to make stone adzes, gave food plants to grow as well as a host of other things, and instructed humans how to use them and which rules to follow and which rituals to carry out so that maintenance of the delicate balance of all things would be safeguarded. Because otherwise there would be chaos, destruction, common death and disappearance of culture. Many of the concepts, embedded and expressed in religious myth, are intellectually and artistically appealing. They betray the searching human mind which must create order in the world. Therefore, the sophisticated Eipo systems of classifying plants (Hiepko and Schiefenhövel 1987) and animals (Blum 1979), even the most insignificant ones, legends (Heeschen 1990) about how the sun and the moon (a loving couple in Eipo religion) came into being and what their nature is, why women menstruate and bear children, why there is love, hate, war and peace.

Yet, this aspect of a world in need of getting explained, thereby a functional view of religion, does not figure prominently in Melanesian literature. Swain and Trompf, in their comprehensive volume (Swain and Trompf 1995) highlight many facets of the religions of Oceania, but, as is typical for comparative ethnoreligious works, take a ". . . by and large historico phenomenological. . ." (p. 442) approach, e.g. stressing the war-oriented nature of most of the traditional cultures in the Pacific and how this may have shaped their religious concepts.

In my view, the core of all religions can be seen as an evolved mental adaptation to cope with the bewildering magnitude of phenomena which plague the exceptionally large human cortex. I think it is most likely that early on in the process of hominization those of our ancestors who were, due to specific cognitive and psychological characteristics, inclined to posit the existence of supernatural forces which could be made responsible for all the things in need to be explained, had advantages over those who were not equipped with this kind of attributing principle. Stress and anxiety are reduced if one has, as the pre-Christian Eipo, an idea how, e.g. earthquakes are brought about, no matter whether this theory is right or wrong. Humans long for meaning. In our postmodern times, many construct their own, often esoteric cosmologies and rituals because the classic ones provided for by the Christian churches have become partially or completely obsolete. In pre-scientific eras, meaning was offered by religion and that must have been a very advantageous effect for all those who believed in its teachings.

It took very long until European thinkers dared to criticize some of the core elements of the Christian faith. Hume (Hume 1757), for example, in his attack on the belief in miracles and his statement that "natural instincts" like fear and the propensity to adulate are the real causes of religious belief, not divine revelation, and

Feuerbach (1854) in his revolutionary view of the "true or anthropological essence of religion" which he saw grounded in our inner needs. God as the outward projection of man's inward nature and thereby basically nothing else than man. A modern evolutionary anthropologist could hardly have found a better phrase. A pity that Feuerbach was not accepted in most academic circles and lived of the means his wife, owner of a porcelain factory, provided. Darwin's biography comes to mind. In our days authors like Wilson (Wilson 2002) and Dennett (Dennett 2006) as well as many of the ones who have contributed to this book are setting out to disentangle religious tradition and the learned corpus of theology from the likely evolutionary roots of our religiosity.

The topoi and symbols created in the process of shaping religious belief systems speak of the creativity of the human brain and, at the same time, of its being shaped by its evolutionary history. Our proclivity and apparent need for symbolism is one aspect of this. Religious rituals, especially those in traditional societies, employ the *tertium comperationis* principle, i.e. by finding a symbolic link from the unwanted to the wished-for condition (e.g. being freed from a spirit causing disease) one utilizes the power which the human brain obviously ascribes to this analogy-type linkage, e.g. one expels the spirit with smoke, strong smells or chants (cp. exorcism rites which are still part of the official therapeutic arsenal of the catholic church) or one pulls out, as is the custom in many traditional societies, the disease by extracting a visible object from the body of the patient which acts as the *tertium comperationis* and has thus a strong psychological effect (Schiefenhövel 1986). The Roro at the south coast of Papua New Guinea, use the fruits of a specific plant which pregnant women eat if they want to have a boy: the fruits are looking like a small penis and two testes. A classic case of the many analogy-concepts which our symbolism-prone brain gives birth to. One only has to think of the "Signaturenlehre", the belief that "signs" are hidden in nature (usually the idea is that God did this) and that they can lead the knowledgeable to their right usage. An example is *Anemone hepatica*, a small plant starting to show its violet flowers in early spring. Its leaves are shaped like the lobi of the human liver; it was thus used, in European pharmacopoeia, as a remedy against liver disease.

This must have been quite convincing for human thought which is so hungry to understand the world and find meaning and sense in its threatening chaos. For the natural scientist, it is quite astounding, that in our own modern society the belief in "aphrodisiacs" like penis-shaped asparagus or the giant phalloi of sea cucumbers is still very frequent and strong. Many patients whose cartilage is worn away by arthrosis, take very expensive pills containing shark cartilage because their brain is caught in the *tertium comperationis* trap. Pharmaceutical products built on mere analogy are selling very well all over the planet and biologists are worried that some shark species will become endangered like the rhinoceros, the elephant and other animals who had the bad luck of triggering analogy concepts in the human brain.

The stress and anxiety reducing effect of religion is particularly strong when there is a real threat. Disease, famine, birth (which is, due to our large brain and the consequences of bipedality, more complicated in humans than in other mammals), natural disasters and generally danger of dying are such universal threats. It is not

surprising that religions, until the present day, promise help and offer relief particularly in these situations. It does not come as a surprise that religious persons have better chances to be healthy and live longer (Koenig et al. 2001); this is a cumulative effect as those individuals are likely to lead a generally healthier life style with less alcohol, nicotine and similar toxins as well as possibly have less stressful relationships with others, yet the psychosomatic effects of believing and finding meaning, of feeling protected in the bosom of a powerful faith and amidst a group with strong identity and social support will also play a protective role.

All transitions, physiological, psychological or social, are potentially dangerous, because they are a threat to the steady state which has established itself in response to intrinsic and extrinsic factors and thus functions well. Socio-political transitions like the one the Eipo communities experienced when they came in contact with the modern world are periods of increased vulnerability and stress. It seems quite logical that in those kind of situations people look for transcendental ways to cope with the threat to their old lives and to help adjust to the new one which is about to penetrate the age-old steady state. The Eipo did this transition, after a few years of hanging on to their old beliefs, in a very decisive and forward-oriented manner. They fully understood that they had lived in a time bubble, isolated from the rest of the world and that there was only one solution: embrace the world, have the children educated, no matter how difficult it would be, and play a role in the political affairs of the country. It would have been, I think, impossible for them to accept the new way of life without accepting, as a kind of prerequisite, the new religion which was offered to them by the North American protestant mission. When white researchers and after them white pastors and pilots are the figureheads of change and representatives of the new world, one better follows their way of life – and religion has always been perceived, by the people of Melanesia, an integral, important part of life. To venture into a new era would probably have been impossible without a corresponding new religious ideology. It is, perhaps, impossible for any society to function without an underpinning catering for the religious needs of our brain.

Another legacy of our evolutionary past is that all religions employ anthropomorphic concepts. In creating images of the divine, generally of supernatural powers, our ancestors have utilized cognitive pathways which have been shaped to optimize communication and transactions with fellow humans. The father-figure of the Christian God and Mother Mary are such archetypal images. The Greek Olymp was filled with ridiculously anthropomorphic figures – I always wondered whether any educated Greek citizen ever believed in their existence. The *isa* and creator deities of the Eipo are equally human-like, in basic morphology and, especially, in their wishes (sex, food, company, etc.) and the ways they communicate and act.

In the apse of the vow church of Andechs, Bavaria, a stone throw away from our research institute, a large amount of naive paintings, mostly several hundred years old, are on display. They all tell the story of how a particular person or group of persons (e.g. a mother in childbed, a horseman attacked by robbers, a passenger in a boat on a stormy lake, the inhabitants of a house which caught fire) prayed, in the moment of imminent danger, to Mary, the patron saint of the church, and how, indicated by a golden ray coming from her hand and touching the supplicant, she

signaled her willingness to step in for rescue. “Ex voto”, from (my) promise, is written on these paintings. In the moment of danger, the pious person turns to the supernatural entity for help and promises (Latin *vovere*) to reciprocate.

This is interesting from the viewpoint of human ethology. The divine Mother does not need a gift to make up for her help. But the human brain cannot step out of its mode of interpersonal communication: *do ut des*; obeying the law of reciprocity, is a must in all cultures. The supplicant follows this law, even though her/his interaction partner is not a fellow human but a powerful, almighty goddess-like figure. Out of neurobiological necessity, we behave towards the divine as we do to other humans, especially to high-rank ones (that is why so many gestures of submission are found in the liturgies of the world; see Feierman this volume). We carve our Gods according to ourselves; Xenophanes (Freeman 1957) and, in a much more radical way, Feuerbach (1854) understood this. The religious myths around the world, from the ones of the Eipo to those of Christianity, take the opposite approach: the creators are believed to have shaped us according to their image. The outcome of these two paradigms is the same: supernatural entities and humans have many things in common and their interaction is modeled along the lines of emotions and sets of behaviors typical for the modes of interpersonal communication in our species.

The similarity of worldwide religious concepts, from New Guinean animism and ancestor worship to the big world religions plus their apparent functionality, also as very effective group binding mechanisms (MacDonald 1994), lends itself to an evolutionary approach. Most likely, it was a bundle of multiple factors which have shaped our brains to crave for religion (cp. Pinker 2006; Iannaconne 1997). Whether this is the result of various distinct and separate adaptations which originally evolved for other functions or whether there was a more unified evolutionary push towards religiosity seems undecided, but that religiosity and related traits are heritable, to a rather high degree, has been demonstrated (Koenig and Bouchard 2006).

The early human mind, this is the position taken in this contribution, needed a powerful paradigm which was able to explain all the seemingly unconnected and unpredictable events of nature as well as its awe-inspiring beauty and functionality, and to make sense of the complexity of human wants and actions. Additionally, our ancestors needed rituals to interact with the supernatural powers who were believed to have created and to be in control of the world. Helplessness, stress and anxiety were reduced through belief and ritual. It is no wonder that we are, by our very nature, Homo religiosus.

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Chapter 11
Authoritarianism, Religiousness, and Conservatism: Is "Obedience to Authority" the Explanation for Their Clustering, Universality and Evolution?

Thomas J. Bouchard, Jr.

Abstract Authoritarianism, Religiousness and Conservatism are among the most studied social attitudes in modern psychology. Measures of the three attitudes consistently correlate between 0.50 and 0.70. These strong correlations suggest that they form a higher order factor that I call Traditionalism. I review evidence that supports the idea of such a higher order factor distinct from other attitude factors and comparable higher order personality traits. I propose that an underlying cause of Traditionalism is the disposition to obey authority and more broadly to respond positively to symbols of authority. Contemporary research shows that variance in this trait is due to genetic factors and not due to patterns of childrearing. There is suggestive evidence that this trait facilitates reproductive fitness, but the evidence is very indirect and appropriately designed studies are needed to answer the question. The predisposition to obey authority is consistent with constructs in two other major evolutionary theories: Haidt's theory of the evolution of moral intuition and Simon's theory of "docility." I further argue that while obedience to religious authorities can be seen as a form of exploitation, and may well be in some cases, the disposition to obey authority probably evolved in the context of reciprocity.

11.1 The Structure of Social Attitudes

Three major dimensions of attitudes and beliefs typically studied by psychologists are Authoritarianism, Religiousness and Conservatism. Various measures of these constructs correlate between 0.50 and 0.70. These correlations are sufficiently high to suggest a higher order factor with a common underlying cause. The most comprehensive study of this topic is that of Saucier (2000) whose findings illustrate the trends found in the psychological literature. Saucier gathered 266 -isms from the dictionary and wrote items based on their definitions (some -isms generated more

T.J. Bouchard, Jr. (✉)
Psychology Department, University of Minnesota, Minneapolis, MN 55455, USA
e-mail: Bouch001@umn.edu

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than one item). Four hundred items were presented to a college student population (N=500). The data were subjected to a variety of factor analytic procedures. He presented data for both a three- and four-factor solution and a selection of the -isms that best characterize the three factors psychologically. A selection of these -isms and their loadings (correlations with) on the factors are shown in Table 11.1.

Saucier does not label the factors, except with Greek letters, so I have taken the liberty of naming them. I call the first factor Traditionalism, the second factor Materialistic Hedonism, and the third factor Liberal/Spiritual. The third factor in the three-factor solution divides into Liberalism and Spiritualism factors in a four-factor solution and they are also shown in Table 11.1. The first factor, Traditionalism, is a bi-polar factor and it clearly highlights the fundamental conflict between secular humanism and revelation.

I will not discuss Materialistic Hedonism. The Liberalism/Spiritual factor, however, deserves brief discussion. It is widely believed that spiritual and religious mean much the same thing and the two concepts are very often conflated. The psychometric evidence strongly supports two rather distinct constructs, at least in the populations studied by psychologists (Saucier and Skrzypinska 2006). The philosopher Stace in his book on *Mysticism and Philosophy* (Stace 1960) comes to a similar conclusion on the basis of the examination of a quite different literature.

Saucier carried out a replication study using a smaller set of representative items and gathered additional attitude and personality measures. The sample was again made up of college students. He included additional social attitude and personality measures in order to see if he could demonstrate discriminant validity. That is, show that not all attitudes simply correlate highly with each other or that they could be explained by well-known personality traits. This validity information for his factors is shown in Table 11.2.

The first finding to notice is the very tight cluster formed by Religiousness, Right-Wing Authoritarianism (RWA) and Conservatism. The Religiousness measure is a composite of two adjectives (*religious* and *nonreligious*) rated on a nine-point scale. The RWA scale is that of Altemeyer (1996, 1988, 1981) and is considered by many to be the best measure of the Authoritarianism construct put forward in the book, *The Authoritarian Personality* (Adorno et al. 1950). The Conservatism measure is a variant of the widely used Wilson–Patterson Conservatism scale (C) (Wilson 1973). The Social Dominance Orientation measure (SDO) is from Pratto (Pratto et al. 1994). The Machiavellian (Mach) scale is from Christie (Christie and Geis 1970). SDO is sometimes called "the other authoritarianism" and treated as a measure of political conservatism (Jost et al. 2003). This data suggests that while SDO correlates very modestly with RWA it does not correlate with Religiousness or with Conservatism. The Mach scale correlates only very modestly with the other four measures. It is clear that Social Dominance Orientation and Machiavellianism are not part of the cluster. In addition to forming a tight cluster Religiousness, RWA,, and Conservatism correlate very highly with Traditionalism. Saucier, concludes that "as in previous studies, Religiousness, Conservatism, and Authoritarianism form a mutually correlating cluster. . ." (p. 375).

Table 11.1 Three and four factor solutions for items written to represent the 266 philosophical -isms found in The American Heritage Dictionary (-isms are used to represent items). The third factor divides into factors four and five

Factors and loadings									
Traditionalism		Materialistic Hedonism		Liberal/Spiritual		Liberalism		Spiritualism	
Ecclesiasticism	0.79	Materialism	0.61	Liberalism	0.61	Liberalism	0.55	Hinduism	0.54
Pietism	0.75	Sensualism	0.56	Environmentalism	0.55	Individualism	0.53	Bergsonism	0.46
Creationism	0.75	Machiavelianism	0.54	Individualism	0.54	Humanism	0.48	Transcendentalism	0.44
Religionism	0.69	Solipsism	0.53	Existentialism	0.48	Constitutionalism	0.48	Asceticism	0.41
Salvationism	0.68	Fascism	0.53	Humanism	0.46	Environmentalism	0.44	Spinozism	0.40
Institutionalism	0.68	Ethnocentrism	0.52	Meliorism	0.45	Intellectualism	0.44	Neoplatonism	0.38
Monotheism	0.64	Rationalism	0.52	Intellectualism	0.43	Hedonism	0.41	Taoism	0.38
Legalism	0.62	Hobbism	0.52	Patriotism	0.40	Utilitarianism	0.40	Zen Buddhism	0.37
Traditionalism	0.57	Hedonism	0.46	Hedonism	0.38	Meliorism	0.40	Animism	0.36
Secularism	–0.52	Egoism	0.45	Zen Buddhism	0.38	Functionalism	0.39	Totemism	0.36
Evolutionism	–0.57	Benthamism	0.43	Constitutionalism	0.37	Credentialism	0.36	Pacifism	0.35
Atheism	–0.58	Cynicism	0.42	Pacifism	0.35	Holism	0.36	Spiritualism	0.33
Humanitarianism	–0.58	Empiricism	0.42	Realism	0.35	Moralism	0.36	Spiritualism	0.33
Secular Humanism	–0.63	Racism	0.41	Antisemitism	–0.35	Physicalism	0.32	Agrarianism	0.31

Table 11.2 Correlations between Saucier's attitude measures and independent measures of attitudes and personality

	Attitude measures						Personality mini-markers				
	Religiousness	RWA	Conservatism	SDO	MACH- IV Total Score	Extra-version	Agreeableness	Conscientiousness	Emotional/ Stability	Intellect/ Imagination	Nine-Item openness
Right-Wing Authoritarian-ism (RWA)	**0.51**	–	–	–	–	–	–	–	–	–	–
Conservatism	**0.59**	**0.77**	–	–	–	–	–	–	–	–	–
Social Dominance Orientation (SDO)	–0.04	0.22	0.09	–	–	–	–	–	–	–	–
Machiavelianism (MACH)	**–0.28**	–0.21	**–0.31**	0.21	–	–	–	–	–	–	–
Traditionalism	**0.69**	**0.74**	**0.76**	0.05	**–0.27**	0.03	0.17	0.05	0.02	–0.17	**–0.31**
Materialism	–0.23	–0.01	–0.16	**0.29**	**0.40**	–0.12	–0.19	–0.07	–0.15	–0.16	–0.21
Liberal/Spiritual	–0.14	**–0.29**	–0.21	–0.21	–0.11	0.06	0.19	0.05	0.03	0.11	**0.47**
Liberalism	–0.10	–0.13	–0.16	–0.08	–0.13	0.04	0.18	0.15	0.10	0.08	**0.28**
Spiritualism	–0.07	–0.24	–0.16	–0.19	0.06	0.02	0.06	–0.15	–0.15	0.00	**0.34**

Note: $N = 303$. Factor scores are regression estimates. Coefficients of at least 0.25 in magnitude are printed in boldface type. All data from Saucier (2000, Tables 4 and 5).

The personality mini-markers consist of 40 adjectives (eight items for each factor) and nine items selected especially to measure Openness. The negative correlation between Traditionalism and Openness replicates a widely known finding. The point of this part of the table is to illustrate the fact that social attitudes are at best only modestly correlated with the major higher order personality traits. Social attitude measures and personality measures constitute distinct domains.

11.2 The Traditional Moral Values Triad

I have called the Religiousness, Authoritarianism, and Conservatism cluster the Traditional Moral Values Triad (TMVT) (Koenig and Bouchard 2006). Figure 11.1 shows how I conceptualize the TMVT.

As humans evolved into social animals and achieved high levels of intellect requiring long periods of parental care they had to solve the fundamental problem of how to relate to each other in families as well as others in the local kin group.

I, among others (Bouchard et al. 1996), have argued that "autopredation" was one of the selective forces that led to the large increase in intelligence in our species. As Finn and Alexander (2007) have pointed out, social selection of this sort can "runaway" and depends on a species having achieved "ecological dominance."

Numerous adaptations came into being during this period (extended parental care, pair bonding, skeletal changes that allowed the birth of babies with larger brains, etc.). The adaptation I would like to focus one here is the mechanism or propensity toward "obedience to authority" I argue that it answers three questions faced by a child in a complex social context. These questions are: "Who is in charge?" "What does he/she want?" "What do I do?" With regard to families and the local kin group "the authority" is a concrete agent. It is easy to see how such a mechanism can be generalized to the adult problem of explaining ones relation to the physical universe. The agent or agents in charge is/are less visible and palpable, but as Boyer (2001) has shown human agency detectors are a plausible mechanism for justifying the existence of Gods. I develop a more detailed rationale for the evolution of "obedience to authority" below.

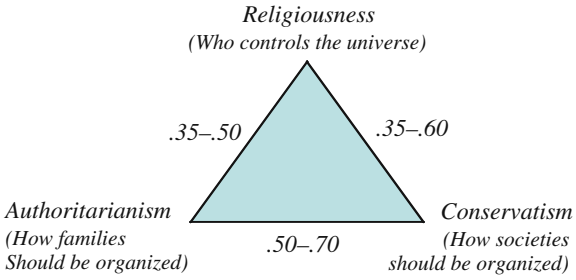

Fig. 11.1 The Traditional Moral Values Triad

The standard measures of the three traits all confound aspects of each other as they contain overlapping item content. Consequently, it has not been clear to what extent they correlate because they share items or because they assess the same underlying construct. Saucier's work, cited above, strongly supports the idea that the correlations are not due solely to item overlap. My choice of the term Traditionalism to characterize the higher order factor is not an accident as my colleague Auke Tellegen worked on this question for a number of years as he developed the Multidimensional Personality Questionnaire (MPQ) (Tellegen and Waller in press). The MPQ is a carefully developed and well regarded personality assessment instrument. It contains a scale called Traditionalism. During the course of development of the MPQ Traditionalism scale Tellegen found that the items sample seven facets of behavior: advocates high moral standards, condemns selfishness, endorses religion, endorses strict child rearing, has positive regard for parents, opposes permissiveness, and values propriety. Because the focus was on behavior in the personality domain none of the item content of the MPQ Traditionalism scale deals with orientation towards governmental/social institutions. I have factored the MPQ scales and the Traditionalism scale is the only one of the 11 that can be factored into parts – religious/moral items and family items. Consequently two of the three domains in the TMVT (religion and family) are clearly represented.

If we look at the items of Altemeyer's RWA scale we see that it covers much the same ground, except that it contains numerous items dealing with patriotism/law and order and thus contains items that focus on how societies should be organized. A common psychometric complaint against the RWA scale is that the statements are complex and confound important distinctions. An example is, "It is always best to trust the judgment of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people's minds." This is a classic "double-barreled statement" that confounds government and religious authorities. Nevertheless, it captures the core idea underlying the construct of Traditionalism, namely Obedience/Rule Following/Law and Order.

The Wilson–Patterson Conservatism scale utilizes what is called the "catch phrase" method. Single items are presented and the respondent is asked to choose to indicate agreement or disagreement by choosing "Yes." "No," or "?" Sample items are Death Penalty, X-rated movies, Foreign aid, Federal Housing, Abortion, Immigration, Divorce, etc. Many of the items deal with policy issues that are under the control of local, state, or federal governments and address activities deemed "moral" or "immoral" by their proponents. My interpretation is that a conservative score indicates a strong preference for authoritative rules that must be obeyed, with obedience being enforced by the proper authorities.

11.3 Causal Analysis of Social Attitudes

It is worth noting that initial work on Authoritarianism (using the Fascism or F-scale) was psychoanalytically based and focused extensively on socialization

(childrearing) as a cause of the specific development of this trait. The childrearing practices of low socio-economic status (SES) families were the culprit. As Scarr has put it,

> The standard explanation of these results was that socioeconomic factors determined life experiences that lead to higher authoritarianism, lower IQ scores, and lower education levels. The implicit causal model led from social status to the other three variables. (Scarr 1981, p. 400).

The typical research design that led to this conclusion involved administering a child-rearing inventory to parents and correlating the scores with offspring F-scale scores. An example of how this data has been interpreted can be found in Eckhardt (1991). At the end of a review of the broad construct of authoritarianism he concludes,

> This conservative pattern seems to be a function of rigid and restrictive childhood training, reinforced by similar disciplines in churches, schools, factories, offices, etc. (Eckhardt, p. 108)

This interpretation assumes a correlation is an index of causation. The causal confound here has been known to social scientists since the work of Galton (1865). This simple design does not discriminate between two sources of influence. Parents pass on genes that may influence behavior, as well as provide an environment that includes child-rearing practices. The extent to which each contributes to the development of a disposition such as Authoritarianism is an empirical question. This problem has not gone away. The interpretation of correlations gathered from biological families and interpreted as causal is almost as prevalent today (Johnson et al. submitted; Keller and Whiston 2008).

The evidence in support of such a causal pattern for the TMVT is very weak at best (McCourt et al 1999). In addition there is now a large body of evidence demonstrating considerable genetic influence on all three members of the TMVT (Bouchard et al. 2004; Alford et al. 2005; Bouchard et al. 2003). The role of childhood training as an important source of variation on the Traditional Moral Values Triad, independent of genetic influence remains to be demonstrated.

11.4 Assortative Mating for Attitudes and Beliefs – Selection Versus Homogamy

An interesting and biologically important feature of the TMVT, relative to personality variables, is their high level of assortative mating. Some representative examples are shown in Table 11.3, where they are compared to personality and other contrast variables.

Right-Wing Authoritarianism, Religiousness and Conservatism yield correlations in the range of 0.50–0.60. In contrast the personality correlations are much more modest. Assortative mating for a genetically influenced trait increases the total genetic variance in the population for that trait relative to a random mating popula-

Table 11.3 Representative assortative mating coefficients for the traditional moral values triad, personality traits, and some contrast variables

Variable	Correlation	Sample size
Authoritarianism		
Right-Wing Authoritarianism, McCourt 1999	0.62	79
Traditionalism, Lykken and Tellegen 1993	0.48	269
Weighted mean	**0.51**	–
Religiousness		
Waller et al. (1990)	0.56	53
Feng and Baker (1994)	0.62	305
Sutton (1993)	0.55	222
Watson et al. (2004) (Newly wed couples)	0.63	276
Botwin et al. (1997) (Newly wed couples)	0.60	107
Weighted mean	**0.60**	–
Conservatism		
Bouchard et al. (2003)	0.60	93
Feather (1978)	0.68	103
Eaves (1999)	0.62	4,692
Feng and Baker (1994)	0.54	301
Watson et al. (2004) (Newly wed couples)	0.75	276
Botwin et al. (1997) (Newly wed couples)	0.49	107
Weighted mean	**0.62**	–
Personality		
Mean of ten MPQ Scales (Traditionalism omitted)	0.08	269
Mean of four Eysenck Personality Questionnaire scales	0.10	4,815
Mean of Big-Five (Newly weds)	**–0.03**	276
Meta-analysis of Eysenck scales, 1989	0.12	889
Weighted mean	**0.10**	–
Contrast variables		
Age	0.77	–
Years of education	0.56	–
IQ	0.33	–

tion. The one large study with sufficient power to estimate this parameter for a member of the TMVT suggests that between 12 and 22% of the variance in Conservatism (W–P scale) is due to assortment (Eaves et al. 1999). These correlations are higher than one would expect from simply being matched at random within one's everyday social environment, such as church group, educational peers, or neighborhood (social homogamy or propinquity). IQ similarity of spouses, about 0.30–0.40, on the other hand appears to be explicable to a considerable degree by social homogamy (Tambs et al. 1993). For attitudes and beliefs it seems likely there is some direct selection. In a study of a newly wed sample by Watson et al. (2004), correction for education and age did decrease the correlation for IQ, indicating social homogamy, but it did not decrease the correlation for Religiousness or Conservatism. The correlations for newlyweds do not differ from those found in other samples, which are largely made up of couples married for various durations. Consequently, convergence with time is not a likely explanation of the overall findings, a con-

clusion consistent with analyses conducted by Watson (Watson et al. 2004). Eaves (Eaves et al. 1999) argue that

> We still do not understand the adaptive significance of assortment for social attitudes in contrast to the essentially random mating we see persistently for personality (p. 78).

I suggest the hypothesis that positive assortative mating for the TMVT is related to reproductive fitness, with couple high on all three variables having earlier marriages of longer duration and producing more offspring than couples less well matched on the TMVT.

11.5 Reproductive Fitness

I find it remarkable that few evolutionary psychologists who discuss the evolution of religion refer to its fitness consequences. They seldom even bother to collect relevant data. In my opinion this is because of an over-commitment to the view that humans are "adaptation executers" (reverse engineering approach) as opposed to "fitness maximizers" (derisively called "baby making"). While the distinction is important and has been productive, it seems to me that ignoring fitness completely in favor of a theoretical construct – strong modularity – particularly at this stage of research is a mistake (cf. Panksepp and Panksepp 2000). As Mulder (2007) has argued the two approaches are not in opposition and each approach can throw light on important questions. As Eaves and his colleagues have pointed out,

> The dearth of empirical data relating difference in human behavior to variation in fitness is a significant "missing link" between our genetic analyses of human behavior and the theories of sociobiology (Eaves et al. 1990, p. 564).

The provocative article by Penke et al. (2007) and the commentaries on it illustrate the fact that integrating quantitative behavior genetics and the modularity approach to evolutionary psychology will be a very difficult enterprise.

In any event there seems to be little doubt that, at the current time, some religious groups are clearly out reproducing secular groups. Blume (this volume) presents relevant data from the Swiss Census 2000. Hout et al. (2001) provide data for the United States. According to them,

> Evidence from the General Social Survey indicates that higher fertility and earlier childbearing among women from conservative denominations explains 76% of the observed trend for cohorts from between 1903 and 1973; conservative denominations have grown their own. (p. 458)

This author argues that

> The explanation for the changing shape of U.S. Protestantism is, therefore demographic, not ideological. The sociology of religion has long known that the surest source of new members for any denomination is the children of today's membership (Greeley 1969).

I have little doubt that this explanation is in part correct, but their exclusion of ideology (social attitudes) is illogical. The question remains: What drives the socialization process and what drives fertility and earlier childbearing? Fertility is

heritable (Rodgers et al. 2001, 2000; Kirk et al. 2001) and, as argued previously, so are the relevant social attitudes. The TMVT may be linked environmentally and/or genetically. Work on this question is currently underway. Longitudinal twin data on the reproductive fitness correlate with social attitudes, which would allow the disentanglement of direction of causation (do children cause conservatism or does conservatism cause children?), would be extremely informative. Of course the results presented in this chapter and any longitudinal findings may be specific to the modern environment in which the populations studied now develop. As Blume (this volume) has suggested, "The reproductive relevance of religiosity may seldom have had a weight comparable to today and the cultural reawakening of religiosity may have just begun." Nevertheless, to the degree fitness is significantly related to the TMVT, it will influence the evolution of the relevant populations. There is increasing evidence of recent Darwinian selection in human populations, some of it related to behavioral traits (Wang et al. 2007; Hawks et al. 2007).

11.6 Innate Intuitions and Moral Psychology

In spite of my label, "The Traditional Moral Triad," I have said very little about "moral psychology" to this point, but it is worth pointing out that most of the ideas about Traditionalism that I have presented are consistent with an important facet of Haidt's theory of the evolution of moral intuition. He suggests there are five foundations of moral intuition upon which human cultures construct their moral communities, each with a separate evolutionary origin. They are "harm," "fairness," "ingroup–outgroup dynamics and the importance of loyalty," "intuitions about bodily and spiritual purity and the importance of living in a sanctified rather than a carnal way," and "intuitions about authority and the importance of respect and obedience" (Haidt and Joseph 2007; Haidt 2007). It has not escaped my attention that Saucier's Liberalism factor incorporates the concepts of "harm" and "fairness," whereas the Materialistic Hedonism factor incorporates the concepts of a carnal way of life and ingroup–outgroup dynamics (Ethnocentrism, Racism). In the Saucier study Spirituality appears to be a different factor than the bodily and spiritual purity construct in Haidt's scheme. The conceptual pie is being split in slightly different ways by the two methods of study, but much of the same content is apparent. More importantly both agree on the importance of a construct that involves "obedience to authority,"

11.7 Docility and the Evolution of "Obedience to Authority"

As my characterization of the TMVT makes clear the fundamental issue is how human beings, during their evolution, have dealt with three questions: "Who is in charge?" What does he/she want?" "What do I do?" A part of the answer is the evolution of (selection for) a disposition to obey authority. Once humans evolved into social animals with a modicum of intellect these questions applied to the physical

world (universe), the family, the local kin group, and in recent evolutionary time the nation state.

The answer to the question, "Who is in charge?" when applied to the universe was (is) supernatural beliefs, often a God or Gods, interpreted in a myriad of ways but generally as an agent or agents who exist in a world beyond the visible and palpable. In my view this was a rationale interpretation given the knowledge base and intellectual tools available. Indeed for a long period of time, my favorite entities, genes, were causal agents who existed in a world beyond the visible and palpable. Latent underlying constructs are common in science. The answer for the family was the parents and/or responsible adult kin; and the answer for the tribe was the "chief," "warlord," or adult tribal elders.

The answer to the question, "What does/do the agent (s) want?" is straightforward – obedience. The capacity to obey, which may entail a process as simple as following, as in imprinting in lower organisms, has enormous survival value for any immature organism. The process can be mediated through olfaction, visual signaling, or as in human by additional mechanisms. Simon (1990) has argued for a "docility mechanism" and has linked it to the spread of altruism. Here I only discuss the docility construct, but the altruism construct is also of considerable importance:

> We will use the term "docile" (in its dictionary meaning of "disposed to be taught") to describe persons who are adept at social learning, who accept well the instruction society provides them. Individuals differ in degree of docility, and these differences may derive partly from genetic differences. There are differences in intelligence (cognitive ability to absorb what is taught) and in motivation (propensity to accept or reject instruction, advice, persuasion, or commands).
>
> Docile persons tend to learn and believe what they perceive others in the society want them to learn and believe. Thus the content of what is learned will not be fully screened for its contribution to personal fitness. This tendency derives from the difficulty – often an impossibility – for individuals to evaluate beliefs for the potential positive or negative contributions to fitness. For example, many of us believe that less cholesterol would be beneficial to our health without reviewing (or even being competent to review) the medical evidence. Hundreds of millions of people believe that behaving in a socially acceptable way will enhance the probability of enjoying blissful immortality.
>
> Belief in large numbers of facts and propositions that we have not had the opportunity or ability to evaluate independently is basic to the human condition, a simple corollary of the boundedness of human rationality in the face of a complex world. We avoid most hot stoves without ever having touched them. Most of out skills and knowledge, we learned from other (or from books); we did not discover or invent them. The contribution of docility to fitness is enormous. (Simon 1990, p. 1666)

Except for the assumption that individuals may actually "evaluate beliefs for the potential positive or negative contributions to fitness" (they generally do not) I largely agree with Simon. I also prefer his reasoning to that of his competitors with regard to this issue (Cavalli-Sforza et al. 1982; Cavalli-Sforza and Feldman 1981; Henrich and Boyd 1998) largely because of their aversion for the evidence supporting the idea that social attitudes (actually virtually all behavioral traits) are to a considerable degree under genetic influence (Martin et al. 1986; Bouchard 2004). Rather than emphasize social learning as Simon does, I would emphasize the features of the second definition of "docility" given by the Oxford English Dictionary – Amenability to training or treatment; submissiveness to management; tractabil-

ity; obedience – as, in my view, it describes the behavior of extreme traditionalist and gets at the core construct – submissiveness and obedience to authority – somewhat better than does Simon's definition. Nevertheless, most of the synonyms for "docile" in Roget's II: The New Thesaurus meets my needs. The first two, meek and mild, are defined as "easily managed or handled," The next five, compliant, submissive, biddable, tractable, and obedient, are defined as "Willing to carry out the wishes or others," Because of our "bounded rationality" broad social attitudes serve as "satisficing heuristics" – procedures for arriving at a decision but not necessarily infallible.

The propensity to obey in human children is undoubtedly an adaptation. A brief walk through the cliff dwellings of the American Southwest will quickly convince one of that simple fact. It is unlikely that most of the environments in which humans evolved were much safer. What about obedience in adults? Obedience of course has its limits, but these limits appear to be incredibly wide. Stanley Milgram (1974) in his work on obedience showed how wide it is in ordinary people. Baring evidence in favor of kin selection suicide bombers go beyond the limits of the Darwinian imperative and some appear to be prepared to kill off entire civilizations. How much wider can it be? Since it is now pretty well agreed that suicide bombers have been with us for a long time and they cannot be explained away as being mentally ill, deranged, etc. (Charlesworth 2003; Atran 2003), the mechanism underlying this behavior must be extremely powerful. Obedience indeed often appears to lead individuals, paradoxically, to behave in ways that are contrary to their own interests.

A highly provocative theoretical explanation of this paradox (if it is a paradox) is that of Voland and Voland (1995) who argue that conscience in children and by extension in adults has evolved as an extended phenotype of the parental "selfish gene." Consequently, obedience on the part of offspring, while sometimes generating a fitness disadvantage, is advantageous to the parents. From this point of view suicide bombers can be considered "true altruists," following their conscience and sacrificing their genes in the service of a broader cause. As Voland and Voland put it,

> The lifetime fitness of the altruist who is guided by his/her conscience and who acts ethically is negative, but not so for this altruist's manipulative parents, and therefore the genetic basis for the formation of a conscience was able to spread in the population. (p. 406)

There is, of course, no reason why two modes of selection could not be at work shaping the same underlying trait. Indeed, Milgram's obedience studies and related work on indoctrinability (Eibl-Eibesfeldt 1998) converge on the conclusion that the propensity to obey authority taps biological mechanisms comparable to imprinting: "Humans follow a flag like an experimentally imprinted duckling, a ball" (Eibl-Eibesfeldt 1998, p. 38).

Given the discussion above, I find the argument that religiousness might be a spandrel or exaptation (Pinker 2006) difficult to digest and it certainly is not my first choice. Bulbulia (2007) has also taken a stance against the spandrel interpretation of religion on grounds that complement the arguments made here. Pinker (2006) has rephrased the question, "Why is religious belief so pervasive?" as "Who benefits?" His answer is the religion and its agents (Priests, Mullahs, Popes, Ministers, etc.). I

recognize that Pinker was explaining religion and I am attempting to explain obedience to authority, but I don't think there is an enormous difference in this instance and I would like to expand the scope of the argument.

First, accept the argument that there is a wide range of general cognitive ability (intelligence) in any human population and this has probably been true for a very long time. Second, assume it was likely that until fairly recently most individuals had minimal opportunity to develop their intellectual skills to their full extent. Under these circumstances we can ask: who were those few members of the population that did get a chance to develop their intellectual skills? They were the head of the tribe, the religious leaders, and the elders or "wise men." Of course it was in their interest of these individuals to manipulate their "followers" – they needed to eat also. But was this exploitation or reciprocity? Those in charge had "knowledge," fragile as it might have been, but still a valuable commodity, and it was in their interest to provide it, as their followers required, else of what value was it.

Vincent Sarich (1993) has elaborated on this point.

We have been interactively social for at least 40 million years, and interactive sociality only works to the extent that individuals within the social group practice voluntary reciprocal exchange, which means that the other individual in any social relationship is going to have to be able to do something for you better than you can for yourself. Otherwise the exchange, and therefore the social relationship, would have no reason for being, and interactive sociality would never have evolved. Clearly that selects for variation, insuring strong individuality.

11.8 Conclusion

"Obedience to authority" is a mechanism that explains, to a considerable degree, the correlation repeatedly found between three major attitudinal constructs – Authoritarianism, Religiousness and Conservatism – that I call the Traditional Moral Values Triad. I call the super-factor that dominates these three constructs Traditionalism. Traditionalism is largely independent of other attitudinal and personality constructs, is influenced to a very significant degree by genes, and appears to influence mate choice more directly and to a much greater degree than personality variables. It may well underlie, to some extent, reproductive fitness in a number of modern populations. The idea that there is a "propensity to obey authority" is entirely consistent with other important theories about the evolution of human sociality and morality, namely Haidt's theory of moral intuitions and Simon's theory of docility and it enlarges the range of phenomena which those theories purport to explain.

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Chapter 12
Cognitive Foundations in the Development of a Religious Mind

Rebekah A. Richert and Erin I. Smith

Abstract Evolutionary explanations for the existence of religious concepts have generally been based on the premise that the transmission and acquisition of religious concepts is a cognitively easy process because religious concepts build on natural cognitive predispositions. These predispositions evolved as cognitive tools essential to human survival. Theories have focused on several candidate cognitive processes that provide the cognitive foundations of religious beliefs: agency detection, folk-psychology, attributions of causality, and the animacy/inanimacy distinction. In this chapter, we review theories and studies outlining children's development of religious concepts such as supernatural agents, creation, religious rituals, afterlife beliefs, and the soul. These studies are discussed within the context of the contributions of ordinary cognition in religious belief, as well as the importance of also considering the cultural influences in the strength and content of belief.

12.1 Introduction

A common question within the study of religion concerns how the structure of human cognition contributes to the acquisition and transmission of religious concepts. As Boyer (2001) outlined, attempts to explain the persistence of religious beliefs over evolutionary history have focused on religion as providing explanations, providing comfort, providing social order, or as a cognitive illusion. Boyer criticized these explanations for relying on functionalism and for assuming the function of religious concepts is equivalent to an explanation for why that concept exists. An understanding of the development of human cognition can uncover how religious concepts are both acquired and transmitted if, as Boyer suggested, the function of a concept is separated from the explanation for its existence.

R.A. Richert (✉)
Department of Psychology, University of California, 900 University Ave., Riverside, CA, USA

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Examining the cognitive foundations of religious concepts allows for the exploration of the evolution of religious concepts. A developmental approach can identify the aspects of human cognition that contribute to religious concepts, prior to the cumulative effects of cultural input. As is outlined below, research into the ontogeny of religious concepts has suggested human cognition, even that of young children, is naturally equipped to receive religious concepts (e.g., Barrett 2000; Barrett and Richert 2003; Boyer 1994, 2001). Barrett argued,

> The cultural phenomena typically labeled as 'religion' may be understood as the product of aggregated ordinary cognition (Barrett 2004, p. 86).

Theories addressing the evolutionary explanations for the existence of religious concepts stem from the basic premise that religious concepts are not cognitively difficult to either transmit or acquire. In fact, most theorists have argued religious concepts are easily acquired because they build on natural cognitive predispositions. These predispositions evolved as cognitive tools essential to human survival. Some theorists would argue the overattribution of these predispositions resulted in the evolution of religious concepts which were followed by religious systems supporting these concepts (e.g., Boyer 2001). Other theorists would argue the action systems related to religious practice came first and were then filled in with religious concepts (e.g., Whitehouse 2004). Regardless of the order in which religious systems evolved, a cognitive approach to understanding religious belief would argue the existence of religious concepts relies on default cognitive processing.

Numerous theories have focused on several candidate cognitive processes that provide the cognitive foundations of religious beliefs. These theories have tended to focus on agency detection, folk-psychology, attributions of causality, and the animacy/inanimacy distinction. In this chapter, we review various theories and studies related to the development of religious concepts. In particular, we describe studies outlining children's development of religious concepts such as supernatural agents, creation, religious rituals, afterlife beliefs, and the soul. In the end, we suggest future research should continue to explore both the cognitive foundations of religious concepts and the cultural influences contributing to the content of religious concepts and belief itself.

12.2 Agency Attributions and Folk-Psychology

The largest body of research into the cognitive foundations of religious concepts has focused on folk-psychology and the human tendency toward agency attribution in concepts of supernatural agents. Theorists have argued these concepts become transmitted when they are minimally counterintuitive, meaning they violate some, but not all, cognitive intuitions about ontological categories (Barrett and Keil 1996; Boyer 1994). These slight violations make the concepts both attention-demanding and extraordinary, which lead to motivation for transmission (Sperber 1994). However, by relying primarily on ontological categories, the concepts require minimal processing capacity, which makes them likely to be accessed on a regular basis

(Boyer 1994). Similarly, Boyer and Ramble (2001) have suggested children are equipped with evolutionarily adaptive survival characteristics that promote the easy transmission of particular violations of cognitive expectations, including violations of human constraints.

Similarly, the preparedness hypothesis is a theory specifically based on the role of folk-psychology in God concepts and argues children are cognitively equipped from an early age to develop concepts of God (and other non-humans) independently from their concepts of people (Barrett and Richert 2003). The preparedness hypothesis claims children acquire concepts of God and God's extraordinary powers relatively easily because these concepts capitalize on default assumptions children have about intentional agents in general. Support for hypotheses that religious concepts stem from early agent concepts comes from research showing children can represent some of God's special characteristics, such as omniscience and immortality, quite easily and quite differently from their human representations.

12.2.1 God's Omniscience

Findings over the past two decades have converged on the conclusion that young children have an early bias to overestimate the knowledge and belief-accuracy of others (Wellman et al. 2001). This bias to assume extraordinary knowledge of others may allow young children (e.g., 3- to 4-year olds) to reason more accurately about God than about their parents, because unlike their parents, God is indeed omniscient. A series of experiments conducted by Barrett and colleagues with 3- to7-year olds both in the United States (Barrett et al. 2001, 2003; Richert and Barrett 2005) and in Mexico among the Yukatec Maya (Knight et al. 2004), have demonstrated that even when children begin to understand the fallible nature of beliefs and limitations on knowledge, they continue to reason about God as omniscient.

Barrett et al. (2001) tested preschoolers' predictions about what various entities would claim were the contents of a cracker box that actually contained rocks. Most 3- and 4-year-old children claimed all characters would not be misled by the appearance of the box and would know there were rocks in the box. On the other hand, most 5- and 6-year-old children only attributed false belief to the other characters, but did not attribute false belief to God. Interestingly, when children were in the process of understanding human false belief, their understanding of God's belief remained stable and technically accurate.

Barrett et al. (2003) tested children's expectations about what their mother, a dog, and God would know about a visual display. In three experiments, 3- to 7-year-old children viewed a visual display that could not be fully understood (e.g., a partially occluded picture). They were then given relevant information for understanding the display (e.g., saw the full picture) and predicted whether the characters would understand the display without having the relevant information. The majority of 3- and 4-year-old children reported all the characters would understand the displays, but the older children revised their responses for their mother and the dog. Again, children's

responses that God would understand the display remained stable, suggesting that even 3-year olds can discriminate between God's mind and ordinary minds (Barrett et al. 2003).

In another study, Richert and Barrett (2005) had children aged 3–7 predict the visual, auditory, and olfactory perspectives of humans, animals with special senses, and God. The preschoolers distinguished God and the special animals as having greater perceptual access than humans and normal animals, who were predicted to have limited perceptual access. Interestingly, even for cases in which children were unsure about their own and others' perceptions, most children were more certain about the perceptions of God and the special animals. Furthermore, children easily incorporated into their animal concepts the perceptual implications of the animals having special eyes, ears, and noses. That this came easily for children, and that responses remained stable across age groups, offers support for the suggestion that it is not the "special" features of these concepts that call for a cognitive adjustment. Rather, the difficulty for children is in accounting for the limited perspectives of humans and ordinary animals.

12.2.2 God's Immortality

Harris (2002) interviewed 3- to 5-year-old children, and found that as children aged and their understanding of psychological and biological constraints on humans increased, they more frequently referenced ordinary constraints on mortality and knowledge when they were talking about their friends. In contrast, references to extraordinary violation of constraints on mortality and knowledge only increased with age in reference to God, and not to friends. These findings suggest that in terms of attributions of mortality, children resist the tendency to anthropomorphize God and continue with their previous assumptions of immortality.

Giménez-Dasí et al. (2005) asked 3½-, 4½-, and 5½-year olds from religious and secular schools in Spain to consider the omniscience and immortality of their best friend or God. The results indicated that only the 5½-year olds consistently appreciated that God, and not their best friend, was omniscient and immortal. This effect was not influenced by school. By 5½ years of age, children in both religious and secular schools made this distinction; whereas younger children did not make this distinction, regardless of school. These results support the interpretation that the violations of cognitive expectations in religious ontologies, such as omniscience and immortality, are easily spread across generations – regardless of early religious schooling. Furthermore, even though the oldest children did not treat God with the same constraints as humans, they generally defended their responses by indicating an understanding of God's extraordinary powers and some degree of anthropomorphism. Although Harris (2002) and Giménez-Dasí et al. (2005) argued that children tended to resist anthropomorphic reasoning, it seems that to some degree, children relied on default assumptions of human perceptual and biological processes – much in the same way adults do (Barrett and Keil 1996).

12.2.3 Afterlife Beliefs

Related to the issue of God's immortality is whether children believe humans experience immortality in an afterlife. Beyond considering how folk-psychology contributes to supernatural concepts, other research has considered how folk-psychology contributes to an understanding of death and a belief in the afterlife. One way to address the possibility of cognitive biases toward belief in an afterlife is to examine young children's beliefs about what happens after death. If belief in an afterlife is primarily the result of sociocultural immersion, we should see a developmental pattern indicating stronger belief of the continuation of physical and mental processes with age. This belief would be related to input from religious and cultural institutions teaching continuation of human processes after death. However, if there are inherent biases in our cognitive structure, we should see that with age, children are more selective in the processes they claim continue after death, a modification of their inherent biases as a result of explicit learning about the nature of biological and psychological processes and religious teaching.

Bering and Bjorklund (2004) investigated this question in three experiments. In the first two experiments, American children from diverse backgrounds between the ages of 4½ and 12 were shown a puppet show of an alligator eating a mouse. Following the show, they were asked questions about the continuation of specific biological processes (e.g., growing old), cognitive processes (e.g., thinking), and psychobiological processes (e.g., being hungry). The results demonstrated that both older and younger children claimed the discontinuation of biological processes. In contrast, older children were significantly more likely than younger children to claim cognitive and psychobiological processes did not continue after death, reflecting an initial assumption of continuation. In addition, the oldest children were more likely to claim psychobiological processes ended rather than cognitive processes. Furthermore, although children responded that the dead mouse did not need to drink (biological), similarly aged children were likely to claim that the dead mouse was capable of feeling thirsty (psychological assessment of a biological state).

To investigate this counterintuitive finding, Bering and Bjorklund (2004) conducted a third experiment in which 5- and 12-year olds, as well as college undergraduates, viewed the same puppet show and responded to questions about the continuity of processes after death in six distinct categories: biological, psychobiological, perceptual, emotional, desire, and epistemic states. The youngest children were most likely to claim biological processes stopped at death, compared to the processes in the other five categories. The older children and adults were likely to claim that biological, psychobiological, and perceptual processes did not continue after death, but claimed a high degree of continuation for the mouse's emotion, desire, and epistemic questions.

These findings indicate two important points. First, young children were likely to provide answers consistent with the continuity of many non-biological processes, suggesting an assumption about psychological continuity after death. Second, older children and adults continued to respond in favor of psychological continuation, although their responses varied systematically as a function of the type of process.

Thus, once death is understood at an explicit, biological level, there is still resistance to complete discontinuous reasoning about mental states after death. These results indicate the importance of considering the roles of early cognitive architecture and the sociocultural influences of belief. This point will be discussed in more detail below.

To address the role of religious instruction and to evaluate potential cross-cultural differences, Bering et al. (2005) presented 6-, 9-, 12-year olds from Spain the same scenario of a mouse being eaten by an alligator. Children answered questions about the continuation or discontinuation of biological, psychobiological, perceptual, emotional, desire, and epistemic states. Half of the children attended a secular school and the other half received religious instruction. The results replicated Bering and Bjorklund's initial findings. The states children argued would and would not continue after death varied systematically in the same direction as the American sample. Moreover, although children who received religious instruction generally provided more responses supporting continuation, this was a reliable difference only for the oldest age group. In other words, despite a social setting that would promote belief in the continuation of processes after death, younger children receiving religious instruction were not reliably more likely than the children receiving a secular education to argue for the continuation of these processes. This finding provides more support for the argument that particular aspects of belief in an afterlife derive from natural cognitive assumptions.

Whereas Bering and Bjorklund (2004) and Bering et al. (2005) examined the specific processes children believed persisted after death, Harris and Giménez (2005) studied how children reconcile a biological and metaphysical understanding of death. To address this question, Harris and Giménez (2005) investigated if older children were more or less likely to adhere to a religious perspective of death than younger children, as well as if children perceived these perspectives as incompatible and how their reasoning (e.g., holistic or dualistic) influenced these perspectives. Seven- and 11-year-old children from public schools in Spain were given two stories about a grandparent who died. The language in one story was designed to evoke religious reasoning; the language in the other story was designed to reflect a biological (secular) stance on death. The results indicated that the older children were less likely to claim processes stopped after death. This finding was especially strong in the context of the religious narrative and for questions related to mind processes, compared to the secular narrative and questions related to body processes. Furthermore, children's justifications, coded into biological and metaphysical responses, further supported these findings. Biological justifications were more frequent in the secular story, for body questions and among the younger children. Metaphysical justifications, on the other hand, were used equally for body and mind questions, but were more common in the religious story and among older children.

Harris and Giménez (2005) argued the discrepancy between the results of their study and those of Bering and colleagues stem from two primary differences. First, the previous studies used a mouse and an alligator. However, in Christian theology it is clear that people, and not animals, have souls and an afterlife. Second, the predator/prey situation in previous studies may have primed children to provide more

biologically driven responses. In the current study, the use of a family member may have evoked more metaphysical reasoning about death. This is consistent with the authors' interpretation that as children mature in their understanding of the finality and completeness of biological death, the religious concept of death and the afterlife is increasingly persuasive. This study indicated that while children are capable of maintaining dual concepts of death, this is probably not completely explained by a natural propensity to dualistic thinking. Again, the importance of considering the cultural influences on religious beliefs will be discussed more thoroughly below.

12.3 Causality and Origins

Although the large majority of the research discussed thus far has been based on children's agency attribution and folk-psychology, more recent research has addressed other cognitive processes involved in religious concepts. In particular, it has been argued that people are strongly prone to anthropomorphism, which leads them to detect intentional agency in the environment (Guthrie 1993). In other words, people are biased to assume that there is intentional action as the underlying cause of an event. Research has suggested even young children are prone to the bias for attributing causality, and this bias serves as a foundation for belief in a supernatural being who causes unexplainable events (Bering 2005). Although the past research into the role of folk concepts in religious concepts has outlined factors related to memorability and transmission, theories related to causality have begun to address issues of motivation for belief (Bering 2006). This tendency to attribute intentional causality has been used to explain children's understanding of creation, prayer, and religious rituals.

12.3.1 Creation vs. Evolution

Past research has suggested children have a tendency to prefer creation rather than evolutionary explanations for origins. Petrovich (1997) interviewed preschool children about the origins of plants, animals, the sky, the earth, and large rocks. Children were asked to choose from three possible creators: people, God, or nobody knows/unknown power. The preschoolers in this study were about seven times more likely to attribute responsibility for the natural world to God, and not to people. Furthermore, Evans (2001) found that regardless of religious affiliation (fundamentalist Christian communities vs. non-fundamentalist communities) a large majority of 5- to 8-year-old children preferred creationist accounts for the origins of the natural world to either evolutionary, artificialist (created by humans), or emergentist accounts.

Kelemen (1999, 2004) has examined the cognitive basis of children's preference for creation explanations. Kelemen (2004) found that young children have strong inclinations to understand both living and non-living things as purposeful. They

see living and non-living things as possessing attributes purposefully designed to help them or serve themselves or other things. For example, 4- and 5-year-old children often claim mountains are "for climbing" or clouds are "for raining" (Kelemen 1999). Related to the relationship between cognitive foundations and cultural input, Kelemen (2004) has suggested the possibility that children naturally develop as "intuitive theists," and religious instruction merely fills in the forms that already exist in children's minds.

Kelemen and DiYanni (2005) specifically examined whether children's assumptions about the purposeful nature of natural phenomena are related to their intelligent design reasoning. They interviewed 6- through 10-year-old children for their intuitions about the origins of artifacts, animals, natural events, and natural objects. Regardless of age, children tended to prefer teleological explanations for the origins of artifacts, animals, and natural objects. In addition, children's teleofunctional intuitions about the origins of artifacts, animals, natural events, and natural objects were significantly correlated with their claims about whether the first things (i.e., artifacts, animals, natural events, and natural objects) just appeared or were made by someone or something. A conclusion from this research might be that developing a concept of a purposeful Creator God is not cognitively demanding for children because this concept builds on their intuitive assumptions about the teleological nature of the world.

12.3.2 Wishing vs. Prayer

Another aspect of religious concepts related to causality is the relationship between belief in mental–physical causality and belief in the efficacy of prayer. Woolley (2000) suggested children do not necessarily outgrow their belief in mental–physical causality, but rather it changes from belief in the efficacy of wishing to belief in the efficacy of prayer. Woolley examined this proposal by interviewing 3- to 8-year-old children about their definitions of wishing and praying, who can wish and pray, and whether wishes and prayers come true. She discussed this research in the framework of children's belief in mental–physical causality, or the belief that people can cause something to happen in the world just by thinking it in their minds. Woolley (2000) found an interesting age by causality type interaction. When children stopped believing in the efficacy of wishing, their belief in the efficacy of prayer was maintained and even increased. Thus, belief in the efficacy of prayer may be easy and natural because it stems from an initial bias towards belief in mental–physical causality.

12.3.3 Religious Rituals

A third aspect of religious experience related to causality is children's intuitions about the causality in religious rituals. In three experiments, Richert (2006) investigated children's flexibility in reasoning about functional and ritualistic actions. In the first study, 5-, 8-, and 10- year-old children from a Protestant church were

asked to consider "how bad" it would be if the protagonist of a story did not conform to specific norms in a church, such as spinning before sitting down or singing on one leg. Some of the children heard a story in which the protagonist was given a justification for the norm, making it a functional action. Others children heard a story in which the protagonist was told that action has always been done that way, making it a ritual action. Although older children were less likely to view the breach of a functional action as bad, children of all ages generally agreed it would be at least "a little bad" to violate the ritualistic action.

In the second experiment, Richert (2006) investigated ritual and functional actions that would be familiar to 6- and 8-year-old children from a Christian background: a bath and a baptism. The results mirrored the findings from the first study. The youngest children were more rigid about a breach of the norms for both a bath and a baptism action, whereas the older children were more flexible about the functional action than the ritual action.

In the third experiment, 5-, 7-, and 10-year-old children were asked to consider how effective a ritual action, a baptism, would be if it was done incorrectly. Again, the youngest children were more likely to claim that the baptism was ineffective if it was done incorrectly, indicating a heightened rigidity than the older children. Although children were generally inflexible as to the conscious breach of ritualistic actions, the oldest children were more flexible in considering the outcome of the action, even if done incorrectly. This tendency may reflect a similar trajectory to children's belief in prayer. In other words, prioritizing the intentionality of the ritual actor over the ritual actions may reflect a changing understanding of the role of mental–physical causality. Importantly, these findings suggest that children's early understanding of rituals builds on their belief in causality; that effects have causes (e.g., being "saved" is the result of some kind of action) and that causes have effects (e.g., ritual actions produce a cause, even if it is invisible).

12.4 Psychological Essentialism and Dualism

Developmental research into cognitive foundations of the concept of the soul recently has received an increasing amount of attention. Bloom (2004) has argued early animacy and inanimacy distinctions by infants develop into a dualistic understanding of humans consisting of distinct and separate bodies and minds. However, as is outlined below, dualistic explanations of a mind/body distinction have often grouped together the concepts of the mind and the soul. Recent research has addressed whether and at what ages children begin to differentiate a third aspect of humanness: the soul.

12.4.1 Soul

In two experiments, Richert and Harris (2006) disentangled children's developing concept of the soul, with a particular emphasis on its differentiation from the mind

and the body. In the first experiment, children from Lutheran churches between 4- and 12-years old were asked to consider what changes occur as a result of baptism. Specifically, children were asked if there was internal or external change, in other words if the change could be seen and/or touched. Additionally, children were asked to consider if the baptism was associated with changes in the brain, mind, and/or soul. Children provided more theologically correct answers with age (e.g., baptism resulting in an internal change that cannot be seen or touched). Moreover, children of all ages were much more likely to claim that the soul changes after baptism, compared to the brain or the mind.

A second experiment examined more specifically how children differentiate the soul, mind, and brain. First, third, and fifth graders from Catholic schools were asked to think about the brain, mind, and soul of a newborn baby. Although many of the youngest children believed that a newborn baby had a soul, the older children were even more likely to agree with that statement. Additionally, although the younger children agreed a baby would not be the same without her or his brain, mind, or soul, the belief that individuals would not be the same without their soul was strongest for the oldest children (Richert and Harris 2006).

This finding was related to children's understanding of the function of the brain, mind, and soul. At all ages, children said that a baby could not perform cognitive functions without a brain; however, non-cognitive and biological functions could continue without the mind or brain. The soul, however, had no clear role in cognitive, non-cognitive, or biological functions. Children's open-ended responses indicated the soul was most likely to be associated with spiritual functions (Richert and Harris 2006). Another way children differentiated the brain, mind, and soul concerned perceived stability over time. All of the children tended to agree that minds and brains change over time, whereas souls stay the same.

This work demonstrates previous conceptions of simple mind/body dualism do not fully capture the complexity with which young children reason. By as early as first grade, children differentiate the mind and the soul according to both function and stability. These results may clarify why it is common for individuals to report that biological functioning does not continue after death, yet attribute continued mental processes (see also Bering and Bjorklund 2004; Bering et al. 2005). Whereas previous explanations for this contradiction (e.g., if the body stops working, so does the mind) have pointed to the context (Harris and Astuti 2006) or nature (Bloch 2006) of the questions, or a general lack of sensitivity to the contradiction, these results indicate children may understand that both the body and the mind stop working at death. It is possible children attribute the continuing processes to a separate entity – the soul. The authors argued these findings provide support for the role psychological essentialism plays in the developing a concept of a soul as a distinct type of spiritual essence.

To evaluate if the concept of the soul is a distinct form of psychological essence, Richert and Harris (2008) examined how adults conceptualized the mind and the soul. Specifically, they were interested in if the concept of the soul is merely a maturation of "mind traits" (p. 100), or if it remains something distinct even in adulthood. Undergraduates from diverse backgrounds answered questions about the

ontology and function of the mind and the soul. Most adults asserted the existence of the mind, claiming it begins at conception, changes over the lifespan, and ends at death.

Respondents were less certain about the existence of the soul (Richert and Harris 2008). Those who did affirm the existence of the soul were likely to claim it would continue to exist after death. In addition to the differences in the form of the soul and the mind, individuals were likely to ascribe differences in function. Particularly, the mind was more likely to be associated with cognitive functions, whereas the soul was more likely to be associated with spiritual functions.

In sum, the brain appeared to be conceptualized according to the life cycle, constrained by birth, growth, and death (Richert and Harris 2008). The soul, however, was dissociated from the cycle of conception, life, and death. These findings do not support the idea that the soul is merely a by-product of developing concept of the mind. The authors argued individuals consider the soul an "invariable essence" across development, one that is associated with spiritual matters. It is important to note, however, that although these participants constituted a diverse religious group, it is unclear to how and to what extent differences in religious teaching and involvement influence these findings.

12.5 Summary and Conclusions

As the above research has suggested, there is no single cognitive starting point for religious concepts. As with other kinds of concepts, religious concepts derive from a variety of sources and predispositions. Concepts of supernatural agents likely derive from early agent concepts. Belief in an afterlife likely draws from assumptions based on folk-psychology. Early assumptions about causality likely form the basis for belief in creation and the efficacy of prayers and rituals.

Thus, a developmental approach has helped researchers identify the cognitive bases for religious concepts, which can inform discussions about how and why people have acquired and transmitted religious concepts over the course of evolutionary history. However, from a cognitive developmental perspective, there is much more that needs to be explained in regard to individual belief in religious concepts. Thorough research has yet to address at what age and based on which input children begin to question the truth value of the concepts they have received. Without cultural input and support, it is unclear whether religious concepts would disappear or simply relegate to the fantasy realm. However, it seems clear that the function of the concepts would drastically change.

As outlined above, research into the cognitive foundations of religious concepts has built a strong foundation for arguing religious concepts are the result of natural cognitive predispositions. What often gets lost in the shuffle of these research programs has been the uniqueness of religious concepts. Although religious concepts may have evolved from natural cognitive processes, so have all other "supernatural" concepts, such as fairies and ghosts; it is important not to forget that religious

concepts and activities hold a "special place" in the lives of religious people. Furthermore, although all people have the capacity for receiving religious concepts, not all people believe in the truth of them. Although less studied in this area of research, the cultural factors that propagate the content and belief in religious concepts will be an important next step to further our understanding in this area.

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Chapter 13
Religious Belief and Neurocognitive Processes of the Self

Shihui Han

Abstract Cross-cultural psychological research suggests that self-construals can be dissimilar between individuals fostered in different cultures. Recent brain imaging studies concerned the underlying neural basis of cultural influences on cognitive processing of the self. In this chapter I first review cultural difference in self-concept and research concerning cultural influence on self-construals and related neural mechanisms. I then discuss the difference in self-construals between individuals with distinct religious belief and practice. Finally, I present brain imaging evidences that help to clarify distinct neurocognitive processes of the self induced by Christian belief, which is characterized with weakened neural coding of stimulus self-relatedness, but enhanced neural activity underlying evaluative process applied to self-referential stimuli.

13.1 The Psychological Self

The significance of the "self" has been central to the study of philosophy and psychology for centuries. Western philosophy, from the time of Descartes onward, has proposed the "self" as a delimited individual that represents an entity of subjectivity and is distinct and separate from others. In addition, the self represents an agent who is responsible for the thoughts and actions of an individual to which they are ascribed. Most of the Western philosophic thoughts about the self focus on search of invariant features or characters of the self (Solomon 2002), assuming that the self consists of attributes that do not vary according to changing social situations.

The self-concept plays an important role in psychology to interpret human social behaviors (Banaji and Prentice 1994). William James (1890) recognized three distinct parts of the self, i.e., the material self, the social self, and the mental self, which

S. Han (✉)
Department of Psychology, Peking University, 5 Yiheyuan Road, Beijing 100871, Peoples's Republic of China
e-mail: shan@pku.edu.cn

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assist to refine the self-concept for psychological research. Contemporary psychological research concerns mental representation of the self and operationalizes the psychological self in several domains. For example, when a person looks into a mirror, he/she knows that the image in the mirror is the self. Self-face recognition in contrast with recognition of familiar faces induces self-awareness (Keenan et al. 2003). When a person tries to recall his/her past experiences, the retrieval process is tightly associated with the self, which has been termed the process of autobiographical memory. Human beings can also conduct reflexive thinking of one's own dispositions. Such self-referential processing functions to define self-construals that help to describe the uniqueness of the self. A large number of psychological studies have shown evidence that the processing of different aspects of self-relevant information and self-knowledge engages unique cognitive and neural mechanisms. For example, human adults usually respond faster to the self-face than to familiar faces and this self-face advantage is more salient with left-hand responses than with right-hand responses (Keenan et al. 1999). Brain imaging studies found evidence that self-face recognition is associated with increased activity in the right frontal cortex (Uddin et al. 2005; Sui and Han 2007), suggesting the existence of specific neural mechanism underlying operationalization of self-awareness that distinguishes the self from others. The distinction between the self and others in memory, however, is mediated by distinct neural structures. Retrieval of autobiographical memory is underpinned by a set of neural structures including the temporomesial and temporolateral cortex (Fink et al. 1996). These neuroimaging findings indicate that the processing of multiple aspects of the self is mediated by distinct neurocognitive mechanisms.

13.2 Culture and the Self

Psychologists, since William James (1890), have noticed that a person may behave differently in different situations. For example, a professor may behave as an elegant gentleman when giving a serious scientific lecture. The same person may tell vulgar jokes and make fun with friends during a private party. Different situations allow presentation of different dispositions of the self. These observations lend support to the existence of multifaceted self-concept and the dynamic nature of the self (Oyserman and Markus 1993). The dynamic and flexible features of the self are also reflected in the fact that cultures produce remarkable influence on the self. For example, a representative theory of culture and self (Markus and Kitayama 1991, 2003) proposes that many Western cultures "require constructing oneself as an individual whose behavior is organized and made meaningful primarily by reference to one's own internal repertoire of thoughts, feeling, and action, rather than by reference to the thoughts, feelings, and actions of others" whereas East Asian cultures emphasize "the fundamental connectedness of human beings to each other" and "entails seeing oneself as part of an encompassing social relationship" (Markus and Kitayama 1991, p. 226, p. 227). The cultural discrepancy results in different self-construals, i.e., the independent self in Western cultures and the interdependent self in East Asian cultures.

The differential self-construals in terms of cultures result in remarkable difference in psychological processes between the Western and East Asian cultures (Markus and Kitayama 1991). One psychological approach to the understanding of different self-construals is to examine the cultural difference in psychological structure of memory in association with the self and others. Psychologists used a self-referential task (Rogers et al. 1977) to investigate whether subjects were able to remember information about the self and others equally well. In this task subjects were presented with personal trait adjectives and instructed to judge whether a trait was suitable to describe the self or others. Subjects were given a "surprise" memory test after the trait judgment tasks in which they were presented with both old and new traits and asked to judge old versus new words. A typical finding of behavioral studies was that self-descriptive traits were better remembered than traits descriptive of others (Rogers et al. 1977). Subsequent research explored whether psychological structure of the memory self is independent of any others for Westerners but overlaps with that of close others for East Asians. Indeed, Keenan et al. (Keenan and Baillet 1980) found that American subjects showed better recognition performance in the self-reference condition than in the parents' condition. By contrast, Zhu and Zhang (2002) showed evidence that Chinese subjects remembered equally well the trait adjectives that were linked to the self and mother in a trait judgment task. These observations suggest that the contents of the psychological structure of the self are essentially different between American and Chinese in that the American self excludes even close others, consistent with the independent self-style, whereas the Chinese self includes at least partially the close others, in agreement with the interdependent self-style.

The cultural influence on self-concept goes beyond the difference between Western and East Asian self-styles and self-related cognitive processing. While most philosophers believe the existence of a distinct "self," such perspective on the self is not taken for granted by all human communities. Particularly, people with specific religious belief have radically different self-concepts. For example, while the common sense assumption of the self as an empirical entity is accepted, Christianity put strong emphasis on human contingency and dependence on God: we are made and saved by God and reflect his goodness. To highlight this relationship between human and God, Christianity advocates denial of the self who is taken as a creature and sinner in order to drastically surrender to God (Burns 2003; Ching 1984; Lin 2005). In addition, in order to grow in God-likeness, one must recognize one's own "nothingness" and pursuit spiritual request for self-transcendence. One consequence of such perspective on the self is to blur the boundary between the self and others, because to be always told that one is nothing may be injurious to the firmness of one's self-concept and self-identity and denial of the self may lead to weak distinction between the self and others. The Christian beliefs about the relation between the self and God may produce strong influence on the cognitive style of processing related to the self. For example, the mandate that "every one of us shall give account of himself to God" (Romans 14:12) emphasizes judgment of the self from God's perspective rather than from one's own perspective. Such divergent views of the self have produced enormous impact on believers' mind and behavior (Spilka et al. 2003).

Similar views of the nature of the self can be found in Buddhism. Central to much Buddhist thought is the idea that human fulfillment comes through self-transcendence. Buddhists criticize and abandon the concept of the self that is considered as an entity that endures unchanged over time and stands external to the subjective experience. The extreme Buddhists' thought of the self is that there is no enduring and independent self underlying experience, or in other words, "there is no substantial entity underlying that flow of experience which constitutes a person's life" (McDaniel 1987, p. 219). Such a concept of the self is an illusion. Zen Buddhists used the phrase "the true self" to describe one's "immediate" experience, here-and-now and the domain of immediate experience which proceeds "without thinking." The true self "is not the entity denied in the doctrine of no-self; rather, it is the reality affirmed once no-self is realized" (McDaniel 1987, p. 221).

Although the significant difference in self-concepts between different cultures (Western vs. East Asian cultures, Christian vs. Buddhist cultures) has been noticed and discussed by philosophers and psychologists for centuries, to date, there has been no behavioral research to explore the difference in cognitive mechanisms underlying self-related processing between people with different religious beliefs and little is known about potential consequences of the religious beliefs on neurocognitive mechanisms involved in self-related processing.

13.3 Neural Mechanisms Underlying Self-Referential Processing

Since self-cognition plays a pivotal role in human social behaviors, understanding the neural substrates of self-related processing has recently become a hot topic in social cognitive neuroscience studies. One approach to this issue is to scan subjects using functional magnetic resonance imaging (fMRI) while they perform a self-referential task (Rogers et al. 1977). Brain imaging studies define neural activity specific for self-referential processing as increased activation related to self-trait judgment relative to trait judgment of a famous person. A number of studies showed evidence that activity in the ventral part of the medial prefrontal cortex (MPFC) and the perigenual anterior cingulate cortex increased in association with self-judgment (Fossati et al. 2003; Kelley et al. 2002; Macrae et al. 2004; Moran et al. 2006; Zhu et al. 2007). Further research explored the functional role of the ventral MPFC in self-related processing. For example, D'argembeau et al. (2005) found that the increased blood flow in the ventral MPFC was correlated with the amount of thoughts about the self (measured using subjective rating). Moran et al. (2006) also found that activity in the ventral MPFC increased in a linear fashion with increasing self-relevance of personal traits. These brain imaging findings suggest that a crucial role of the ventral MPFC is coding self-relatedness of stimuli.

Other researchers found that the dorsal region of the MPFC is also involved in self-related processing when self-referential evaluations are required. Judgment of how a picture made subjects feel engaged the dorsal MPFC relative to judgment of if a picture depicted a scene that was indoors (Gusnard et al. 2001). Evaluation

of one's own fancy to a site or a person also engages the dorsal MPFC (Zysset et al. 2002). Taken together, these findings indicate that, although the ventral and dorsal parts of MPFC are implicated in self-referential processing, the ventral MPFC seems to dominate the coding of self-relevance of stimuli whereas the dorsal MPFC appears to mediate the reappraisal and evaluation of self-related stimuli (Northoff et al. 2006).

13.4 Cultural Influence on the Neural Substrates of Self-Referential Processing

While social psychological research has shown ample evidence that the self-style is strongly influenced by cultures, it remains unknown whether such influence is limited in the domains of social behaviors and cognitive styles or may extend to the neural process related to the self. For instance, individuals in Western cultures tend to be characterized with an independent style of the self and individuals in East Asian cultures are prone to show an interdependent style of the self. Does such cultural difference in psychological structure of the self arise from distinct neural substrates underlying self-related processing in different culture groups? Our recent brain imaging study suggests a remarkable influence of Western and East Asian cultures on the neural representation of the self (Zhu et al. 2007).

The critical issue addressed in this work is, given that the representation of the self is separated from that of others in Western cultures whereas self-representation overlaps partially with the representation of others in East Asian cultures (Markus and Kitayama 1991), whether parallel cultural difference in self-concept can be observed in the neural substructure underlying self-representation. To investigate this, Zhu et al. (2007) scanned English-speaking Westerners (including British, American, Australian, and Canadian) and Chinese, using fMRI, when the participants judged personal trait adjectives regarding self, mother, or a public person. The rationale is that, though Western participants with the independent view of the self used the ventral MPFC to represent only the self (Heatherton et al. 2006), Chinese participants with the interdependent self are likely to employ this brain region to represent both the self and intimate others, such as their mothers.

The fMRI results confirmed increased activation in the ventral MPFC in association with the self-judgment relative to trait judgment of a famous person in both Western and Chinese participants, consistent with the observations of the previous work (Kelley et al. 2002; Heatherton et al. 2006). In addition, in line with Heatherton et al. (2006), Zhu et al. (2007) found that self-judgments induced stronger ventral MPFC activation relative to mother-judgments in Western subjects, suggesting that the ventral MPFC activity is specific to the representation of the self. Nevertheless, in Chinese individuals, the contrast of self- vs. mother-judgments did not show activation in the ventral MPFC and mother-judgments generated enhanced MPFC activity compared with trait judgment of a famous person. It appears that the representation of Chinese mother cannot be distinguished from the representation

of their selves in terms of the ventral MPFC activity, indicating that Chinese individuals use the ventral MPFC to represent both mother and the self. While social psychological studies suggest that cultures create habitual ways of processing information related to the self and one's important others (Markus and Kitayama 1991), our fMRI results indicate that these habitual cognitive processes are accompanied by detectible parallel neural processes.

13.5 Neural Consequences of Christian Belief on Self-Referential Processing

Because Zhu et al. (2007) showed evidence that the difference in self-construals between Western and East Asian cultures resulted in differential neural processes of the self and others in the ventral MPFC, one may then ask whether religious cultures may similarly influence the neural substrates underlying self-referential processing. As mentioned above, there is essential difference in self-concept and self-cognition between Christians and non-religious people. What are the neural consequences of Christian belief and practice on the neurocognitive processes of the self? This question can be answered by examining whether Christians and non-religious people employ distinct neural substrates for self-related processing. To address this issue, we recently scanned two groups of participants (14 non-religious and 14 Christian Chinese participants) using fMRI while they performed tasks of personal trait judgments regarding the self or famous persons (Han et al. 2008).

We hypothesized that the unique spiritual quest and practice of Christianity may produce two psychological consequences. First, to deny oneself in order to live a spiritual life as dictated by Jesus may weaken encoding process of stimuli as self-referential. Second, emphasis of evaluation of the self from God's perspective may strengthen the evaluative process of self-referential stimuli. The possible neural consequences related to these unique cognition styles may be then that, relative to those in non-religious people, the neural activity mediating the processing of coding stimuli as self-referential in the ventral MPFC may be weakened in Christians. In addition, the neural activity underlying the evaluation process of self-referential stimuli in the dorsal MPFC may be enhanced in Christians.

Similar to the previous research (Kelley et al. 2002; Zhu et al. 2007), we assessed brain activities associated with self-referential processing using the self-referential task. Participants were scanned using fMRI while they were presented with personal trait adjectives and asked to judge if an adjective was appropriate to describe the self or a public person (the former Chinese premier Zhu-Rongji). Neural activity mediating self-referential processing was indexed by the increased activation linked to self-judgments relative to judgments concerning others. Following the functional and anatomical scans, participants were given a "surprise" recognition memory test. The scores of recognition memory were recorded as behavioral index of self-referential processing.

Our behavioral data showed superior memory for self-referenced trait adjectives compared with those related to others in both non-religious and Christian participants. It appears that our participants showed promotion of elaboration and organization of information related to the self regardless of religious beliefs. To identify the neutral substructures involved in self-referential processing in Christian and non-religious participants, we performed a whole- brain statistical parametric mapping (SPM) analysis to compare self- with Zhu-Rongji-judgments in both subject groups. This revealed significantly increased activation in the ventral MPFC associated with self-judgment (BA 10/32, the Talairach coordinates of the activation center are 2, 53, 7, Fig. 13.1) in non-religious participants. Nevertheless, increased activation was observed in the dorsal MPFC linked to self-judgment (BA 9/32, centered at 8, 27, 3 and –6, 32, 24) in Christian participants.

To further confirm that Christian and non-religious participants employed distinct neural structures in the self-referential task, we calculated parameter estimates

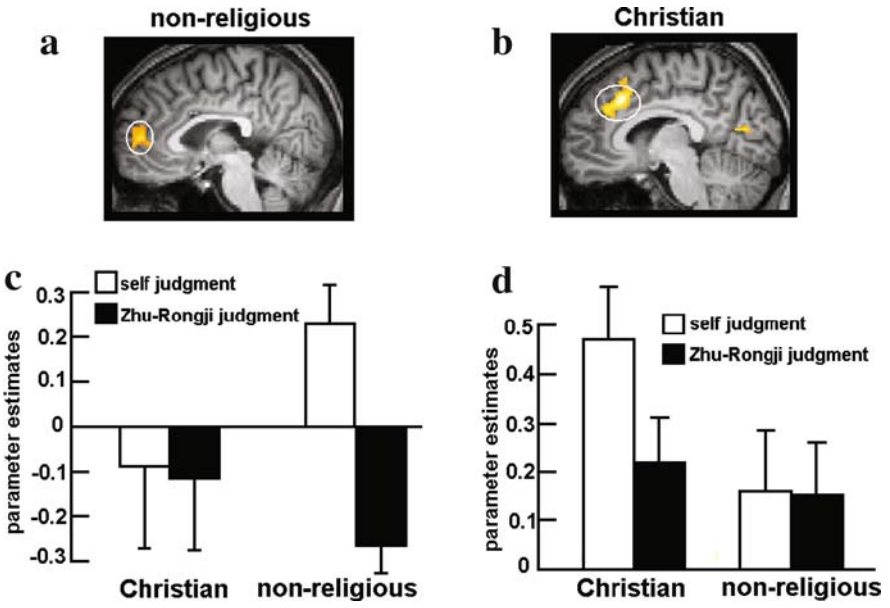

Fig. 13.1 Increased brain activations associated with self-judgments. Illustration of the fMRI results of Han et al. (2008). (**a**) Increased brain activations associated with self-judgment relative to Zhu-Rongji-judgments was identified in the ventral MPFC in non-religious participants. (**b**) Increased brain activations associated with self-judgment relative to Zhu-Rongji-judgments was identified in the dorsal MPFC in Christian participants. (**c**) Parameter estimates of signal intensity in the ventral MPFC linked to self- and Zhu-Rongji-judgments in non-religious and Christian participants. The signal intensity in the ventral MPFC was significantly greater in associated with self- than Zhu-Rongji-judgments for non-religious participants but not for Christian participants. (**d**) Parameter estimates of signal intensity in the dorsal MPFC linked to self- and Zhu-Rongji-judgments in non-religious and Christian participants. The signal intensity in the dorsal MPFC was significantly greater in associated with self- than Zhu-Rongji-judgments for Christian participants but not for non-religious participants

of signal intensity related to self- and Zhu-Rongji-judgments in both the ventral and dorsal MPFC so as to compare the results between two subject groups. A repeated measure analysis of variance with Participant (non-religious vs. Christians) and Judgment (self vs. Zhu-Rongji) as main effects showed a significant interaction between Judgment and Participant, suggesting divergent activation in the ventral MPFC linked to the dissociation of self- and Zhu-Rongji-judgments between the two participant groups. One-sample t-tests confirmed that signal intensity of the ventral MPFC was significantly larger to self- than Zhu-Rongji-judgments for non-religious participants, but did not differ between the two judgments for Christians. Similar analysis of the signal intensity calculated from the dorsal MPFC also revealed a reliable interaction of Judgment and Participant. One-sample t-tests confirmed that signal intensity of the dorsal MPFC was greater to self- than to Zhu-Rongji-judgment for Christians but did not differ between the two judgments for non-religious participants. These results indicate that Christian participants utilized the dorsal MPFC to differentiate the self from others in the trait-judgment tasks whereas non-religious participants employed the ventral MPFC to distinguish the self from others when judging personal traits.

These findings indicate that, although the behavioral performances of both Christian and non-religious participants showed self-advantage in memory of trait adjectives, the neural process of self-trait judgment is essentially different between the participant groups. Previous brain imaging studies have linked self-referential processing of personal traits to the ventral MPFC activity (D'argembeau et al. 2005; Heatherton et al. 2006; Kelley et al. 2002; Macrae et al. 2004; Zhu et al. 2007) that subserves the process of self-relevance of stimuli (Moran et al. 2006). Our fMRI results, however, provide the first piece of neuroscience evidence that the ventral MPFC activity linked to self-judgment was eliminated in Christian participants. This is the first neural consequence of Christian belief and practice on self-referential processing, i.e., the coding process of stimulus self-relatedness was weakened. In addition, we observed increased the dorsal MPFC activity linked to the self-referential processing in Christian participants. This is the second neural consequence of Christian beliefs and practices on self-referential processing, i.e., Christian beliefs and practices enhance the evaluative process of self-related stimuli mainly from God's perspective, which is consistent with the functional role of the dorsal MPFC in reappraisal and evaluation of self-related stimuli (Northoff et al. 2006) and in inference of others' mental states (Grèzes et al. 2004; Mitchell et al. 2005).

13.6 Conclusions

While it is widely acknowledged that religious beliefs influence humans' social behaviors substantially, the underlying neurocognitive mechanisms remain poorly understood. In addition to the recent neuroimaging studies that examined the neural correlates of religious experience (Azari et al. 2001; Beauregard and Paquette 2006), we explored possible difference in functional anatomy of social cognition

(i.e., self-referential processing) between Christian and non-religious participants. Our brain imaging results indicate that religious culture (e.g., Christianity) that repudiates the distinctness of the self but underscores the evaluative process of the self by God results in stronger involvement of the dorsal MPFC relative to the ventral MPFC in self-referential processing, providing further evidence for the dynamic and culture-sensitive characteristics of the neural mechanisms underlying self-referential processing. Further research may explore if the characters of the neurocognitive processes of the self observed in our work are specific to Christian participants. Our studies also raise questions for neuroscience research, i.e., at which level of neural structures we must consider cultural difference in neural activity underlying human cognition.

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Chapter 14
Neurologic Constraints on Evolutionary Theories of Religion

Erica Harris and Patrick McNamara

Abstract Patients with Parkinson's disease (PD) experience a selective depletion of neostriatal and meso-frontal dopamine and thus provide an ideal model for assessing potential dopaminergic influences on religious cognition and experience. We review three specific studies conducted in our laboratory focusing on reports of various facets of religiousness in patients with PD. We find that (1) there is a reduction in self-reported religiousness among these patients as compared to healthy age-matched controls; (2) PD patients with left-onset disease (right hemispheric impairment), report less detailed religious ritual action scripts; and (3) PD patients are less able to recall and access religious experiences. Our findings are consistent with adaptive theories of religion that point to evidence for functional design of religious cognition.

14.1 Introduction

A fundamental question for evolutionary theories of religion is whether any aspect of religion is an adaptation. The best way to identify a trait as an adaptation is to demonstrate correlated evolution of that trait with some other functionally linked trait over evolutionary time. For example, if it could be demonstrated that whenever religiousness appeared or increased in a human lineage, so, too, did some other trait with which it was functionally linked, then it would be reasonable to ask if religiousness functioned to enhance or support the second trait. If, for example, religiousness increased across human lineages in tandem with innovations in healing practices or with new forms of cooperation, then it becomes more reasonable to functionally link religiousness and innovative healing practices or cooperative practices. Or, to take an example less rooted in cultural change, if REM sleep durations increased

E. Harris (✉)
Department of Neurology and Boston University School of Medicine, Boston VA Healthcare System, Jamaica Plain Campus, Boston, MA, USA
e-mail: erh8x@bu.edu

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over a number of animal lineages in tandem with increased volumes in the amygdalar complex and associated emotional memory capacities, then the case for REM sleep as an adaptation for amygdalar-linked emotional learning capacities would be correspondingly strengthened. New statistical techniques can now reliably identify instances of correlated evolution while controlling for Galton's problem of non-independence of cultural samples. These techniques can and should be exploited to test adaptive hypotheses of various components of religion. To do that one needs a large range of cultures with reliable data on religious practices as well as some knowledge regarding the phylogenetic history of the cultures under investigation. That history can be obtained with use of the relevant language phylogenies, but again, these techniques have not yet been exploited in studies of the evolution of religion. Although correlated evolution is one of the best ways to identify a trait as a potential adaptation, there are other important diagnostic criteria to consider as well. Another way to show that a trait is an adaptation is to demonstrate that it exhibits "functional design."

14.1.1 What Is Functional Design?

Functional design refers to the thing that that features or working parts of a trait accomplish. If the features of a trait seem to work together to produce a common effect that benefits the organism in some way, then that trait likely exhibits functional design. Sleep exhibits functional design. Its features seem designed for restoration and repair of the body. Sleep is associated with a specific set of brain activation and de-activation patterns and neurophysiologic events. It is even associated with its own peculiar forms of cognition. When activated, sleep allows animals to restore biochemical housekeeping functions and immune system functions, so sleep confers a benefit on animals.

An adaptive trait is likely to be more complex than a non-adapted trait given that its features must mesh with and address some problem or opportunity for an organism in the environment. The greater the specific fit of the trait to the problem, the more likely that the trait was designed by natural selection to address that problem. The lesser the fit, and the lack of evidence of functional design, the more likely that the trait in question was not an adaptation but was instead a mere chance association or by-product from some other functional complex.

It is important to point out that evidence of functional design does not mean that the trait in question is always going to appear "optimal", "functional", or create a "happy" organism. Because of their complexity, adaptations are often costly to operate. They require that the organism give something, expend some effort or energy to keep the trait operating in good condition. The brain, for example, requires a tremendous metabolic investment on the part of the animal who "chooses" to build a brain – the more complex the brain, the greater the metabolic investment, and the greater the chance that other parts of the animal go without. The brain, in turn, will create all kinds of opportunities and all kinds of new costs for the animal.

Even very basic adaptations may not necessarily appear to be good for the animal. Fever, for example, creates a very uncomfortable organism that can barely move around or defend itself. Yet, fever saves lives by making it difficult for pathogens to thrive in the host. The higher the fever, the more effective it is, but at higher temperatures, fever can produce delirium and physiologic collapse. Even at lower temperatures, fevers can kill sperm and so produce temporary sterility in males. Here we have an adaptation that directly produces a short-term impairment in reproductive fitness! Similarly, religiousness may sometimes appear to cause dysfunction, but it may, nevertheless, be an adaptation if it can be shown that it exhibits functional design and that it benefits the individual (or, more precisely, that they benefited our ancestors) in the long term. With respect to religiousness, there are a converging number of studies that show that religiousness acts as a protective influence on mental and physical health – at least for some illnesses (Musick et al. 2000; Powell et al. 2003; Strawbridge et al. 1997; Townsend et al. 2002). Religiousness also appears to promote prosocial and cooperative behaviors. Thus, there is a reasonable argument to be made with respect to the usefulness of religiousness for individual fitness. Nevertheless, we will not pursue that line of inquiry here. Instead, we will bracket for the time being what effects religiousness have on individuals and instead focus on the question of functional design.

14.1.2 How Do We Look at the Design of a Trait Such as Religiousness?

There are a multitude of psychometric instruments and constructs that identify a reliable trait that can reasonably be called "religiousness" (Hill and Hood 1999). We want to know whether that trait exhibits features of functional design. How do we do that? The answer lies within the brain. We have to look at the specific cognitive architecture and brain mechanisms of religiousness. If we are able to look at the cognitive architecture that supports religiousness to understand how religiousness is organized, then we can begin to entertain claims that the trait "religiousness" is non-trivially dependent upon specific neural networks of the brain. Therefore, we want to look at the brain correlates of religiousness and see how the design changes as a result of brain dysfunction. Before we go any further, we describe what we mean by "religiousness."

14.1.3 Definition of Religiousness

If we summarize across hundreds of psychometric studies on religiousness (Hill and Hood 1999), we find that religiousness can be profitably construed as comprised of three basic components. The first component is the positing of belief in supernatural agents. Belief is the cognitive mechanism that allows us to posit and think about supernatural agents, to suppose that they have "minds" like our own and can be

communicated with. The second component is the tendency to perform rituals in order to relate to those supernatural agents. And the final component is the experience, or state of consciousness, that results from the actual belief in supernatural agents and the performance of rituals. The experience of religiousness is distinct and results from a combination of different brain areas and functions.

Is it possible that each of the components of our definition have a separate brain realization? They probably do as there are likely different networks that support these behaviors. We will focus on the third component of religiousness – the capacity to engage religion experientially. We present evidence that suggests that this component process may be diminished in PD while the capacities to posit supernatural agents and to perform/understand rituals are relatively intact.

14.2 Our Program of Research

14.2.1 Why Study Patients with Parkinson's Disease (PD)?

Parkinson's disease is a progressive neurodegenerative disorder with a life-time course of about 30 years after its onset (Aarsland and Karlsen 1999). Dopamine projections from the substantia nigra to the basal ganglia and the prefrontal cortex are diminished. Meso-cortical dopaminergic activity is crucial for obtaining rewards from experiences. Without this capacity, rewarding aspects of religious experience should be diminished, and therefore, PD patients should be less inclined towards religiosity. The hallmark of PD is a loss of cells in the substantia nigra (SN) which manufactures dopamine neurons (DA) and in the ventral tegmental area (VTA) which also manufactures DA neurons. Both neurons from the SN and the VTA have projections to the pre-frontal cortex (PFC). Without these dopaminergic projections, the PFC does not function normally, and the patients experience prefrontal dysfunction such as inappropriate social behaviors, impaired judgment and planning abilities, an impaired theory of mind, etc. (McNamara et al. 2006a, 2006b, 2006c, 2006d, 2008, 2007). We are interested in whether dysfunction in these prefrontal striatal dopaminergic networks can selectively impact religiousness.

Most importantly, PD is associated with a localized area of function in the brain: the nigro-striatal and meso-cortical DA circuits are impaired within the basal ganglia and the ascending dopaminergic tracts that project to the prefrontal lobes.

What is more, PD is an asymmetric disease, at least initially – either the patient suffers a depletion of DA in the left brain or the right brain with motor symptoms emerging most dramatically on the contralateral side. If a patient has right-onset PD, there is a deficit of DA in the left brain; if a patient has left-onset PD, there is a deficit of DA in the right brain. As a result, we can evaluate right hemispheric and left hemispheric contribution to religiousness by examining these patients.

Although these PD patients have brain dysfunction, they are not psychotic or demented; they can still reflect on their capacities and beliefs. Anecdotally,

clinicians who deal with PD patients on a daily basis have remarked to us that is not uncommon for some patients to "lose" their religion while other patients have an opposite experience: they may undergo deep conversion experiences. This latter set of events, however, is very rare, apparently.

In any case, the profound deficit in forebrain dopaminergic activity within this patient population allows us to evaluate the role of dopamine in production of religious experience. There are several lines of evidence that suggest that dopamine is crucial for production of religious experience:

- Dopaminergic drugs reliably induce changes in religious experience (Nichols and Chemel 2006);
- Religious delusions of epileptics, OCD patients, schizophrenics, and bipolar patients are linked to abnormally high dopaminergic states (Geschwind 1983; Dewhurst and Beard 1970; Siddle et al. 2002; Tek and Ulug 2001); and
- High self-transcendence scores on the Cloninger (Cloninger et al. 1993) personality inventory known as the Temperament and Character Inventory (TCI) are correlated with genetic markers of dopaminergic transporter molecule (Comings et al. 2000; Hamer 2004).

In summary, PD patients are an ideal patient population to study to identify neural correlates of religious experiences. We will now present data from three preliminary studies that we have conducted with our PD patients to illustrate the role of DA in religiousness and what makes PD patients different from normal controls. Each of our studies touch on a separate component of the definition of religiousness that we presented earlier in this chapter: belief, ritual, and experience.

14.3 Data from Our Studies

14.3.1 Study 1: Religiosity in PD Patients

Our first study examined religious beliefs in PD patients and healthy age-matched controls (McNamara et al. 2006a). PDs and controls were asked about their religious beliefs and were administered a spirituality questionnaire known as the Brief Multidimensional Measure of Religiousness/Spirituality (Fetzer 1999). The BMMRS was developed by a panel of experts on religion and health from the Fetzer Institute and the National Institutes of Health and Aging. The BMMRS contains 38 statements in Likert scale formats that cover 11 religious domains. Examples of questions/statements on the BMMRS include "To what extent do you consider yourself a religious person?" or "I feel God's presence." Results revealed a trend toward reduction in religious beliefs and religiosity levels among PD patients as compared to age-matched controls (see McNamara et al. 2006a).

14.3.2 Study 2: Social Action Scripts

In this study, we examined PD patients' access to routine religious ritual knowledge by examining their production of social action scripts. We asked patients to tell us the steps they would take to go to the doctor's office, to order a meal at a restaurant, to attend a religious service, and to make a good sandwich. For the purposes of this chapter, we are going to look at the social action scripts for attending a religious service and only one of the other social action scripts as a comparison – going to the doctor's office. In Appendices 1 and 2 are examples of the social action scripts for visiting the doctor's office and attending a religious service. Below in Fig. 14.1, we present the percentage of basic actions that PD patients and healthy controls produced for going to the doctor's office.

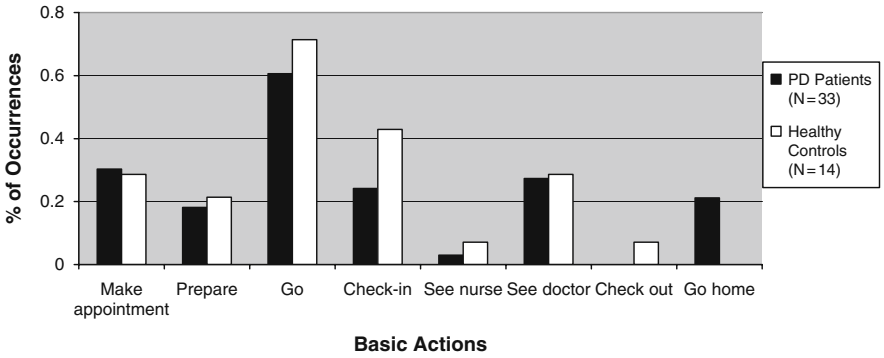


Fig. 14.1 Percentage of basic actions for visiting the doctor's office among PD patients and healthy controls (*PD* = Parkinson's disease)

Figure 14.1 shows that the controls are much more organized and provided more of the basic actions than the PD patients to accomplish the superordinate goal of going to the doctor's office. However, we did not find any differences in routine access to knowledge about going to the doctor's office. This is no surprise since PD patients go to the doctor's office quite often. As a result, this offers evidence that PD patients can access routine scripts. However, when we look at the script for going to a religious service (Fig. 14.2), we find that the controls are producing more of the basic actions for the "religious rituals": sit (meet and greet others), listening/participating in the service, and singing hymns. The PD patients are having more difficulty with these actions.

When we look at the percentage of basic steps that were produced by right- vs. left-onset PD patients for going to a religious service, we find that those who have right-onset PD (left-hemisphere dysfunction) produced more basic steps than patients who have left-onset PD (right-hemisphere dysfunction). For the basic action of singing, the left-onset PD patients completely drop this step (see Fig. 14.3).

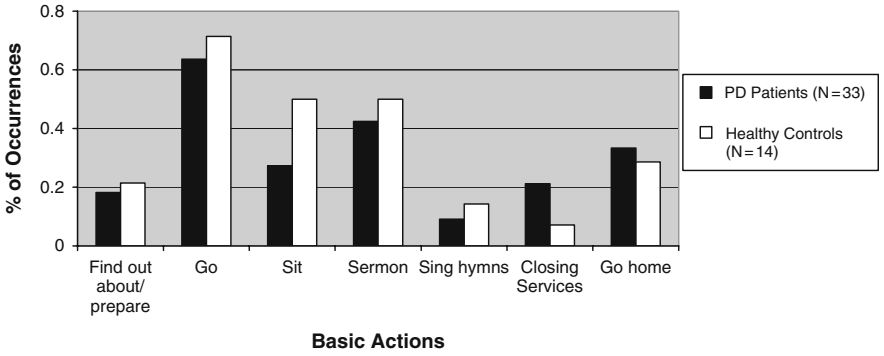


Fig. 14.2 Percentage of basic actions for going to a religious service among PD patients and healthy controls (*PD* = Parkinson's disease)

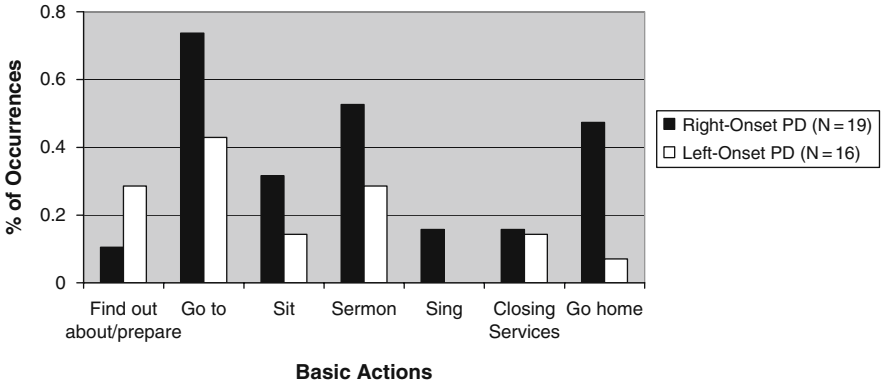


Fig. 14.3 Percentage of basic actions for going to a religious service among *Right-Onset* vs. *Left-Onset PD* patients (*PD* = Parkinson's disease)

14.3.3 Study 3: Memory of Religious Experiences

We now discuss our final study (done in collaboration with Wesley Wildman, Ph.D.) which involved asking participants to report different types of experiences and administering a phenomenology questionnaire known as the Phenomenology of Consciousness Inventory (PCI) (Pekala 1991). The result from administration of this inventory is a quantitative, survey-based "signature" or profile of an extended state of consciousness. The signature is produced by triggering a memory using carefully designed prompts. The experimental subjects are then asked to fill out a 53-item inventory based on their subjective experience of the event. A quantitative profile of the contents and quality of personal consciousness along 26 measures, grouped into 12 major dimensions (positive affect, negative affect, altered

experience, imagery, attention, self-awareness, altered state of awareness, internal dialogue, rationality, volitional control, memory, and arousal) is produced. The PCI has been validated by Pekala and colleagues (Pekala 1991) and has been repeatedly tested; its domain of validity has been extended in numerous studies since it was first introduced.

In our study, we asked PD patients and healthy controls to report about three experiences: religious, ordinary, and happy. They were asked to reflect for a minute or two on each experience and then fill out the PCI for each experience. Below (see Fig. 14.4) we present some pilot data reflecting the major and minor dimensions of the PCI for our participants.

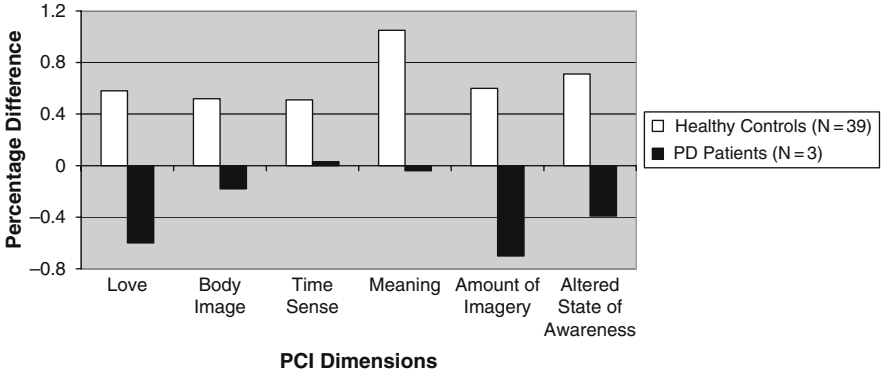


Fig. 14.4 Pilot data reflecting the major and minor dimensions of the PCI for our participants (*PD* = Parkinson's disease; *Love* = positive affect major dimension; *Body Image, Time Sense,* and *Meaning* = altered experience major dimension; *Amount of Imagery* = imagery major dimension; *Altered State of Awareness* = major dimension)

Note that the baseline for the experiences is 0. The baseline represents the scores that healthy controls and PD patients produced for ordinary experiences.

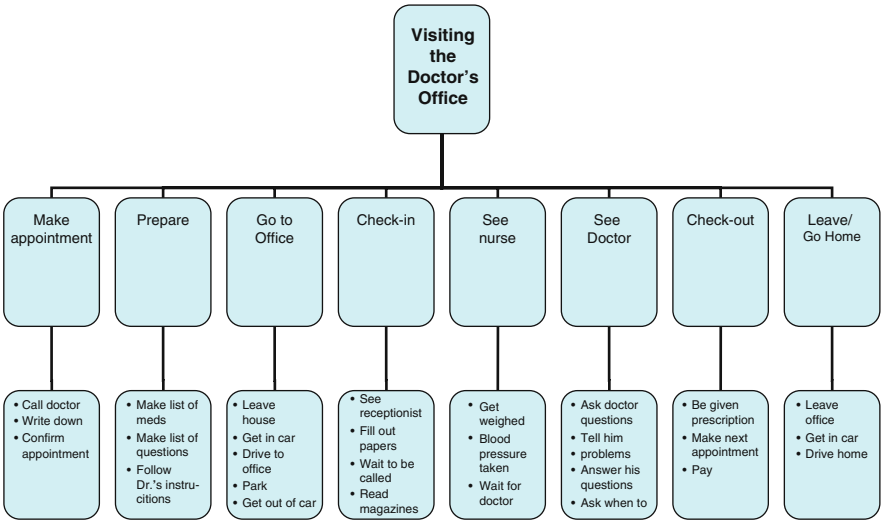
14.3.4 A Summary of Our Studies

- Study 1 showed that there was a trend among PD patients for a reduction among religious beliefs;
- Study 2 showed reduced access to ritual knowledge for PD patients – particularly left-onset (right hemisphere dysfunction); and
- Study 3 showed a reduction in the recall of content of religiousness and access to religiousness per se.

On all three dimensions of religiousness, PD patients are impaired. This evidence is consistent with functional design theories of religiousness.

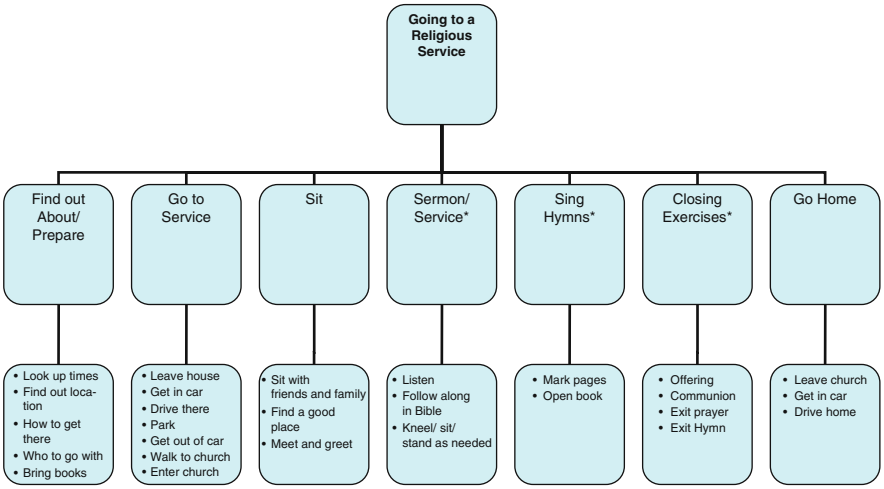
14.4 Appendix 1: Social Action Script for Going to the Doctor's Office

The superordinate goal is visiting the doctor's office. The basic actions, which are the middle row, are the steps that are necessary to complete the superordinate goal. If it were not for these steps, the action would not be able to be performed at all. Finally, we have the subordinate steps. These can be limitless and do not contribute to actually achieving the superordinate goal. Many subordinate steps consist of activities of daily living such as sleeping, eating, bathing, driving, and taking care of finances.



14.5 Appendix 2: Social Action Script for Going to a Religious Service

The superordinate goal for this social action script is going to a religious service. The basic actions and subordinate steps overlap to some extent as steps described in Appendix 1. Note that under the subordinate goals for the basic actions of Sit, Sermon/Service, and Sing Hymns, all of the religious rituals are embedded here which includes following along in the Bible and singing, whereas the other items are not about religion per se. Note: * indicates basic and subordinate actions are religious rituals.



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Chapter 15
On Shared Psychological Mechanisms of Religiousness and Delusional Beliefs

Martin Brüne

Abstract Ever since psychiatry emerged as a branch of clinical medicine, religiosity and religiousness have been interwoven with shifting concepts of psychopathology. Recent research has re-focused on the association of suicidal behavior and religiosity, adherence to treatment, coping with mental illness or bereavement, how religiosity may be related to the attachment system, and the role of religiousness in psychotherapy. One of the most contentious issues, however, pertains to the question how religiousness is related to the formation of delusional beliefs, mainly, because religiousness and delusion formation share several definitional characteristics. This chapter seeks to highlight similarities and dissimilarities between religiousness and delusional beliefs with respect to their neurocognitive underpinnings, which include the ability to recognize agency and to experience the self as an agent, the ability to evaluate current evidence in support of or refuting a hypothesis, the propensity for causality, and the ability to attribute mental states to one's self and others. It is concluded that the intensity with which religious faith is expressed can be interpreted as continuous trait variation ranging from normal belief evaluation with the preserved capacity to consider alternative explanations (thus, weak expression of religiousness), to the extreme of systematized delusion with the incorrigible conviction of divine influence of virtually all aspects of life (which might be termed "delusional religiousness").

15.1 Introduction

Ever since psychiatry has emerged as a branch of clinical medicine, religiosity and religiousness have been intimately interwoven with shifting concepts of psychopathology. Pre-scientific theories proposed that mental illness was a

M. Brüne (✉)
Department of Psychiatry, Psychotherapy, Psychosomatics and Preventative Medicine, University of Bochum, LWL University Hospital, Alexandrinenstr. 1, D-44791 Bochum, Germany
e-mail: martin.bruene@rub.de

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consequence of personal failure and punishment inflicted by God. These untenable speculations prevailed well until the middle of the nineteenth century, and contributed to the maltreatment of many psychiatrically ill in asylums and mental hospitals (Kraepelin 1918). One of the reasons for linking psychopathology with religious matters could have been that psychotic experiences frequently involve ideas of being influenced by supernatural powers, including God or the devil. Even though the prevalence of such ideas may wax and wane with cultural attitudes toward religiosity (Steinebrunner and Scharfetter 1976; Westermeyer 1988; Pfaff et al. 2008), they represent an important aspect of subjective experience during psychotic states to the present day.

Recently, the role of religiousness in psychiatric disorders has received renewed interest, and the number of papers published in prestigious psychiatric journals on religious issues in relation to psychiatry has grown substantially. Most articles revolve around topics relating to suicide risk and religiosity (O'Donnell et al. 2004; Mohr et al. 2006; Huguelet et al. 2007), adherence to treatment (Borras et al. 2007), coping with mental illness or bereavement (Brown et al. 2004; Mohr and Huguelet 2004; Johnson et al. 2007; how religiosity may be related to the attachment system (Walsh 1995; Birgegard and Granqvist 2004; Cicirelli 2004), the role of religiousness in psychotherapy (Carone and Barone 2001), and how religiousness of psychiatrists compares to other physicians (Curlin et al. 2007). For example, several studies found evidence in support of both protective and negative effects on suicide risk in patients with schizophrenia (Mohr et al. 2006; Huguelet et al. 2007) and moderate effects in terms of strengthening resiliency in suicidal adolescents (O'Donnell et al. 2004). Moreover, in widowed individuals religiousness was associated with decreased grief but did not influence depression (Brown et al. 2004).

One of the least well understood phenomena is, however, the relationship between religiousness and delusional beliefs. According to a recent report, 57% of patients with schizophrenia believed that their illness was in one or the other way influenced by their religious convictions, with 31% believing in a positive (e.g., "a test sent by God to put me on the right path") and 26% in a negative impact (e.g., "my illness is a punishment sent by God for my sins") of religious matters on their illnesses (Borras et al. 2007). Interestingly, the extent to which schizophrenic patients interpreted their illnesses as being influenced by religious matters was associated with non-adherence to treatment. Thirty-one percent of non-adherent patients judged their religiousness as incompatible with taking medication and comply with educational therapy, whereas in the treatment-adherent group only 8% viewed medication negatively according to their spiritual beliefs (Borras et al. 2007). However, this study leaves open to speculation how to differentiate between spirituality, religious attitudes, and religious delusions, which is perhaps the most interesting issue regarding the association of religiousness and psychopathology. Can we, and, if so, how can we distinguish between "normal" religiousness and delusional beliefs? Why are religious delusions so prevalent (and apparently stable) in schizophrenia?

In this chapter, I will focus on the evolved cognitive mechanisms involved in religiousness and their particular relationship to psychopathology, above all, the formation of delusional beliefs. This is based, in part, on the premise put forth by Konrad

Lorenz that pathology is at least equally informative as physiology is to explain the nature of behavior and psychological mechanisms (Lorenz 1973). The chapter is organized as follows: first, I will briefly outline the question whether religiousness is a pathology per se.

I will argue that, although religiousness shares some features typical of delusional beliefs, the matter is more complicated than merely equating religiousness with delusion.

Second, I will try to dissect the shared cognitive architecture of religiousness and delusional belief, which may, in part, explain why religious delusions are common in patients with schizophrenia. I will then conclude from these ideas that religiousness lies on a continuum from "normalcy" – whatever this exactly may be – to manifest and systematized delusion. Finally, I will point to some future research directions for empirical testing of my hypotheses.

15.2 On the Relationship of Religiousness with Delusional Beliefs

In modern times, Freud was perhaps among the first to assert that religion was akin to delusion and served as a primitive attempt to infantilize individuals. In his treatise "Das Unbehagen in der Kultur" (*Civilization and its Discontents*, first published in 1938) (Freud 1929/1930) Freud reasoned "the method of religion is to devaluate life and to distort the picture of the real world in a delusional way, for which the intimidation of intelligence is indispensable."

More recently, Richard Dawkins (2006) published an entire book entitled *The God Delusion*, in which he outlined that religiousness was the result of several psychological mechanisms gone awry (hence, favoring the view that religiousness was a "by-product" of cognitive adaptations). The preface contains the only passage in which Dawkins highlights the definitional criteria of delusional beliefs:

> The word 'delusion' in my title has disquieted some psychiatrists who regard it as a technical term, not to be bandied out . . . But for now I am going to stick with 'delusion', and I need to justify my use of it. The *Penguin English Dictionary* defines a delusion as 'a false belief or impression' . . . The dictionary supplied with Microsoft Word defines a delusion as 'a persistent false belief held in the face of strong contradictory evidence, especially as a symptom of psychiatric disorder'. The first part captures religious faith perfectly. As to whether it is a symptom of a psychiatric disorder, I am inclined to follow Robert M. Pirsig, author of *Zen and the Art of Motorcycle Maintenance*: 'When one person suffers from a delusion, it is called insanity. When many people suffer from a delusion it is called religion.' (Dawkins 2006, p. 5)

Dawkins failed, however, to explain what the delusional aspect of religiousness actually is, except for quoting Robert M. Pirsig who, in a sense, reiterates Karl Jaspers's (1973) distinction between a delusion held by an individual and culturally accepted beliefs, which do not, by definition, qualify as delusional.

In contrast to Dawkins's polemic perspective, a more scientific approach to the examination of possible differences and shared features of religiousness and delusion ought to acknowledge the diagnostic criteria of "delusion" and the

role of evolved psychological mechanisms involved in religiousness and delusion formation.

15.3 Definition of Delusion

Delusions are conventionally defined according to the following criteria (Oltmanns 1988):

- The balance of evidence for and against the beliefis such that other people consider it completely incredible.
- The beliefis not shared by others.
- The beliefis held with firm conviction. The person's statements or behaviors are unresponsive to the presentation of evidence contrary to the belief.
- The person is preoccupied with (emotionally committed to)the belief and finds it difficult to avoid thinking or talking about it.
- The beliefinvolved personal reference, rather than unconventional religious, scientific, or political conviction.
- The beliefis a source of subjective distress or interferes with the person's occupational or social functioning.
- The person does not report subjective efforts to resist the belief (in contrast to patients with obsessional ideas).
- The person has faced some unusual or abnormal experience (this criterion is not unequivocally accepted)

None of the above criteria is, however, necessary or sufficient for a diagnosis of delusion, and this clearly indicates that the defining features are not specific to delusional beliefs. The same criteria probably apply to religiousness, except that religious ideas are usually shared with others, and not associated with subjective distress or social malfunctioning.

To illustrate the vague boundaries of the psychopathological concept termed "delusion," we may look at some of the controversial criteria, beyond the fuzziest aspect of delusional belief definition, i.e., whether or not the belief is shared or not shared with others.

For example, there is controversy about the question whether or not the formation of a delusional belief requires aberrant perceptual experiences (Maher 1974, recently updated: Maher 2005), abnormal reasoning or both (overview Bentall et al. 2001). The majority of researchers now agree that an anomalous experience alone is not sufficient to account for a delusion (e.g., Coltheart et al. 2007). For example, Hildegard von Bingen is believed to have suffered from migraine (Sacks 1971). During her migraine aura, she probably had photic sensations, referred to as phosphenes, negative scotomas, and fortifications, which she misinterpreted as divine signs. However, there is little evidence that she was delusional in psychiatric terms, which would require impaired reality testing and impaired psychosocial functioning. From

Hildegard's life history, neither can be assumed, but she certainly was a highly religious person.

The distinction between abnormal perceptual experience and delusional belief evaluation may further be illustrated by the example of the "anarchic hand" or "alien hand" sign. The "anarchic hand" describes a neurological sign that is associated with damage to the supplementary motor area (SMA) or to the anterior corpus callosum. The syndrome is characterized by simple, goal-directed movements, of the hand contralateral to the lesion, which are not purposefully initiated by the patient. These movements are purely determined by current contextual information and may interfere with the patient's actual goals; however, the patient is unable to control these movements. Clearly, patients with an "anarchic hand" are not delusional, because they are aware of the discrepancy between the observed action and their own intentions, and patients often try to prevent further unwanted movements, which patients are fully aware of that they are not generated by alien forces (thus, the synonymously used term "alien hand" is somewhat misleading). In contrast to patients with an "anarchic hand" individuals with delusional beliefs usually behave inconspicuous, except when acting on their beliefs. Hence, there is no visible sign that they misinterpret external stimuli or internal signals as being produced by some other force, but nevertheless, their experience is such that they feel controlled or influenced in terms of body sensations, movement or even thoughts (Frith et al. 1998, 2000).

Similarly, the criterion of distorted reality testing is somehow non-specific to delusions for a number of reasons. First, reality testing of perceptions depends, in part, on learned concepts and these concepts may be idiosyncratic. Second, reality testing of perceptions requires that an individual accept a "sensate epistemology." Ideational philosophers may, however, assert that an empirical test of whatever is being perceived constitutes no proof at all. Third, objective tests may be created to selectively confirm, rather than disconfirm first-person perceptual experiences, and this argument may even apply to science itself. Thus, as pointed out by Heise (1988), perceptual experiences are neither predetermined nor unbiased. Rather, perceptions are highly selective and interpreted within a framework they are supposed to test. Many delusions are therefore supported by reality tests, but not by tests others conceive of as being appropriate. The very same is true for religious beliefs and practices. For example, the Aztecs had a cosmological view of the world. They held the belief that the sun was born from sacrifice and blood. To keep the sun moving it was necessary to feed it every day with its preferred food, i.e., human blood. Sacrifice was thus meant to be a necessity to keep the sun rising. This mental construction was hence confirmed by reality testing every day: Hearts were torn out, and surely the sun rose the next day. A disconfirming proof would have been to stop killing people and see whether or not the sun would rise again, but this was completely out of the Aztec's cognitive scope (Heise 1988). Consequently, facts and knowledge determine what is believed and what actually can be believed. This pertains to both religiousness and delusions. In spite of these conceptual problems of how to define "delusion, " however, several cognitive mechanisms have been identified, which are thought to be involved in the formation of delusional beliefs, and, as is argued in this paper, also in religiousness.

15.4 Common Cognitive Mechanisms Involved in Religiousness and Delusion Formation

The examples outlined in the preceding paragraphs clearly suggest that neither abnormal experiences nor distorted reality testing are sufficient to explain the formation of a delusional belief. So, what is it, then, that makes an individual accept a false interpretation and resist evidence to the contrary? When we look at cognitive biases that may account for the formation of delusional beliefs, several, partly interacting, cognitive processes stand out as potential candidates as listed below:

- Recognition of agencyincluding experiencing the self as agent.
- Evaluation of current evidence in support of a hypothesis (reasoning).
- Causality.
- Attribution of mental states (theory of mind).
- All these cognitive processes are probably part of the cognitive architecture underlying religiousness, and, if disrupted, malfunctioning or exaggerated, may explain the propensity of individuals to form delusional beliefs (including religious delusions).

15.4.1 Agency

Agency is certainly one critical aspect of religiousness. Religious people hold the belief that a supernatural agent (God) can influence virtually all aspects of life. Supernatural experiences may, however, also depend on a diminished sense of the self as agent, and this failure to consciously experience the self as source of action has been identified as an important mechanism involved in delusion formation. Empirical evidence from experimental studies suggests that delusions of influence are related to an individual's abnormal perception of his or her own actions. The experimental procedures works as follows: the test subject views the image of an electronically constructed hand holding a joystick, which according to the designed program corresponds to the position of a joystick that the test subjects actually holds in her right hand. The design allows the depiction of the dynamic movements of the joystick in temporal and spatial real-time resolution. The subject's view of her real hand is blocked. During the task, the subject has to carry out simple movements with the joystick in the direction of a spot that appears on a computer screen together with the virtual hand. The program then allows introducing slight deviations in space or time, such that time delay biases or angular biases occur. After each trial the subject has to give feedback by either "yes" or "no" whether or not the movement she saw on the screen matched exactly the movement the subject had carried out. It turned out that patients with schizophrenia had problems in identifying the temporal delays compared to healthy controls. However, only a subgroup of patients with delusions of influence was impaired in recognizing angular deviations, suggesting that these patients have difficulties in correct self-attribution of actions (Spence et al. 1997; Franck et al. 2001).

One possible explanation for these findings could be that patients with delusions of influence have abnormalities of a mechanism that has been referred to as "reafference copy" (von Holst and Mittelstaedt 1950). A reafference copy is seen as part of goal-directed behavior according to which an efference copy of an action is made to predict the sensory consequences of the resulting action, where the reafference copy serves the purpose to signal deviations from the expected outcome of the action such that adjustments of the movement can be made. In patients with delusions of control or influence, the representation of the desired state, the motor command and the actual movement are intact, but the individual is apparently unaware of or unable to represent the predicted state, and hence has no feeling of being in charge of the action. This lack of self-monitoring capacity may similarly underlie other passivity symptoms observed in schizophrenia, such as auditory hallucinations in the form of hearing voices, which, in fact, represent subliminal self-generated inner speech.

15.4.2 Reasoning

Second, the evaluation of current evidence in support of or refuting a hypothesis is an important mechanism contributing to reasoning and decision-making. The readiness by which a religious person is willing to accept that something has been influenced by God (and has not been caused by natural forces like the wind or whatever) may depend on the intensity of religious involvement; the more religious, the more an individual is inclined to promptly accept supernatural explanations of events. Similarly, delusion-proneness may result from a reasoning bias that leads an individual to arrive at a conclusion based on sparse evidence. Indeed, such a bias, in the cognitive sciences referred to as "jumping-to-conclusions" (JTC) has been shown to play a role in patients with delusional beliefs.

In an experimental task, subjects are shown two jars containing colored beads in ratios of 85:15 beads of two colors in one jar, with the reversed ratio in the other jar. The jars are then hidden from the view of the participant, and a series of beads is ostensibly drawn at random from one of the jars. The task is to decide from which of the jars the beads are drawn. Patients with delusions come to a decision after significantly fewer draws compared to controls. Moreover, deluded patients are overconfident in their decision, which could explain why they tend to hold implausible beliefs with unwarranted conviction. It has been suggested that deluded patients fail to override first-person evidence to consider alternatives, e.g., other people's views or facts, and this heightened attribution of unwarranted salience may, at the physiological level, be associated with elevated dopaminergic neurotransmission (McKay et al. 2006).

15.4.3 Causality

Third, causalityor "need for closure" (NFC) is inherent to human nature. In the psychological literature, NFC reflects the desire for definite answers on some topic. The

wish for causal explanations is certainly part of most animistic religions, where natural events such as the wind, the waves, and the rain are ascribed to the action of some deity . Exaggerated need for disambiguating information and an inflated NFC mechanism may similarly contribute to delusion formation. Research has shown that deluded patients have a greater need of closure as measured using a scale comprising 47 items (Kruglanski 1993). Although it was originally assumed that an enhanced NFC would account for the JTC reasoning bias, it has been shown that these processes apparently contribute independent of each other to delusion-proneness (McKay et al. 2006).

15.4.4 Mental State Attribution

Fourth, attribution of mental states also referred to as having a "theory of mind," is essential for making assumptions about intentions of others. That religiousness involves inference of intentional actions of God is all too obvious. Correspondingly, it has been argued that delusional beliefs entail a bias toward overattributing, usually malicious (rarely benevolent) intents to others (Bentall et al. 2001). In other words, deluded patients know that other people have mental states in terms of desires, beliefs, intentions, and feelings, but overvalue their ideas about the nature of these mental states without further testing the hypothesis that their belief could be wrong. In addition, patients with schizophrenia may often tend to over-mentalize, i.e., they erroneously believe that others share their knowledge, a phenomenon known as "delusion of mind-reading," while at the same time they may not be able to determine "on the spot" other people's mental states (Abu-Akel 1999). Our own study group has looked at metalizing abilities in patients with "pure" delusional disorders. "Pure" delusional disorders are characterized by abnormal content of thought in the absence of formal thought disorder or other clinically detectable cognitive deficits. In clinical context, these disorders are extremely rare, probably, because psychosocial functioning can be preserved in individuals with monothematic delusions. In our study, deluded patients performed more poorly on a standard mentalizing task compared to healthy controls. Unlike patients with schizophrenia, the deficit in mental state attribution in patients with delusional disorder was attributable to their reduced cognitive flexibility to shift concepts (Bömmer and Brüne 2006), whereas schizophrenic patients' ability to infer others' mental states remained impaired when neurocognitive variables were co-varied out (Brüne et al. 2007).

15.5 Discussion

Classic conceptualizations of psychopathology have struggled with the distinction between a "delusional belief " as a "private" phenomenon and religiousness as belief or set of beliefs shared by the majority of people from a common cultural background. This chapter has sought to examine similarities and dissimilarities between delusion formation and religious beliefs. Accordingly, neither an abnormal

perceptual experience nor a distorted belief evaluation alone suffices to account for the emergence of a delusional belief or an individual's religiousness. At least four cognitive mechanisms exist that are involved in the formation of delusional beliefs, which most likely contribute to an individual's propensity to accept religious or other supernatural explanations for both abnormal and normal experiences. However, the cognitive bias model presented here, while referring to delusion formation in general, is not sufficient to explain why the attribution of agency and intentionality and the desire for causal explanations manifest in the form of religious contents. Beyond cultural influences including moral codices and rules, religiousness probably involves some other kind of cognitive or emotional bias. One such aspect could lie in the human universal to favor teleological explanations for one's existence over natural or "mechanistic" ones. For instance, many individuals believe that they have been "born to do" something or are "meant to" lead certain lives. In other words, according to a widespread belief an individual's existence is designed to serve a particular purpose. Such a position could additionally be fuelled by one's existential anxiety and inconceivability of one's personal death (Bering 2006). In a similar vein, an individual's emotional disposition may play a role in that an anxious individual may seek comfort in overvaluing religious ideas. Moreover, attachment theorists have argued that God may serve as a substitute for an attachment figure. Research into attachment has shown that religious people are more often securely attached compared to atheist or agnostic individuals, who are more frequently ambivalently attached (Kirkpatrick 1999). Finally, self-deception may be particularly prevalent in religiousness. The adaptive value of self-deception has been attributed to an individual's ability to better deceive others, if successful in blocking the self from his or her real intentions (Trivers 2000). From a psychiatric point of view, Lloyd (Nesse and Lloyd 1992) have pointed out that self-deception may be distorted in schizophrenic patients, which seems at odds with the observation that schizophrenic patients frequently interpret their experiences as being under the influence of supernatural forces, including God or the devil. However, the findings that patients with schizophrenia are often impaired in experiencing the self as agent, tend to jump to conclusions, and/or have difficulties in correctly appreciating mental states of others may explain the prevalence of religious delusions in schizophrenia. It would be interesting to examine as to what extent schizophrenic patients with religious delusions differ from those without religious delusions with regard to the cognitive bias model outlined above. Finally, anthropomorphism and mind–body dualism may be an essential part of religiousness, but are perhaps particularly difficult to operationalize (cf. Bering 2006).

Crucial to the differentiation of delusion formation from religiousness is the question whether these phenomena are part of a continuum from normal belief evaluation to extreme forms of fixed ideation, or categorically distinct from normalcy. Studies into so-called "delusion-proneness," i.e., individuals who score high or low on a self-report scale measuring suspiciousness and the tendency to accept unusual explanations of experiences have shown that high scorers are more likely to "jump to conclusions" and have a greater need for closure compared to low scorers, which strongly suggest that the cognitive processes involved in belief evaluation lie on a

continuum from low to high proclivity to be cognitively biased in one or more of these dimensions (McKay et al. 2006). These findings support the assumption that the intensity with which religious faith is expressed can be similarly interpreted as continuous trait variation ranging from normal belief evaluation with preserved capacity to consider alternative explanations (thus, weak expression of religiousness), to the extreme of systematized delusion with the incorrigible conviction of divine influence of virtually all aspects of life (which might be termed "delusional religiousness"). This dimensional approach to the phenomenon "religiousness" is akin to the observation that any psychopathological sign or symptom can be considered as extreme of variation, rather than being qualitatively distinct from normalcy.

15.6 Conclusions and Further Directions

The formation of delusional beliefs involves a number of cognitive processes that are quantitatively rather than qualitatively distinct from normal belief evaluation. It is argued that the same may apply to the intensity with which religious beliefs are held. Further research may aim at clarifying the following questions:

1. Is there an association of religiousness with the JTC bias?
2. Do highly religious people have a more intense need for closure compared to less religious individuals?
3. Do highly religious people tend to hyper-mentalize?
4. Do highly religious people have a diminished awareness of agency and self-monitoring?
5. Do highly religious individuals tend to deceive themselves more strongly compared to irreligious people?

If the answer to these questions is "yes" (and there is some evidence that this is the case, at least with regard to NFC; Saroglou 2002), we may be able to quantify religiousness on a dimension from normal belief evaluation abilities to manifest delusional ideation. This line of research may contribute to gain deeper insights into the nature of such a widespread phenomenon as "religiousness" and its extreme excrescences we witness today.

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Chapter 16
Cognitive Foundations of Religiosity

Ulrich Frey

Abstract How did religiosity and in its wake religion come into existence? How do religious systems manage to survive in spite of their many paradox issues, glaring inconsistencies, and dubious claims? To answer these questions the approach will be threefold. First, it is suggested that many of our intuitions about the world (about causality, living and non-living objects, and intentionality) are not only consistent with primitive religiosity, but in fact are actively advancing such a belief. In children, too, this is more than evident. As soon as a belief in one or more powerful beings is in place, quite a few cognitive mechanisms make sure that this belief will persist. Cognitive biases contribute to the belief's perseverance by systematically biasing evidence for and against it. These mechanisms are spelled out in detail. A second point is made via a cultural perspective. It is often the case that religion mirrors the organization of the particular society by which it was created. Often simple biological or social models are at the foundations of religious beliefs. And third, there is evidence from evolutionary biology that religious behavior fosters cooperation as well as group coherence and helps solving free-rider problems.

16.1 How Does Religiosity Come into Existence?

This chapter aims at understanding how religious beliefs came into being and how they managed to survive in spite of its many inconsistencies, "logical" shortcomings, and inherent paradox issues. This question is partly answered by findings from cognitive science. Human beings have certain intuitive ways of coping with the world, commonly called "folk-biology," "folk-physics," and "folk-psychology, " to name only the three most prominent (e.g., Atran 1990). And there are in fact strong

U. Frey (✉)
Center for Philosophy and Foundations of Science, Otto-Behaghel-Strasse 10C, 35394 Giessen, Germany
e-mail:ulifrey@yahoo.com

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connections between our intuitive ideas and religious concepts. Could religion have arisen from these very basic cognitive schemata?

16.1.1 Intuitive Cognitive Patterns of Adults

16.1.1.1 Causality

People in non-industrialized societies have a fascinating concept of causality. If illiterates are asked questions like "Why do sun and moon move?" or "Why does a stone fall to the ground?" the answers are usually quite uniform (Kälble 1997). Two types of answers are dominant. First, *animistic* answers: the clouds, the sun, and the moon live and thus move intentionally by themselves. Second, answers are given that require a *creator*: they are moved by someone else (a higher and very powerful being). Depending on the domain of the question, the number of animistic answers is quite high, ranging from 20 up to 80%. For example, 38% of Turkish illiterates are convinced that clouds have a consciousness and 55% think that the sun is alive.

In general, it is possible to distinguish four basic patterns:

1. Explanations show an explicit bias toward the originator/agent/cause of an action or situation.
2. In analogy to living social agents it is insinuated that inanimate objects have goals and intentions.
3. External physical forces (e.g., force of gravity) are regarded as object-internal, that is as intrinsic forces.
4. Forces are always thought to be in the direction of movement; if there is no apparent external force, an internal (intrinsic) force is presumed.

Even today, agrarian communities (e.g., in rural Turkey) have not progressed up to the mechanistic-causal level of modern industrial countries to explain causality. Illiterate adults reach about the level of school kids in industrial countries. Thus their causal grasp of the world is animistic in the sense described above.

Interestingly enough, our Western historical development of causality is quite identical to the different educational levels. The Aristotelian theory of causality corresponds to animistic beliefs, in which the subjective part of the explanation is not quite overcome (Kälble 1997). The "Impetus" theory of Philoponus (490–570 A.D.) and Buridan and Oresmes are the next stage toward a mechanistic Newtonian explanation: an object moves because a "moving force" has been transferred into it. The object stops moving, as soon as this force is used up. Interestingly, this is the top level most – even educated – people reach. Actually, most physics college students do not master Newtonian concepts (Kaiser et al. 1985).

Causality is just one example of deeply engrained ideas about folk physics, but it shows that these ideas are very strong, persistent, and powerful. Sections 16.1.1.2–16.1.1.4 describe three other powerful mechanisms of how humans handle causal events and how the combination of these patterns of thought connects to the idea of God's existence.

16.1.1.2 Hypersensible Detectors

Humans perceive events as causally connected, when the following four conditions are fulfilled (cp. Goswami 2001):

1. Event A is prior in time to event B.
2. Event A and B covary.
3. Event A and B are close to each other in space and time.
4. Event A and B are in some aspects similar.

These preconditions of causality, however, sometimes lead – each in turn – to causal errors. The most famous one is *post hoc, ergo propter hoc*, which has been known as incorrect at least since Hume (1748/1964).

Other prominent errors are as follows: humans often see causal links even when there are none (cp. Barrett 2000). The evolutionary reason for this behavior is simple: our detectors for causal relations are "hypersensible." Even regressions to the mean, which are fairly common, are wrongly perceived as connected in a causal manner (Kahneman and Tversky 1973). An example for a causally interpreted regression to the mean are Nobel Prize winners or top athletes who show decreasing performance after their triumphs. Neuroscientific results support this, too: split-brain patients invent causal chains and whole stories for completely disconnected and independent stimuli (Gazzaniga 1985). Furthermore, normal subjects attribute influence to completely *meaningless* factors (Nisbett and Ross 1980). Often one single instance is sufficient for adults and children alike for assuming a causal connection (Kuhn et al. 1988).

16.1.1.3 Law of Similarity

In addition, there are cross-cultural tendencies to think of causes and effects as similar. This is called the *law of similarity* and it is indeed plausible in evolutionary terms, as this is how the world is structured more often than not:

> [...] representativeness leads to the belief that causes resemble their effects: Big effects should have big causes, complex effects should have complex causes, and so on. (Gilovich 1991, S. 50; cp. Nisbett and Ross 1980)

This pattern of thought is a very basic pattern, present in numerous phenomena. Examples are priming, the frequent use of the representativeness heuristic, and the ubiquitous categorization of the world through prototypes.

16.1.1.4 Illusionary Correlations

Also bearing down on the origins of religion is the tendency to see correlations when there are none. This phenomenon is known as *illusionary correlations* and is quite similar to the tendency to perceive causal links, even when there are none.

Again, this is a cross-cultural phenomenon, true for laymen, experts and scientists alike. Humans follow their naive intuitions and "discover" laws and regularities

even when the stimuli or events are totally random (pattern recognition). One of many revealing experiments shows that subjects insist on having seen correlations ("hidden regularities," which supposedly eluded even the experimenter), *even after* the experimenter tells them that the "patterns" were completely randomized (Bavelas 1957, cited in Lorenz 1964). A more modern example is the conviction of many believers to see Mother Teresa or Jesus on a bun, toast or on a turtle (Atran 2002; cp. numerous websites with photos).

In short: often there are no patterns, but we think there are. Further examples are the perceived bombing patterns of London during World War II (Feller 1968 in Kahneman and Tversky 1982) or the famous *hot hand* phenomenon (a player is "hot" in the sense that "he has a run") in sports, which everybody believes in, but which is statistically totally non-existent (for basket-ball, see Gilovich (1991) and for soccer, see Heuer and Rubner (2008)).

16.1.2 Protection of Beliefs Through Cognitive Errors

There is still another set of cognitive errors coming into play *to protect beliefs, once they are in place*.

Experimental cognitive psychology tells us that once a hypothesis or belief is in place, it is extremely hard to discredit. This is called *belief perseverance* or *conservatism bias*. New data are almost never able to shake existing beliefs. On the contrary, even contrafactual data are interpreted as supporting the theory (Nisbett and Ross 1980; Tetlock 2002). Even when told that their theory is a complete nonsense (because it was manipulated by the experimenter) subjects are not affected by this clear-cut and negative feedback (Ross et al. 1975).

In addition, it is well known that humans practically never try to falsify their hypotheses or beliefs (Wason 1968). Instead, subjects try to confirm their hypotheses over and over again – and children even more so (Wason 1960). This tendency is called *confirmation bias*.

As if this were not enough, contradicting evidence in most cases is simply ignored (Chinn and Brewer 1998). Theories and beliefs are psychologically and scientifically protected against contrary evidence (Skrabanek and McCormick 1992). Most worryingly, new facts are a priori perceived in a biased way (Vallone et al. 1985). This is true over a wide range of situations (Plous 1993). So it is not surprising that some authors conclude their studies with a summary like that,

> Supportive evidence was handled with kid gloves; opposing evidence was mauled. (Lord et al. 1979, S. 170)

The tendency to see data in a biased way and fitting it to one's own beliefs is a core methodological problem in science. This *expectancy effect* or *observer effect* is so strong that numerous counter-measures have been devised to counter it. The effect itself consists in the unconscious influence of the experimenter on measurements or experimental outcomes. This is a very robust phenomenon, which has been

found in many and very different areas (Rosenthal 1969). Up to 60% of test persons and 70% of experimenters are probably affected.

Research with placebos supports this nicely. Placebos are effective for up to 70% of all subjects; the placebo effects can be quite differentiated, depending on what the patients are told, so even contradicting effects can be achieved in one trial (Turner et al. 1994). People on crutches can walk after a placebo-operation (Moseley et al. 2002), effects are quite large and depend on color, shape and even price of the placebo given – cheap ones do not help as good as expensive placebos (Waber et al. 2008).

Two other sets of cognitive mechanisms contribute to the retention of hypotheses or beliefs, too: *overgeneralization* and *oversimplification*.

One aspect of oversimplification is that humans treat complex systems as if there was only one cause which explains all effects in that system. This system (which can easily be a belief system) is almost never subject to a critical examination or deliberate thoughts about it (Dörner 1989). It is easy to see how this cognitive tendency of humans supports religious beliefs.

Overgeneralization means to infer from one or few cases to all, which is logically invalid (Hume 1748/1964). When coupled with ontologically correct categories and the use of prototypes it then becomes possible for humans to acquire new knowledge very fast. Disadvantages are that complex cause-and-effect networks are reduced to simple black-and-white dichotomies. This can be nicely demonstrated with pseudosciences: many of them (no overgeneralization!) posit that their method cures all or nearly all illnesses. Or, complementary, there is only one cause for all diseases (Federspiel and Herbst 1991/1996).

Combined with the often frantic search for causes and the inexplicability of many phenomena (diseases, catastrophes, etc.), overgeneralization easily leads to explanations of such events as being causally connected and explicable by one – often a huge and mysterious – cause. One example out of a limitless supply is from India: the explanandum is the mysterious illness of one's own child. Therefore the mother looks for the explanans – that is a suitable causal connection (a *reason*) – everywhere and often enough finds it in the "evil eye," perhaps from a visitor (Boyer 2004).

These cognitive errors and patterns remind us that critical, evidence-based, nonbiased, and statistically sound reasoning is an invention of modern science. Religions never had to fulfill such requirements and, in fact, the intuitive cognitive problem-solving strategies encountered so far are an entirely different matter. They are beneficial to, if not sometimes identical with, religious beliefs.

Does this really suffice to bring religions into being?

Yes, it does, as modern cargo cults demonstrate quite convincingly (see Dawkins 2006). Cargo cults show how opinions and guesses can become religious beliefs over night, then become convictions, then truths, and then God's word in not more than 40 years. Cargo cults sprang to life in the twentieth century, when white people reached isolated islands and appeared to be like Gods with their advanced technology. These white visitors did incomprehensible things (setting up wired masts, shuffling papers, etc.) and soon after these "rituals, " ships arrived with more "magic"

and wondrous things. Thus, many islanders in different parts of the world concluded independently: white men had powerful religious rituals and the "cargo" is sent by God as an answer to their prayers.

Interestingly, at least one cult is still in existence. Its "founder" (John Frum) is even now – only 40 years later – a mythical figure and people wait for his second coming (compare the Catholic Church). They go to extraordinary lengths "to please" him, and believe they (a priest) can talk to him via a subject in trance (Dawkins 2006).

16.1.3 Summary and Implications

The empirical findings presented so far show that adults in pre-industrial societies think of objects as living things; that objects move intentionally by possessing consciousness or by being moved by a supernatural being. This is in a nutshell what animistic and pantheistic religions believe, too.

Humans also tend to ascribe causal links, even when there are none. They do so by using the law of similarity: big effects have big causes. Even if the cause is unclear, even if it is only one instance, even if it is only a coincidence, even if the influence is absolutely meaningless, humans most of the time perceive a causal relation. So if *big and unexplainable* effects (like lightning, earthquakes, etc.) are witnessed, a search for a "big cause" is inevitably set in motion. Again, this is exactly what we tend to find in animistic and pantheistic religions. And it is most probably no coincidence that some of the mightiest Gods are the Gods of thunderstorms (e.g., Thor, Zeus, Schible) and most Gods are associated with a natural force (Poseidon, Quetzalcoatl, Enki, Enlil).

Once it is believed that there is a God or Gods, it follows that almost every pattern encountered tends to confirm this supposition, as we are easily fooled into illusionary correlations, thus seeing what we want to see. Every *inexplicable* event then becomes an act of God; every event that is *explicable* is a demonstration of God's power.

Also, several cognitive errors (confirmation bias, belief perseverance, expectancy effects, overgeneralization, oversimplification, ignoring contradictory evidence, biased uptake of information, and still others more) protect beliefs, once they are in place.

Therefore, these findings, too, support the theory that humans – as well as children – show attitudes that resemble the roots of religious behavior.

By now, one question has to be answered. Why is our perception of causal relations so error-prone (and indeed our other, quite powerful modules of folk biology, folk physics and folk psychology)? We have mentioned the answer for causality: this mechanism is hypersensible – the inevitable trade-offs are the above-mentioned errors (see Frey 2007 for details of other reasons).

Additionally, there is extensive evidence from child psychology that children are "ready believers": children ascribe life even to unmoving objects and assign intentionality to these same objects (Carey 1987). Their intuitive biology is animistic in

its nature. Causal concepts evolve from intentional ascriptions and are in their core *finalistic*. In consequence, external physical facts are explained by magic, a designer, or moralistic, motivational and animistic reasons (Kälble 1997, p. 84). Thus, children are convinced that objects have to be created by someone, that objects can live and have intentions (Barrett 2000). This in turn means for them that something that is alive itself (God) created these intentional and complicated living things. In sum: children are dualists and teleologists by nature (Richert this volume).

16.2 Religious Manifestations of Intuitive Beliefs

It has become clear that humans do hold certain intuitions about the non-religious world that could have helped supporting religious beliefs (cp. Barrett 2000). Causal connections are read into unconnected events and many biases exist. Above all, there is the strong need to explain things, which may have lead to explaining huge, inexplicable events through Gods by thinking along the lines of the law of similarity.

But do such kinds of beliefs *actually exist* or is this only speculation? If religion really sprang from very basic intuitions, then we should expect to find very simple beliefs, inspired by things that have been near, important or everywhere, like biologically or socially modeled beliefs. Thus, are there in fact religious beliefs that,

1. are derived from biological models?
2. are derived from basic cultural techniques (tool use, etc.)?
3. are similar to the social world of the creators of one particular religious belief?
4. construct their gods or God as a very powerful *human* being?

Undoubtedly, there is overwhelming evidence for very basic and pervading anthropomorphisms in religious beliefs. The modern father of deconstructing religion as completely anthropomorphic is Ludwig Feuerbach (1849/1980), but the weaknesses of anthropomorphic religious beliefs were as clear to Xenophanes and Critias 600 B.C. Feuerbach's main thesis sees religion as the mirror of humanity's inner being: "God is the mirror of man" (Feuerbach 1849/1980, p. 121). What we believe tells us little about God, but everything about ourselves. Our concept of God as "human," that is, deeply anthropomorphic is validated by experiments (Barrett and Keil 1996).

But this analysis is more concerned with the roots of religion at the dawn of civilization. Four main classes can be distinguished: biological, technological, social, and mystic–magic religious models of the world.

16.2.1 Biological Models

Religious beliefs derived from biological models of the world can easily be found. Examples are Gods that are animals: the Aztecs believed in an almighty jaguar God, ancient Egyptians in Ra (sun God, pictured as hawk), Apophis (snake) and many

others, Aryans in beasts like the wolf Fenrir or the snake of Midgard; many more religions could be named – in fact all animistic ones. Sometimes, the world itself is interpreted as alive. "Mother earth" can be found in the Greco-Roman world, in Norse, Hindu, Sumerian, Maori, South American, and Mexican religions. Another associated biologically inspired concept is the imagination of the soul as an animal (Topitsch 1988).

16.2.2 Technological Models

Often, *technological* concepts underlie creation myths. God created the world by giving life to clay, reed, bast or some other material abundant to one particular area and religion. Interestingly, even before technology existed, such concepts are found – but in these cases the *intention* of the designer, not the material is most prominent. This is particularly telling, as indeed intention stands at the very beginning of each design process (Topitsch 1988). Not surprisingly, in our technologically dominated world, the doctrine of "intelligent design" is the most dominant religious explanation of our world by positing a creator-craftsman.

16.2.3 Mystic–Magic Models

This third group of religious patterns of thought is characterized by its otherworldly tendencies. The belief in demons, ghosts and dead ancestors, who are able to communicate from the world of the dead, is very common, if not universal. With these convictions goes the belief that certain persons are more able than others to communicate with this world – they possess extraordinary abilities. This gives rise to mage cults and in its more sophisticated form to priest castes that reject contact with the real world as harmful to these powers. Connected to this belief are all forms of cleaning or purification ceremonies. Avoidance of the world as "harmful" has found its way to philosophy, too. An example is the famous "vision of forms" of Plato. This theme recurs in the mystic of the Rosicrucianism (the highest ranks possess the divine powers of Jesus) and in alchemy (Topitsch 1988).

16.2.4 Social Models

As humans are first and foremost social beings, the most important religious models are *social* models. Here, the anthropological element is the most obvious and apparent, for example to thinkers as early as Aristotle (Politik I 2, 1252b, 24–27).

The Gods and the heavens are constructed as a social system, often exactly like the human society itself. Thus we find in a rural and sedentary society like Latvia a heaven modeled like a farm and God is like the owner of a large estate, whereas the Bantu, living in many tribes, conceived their heaven as an immense hierarchical tribe system. In the first ancient civilizations, the new and powerful state hood

is perspicuously projected into heaven. The pharaoh is the proxy of God on earth, but even the Gods themselves are treated like public servants in a state: the creator Ptah-Tatenen appoints them each *income revenues* (Topitsch 1988)! State hierarchies are also evident in mummification, as this was only accessible for the rich and important.

Furthermore, state hierarchies in life are continued into the realm of death: sometimes, only the elite are allowed to "live on" after death; other souls are "eaten up," as the Tonga in Polynesia believe. Sometimes, even the personal attendants are killed together with an eminent personality, as is known from the Egyptian, Sumerian, and Aztec religions (Topitsch 1988).

Putting the evidence from those four models of religion together, it is safe to conclude that

- religion is deeply anthropomorphic,
- religious beliefs are inspired by the world around us,
- religion follows our often simple intuitions about the world.

16.2.5 Immunization Strategies

It is not difficult to see the weaknesses and paradoxes of some of the mentioned beliefs. Already the philosopher Xenophanes mocked the peculiar issue that each God resembled its respective ethnic group.

But religious beliefs could evade such criticism. First, the majority of explanations by priests concern otherworldly matters, which means they are principally untestable. Second, and this is known in the philosophy of science as the underdetermination problem: each phenomenon can have many different explanations, making it difficult to decide which explanation is correct. Third, before modern science as a logically consistent system trying to eliminate personal bias or opinions, it was simply not necessary to present a perfectly "rational" belief system without paradoxes. A perfect example is the Daemonolatria from Remigius (1595) about how to find out if a woman is a witch:

> [...] the woman who is to be studied, is suspicious [to be a witch], if she goes often to church and never, if her body is warm and if her body is cold. (cited from Topitsch 1988, p. 120, translated)

Fourth, predictions were immunized by

- disallowing questions, which could easily be proven or disproven by empirical evidence,
- phrasing predictions as empty formulas,
- blaming failures of predictions on technical problems during the ritual (object was contaminated, ghosts were angry, etc.),
- generally making only few predictions and concentrating on explanations of the past and
- lies.

Thus, religious beliefs are almost never falsifiable and often enough just empty formulas.

16.3 Ultimate Causes for Religious Behavior

So far, this analysis was concerned with *proximate* causes for religious behavior. But, of course, religious beliefs can be very costly indeed: this ranges from sacrifices (particularly self-sacrifices, mutilations, and martyrdom) to enormous costs in time and resources to build otherwise useless structures (Pyramids, Angkor Wat, etc.) or fitness-reducing behavior (e.g., when possessed by demons) (Atran 2002; Söling 2002).

Thus, to explain the overwhelming presence of religious beliefs, the obvious question about *ultimate* causes remains: Are religious beliefs adaptive? If yes, what is their advantage? Or are such beliefs exaptations, byproducts or spandrels? I will argue that some elements of religious beliefs are exaptations, as e.g. Atran makes clear that religion is a cluster of many phenomena, defying one single answer (Atran 2002).

Basically, there are four major groups of explanations (cp. Boyer 2004; Wilson 1998):

1. Religious beliefs help explaining the world.
2. Religious beliefs comfort us.
3. Religious beliefs further cooperation and help in the bonding of groups.
4. Religious beliefs are cognitive illusions.

Some authors (e.g., Söling 2002) combine all four groups. This article argues for a combination of the last two points as most important.

It is difficult to see how a religiously inspired explanatory model of the world (point 1) could be advantageous in biological terms. In contrast, hypothesis two – religion as providing comfort – has testable consequences: maybe believers with such attitudes are healthier than non-believers. But so far evidence tends to be inconsistent, small in effect size or is constrained to certain groups. Dealing with such a pervading phenomenon like religion, expectations on size and consistency among different groups are much higher.

In contrast, religion solves cooperation problems in groups almost perfectly. For clarification: this describes a process of competitive *ecological replacement of groups*, not *group selection*. First, a rigid hierarchy makes sure that in-group fights are kept at a minimum. As stability is ensured, resources are not wasted in rivalries.

Second, strict religious rules create a sense of group unity. Most importantly, Sosis found significant differences between the overall success (duration of group existence) and strict religious organization (Sosis 2003). This evidence from nineteenth century groups is backed up by results from Kibbutzim in Israel (Sosis 2004). Without strict rules (e.g. without punishment) a break-down of cooperation is well-known from controlled public goods experiments (Fehr and Fischbacher 2003).

Third, religious institutions provide excellent solutions for the diverse aspects of free-rider problems. An all seeing, infallible, and just God is a near-optimal solution for monitoring – even for events that are impossible to monitor. Complementary, a tight moral system taught by parents and moral authorities is a powerful measure to deter free-riders. Furthermore, a group united in one belief has solved the motivation problem – potential free-riders feel more responsible toward the group, defect less often, and are thus effectively controlled.

Fourth, religious structures can be used for societal needs. They are – in hindsight from a historical perspective – very flexible. Lahti (Lahti this volume) demonstrates that it seems indeed historically justified to postulate a correlation between the different concepts of religion and the necessities of societies having to solve certain structural problems. Religious structures and societal needs do in fact fit very well together in many epochs – from nomadic bands to agricultural societies and more sophisticated civilizations.

Moreover, this trend – Parallel development of societies and their religious structures – is evident in the twentieth century as well. The tremendous impact of modern science begins to make its impression on modern religion. The Catholic Church has now been forced to embed scientific facts into their system. In 1992, the church rehabilitated Galileo; in 1996 it confirmed that the Darwinian Theory is more than just a hypothesis.

16.4 Conclusion

The basic cognitive layout of humans seems to make it easy for religious beliefs to come into existence. Children and adults alike exhibit many biases: are native dualists, animists, think teleologically, and have hypersensible "causal detectors." Once beliefs are in place, many mechanisms help stabilizing them. These early beginnings are apparent in many ways in religious anthropomorphisms. Moreover, flexible adjustments to particular societal needs are historical fact. Religious beliefs could have been advantageous in evolutionary terms by promoting in-group cooperation and solving free-rider problems. So it is not surprising for such a pervading phenomenon that contributing factors for the dominance of religious beliefs stem not only from cognition, but as well from social and cultural needs, all of them based in the evolutionary process.

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Chapter 17
The Religious System as Adaptive: Cognitive Flexibility, Public Displays, and Acceptance

Benjamin Grant Purzycki and Richard Sosis

Abstract Religion is often conceived as a conservative social force that sustains traditional cultural beliefs and behaviors. Religion, however, also exhibits predictable socioecological variation and facilitates adaptive response patterns in the diverse environments that humans inhabit. Here we examine how the religious system, which is composed of a number of interacting components, generates adaptive response patterns. We argue that the religious system accomplishes this by: (1) employing highly flexible cognitive mechanisms, (2) evoking emotional responses that provide reliable information concerning individual physical and psychological states, (3) supporting specialists who introduce religious ideas that endorse and sustain the social order, and (4) encouraging collective acceptance of these ideas with public displays, typically in the form of rituals, badges, and taboos. These interacting components of the religious system ultimately promote prosocial behavior under diverse conditions.

17.1 Introduction

There is considerable debate among evolutionary and cognitive scholars about the adaptive nature of religion (Bulbulia et al. 2008). In this chapter we contribute to this discussion and argue that religion is an adaptive system. Much of the debate about whether or not religion is an adaptation divides neatly between those who study cognition and reject adaptationist interpretations (Atran 2002; Barrett 2007; Boyer 2001; Kirkpatrick 2006) and those who study behavior and endorse such interpretations (Alcorta and Sosis 2005; Richerson and Newson 2008; Sanderson 2008a; Wilson 2002), although there are notable exceptions (Bering 2004; Harris and McNamara 2008). Despite our partiality to adaptationist interpretations, we situate our argument within the cognitive approach in hopes of building a much-needed bridge between the cognitive and behavioral studies of religion. A full adaptationist account of religion is beyond the scope of this chapter; our aim is more modest.

B.G. Purzycki (✉)
Department of Anthropology, University of Connecticut, 354 Mansfield Road, Storrs, CT, USA
e-mail: benjamin.purzycki@uconn.edu

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Building on the work of Alcorta and Sosis (2005), we focus on several core elements of the religious system and examine how they motivate adaptive response patterns under diverse socioecological conditions.

To summarize our argument, we maintain that the cognitive mechanisms responsible for religious beliefs are adaptively flexible to accommodate the wide range of social environments that humans inhabit. The beliefs and behaviors that comprise religion are attention-grabbing and emotionally salient. Emotions can display and indicate an individual's physical and psychological state, and thus serve as honest signals providing important social information to others. When religious ideas are introduced by those who are in highly influential positions, as is often the case, their acceptance by the community helps sustain the hierarchical social order and facilitates intra-group trust. Acceptance of religious ideas that become institutionalized is publicly displayed by ritual behaviors, which further promotes cooperative behavior and solidarity, resulting in the benefits that individuals reap in prosocial environments. Selection favored the coalescence of numerous behavioral and cognitive traits to form the religious system because fitness benefits accrued to individuals who possessed the cognitive, emotional, and behavioral mechanisms necessary to participate in this system.

17.2 The Religious Mind

17.2.1 The Interaction of Nature and Nurture: Mental Organs and Cognitive Flexibility

Chomsky reasoned that our minds are innately equipped with "mental organs" or "modules" that require external stimuli in order to function optimally in various environments (Chomsky 1980). While there has been abundant debate among philosophers, linguists, cognitive scientists, and anthropologists regarding what exactly counts as a module (Atran 2002; Fodor 1998, 2001, 2005; Pinker 2005a, 2005b; Sperber 1996), one of Chomsky's lasting contributions to contemporary cognitive science and evolutionary psychology is his assessment of the language learning process. Learning, he argued, should be thought of as the growth of genetically endowed mental organs that are triggered and then influenced by the external environment. Chomsky emphasized the *interaction* between genetically determined cognitive faculties and the environments in which they operate (Chomsky 1980). One child grows up speaking British English, whereas another child grows up speaking Arabic because there are multiple, flexible cognitive mechanisms devoted to computing and producing linguistic information. Likewise, a child raised in a Christian environment is likely to grow up believing in the death and resurrection of Christ, whereas a child raised in an Islamic environment might grow up to believe that Muhammad spoke with the angel Gabriel. Religious beliefs are formed by the interaction between flexible cognitive mechanisms and the social environment.

Sperber argues that cultural ideas which are easier to retain and transmit have a *cognitive* selective advantage and will become culturally prevalent (Sperber 1996). Therefore, Sperber contends, to explain why some ideas survive whereas others do not, we must understand why our evolved minds find some ideas catchier than others. Sperber's epidemiological program has strongly influenced cognitive research examining the structure of religious ideas. Indeed, it is now axiomatic that religious ideas are widespread because they violate the default operations of our basic organizational mechanisms. This makes them particularly salient and memorable. Boyer (2001) argues that our evolved organizational mechanisms – our ontological templates – are much like software programs that consist of a number of default inferences about objects in the world. Religious ideas typically contain violations of these default inferences.

"A statue that listens to your concerns," for example, is a good candidate for a religious concept because it violates assumptions about entities in specific categories; we know that "listening" is a behavior particular to agents (animals and people) and not typically a feature of manmade objects. Such ideas are counterintuitive and attention-grabbing and therefore "catchier" than intuitive ideas (e.g., a squirrel that climbs trees or a refrigerator that keeps food cold). In a number of experimental memory studies, counterintuitive ideas are recalled more frequently and remembered longer than intuitive statements (Boyer and Ramble 2001; Norenzayan et al. 2006; Purzycki 2006). These results are consistent with Sperber's claim that violations of our cognitive architecture are more memorable and therefore more culturally prevalent.

The acquisition of religious beliefs, however, is not simply an anarchic transfer of counterintuitive ideas between minds where the catchiest ideas survive. There are many avenues of transmission, often broadly divided between vertical transmission (from elder generation to younger) and horizontal transmission (from peer to peer), and each avenue faces respective constraints (Boyd and Richerson 1985). Despite numerous experimental studies on the memorability of counterintuitive ideas, we have little understanding of the distinct dynamics of vertical or horizontal transmission in natural settings. Nor do these studies examine whether individuals *accept* the counterintuitive ideas they are remembering. Acceptance, as we argue below, is a crucial component of bridging the gap between the cognitive and behavioral aspects of religion.

We can produce and compute counterintuitive religious ideas because our means of categorizing the world are flexible; environmental stimuli are required to shape even our most basic ontological categories and these mechanisms interact with the social environment to facilitate an organism's success. Owing to this cognitive flexibility, the default inferences of one category can be attributed to an object in another category if the social environment provides this information (e.g., rivers having voices and the forest listens to you) generating the extraordinary diversity in religious beliefs that humans exhibit. This apparent diversity in beliefs, however, shares a similar underlying cognitive structure (Bulbulia 2004). Tomasello notes that

> . . . truly cognitive adaptations, almost by definition, are more flexible than [modular accounts]. Although they may have arisen to solve one specific adaptive problem, they are quite often used for a wide array of related problems (Tomasello 1999, p. 206).

Therefore, adaptive mechanisms – physical and mental – are maximally beneficial for organisms if they have a particular degree of flexibility. Such flexibility has allowed humans to utilize virtually every environmental niche on Earth. Our cognitive mechanisms are flexible enough to produce adaptive responses under diverse social and ecological conditions, and they are flexible enough to create and process religious ideas that are accepted and incorporated into diverse worldviews. This is necessary, of course, for individuals to function optimally in any social environment.

17.2.2 The Ontogeny of the Religious Mind

Some children spontaneously create imaginary friends. Imaginary friends are counterintuitive (they lack physicality) and might be "catchy" if one were to transmit the idea, but this does not explain why children actually believe in and behave as though they perceive some agent. Children engaging in pretend play will also readily use sticks and rocks to represent counterintuitive creatures. These phenomena strongly suggest cognitive flexibility; if children are capable of *producing* (as opposed to simply "catching") prototypical counterintuitive ideas without explicit instruction, it suggests there is much more to religious beliefs than memorization. Cognitive flexibility poses a challenge to current cognitive accounts of counterintuitive religious ideas. If a child is raised in a social environment where others grant agency to mountains and this belief is actively encouraged, such a belief may change the very nature of the template upon which such ideas are built. Cognitive flexibility is an adaptation that enables us to learn appropriate socioecological information within local environments, and social pressures often define what information is valuable. While the persistence into adulthood of individualized fantasy play would likely entail social costs, the rejection of commonly shared beliefs can also have negative social consequences.

Beliefs that are endorsed and encouraged by the community may be internalized and become assumptions about the world. Internalizing such ideas and behaving with these assumptions makes adaptive sense if one is to successfully operate in a social organization comprised of like-minded individuals (D'Andrade 1992; Ryan et al. 1993). But internalizing ideas is never enough to ensure positive social outcomes; the acceptance of ideas must be *demonstrated* and the culturally derived motivations for demonstrating them must be understood as well. Motivations such as "participating in a community" or "ensuring the wellbeing of one's tribe" (see below) as opposed to purely selfish rationalization are often socially accepted reasons for religious participation. Demonstrating acceptance of religious beliefs defines who is within and outside the community, who shares ideological commitments, and who can be trusted (Rappaport 1999). Public displays of

acceptance often come in the form of transitional rites of passage for young members of societies.

Among the Walmadjeri and Gugadja of Australia, rites of passage involve genital mutilations, intensive religious instruction, blood rites, and extended pilgrimages to sacred sites. During subincision rites, an initiate "is repeatedly told to be good – not to go contrary to custom, not to quarrel, to conform; to pay attention to his elders. . .to shoulder his responsibilities and fulfill his obligations; to supply food and to look after those who perform ritual " (Berndt 1972:221). During circumcision rites among Pygmies of the Congo, on the other hand, boys are inducted as "blood brothers," forging life-long economic ties to each other. After the operation, boys "are made to sit down and join the others in singing one of the many work songs they will have to learn during the coming months" (Turnbull 1987, p. 221). These initiates endure considerable pain and religious indoctrination, but their successful completion of the rites is an unquestionable public demonstration of acceptance of societal norms. This is a critical social function of religious ritual. Alcorta and Sosis (2005) argue that the emotional intensity of initiation rites, coupled with explicit instruction about the sacred, facilitates, or even establishes, the transition into adulthood by collectively sharing cultural models about the world and the emotional motivations that ensure their retention. Rituals serve similar adaptive functions once shared cultural models and motivations are institutionalized and codified in the young. The shared nature of institutions is a prerequisite to an individual's success in their social group.

17.3 The Religious Community

17.3.1 On the Adaptive Value of Sharing Institutions

Our species has a remarkable ability to arbitrarily ascribe meanings and attributes to ordinary objects. This coupling is often difficult to reject. Searle, making the distinction between *brute* and *social* facts, defines institutions as the shared transference of the former to the latter (Searle 1997). The oft-used example of paper currency serves quite well; there is no inherent difference between pieces of reconstituted cotton and linen fiber with ink illustrations (brute facts) of the number 50 and the number 100 on them. However, we ascribe them a particular value where one is "worth" twice as much as the other (social facts). The active rejection of social institutions – once they are stable – can be particularly maladaptive. An economic transaction is unlikely to transpire if one were to try to pay for a meal with a tuft of cotton soaked in ink. The *conceptualization* and *acceptance* of this and similar social institutions are essential for successfully navigating social environments, and bear on one's ability to acquire resources and attract mates.

We typically defer to people in positions of power to rationalize the legitimacy or illegitimacy of institutions. If we were to sneak into the mint, make money with the machinery and materials used to print paper currency, it would be considered

counterfeit by virtue of its not being "made" by an elusive but designated authority, "the Treasury." Even if employees of the mint were to sneak in after hours to print money for their personal use and kept only what they would have been paid to work, it would still be counterfeit money. Institutions can also serve as profound motivators of collective action. While institutions may provide internal rationalizations for behavior, it is quite clear that publicly asserting these rationalizations does not serve to convince anyone of the merit of such institutions (although this may occur), but rather serve as a public demonstration of shared understandings which reinforces perceived solidarity within one's social group. The question of whether or not belief in institutions is required for the perpetuation of them is rather moot. What matters is that the population *acts as though* they believe by actively participating in them. It is unlikely that every Catholic, for instance, believes that ingesting a wafer and wine are actual acts of consuming the body and blood of Christ. This does not prevent the institution from perpetuation as though it were literally true.

Consider the notion that God knows and can do everything, and is everywhere at once. This idea is particularly counterintuitive. However, people often reason about God as though He were confined to the limits of time and space (Barrett 1998). The disparity between theologically correct (omniscient) and theologically incorrect (anthropomorphic) versions of God illustrates our point precisely (Slone 2004). The fact that our stated beliefs (i.e., the theologically correct, omniscient version) are so dramatically inconsistent with how we think about God in real-time suggests that our stated beliefs are useful signals of group affiliation and devotion, rather than the assumptions we carry with us. The beliefs that serve as signals must be publicly demonstrated and cognitively palatable for receivers if signalers are to reap benefits from sending such signals (Henrich 2009).

17.3.2 Supernatural Agents and Socioecological Variation

In the *Descent of Man* (Darwin 1879/2004), Darwin observes that belief in "unseen or spiritual agencies" is a human universal, and he characterizes such beliefs among "the less civilized races" as a means to make sense of the world around them (p. 117). Darwin assumes that "making sense of the world" has adaptive value, an assumption still entertained by many scholars today. However, the selective pressures that could have shaped our need for a coherent worldview are generally left unspecified. The notion that "God loves us" may be comforting, but this does not explain *why* many people find this idea comforting. Assuming for the moment that people do indeed strive to attain a worldview that makes sense, why do religious beliefs provide a satisfying worldview?

Religion provides a "satisfying explanation" for an individual when his or her own models of the world are successfully signaled and accepted by receivers, thus maximizing perceived solidarity and the benefits concomitant with this perception of solidarity. Religious views are satisfying when they are confirmed by one's peers; consequently, individuals constrain each others' religious beliefs. There is of course individual variation in religious belief within all religious communities, but all

communities also maintain a range of acceptable beliefs which are usually socially enforced. Those outside the range of acceptability are typically denied access to group benefits. Religions often change when the benefits derived from sharing models are no longer perceived to be worth the costs of participation.

Social organization also poses constraints on religious concepts (Sanderson 2008b; Wallace 1966). Conventional wisdom suggests that in small-scale societies, selective pressures for belief in one supreme moralizing supernatural agent are weak since social behavior in small communities is easily observed and moral reputations are easily communicated. The anonymity of individuals in large-scale societies, however, favors belief in an all-knowing supernatural agent that can encourage particular modes of conduct (Rappaport 1999). If God or "Big Brother" is watching, one might reconsider defecting from a social contract, especially if it is believed that this agent can enforce some punishment. Indeed, many have recently argued that belief in supernatural agents with access to strategic information evolved to enhance prosocial behavior (Johnson and Bering 2006; Rossano 2007; Shariff and Norenzayan 2007). In experimental studies, believing that supernatural agents are watching us has been shown to alter the way we make moral decisions (Bering et al. 2005) and influence our conduct in economic transactions. People are even more generous with their money when primed with a drawing of two eyes (Haley and Fessler 2005)!

Cross-cultural analyses indicate that supernatural agent concepts exhibit predictable socioecological variation (Sosis and Alcorta 2003), which suggests that religious beliefs are a product of the interaction between environmental (social and natural) constraints and our evolved cognitive architecture devoted to detecting mental states (Baron-Cohen 1995). The Yanomamö, for example, believe that in the afterlife, a spirit named Wadawadarwä directs those who have not been generous in life down a particular path "leading to a place of fire" (Chagnon 1996, pp. 112–113). However, these beliefs are unlikely to prevent hoarding or stinginess since, according to the Yanomamö, this spirit is easily fooled: "We'll just all lie and tell him we were generous, and he'll send us to *hedu* [the sky]" (p. 113). The Ju/'hoansi of the Kalahari (Lee 2003) seem to lack agreement on the nature of their two gods, but are virtually unanimous in their belief that ancestor spirits cause most major illnesses and other misfortunes. These ancestors, according to one Ju/hoa,

> . . . expect certain behavior of us. We must eat so, and act so. When you are quarrelsome and unpleasant to other people, and people are angry with you, the *//gangwasi* see this and come to kill you. The *//gangwasi* can judge who is right and who is wrong (Lee 2003, p. 129).

Supernatural agents in these societies vary in form and the roles they play in human affairs. Despite obvious cultural differences, agents in each society are *concerned* with proper human conduct, as is found throughout human populations.

To understand cultural variation and the adaptive nature of religious beliefs we must examine socioecological factors. Consider, for example, the widespread belief that ancestral spirits cause illness. Is such a belief adaptive? If such beliefs steer individuals away from reliable curing behaviors, then surely it is not adaptive. However, when effective medications and treatments are unknown or unavailable, convincing

someone else that *your* ancestral spirits have curing powers opens an opportunity for exchange of resources. Believing in the efficacy of ancestral spirits may have significant consequences on one's ability to survive and reproduce. *Not* believing in particular ideas, such as the ancestral spirits, might be socially costly and serve as an indicator of outsider status.

Religious ideas are not dormant assumptions that underlie worldviews; they motivate frequent expressions of acceptance of social institutions. Accusations of witchcraft or wearing an amulet to protect one from the "evil eye" reinforce an individual's beliefs, but also signal acceptance of such ideas. Experimental evidence suggests that emotionally salient counterintuitive ideas are easier to retain than intuitive or non-emotional counterintuitive ideas (Purzycki 2006). If emotions are default decision-making programs (Frank 1988), then the employment of emotion-triggering counterintuitive ideas undoubtedly affects the way we interact with each other and serves to maintain a perceived state of equality among individuals within a social unit (Alcorta and Sosis 2005). If idiosyncratic behaviors are associated with witchcraft, for instance, then those behaviors and individuals associated with them are avoided and ostracized by those who share this belief. However, these same mechanisms that can generate feelings of equality or *communitas*, as Turner famously described, are often exploited by religious authorities to organize others, maintain their own status, and enter into contracts between themselves and adherents (Turner 1995).

17.3.3 Specialists and Authorities

While surprisingly broad, there are limits to what individuals will believe. If we were to claim that pink rabbits inhabit the moon, you are not likely to take us very seriously. On the other hand, if we were to suggest that we had the ability to cure your loneliness or illness, find a valued article that you lost, or remove soul-sucking spirits from your body, you might be a little more credulous. Beliefs themselves might be *generated* or even *perceived* as violations of intuitive knowledge of the world, but in order for these beliefs to survive, others must accept them. One of the best predictors of which ideas survive is who proclaims the idea. If someone in a position of power announces, for instance, that their ancestral spirits have healing powers or that God told them to invade a particular country, the risk of social sanctions might prevent public denunciation of such claims. While some have discussed a "prestige bias" in terms of how cultural information is transmitted (Henrich and Gil-White 2001), such a bias is also likely to have significant effects on whether or not counterintuitive ideas are accepted. Humans may be disposed to readily accept, or at least evaluate less critically, the information offered by those in power, since the powerful may have greater access to important social information and their ascendancy to leadership may be a direct consequence of their social knowledge. Religious leaders often have the power to incur social and economic costs for non-participants. Moreover, regardless of the reliability of claims made by those in power, such social costs can encourage the acceptance of even patently false claims.

In some cases, a religious specialist quite readily suggests that he or she possesses exclusive knowledge or has been "chosen" for a specific role. Such claims stimulate intrigue and, if propositions are accepted, garner prestige for the producer of such ideas. Dennett refers to this as the "shamanic-advertising hypothesis" (Dennett 2006). The Hopi, for instance, participate in highly secretive, rigidly hierarchical religious clans where conformity garners benefits and violations yield supernatural sanctions (Whiteley 1998). Each clan owns rituals and knowledge about how to control natural forces, and access to this knowledge is positively correlated with age. Institutional leveling mechanisms serve to keep those in positions of power where they are, but also entice others to strive for more insight into the nature of reality. Knowledge increases the prestige of the elders and their ability to influence others. Among the Netsilik, medicine men were both "respected and feared" (Balikci 1970). They also publicly competed over who had more power by doing seemingly extraordinary things:

> [one] used to shoot himself with a gun . . . [one] removed his own leg, other[s] preferred to pierce themselves with spears and grow beards in a second (Balikci 1970, p. 235).

Moreover, medicine men "lived in an atmosphere of suspicion and fear, dreading both the possible secret attacks of his camp fellows and the spirits who might initiate an evil action on their own." These specialists served to "enforce norms or re-establish harmonious relations between environment, people, and supernaturals," yet they clearly competed with each other both publicly and privately (p. 237).

Among the Hopi and Netsilik, influential individuals were engaged in competition over both material and ideological resources, using institutions and counterintuitive ideas as leverage to maintain and propel their status. Demonstrations of power are necessary for individuals to attain and maintain their status and apparently counterintuitive behaviors are useful in this sense. Note, however, that such ideas do not become doctrine, but are associated with their performers. These demonstrations are often materially costly, and also pose potential social costs if the displays are revealed as dishonest. These costs can become excessive if an "arms race" develops between individuals competing for limited social status, particularly if many in a social group actively struggle for this status. However, in religious communities, benefits do not only accrue to successful leaders; as we discuss in Sect. 17.4, followers gain as well (Van Vugt et al. 2008; Van Vugt and Kurzban 2007).

17.4 The Costly Signaling of Ritual

Adherence to a set of religious beliefs entails a host of ritual obligations and expected behavioral patterns. Although there may be physical or mental health benefits associated with some ritual practices (Koenig et al. 2001), the significant time, energy, and financial costs involved in imitating such behavior serve as effective deterrents for anyone who does not believe in the teachings of a particular religion. Hence, those who engage in the suite of behaviors, badges, and bans required by a religious group can be trusted as individuals who largely accept the doctrines of the

group, which often includes behaving altruistically to other group members. As a result of increased levels of trust and commitment among group members, religious groups are able to overcome free-rider problems that typically plague communal pursuits and limit over-consumption and exploitation of the mutual benefits they generally offer their adherents (Sosis 2005, 2006). Schloss argues that

> Costly signaling theory helps make sense of a distinctive aspect of religious belief that neither spandrel nor memetic accounts alone address: not why people believe, but why their beliefs motivate such substantial investments (Schloss 2008, p. 201).

Rappaport (1999) claimed that religious rituals, badges, and bans are indexical signals; that is, they are signals which refer to what they denote by being truly affected by them (e.g., weathervanes denote wind direction). Rappaport argued that while ritual behaviors appear to be shrouded in mystery, they are deliberate and their message to other adherents is clear: participation in a ritual performance indexically signals acceptance of (and not necessarily belief in) the moral values encoded in the ritual. He maintains that regardless of whether or not individuals believe in the moral values encoded in a ritual performance, by participating they are signaling that they accept the moral code of the community, and can be held accountable if these rules are compromised. Rappaport insightfully observed that whereas belief is a private, internal state, acceptance is a public, external state (Rappaport 1999). Participating in a public ritual demonstrates acceptance of rites and the beliefs that underlie them. Such demonstrations, however, generally come at a cost to the participant.

Recall the above-mentioned rites of passage. Sending one's child to engage in particularly stressful rites seems especially maladaptive in the event of permanent damage or disfigurement. However, allowing one's children to engage in traumatic rites sends an unmistakable signal of commitment to other group members (Sosis et al. 2007). Such demonstrations of sharedness are a critical component of the religious system and its ability to promote cooperative behaviors under diverse conditions. Less traumatic rituals also serve similar adaptive functions once shared cultural models are institutionalized and codified in the young.

There is considerable experimental, cross-cultural, and historical evidence that costly rituals are associated with increased group solidarity and cooperation. In one cross-cultural study, a positive correlation was found between the costliness of male rites and warfare frequency (Sosis et al. 2007). Warfare is widely recognized as posing significant coordination and cooperation problems and it appears that costly rituals are one way in which groups increase male solidarity to overcome these problems. One illustrative case not represented in the sample is the Sundance of the Sioux of the Great Plains, who are well-known for their historical military prowess. After 4 days of "visiting. . . relatives, courtships, minor ritualsritual, and feasting" (Lewis 1990, p. 52), and four subsequent days of fasting, the flesh of ritual participants is pierced with eagle talons. The talons are ripped out by either pulling free from them or by dragging bison skulls attached to thongs. Often dancers extend and intensify the pain as a test and demonstration of endurance.

This elaborate rite is explained by many Lakota as a sacrificial one; piercing ensures the wellbeing of one's family and nation. People can sponsor dancers by cutting away pieces of their own flesh. If dancers require assistance in tearing themselves free from the talons, family members donate a pony to those who help (Standing Bear 1928/1975). Sundancers are afforded a fair amount of prestige for piercing. Although they are piercing for the good of the Nation and must give away some personal possessions, they also reap benefits from such an investment in the form of gifts and status (Feraca 1998; Lewis 1990). Feraca (1998) notes that "every candidate will pray for the general well-being of the people" but that there are, of course, personal motivations as well, including impressing women, political publicity, and laying the groundwork to become a medicine man.

This ritual rests on the collectively held belief that suffering ensures group wellbeing. Bodily sacrifice to *wakan tanka* ("Sacred Vastness" or "Big Holy"), the creative force that is found in everything, ensures that prayers are heard and enhances the group's chance of success (Mails 1979; Standing Bear 1928/1975). This practice also reinforces the shared understandings of the cosmos and demonstrates acceptance in that shared understanding. In the case of the Sioux, this idea has payoffs in the form of group cohesion, cooperation, and social solidarity. These beliefs and behaviors have efficacy among adherents precisely *because they actually do yield benefits*.

The prosocial effects of ritual have also been demonstrated in experimental and historical studies. For example, Sosis and Ruffle (2003, 2004) and Ruffle and Sosis (2007) found that individuals who participate in frequent public prayer, costly in terms of time investment, were more cooperative than those who did not attend synagogue daily. In related ethnohistorical work, Sosis and Bressler (2003) analyzed a sample of nineteenth century American communes and found that religious communes that imposed more ritual demands on their members survived significantly longer than less demanding communes. Signaling theory offers a parsimonious explanation for this paradox; the costly demands serve as both a gatekeeper preventing those who are not committed to the goals of the commune from entering and as a mechanism to bond individuals in their shared experience.

17.5 Conclusion

The religious system plays a vital role in human sociality. The cognitive mechanisms that entertain widespread cultural and religious assumptions are remarkably flexible and enable humans to respond adaptively under diverse conditions. Rituals, badges, and bans are collectively shared institutions that publicly display and internalize commitments to counterintuitive ideas. Youth, for example, often endure costly religious rites of passage in order to demonstrate their initiation into the adult community. These rites signal to others not only the child's, but also the parents' solidarity with the rest of the community. People regularly engage in religious behaviors that entail short-term costs, but doing so enhances long-term relationships built on a

foundation of trust. This trust, perpetuated by ritual signaling, sustains communities and promotes social coordination and cooperative behavior.

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Chapter 18
The Evolution of Evolutionary Theories of Religion

Wolfgang Achtner

Abstract This paper gives an overview about the development of evolutionary theories of religion. It distinguishes four types namely: (i) a common sense understanding of evolution, (ii) evolution as proceeding to higher levels, (iii) the teleological model of evolution, and (iv) the functional evolutionary notion of religion. Every category is illustrated by an important historical example. Examples are from: for category (i) antiquity and historicism; for category (ii) Schleiermacher, Hegel, Comte, Tylor, Frazer, Bachofen, and Bellah; for category (iii) Aristotle, Paley, and Chardin; and for category (iv) Jäger, Malinowski, D.S. Wilson, E.O. Wilson, Voland. A certain development in complexity of these theories can be observed. The sequence in this development is like this: (a) level of religious consciousness (Schleiermacher, Hegel); (b) correlation between religious consciousness and society (Comte, Tylor); (c) function of particular religions in particular societies (Malinowski). Though functional evolutionary theories of religion dominate the current discussion, their shortcomings are being discussed in Sect. 18.3 and a model is proposed to combine functional and essential features of religion in order to come to a comprehensive understanding of religion, which is not exhausted by its function. Various possibilities to understand the essence of religions are proposed, such as doctrines, transcendence, and experience.

18.1 Introduction

The relation between the concept of evolution and religion has been not without tensions ever since the emergence of evolutionary theories in the middle of the nineteenth century.

However, the perspective under which religion is regarded from an evolutionary point of view has dramatically changed in the course of time. At first religion was

W. Achtner (✉)
Institut für interdisziplinäre Wissenschaftsentwicklung, Steinkaute 15, 35396 Giessen, Germany
e-mail: info@wolfgangachtner.de

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regarded as superfluous or even harmful, then it was seen as problematic and finally as somehow serving a function with regard to the struggle of life.

In the nineteenth century the heroes and founding fathers of the evolutionary way of thinking interpreted religion within their scientific framework and predicted that religion would necessarily disappear in the course of progressive scientific insights and control over nature. Evolutionary thinkers like Charles Darwin, the founder of positivism, Auguste Comte, or the founder of religious studies, James G. Frazer, could understand religion within their positivistic world view only as a deficient way to explain natural phenomena. This point of view was dominating many decades.

In the late twentieth century when it became apparent that religion still survived even under unhealthy conditions and became still not extinct as anticipated by many naturalistic scientists, a kind of turnaround emerged in the scientific community. Something must be special with religion. Thus, the founder of sociobiology, Edward O. Wilson (1929–) diagnosed, "Religion constitutes the greatest challenge to human sociobiology and its most exciting opportunity to progress as a truly original theoretical discipline" (Wilson 1978, p. 175). He even claimed that religion would become part of the naturalistically oriented scientific paradigm:

> [. . .] the final decisive edge enjoyed by scientific naturalism will come form its capacity to explain traditional religion, its chief competitor, as a wholly material phenomenon. Theology is not likely to survive as an independent intellectual discipline. (Wilson 1978, p. 192)

Finally in the twenty-first century, scientists asked whether or not religion might play a positive role in the evolutionary process. The science journalist Rüdiger Vaas (Vaas 2007) stated on the front page of *bild del Wissenschaft* in February 2007 "Why belief helps."

So one can see from this short sketch that religion has gained an astonishing acceptance in the scientific community ever since it was excluded from scientific studies in the nineteenth century as an undertaking that retarded scientific progress. Again religion is on the scientific agenda even under the auspices of the concept of evolution. However, it is not always very clear what evolution actually means in the context of religion. This chapter aims toward clarifying different concepts of evolution as they emerged in history and asks for an appropriate one for the evolution of religion by proposing a concept that includes functional and essential parts of religion based on a specific understanding of religion as a part of human nature.

18.2 Four Types of Evolution

18.2.1 Common Sense Understanding of Evolution

Firstly, I mention the common sense use of evolution. This understanding of evolution simply means that things change and nothing remains as it is. Even in antiquity we find some traces of ideas about the development of religions as soon as a consciousness of historical development had arisen. One can identify authors like

Herodot (*Histories*), Plutarch (*de Iside et Osiride*), Lukian (*De Deo Syria*), and Cicero (*De Natura Deorum*), although neither of them uses the word evolution. The original meaning of *evolutio* in Latin language is "to flip a book open," like Cicero: "*evolutio poetarum*" in *De Finibus Bonorum et Malorum*, 1, 25.

It is interesting to note that such a general common sense understanding of evolution of religion arose also as a result of historicism in the nineteenth century. The so-called "Göttinger Religionsgeschichtliche Schule" as a subdivision of historicism applied historical methods to the Bible, seeking its dependence from other contemporary religions.

This scientific endeavor brought into focus of attention the problem how the peculiarity of the Jewish–Christian tradition relates to the general history of religion. How can historical relativity of religious development be reconciled with the claim of Christianity to be the highest form of religion? Or are there common universal traits of religion that are applicable also to Christianity? Starting from this problem, one of the most famous representatives of the "Religionsgeschichtliche Schule," Ernst Troeltsch, came up with the concept of evolution in the aforementioned general sense.

He wanted to show that within the process of evolution of religion, Christianity can rightly demand the highest form – absoluteness – of development:

> The expression absoluteness originates from modern evolutionary apologetics and makes only under these presuppositions a particular sense. It includes the horizon of the general history of religions, accepts other non- Christian religions as relative truth and encompasses the construction of Christianity as the absolute and perfect form of religion, which includes all relative truth of other religions (Troeltsch 1912, p. 9)

Ernst Troeltsch's major concern was not to let Christianity fall prey to historical relativism in the evolutionary process. But he did not want to do this by finding laws of the evolutionary process in accordance with the natural sciences or the more or less deterministic reasoning of Hegel (Troeltsch 1912, p. 24). He emphasized the contingency and novelty of historical processes in relation to the deepness of history:

> [. . .] Essential for history is: that in the development of the any time given forces originating individual and specific, which is not deducible, but is a new creation in relation to the given, emerging from the transcendent depth of history (Troeltsch 1912, p. 55/56)

18.2.2 Evolution as Proceeding to Higher Levels

From this general common sense understanding of evolution one can distinguish another one that includes an additional feature: the degree or level of development reached by the evolutionary process.

We find this understanding of evolution in the works of the church father of the nineteenth century, the German theologian Daniel Friedrich Ernst Schleiermacher (1768–1834), especially in his early work, that made him famous, the *Talks about Religion to the Educated Among its Dispraisers* from 1799, although

Schleiermacher does not use the word evolution in the context of religious development. He uses the German word *Stufe* (meaning step or stair; Schleiermacher 1967, p. 87/96/164). Schleiermacher does not develop an elaborated theory, but his work has the character of loosely connected ideas. He distinguishes four levels of the development of Religion (Schleiermacher 1967, pp. 95–99.)

The first level is that of idolatry and fetish, the second level is that of polytheism, the third level is that of unity in diversity (Spinocism), and the fourth level is opening the limitations of finite consciousness to the infinite and that of time to eternity. Here is his final conclusion about this ultimate goal of religion at the end of his second talk:

> In the midst of finitude to become one with infinitude and being eternal in a moment, that is the immortality of religion (Schleiermacher 1967, p. 95–99)

Religion as understood by Schleiermacher is a specific trait of the human mind (*Gemüt*). This understanding of religion is a watershed in Christian theology because it deviates from traditional Christian theology, which was based so far on either supernaturalism or revelation.

Under this presupposition of Schleiermacher's understanding of religion as a particular feature of the human mind he succeeds in interpreting religious evolution as an upwardly directed process of education (*Bildung*), which is governed by imagination. Accordingly, every new level of the religious consciousness is associated with a higher value, liveliness, and perfection. Thus he writes,

> Not only in its being you must recognize humanity, but also in its becoming. In addition is has an ample course which it does not recurrently but progressively pass through. Also it is formed by its inner changes towards the superior and perfect (Schleiermacher 1967, p. 79)

By connecting the religious consciousness with the particular German understanding of "Bildung" which is not completely covered by the Anglo-Saxon notion of education, Schleiermacher is able to associate religion with the highest level of recognition in contemporary society, which is "Bildung" of the individual. Thus, his concept of religious evolution is rather individualistic and is not related to the specific structure of society.

This means his evolutionary theory of religion is conditioned by his context of values and the specific structure of the German society in the Age of enlightenment and romanticism at the end of the eighteenth century.

Earlier in the nineteenth century the German philosopher Georg Wilhelm Friedrich Hegel (1770–1831) developed in his *Lectures about the philosophy of religion* (1821–1831) also a level understanding of the evolutionary process of religion (Hegel 2000). He tried to combine the general evolution of the religious consciousness with the particular Christian tradition and wanted to show that Christianity is the highest form of religion. The final aim of the evolutionary process is that after the self-alienation of the world-spirit he finally comes to the self-reconciliation. The result – the telos – is the end of history.

Quite different is the level-oriented understanding of evolution of Auguste Comte (1798–1857). In contrast to Schleiermacher for the French founder of sociology

religion is not a matter with different levels of perfection, but rather a form of primitive dealing with the world. So in a sense he also has a level-oriented understanding of the evolution of religion, but sees religion as a primitive human endeavor of knowledge acquisition that needs to be overcome. Therefore, it has to be substituted by science as the only and highest form of acquisition of knowledge. Again the levels are measured within the matrix of the contemporary value system of the society. For Comte this highest value was "positive knowledge" gathered by science. In this sense he develops a hierarchy of levels of knowledge, his famous *law of three stages (loi des trois etats)*, which is: Theology, Metaphysics, and Positive Knowledge.

> Each of our leading conceptions – each branch of our knowledge, passes successively through three different theoretical conditions: the Theological or fictitious; the Metaphysical or abstract; and the Scientific or positive (Martineau 1853, p. 1)

The first level is subdivided in fetishism, polytheism, and monotheism. This concept first appears in his Opuscule fundamental from 1822, but was already formulated by Condorcet and Turgot (Bury 1955, p. 157).

However, in Comte's system a new idea appears. He claims that there is a correlation between the structure of society and the way it acquires knowledge. Primitive societies base their acquisition of primitive knowledge on religion, the more developed society in the Middle Ages on metaphysics and the highest form of the development of society does so by science (Table 18.1).

Likewise the founder of British Anthropology, Edward B. Tylor (1832–1917) who was inspired by Spencer, Darwin, and Comte, follows a level-oriented model of evolution of culture, without applying it directly to religion. His model is: Savageness, Barbarism, and Civilization (Wunn 2002, pp. 329–331) (Table 18.2).

Tylor confines himself with identifying the two extremes of his hierarchy: animism as the religion of savageness and protestantism as that of British nineteenth century society (Wunn 2002, p. 335). We see a different picture in the works of James G. Frazer (1854–1951) one generation later.

It is Frazer's intention to discover laws of the religious evolution. His claim is that the different levels he identifies are more and more efficient modes to cope

Table 18.1 Correlation between structure of society and knowledge acquisition

Levels of progress	Theology	Metaphysics	Positive knowledge
Prevalence to society	Primitive society	Middle Ages	Modern scientific society
Function in society	Dysfunctional acquisition of knowledge	Destruction of religion	Progress

Table 18.2 Evolution of culture

Levels of religion	Animism	–	British protestantism
Prevalence to society	Savageness	Barbarism	Civilization

Table 18.3 Modes to cope with reality

Levels of religion	Magic	Religion	Science
Function of religion in society	Dysfunctional coping with reality	Dysfunctional coping with reality	Functional coping with reality by discovering laws of nature

with reality (Wunn 2002, p. 336). The levels he identifies are: Magic, Religion, and Science (Table 18.3).

The three mentioned representatives of a level-oriented understanding of religious evolution have one thing in common. They all interpret religions from their scientific perspective as deficient form of knowledge in accordance with the understanding of science in the nineteenth century, based on a mechanistic and deterministic interpretation of the laws of nature (Wunn 2002, pp. 330–349).There is no attempt from the side of these scholars to understand religion for what they are: religions!

This marks the great difference to another representative of a level-oriented understanding of religious evolution. Johann Jakob Bachofen (1815–1887) is neither influenced by positivism nor by Darwinism. He is a child of the German Romantic movement. Rooted in this context he develops a different methodological approach which is not based on the concept of law of nature like the aforementioned authors. His method is concerned about understanding religions as forms of life in their own right. This means he does not want to scientifically explain religions, but his method is that of "sentient, emphatic understanding" (Bachofen 1861).

This distinction of explanation and understanding is of paramount importance for the German humanities and theology in the nineteenth century and the attempt of their representatives to assure and defend the scientific status of the humanities against the conquering attitude of the successful natural sciences. In fact Wilhelm Dilthey (1833–1911) based the different mode of pursuing science between the hermeneutically oriented humanities and the natural sciences on his famous distinction of "explanation" and "understanding" (Dilthey 1910).

Again, he like Comte and Frazer finds a correlation between a specific form of society and its corresponding form of religion (Table 18.4).

Bachofen's main concern was to understand religion emphatically from their own inner essence. Valuation of religions as a kind of deficient form of knowledge like

Table 18.4 Corresponding levels of society and religion

Levels of society	Primordial horde	Cross-over	Agriculture	Town- culture
Level of religion	Telluric	Amazon	Lunar (substantial-motherly)	Apollonian (spiritual-paternal)
Deity	Aphrodite	–	Demeter/Isis	Athena/Apollo
Gynaikokraty/ Patriar-chy	Gynaikokraty/ Heterism	Gynaikokraty	Gynaikokraty	Patriarchy
Symbolism	Marsh plant/ water-animals	–	Spike/grain of seed	–
Relation of sexes	Promiscuity	–	–	Patriarchy

Table 18.5 Development of society and level of religion

Levels of religion	Primitive religion	Archaic religion	Historical religion	Early modern religion	Modern religion
Levels of society	Primordial horde, no socialization (rites/myths)	Functional differentiation between religion and politics	Literal cultures, religion: transcendent	Reformation, dualism religion/politics	Pluralism, privatization of religion

they were interpreted by Tylor and Frazer was alien to him and did not fit within main stream thinking of the nineteenth century. This emphatic understanding of religion was recovered rather late by V.W. Turner (Turner 1967).

For the twentieth century, the model of religious evolution comprising five levels by the American sociologist of religion Norbert Bellah (1927–) was formative. It is inspired by systems theory.

It is an essential trait of Bellah's model that it describes the evolution of religion as a process of increasing complexity and differentiation. This increase of complexity and functional differentiation occurs in accord to the development of society (Bellah 1970; Wunn 2002, pp. 360–368). Bellah distinguishes five levels, which are correlated to the development of society (Table 18.5).

As a final common feature of all level-oriented theories of the evolution of religion it should be noted that they all more or less presuppose an upward development of religions correlated to some extend to society.

18.2.3 The Teleological Model of Evolution

The first representative of a teleological understanding of evolution is Aristotle, who coined the notion of teleology as a result of his observations in nature in general and of organic life in biology in particular (Aristotle 1942, *De generatione animalium*, book I, Chapter 1, 715b, and book I, Chapter 1, 715a4–7; Aristotle 1978, *De motu animalium,* 700b15–29; Aristotle 1933, *Metaphysics*, book I, Chapter 3, 983a32; Aristotle 1929, *Physics*, book II, Chapter 2, 194a29f). Interestingly, he had a dispute on the teleological development in nature with Empedokles, who claimed that all development in nature is driven by pure chance (Aristotle 1929, *Physics,* book II, Chapter 8, 198b29–199a32), thus foreshadowing the debate in the nineteenth century between Darwin and the representatives of natural theology based on teleology. In antiquity Aristotle won the battle, in the nineteenth century the revenant of Empedokles, Charles Darwin was the winner.

Due to the Aristotelian reception by theologians and philosophers in the Middle Ages teleology becomes part of the scientific canon. However, already as early as the fourteenth century teleology was severely criticized in the context of the emerging nominalistic philosophy of nature and extinguished in favor of the *causa efficiens*, the efficient causes. In the seventeenth century, teleology was completely replaced by the concept of law of nature within the Scientific Revolution. It was only in

biology that teleology survived as a scientific concept as late as the nineteenth century. Nineteenth century famous biologists like Gerhard Oncken (1800–1884) or Johannes Müller (1801–1858) took it still seriously as scientific.

As is generally known, British natural theology was based on the teleological interpretation of nature. The long-standing tradition of natural theology found its climax in the work of William Paley (1743–1805) and his book *Natural Theology*.

The studied theologian Charles Darwin owes his decisive inspiration to coin "adaptation" or "fitness" as a scientific term to him. In natural theology adaptation and fitness was interpreted as the result of divine creation. The "fallen theologian" David F. Strauß ironically commented,

> It is fitness in nature, in particular in the realm of organic life to which those referred who wanted to demonstrate, that the world can not be conceived out of itself but only as the work of an intelligent creator (Strauß 1895, p. 143)

Darwin replaced this theological interpretation of adaptation as a result of the divine creator by a scientific explanation, in which the evolutionary process is governed solely by pure chance. Thus teleology was extinguished from biology and theology suffered because the argument of divine design could no longer be sustained. The problem arose whether or not the evolutionary process of creation based on chance could be reconciled with the idea of divine creation and teleological providence.

In fact, the French Jesuit and paleontologist Teilhard de Chardin (1881–1954) tried to make evolution by chance compatible with a divinely inspired upward evolution. In his speculative system he combines the three levels of religious evolution "cosmo-genesis, bio-genesis, and noo-genesis" with a teleological interpretation of evolution. One has to concede, however, that his teleological angle of evolution is not based on a Darwinian perspective (Teilhard de Chardin 1959).

The final aim of the evolutionary process is the cosmic Christ, the point Omega. His grandiose system can be interpreted as the attempt to find speculatively a substitution for the lack of meaning that appeared as a result of a purposeless Darwinian evolutionary process without ignoring the undeniable empirical fact of natural evolution. This teleological interpretation both of evolution and religion does not include other religions than Christianity. This means Teilhard is not interested in religious universals, he wants to do theological apologetics in favor for Christianity based on science.

18.2.4 The Functional Evolutionary Notion of Religion

The functional notion of evolution of course was introduced by Charles Darwin (1985). It was one of his major scientific insights. But Darwin did not apply it to religion. He wanted to explain the adaptation of any organism to its environment, its fitness, by a natural causal process, mutation, and selection. Teleology became dispensable. Evolution thus is purely functional. In this case it aims toward explaining the adaptation, the origin and survival of the fittest, and the changes in species as well as the emergence of a new species.

Biological evolution is the process, in which in a situation of competitiveness and selective pressure different strategies of survival are tested on the basis of undirected trial and error. This means that the most suitable ones are selected as the most appropriate, but this is not necessarily the case, because by pure chance the most adaptive may be extinguished. Even retardation is possible in biological evolution. Therefore there is no preordained and thus no predictable aim and purpose of evolutionary processes.

This understanding of evolution has its contemporary contextualization also. It is well known from the history of science that Darwin's key notion of competition and the "natural selection" in the struggle for survival of the species was inspired by the Anglican theologian and minister and later economist Thomas Malthus (1766–1834). D.F. Strauß had already drawn attention to this fact:

> Darwin's struggle for survival is nothing as the extension to a principle of nature , what we already know as a social and industrial principle for a long time. (Strauß 1895, p. 125)

In 1798 Malthus had predicted in his paper, *Essays on the Principles of Population,* a catastrophe in the development of the human population, because the increments of growth of the population obey a geometric, but the production of food obeys only an arithmetic law of progression.

Thus, this functional notion of evolution also mirrors exactly the currents of Darwin's society, namely the English Manchester capitalism.

Now it is interesting to note that Darwin did not apply his functional understanding of evolution to religion. He could have asked: Do religions have a function in the struggle of life? He did not ask this question. In contrast he had a rather negative interpretation of religion from an evolutionary perspective. In his book "*The Descent of Man*" from 1871 Darwin in a chapter dwelled about the difference between human beings and animals on the role of religion, too. Again, he could have asked the question about a role of religion in the evolutionary process. He did not. In contrast he confined himself to the remark that the outstanding mental abilities of human beings led to a succession and also to a ranking order of religions.

In a loose sequence he mentions the "believe in invisible powers," "fetishism," "polytheism" and finally "monotheism." Obviously he follows unconsciously the pattern of a level-model. Darwin acknowledges the value of these levels of religion in their evolutionary succession. But he depreciates very much the value of contemporary religion (Darwin 2002, p. 121). However, Darwin does neither pose the question why religions survived despite they are obviously dysfunctional, nor does he ask whether or not religion can have a positive role in the struggle of life. This is even more astonishing, because as soon as 1869, 2 years before the publication of Darwin's book *The Descent of Man* from 1871, the German zoologist and anthropologist Gustav Jäger (1832–1917) addressed this issue in his book *The Darwinian Theory and its Relation to Moral and Religion* in the form of an elaborated functional theory of religion and Christianity (Jäger 1869). It is proven that Darwin had read this book.

Even an exchange of letters between Jäger and Darwin survived (Darwinproject 1869–1870, 1875–1876). But he does not in the slightest way allude to Jäger's

theory, which would have amplified his own theory. Instead he adheres to a level-oriented theory that is already outdated according to his own methodological standards. One can only speculate why Darwin did not take over Jäger's ideas.

Now I want to briefly sketch Jäger's arguments. Jäger gave five public lectures in Vienna. In these lectures he describes the development of religions and asks, if they have a survival advantage. He starts with natural religion, proceeds to ethical religion, ancestor worship, and Israelite religion, and ends with Christianity .

I do not want to go into the details of his arguments. But may it suffice to briefly point to a trait of Israelite religion. He claims that in particular this religion by virtue of its high ethical standards is able to maintain inner social stability on the one hand and at the same time maintain an aggressive stance to its outside enemies.

Jäger cites psalm 118 and concludes,

> Where do you find expressed in the so called classical literature of Romans and Greeks such an aggression, such an energy in the struggle of survival? It fitted very well to the practical requirement, which the Darwinian expects from a form of religion, that it is a weapon, that it augments the energy of self-defense of the society as well as of the individual, that it creates social cohesion, without which the individual is nothing. This requirement is met by the Israelite idea of God to a degree, that it surpasses by far natural religion which gallops from abstraction to abstraction and finally ends up in atheism. (Jäger 1869, p. 114–115)

Jäger comes to the conclusion that Christianity based on the principle of division of labor, charity, and the belief in immortality is the religion with the highest advantage of survival. As a result, Christianity is not only compatible with Darwinism, but Darwinism has its natural habitat in Christianity:

> So our objective exploration has shown us, based only on practical aspects, not only that religion is a weapon in the struggle of survival, but that Christianity in comparison with other religions has accomplished the highest capacity for survival. Thus you may have realized that the Darwinian is neither Hindu nor Turk, but stands in the case of Darwinism on the grounds of Christianity. (Jäger 1869, p. 119–120)

Later in his life he became an entrepreneur and an advocate of healthy woolen attire. He founded factories in Germany, Great Britain, and America and thus became the inventor of woolen cloth, which he supposed to be very health sustaining. He sold them especially to the upper classes, because they were very expensive. This new conceptual and ground-breaking perspective on the nature of religion by Jäger from 1869 was completely forgotten. Jäger's functional approach was not successful in Germany. Religion and evolutionary theory thus became segregated. This becomes apparent in an influential contemporary book: *Die Darwinistischen Theorien und ihre Stellung zur Philosophie, Religion und Moral,* (Schmid 1876).

The functional evolutionary approach on religion was reinvented by Bronislaw Malinowski (1884–1942), a disciple of James Frazer (Malinowski 1983) and elaborated on empirical grounds during his fieldwork in Melanesian primitive societies. He made a significant progress in comparison to his precursors in the nineteenth century, because he showed that one can reasonably distinguish between religion based on rites and religion based on magic. They differ in their function. Whereas rites as an expression of religion is related to important steps in life (birth, adolescence,

marriage, etc.) magic is related to unforeseeable contingencies of every day life. Moreover, he showed that magical and empirical acquisition of knowledge is compatible with primitive societies, thus proving the level-oriented evolutionary theories of religion as being wrong.

Functional theories of religion became very prominent in the twentieth century: in biology (Campbell 1966), sociology of religion (Bellah 1970; Dux 1982; Döbert 1973), sociobiology (Wilson 2002, Voland and Söling 2004; Wilson 1978), evolutionary psychology (Boyer 2004), demography (Blume 2007), religious studies (Wunn 2002), medicine and life expectation. (Grossarth-Maticek 2003; Grom 1997; Breitenbach 2002; Dourley 2002; Fabricatore et al. 2004; Koenig 2001; Benson 1984; Piron 2003; Ritter 2005), but less in theology (Theißen 1984; Huyssteen 2006; Achtner 2007). In most cases they are associated with some kind evolutionary benefit.

However, the application of a functional Darwinian understanding of evolution still suffers from a so far unresolved theoretical problem. The problem is: What is the natural unit of the evolution of religion. Edward O. Wilson argues,

> At the one extreme, the one more likely to produce hard religiosity , the group is the unit of selection. [. . .]. At the other extreme, generating a softer and more ambivalent religiosity, individual selection is the ruling force in Darwinian evolution (Wilson 1978, pp. 186–187)

Is it the gene, the individual or the religious community? In any case one encounters specific problems. For example, if one takes religiously motivated altruism, one has to show that altruism is compatible with Darwinism. The argument according to Edward O. Wilson is as follows:

> A narrow interpretation of Darwinian natural selection would predict this outcome: because people governed by selfish genes must prevail over those with altruistic genes, there should also be a tendency over many generations for selfish genes to increase in prevalence and for a population to become ever less capable of responding altruistically.
>
> How then does altruism persist? (Wilson 1978, p. 153)

The solution proposed is that the phenotypical altruism is just the expression of genotypical egoism, so there is no real altruism as revealed by the solutions of kin-selection and reciprocal altruism (Hamilton 1995). But one question still remains unsettled, namely that of altruistic behavior at the expense of one's own extinction. Already Tertullian said, "The blood of the martyrs is the seed of the church" (Wilson 1978, p. 149).

An example for taking members of a religious group as the natural unit is the work of David S. Wilson, who reintroduced group-selection ("Religions are well known for their in-group- morality and out-group-hostility" (Wilson 2002, p. 10)). But how can one understand a group, consisting of heterogeneous members, as a functional unit? That is what D.S. Wilson concedes as an unsolved problem: "Thus social groups are a nebulous and heterogeneous category with respect to the concept of adaptation" (Wilson 2002, p. 7). This minority position was first developed in an extensive way by David S. Wilson:

> Religion returns to center stage, not as a theological explanation of purpose and order, but as itself a product of evolution that enables groups to function as adaptive units – at least to a degree. (Wilson 2002, p. 6)

> Applying these insights to the study of religions, we should think of religious groups as rapidly evolving entities adapting to their current environments. (Wilson 2002, p. 35)

To theoretically understand a social group as an adaptive unit, one has to focus on such aspects of a society that make it in a formal sense to a kind of self-operating system. To this end, for example, the social binding mechanisms such as control mechanisms, coordination and cooperation at the one hand and adaptive complexity on the other hand can be identified as such mechanisms that enhance internal cohesion (Wilson 2002, pp. 5–46/86–160; Wilson 1978, pp. 149–194). In addition one has to shift from biology to culture as the realm where evolution is operating, even if biology and culture are related to each other, for instance by language (Wunn 2002, p. 487ff).

The recent functional theory of religion of Eckart Voland in this volume based on the individual as natural unit identifies five traits of religious functionality: first, a survival benefit , self-preservation through improved mastery of contingencies; second, strengthening the community by work toward common goals; third, in-group social identity by myths and as well as out-group competitiveness; fourth, solving the "free-rider" problem by compelling communicative honesty; and finally, religion aims toward strengthening moral standards within a group. Whereas these features of religion operate as biological functional, the religious metaphysics, as Voland claims, is biologically irrelevant in terms of survival and needs therefore to be classified as a negligible non-functional byproduct of evolution.

18.3 Conclusion and Discussion

So far I have identified four different types of evolutionary theories. Of course these are idealizations and partly overlapping. There is an overlapping between the teleological and the level-oriented theory of evolution, like in Hegel's philosophy of Religion. Also, there is an overlapping of the functional and the level-oriented understanding of evolution. However, there is a mutual exclusion of a functional and a teleological interpretation. Finally, I want to ask the question, if there is such a thing as an evolution of theories of evolution of religion. Or is the sequence of their development purely accidental? Some observations are offered.

1. In antiquity only some changes in religions were noticed by authors like Herodot. This lack of theoretical understanding may be due to the fact that in Greek philosophy – with exception of Heraclitus – change was regarded as something of inferior scientific interest. Even more, change could not be thought of as scientifically accessible. Also the theoretical scientific consciousness was not developed to the necessary degree.

2. The theoretical frameworks of evolutionary theories in the works of authors like Schleiermacher, Comte, Tylor, and Bachofen was contingent upon the main cultural currents of their time. This indicates that the evolution of evolutionary theories will continue.
3. It can be noticed that there is an interesting increase of differentiation and complexity of evolutionary theories of religion, which follows an underlying pattern. Evolutionary theories of religion started with some kind of level orientation. The next step was to correlate these levels of religious awareness to a particular structure of society.

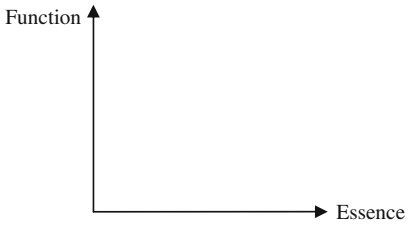
Finally, this correlation was specified by asking the question what particular function religion serves in a given society. The sequence in this development is like this:

1. Level of religious consciousness (Schleiermacher, Hegel).
2. Correlation between religious consciousness and society (Comte, Tylor).
3. Function of particular religions in particular societies (Malinowski).

I want to conclude with a suggestion to extend the theoretical framework of a functional theory of religion. According to empirical research, at least as presented in this volume, it seems irrefutable that religion has a beneficial effect on survival. The question, however, remains open to which aspect of religion this benefit can be attributed. Rightly, Voland asks, if this benefit can be seen as the result of its content, its implicit or explicit metaphysics, which he claims to be functionally irrelevant or only relevant to the underlying innate religiosity. One can reformulate the same question according to Voland's own phrasing: "Is there a religiosity without religion?" In fact, many functions of religion can be substituted by other contents as the examples of Voland indicate. A striking example is the take-over of the religiously inspired midwinter festival by folkloristic carnival. However, there are also empirical examples which seem to show that the content of a religion is somehow related to its biological functionality. In particular, the research made on long term persistence of settlement groups in nineteenth century America shows, that religiously committed groups performed much better in long term persistence than secular, for example, humanistic or socialist orientated groups. If the content of religion was irrelevant and could be substituted by any other content, like a socialist vision, one would expect that both perform equally well.

This example makes obvious that the content of a religion which goes beyond the biologically conditioned religiosity as the handicap principle in this case (Sosis and Bressler 2003), has some function, too, in terms of a benefit for survival. One could even argue that it is certain religious content that activates the handicap principle much better than a worldly one. The argument then is that it is the combination of a certain religious content or essence with its function that leads to an appropriate understanding of religion. Of course this would include religiosity as the biological basis of religion. The concept which I suggest here is a mutual intertwining of function and essence of religion. This more complex and abstract notion

of religion avoids the unnecessary combat between an essentialist and functionalist approach to understand religion in its various forms, because both can be seen as special cases of this more complex and abstract approach. It also offers the possibility for a classification of religions, because the relation between functionality and essence has to be empirically determined. A variety of combinations are then possible. For instance, one could argue that there are highly functional religions with little essence at the one hand and religions with a deep essence which are not at all functional or even dysfunctional. This theoretical approach could be depicted as a two-dimensional diagram.



The notion of essence of religion needs further clarification. In principle many classifications are possible. However, I would like to draw a basic distinction between religious essence as the *teachings*, *transcendence*, and existential longing for salutary *religious experience*. How these three features interact with function has to be determined in every single case and is thus a matter of empirical research. A few historical examples may highlight what is meant and stimulate further research.

18.3.1 Religious Essence as Teaching

Not all, but many religions have truth claims that are intellectually formulated in dogmas. For instance, the dogma of justification, which means how to become accepted by God, or the dogma of trinity is of paramount importance for Christianity. Do they have any function in terms of fitness for survival? Certainly the doctrine of trinity has no such function. Its only function is the intellectual attempt of clarifying how the Christian God could be conceived. It is different from the doctrine of justification. The conviction of being accepted by God could very well serve the function of coping with the contingencies of life or stimulate to a high degree of activity. The basic three solutions of Lutheran, Reformed, and Catholic theology of the problem of justification in fact lead toward different functions of survival. As example, one can mention the "inner-worldly asceticism" with the function of strong and successful activity in the world triggered by the specific solution of Reformed theology, as Max Weber has shown. Thus essence and function go hand in hand.

18.3.2 Religious Essence as Transcendence

The idea of a transcendent and free creator beyond the world belongs to the very essence of both Judeo and Christian belief. This religious conviction, based on the numerous accounts of his interaction with his chosen people, has both a frightening and liberating effect. I will focus on the latter one. The liberating effect or function is the pushing back of divinization of worldly features that claim religious adoration like in pagan religiosity. For example, in many myths like in the Egyptian religion or in the Enuma Elish, planets and in particular the sun were seen as Gods and had to be worshipped. Nature as a whole in these religions is understood as divine deserving religious respect. Thus it is not accessible to human control except by magic in some cases. Pushing back this divinity of nature paves the way to a rational control over nature which is in fact the biblically motivated *dominium terrae*, as a divine order of the transcendent God (Gen. 1, 26–28). Stripping off nature of its divinity makes it rationally accessible according to the order – later called laws of nature – with which the creator has endowed it. The positive function of this religious accomplishment for survival is obvious in Western tradition based on these grounds – often at the expense of religions that did not follow this path and became extinct. Again we see the interaction between essence and function.

18.3.3 Religious Essence as Religious Experience

The variety of religious experiences is overwhelming and cannot be simply categorized. It ranges from mystic exaltation to the experience of grace, repentance, or fanatic intolerance based on being the only one possessing the truth. One common feature, however, is striving for salvation, whatever this means in a particular religious tradition. Such a striving for salvation can have a completely otherworldly orientation, like in Gnosticism in its various ancient and recurrent forms. It is obvious that such a non-worldly orientation in connection with a religious devaluation of worldly affairs is not very likely to have a positive effect on coping with life. In fact, Gnosticism with this deep religious essence did not develop any functions for survival, simply because surviving in this world itself was already regarded as religiously worthless. That is why Gnosticism did not survive as a religion. Again we see a connection between the essence of religion and its function. In this case there is a deeply religious essence combined with the complete absence of any survival benefit.

This model to always understand religion as a combination of its essence and its function or dysfunction seems to be more appropriate to categorize the great variety of religious phenomena and thus to avoid the theoretical shortcomings of a solely functional approach. It also opens up new horizons for empirical research about how to determine the relation of essence and function with respect to function or dysfunction of a particular religion.

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Chapter 19
Evolutionary Perspectives on Religion – What They Can and What They Cannot Explain (Yet)

Detlef Fetchenhauer

Abstract In the present chapter it is argued that evolutionary theories of religion contain many brilliant and fascinating ideas, but that there is currently no overarching theory, which is able to explain all or at least the most important aspects of religion. It is described, which different lines of research such a theory would have to combine with. Furthermore, a number of hypotheses are critically discussed, namely (a) that religion can be explained by group selection, (b) that religiousness is adaptive because it is related to fertility, and (c) that religiosity is costly. Additionally, based on the fact that religious ideas spread by humans convincing other humans of their religious illusions, the question is raised how to explain, why humans can be manipulated by other humans to believe in entities that do not exist.

19.1 Introduction

In the foregoing 17 chapters, scholars struggle to explain the phenomenon of religion from an evolutionary perspective. The authors come from many different disciplines: anthropology, evolutionary biology, ethology, medicine, philosophy, psychology, and even theology. What is uniting them is their attempt to reconcile Darwin's theory of evolution with the existence of religion as cultural universal.

After having read all 17 chapters, I am impressed by the many great and fascinating ideas that these authors (and other authors in the field) have come up with. Still I would argue that all these ideas do not yet form a coherent theory that could be regarded as a sufficient explanation for why religion exists and how it could evolve.

In the present chapter I will not try to give another answer to the questions that have been dealt with by my colleagues in the earlier chapters of this book. Instead, I will (a) try to systematize the field, (b) critically discuss some ideas and

D. Fetchenhauer (✉)
Department of Economic and Social Psychology, University of Cologne,
Herbert-Lewin-Straße 2, 50931 Cologne, Germany
e-mail: detlef.fetchenhauer@uni-koeln.de

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assumptions that have been used, and (c) try to ask a number of questions that should be addressed in future research.

Before doing so, some logical clarifications of the relationship between evolutionary theory and religion might be helpful.

19.1.1 Can a Science of Religion Be Agnostic?

Some authors of this volume and many others in the field argue that evolutionary theory should be agnostic (i.e., should make no statement to whether God actually exists or not). However, I would argue that such a position is difficult to keep up for at least two reasons.

First, evolutionary theory tries to explain the behavior of humans (and that of all other animals) by reference to material causes. Contrary, all religions I know and can conceive of at least implicitly follow a dualistic conception of the world in which human behavior and natural phenomena not only do have material causes, but also are determined by the will of one or several supernatural beings that are not bound to the laws of nature and physics. Furthermore, most religions presuppose that humans do have an immaterial soul that has to be distinguished from their material body. I would not know how to integrate such a "ghost in the machine" into a Darwinian perspective.

Second, and more importantly, if one refuses to decide whether God exists or not, one has to develop two alternative theories as to why humans believe in God, namely one for the case that God actually does exist and another theory for the case that God does not exist.

If God does not exist, the question is why people all over the world and for all times we have evidence for tend to believe in entities that from a rational point of view are illusory.

If God exists, our belief in God is just a valid perception of an existing entity. Then, the question might remain, why different humans in different religions perceive God so differently, but the question that is the basis of this whole book would be easy to answer: Humans believe in God because God wants them to.

I would argue to assume that God is an illusion, as such a perspective is much more parsimonious and much more consistent with all we know from evolutionary biology and the natural sciences in general.

19.1.2 The Persistence of Religiosity – A Sign of Its Truth?

Against this conclusion it is sometimes argued that the persistence of religiosity can be regarded as a sign of its truth. This is a strange argument, as the truth of a certain belief is not dependent on how many laypeople share it or not. For example, in the United States a majority of people still refuses Darwin's theory of evolution as an explanation for the origin of different species, yet biologists would not take that as a hint to reconsider the theoretical foundations of their discipline.

On a very general level, one has to logically distinguish the truth of a certain assumption from its functionality as sticking to a false hypothesis may be highly functional for a number of reasons.

For example, social psychology has shown that humans tend to "believe in a just world" (Lerner 1980): most people think that they and others "get what they deserve and deserve what they get." This illusion is highly functional in that it is positively related to life satisfaction and helps people to deal with adverse life events (Dalbert 2001; Fetchenhauer et al. 2005). Yet, this functionality is no sign at all that the world indeed is a just and fair place (I am sorry to inform you if you thought otherwise up to now). Social psychology has identified a vast number of such "positive illusions" (Taylor 1989).

Thus, it might actually be the case that at least for many humans life is easier to live with the illusion of God. But from a scientific point of view we should clearly distinguish between ought and is. As Bertrand Russell once wrote about Plato, being determined to prove that the world is in accord with our dreams and hopes is "treachery to truth, and the worst of philosophic sins" (Russell 1961, p. 156).

19.1.3 Is There a Renaissance of Religion?

Irrespective of the veridicality of God, it is often claimed that we witness a "renaissance of religion" (typing in this search term leads to more than 6,000 hits in Google). Humans in Western secular societies are often said to find their way back to religion because science and rationality cannot tell people what to do and how to find meaning in their life.

This assumption is in stark contrast to classical thinking about secularization theories a la Durkheim and Weber who argued already a100 years ago that in modern societies religion would lose more and more of its functions and was bound to eventually go extinct.

This obviously has not happened. Still, it is important to note that in modern societies religiosity has indeed declined in the last decades and is still declining today (Norris and Inglehart 2004). Using data from the World Value Service (covering about 80 countries and tens of thousands of participants) Norris and Inglehart (Norris and Inglehart 2004) show that the degree of religiosity in a given country is heavily dependent on its level of economic development: for example, in agricultural societies about half of all citizens take part in a religious service at least once a week, in postindustrial societies this is only done by about 20% of all citizens. This relationship holds true in both cross-sectional analyses as well as in longitudinal analyses. When most risks in life are covered by one's income or by the welfare state, humans' desire to find relief in God heavily declines.

Should not this fact be informative for theories of religion? Unfortunately, none of the authors of the present volume (and none of the authors I have read in the field at large) ever mentions this fact or would even incorporate it into their theorizing. Yet, I would argue that a coherent theory of religion should not only be able to

explain why so many humans believe in God, but should also be able to explain why under certain conditions they do not.

19.2 Societal Structure and the Evolution of Religion

Today's humans approach their social and physical environment with a stone-age brain. This is a basic assumption of evolutionary biologists and evolutionary psychologists. Being an evolutionary psychologist myself I would not doubt the validity of this assumption. The human mind is no "blank slate" as many social scientists still tend to assume (Pinker 2002).

However, many evolutionary theorists tend to ignore the fact that the social and physical environment of today's humans is very different from what it looked like 100,000 years ago.

Literally thousands of empirical studies show that the behavior of a certain person in a certain environment is determined by both the specific person and the specific environment this person has to deal with. Consequently, although the human mind has evolved in times when our ancestors were living as hunters and gatherers we must not ignore the fact that today, by far the most humans do live in societies that are much larger and much more complex.

With regard to religion the size and complexity of a society does influence two important variables: (a) the functional differentiation of a society and (b) the homogeneity of the religious belief systems.

The level of functional differentiation of hunter and gatherer societies can be described as rather low. Besides differences between males and females, basically, all (adult) members do have the same formal social status. What is important for our topic: there are no formal religious leaders and religious experts (e.g., shamans) who do not specialize on their expertise as a means of earning their income.

Contrarily, when societies become more complex they become more stratified and more differentiated. Consequently, complex societies know religious experts that are paid by the rest of the society for their religious services (e.g., in modern societies priests are paid by their parish for preaching and conducting religious ceremonies like weddings or funerals). Beyond such horizontal specialization complex societies know much more differences in the social status of its members. Some people have much more power than others. Consequently, religious experts have (Darwinian) incentives to aim at a high formal status and to exploit other members of their society. One possibility to do this is to legitimize one's own social status by the putative decrees of supernatural beings. As an example the Catholic Church bases its authority partly on Jesus' word "you are Peter, and on this rock I will build my Church" (Matt. 16:18).

Consequently, the question arises why people would be willing to follow such religious leadership. In Sect. 19.6, I will refer to this issue and why it is important for the understanding of religion.

Another important distinction between hunter and gatherer societies and more complex societies refers to the fact that complex societies know much more religious heterogeneity. In most hunter and gatherer societies all members hold the

same religious beliefs. Therefore, these beliefs become what social psychologists describe as truisms (i.e., parts of a belief system that are never questioned). In contrast, in more complex societies members differ in which supernatural beings they believe (or might potentially do not believe in any Gods at all). This existence of other belief systems might threaten the validity of one's own religion (Taylor 2007). Furthermore it puts religions in a system of mutual competition.

In Sects. 19.5 and 19.7, I will refer to this issue and why it is important for the understanding of religion.

19.3 Possible Approaches to Religion from an Evolutionary Perspective

At first glance it seems that evolutionary theory is not well suited to explain the phenomenon of religiosity. How could the illusion of something non-existent ever have evolved? The sheer existence of religion appears to be an anomaly to evolutionary theory because evolutionary epistemologists have argued that humans (and other animals) tend to perceive their environment in a valid manner, as a valid perception of the world mostly helps organism no navigate their social and physical environment. Thus, organisms should not regularly perceive entities that do not exist because there should be strong selection pressures not to fall prey to such illusions (e.g., thinking that one has an invisible weapon to win every fight with a wild animal).

This might be one reason why for quite some time evolutionary theorists have struggled with religion about how to explain the world, but have not tried to explain why religion exists.

At the end of the 1970s, E. O. Wilson declared that religion should be one topic of evolutionary biology (or sociobiology, as he would have it) and was to be explained as a "wholly material phenomenon" (Wilson 1978, p. 192). Once that goal would have been achieved, theology, he argued, was "not likely to survive as an independent intellectual discipline." (Wilson 1978, p. 192)

Since then, evolutionary theorists have tried to explain religion in many different kinds of ways. Today, only 30 years later, there is no lack of evolutionary theories on how to explain religion.

However, I would argue that this abundance of theories is rather worrisome as the logical connection between these theories is often unclear (e.g., do they contradict or complement each other?). Furthermore, with regard to many theories and ideas it is hard to tell, to which degree they have been empirically confirmed. Often, it is even unclear which specific and falsifiable hypotheses could be derived from them.

19.3.1 The Important Distinction Between the Evolution and Derived Functions of Religiosity

Generally speaking, most theories take the phenomenon of religion for granted and then analyze possible adaptive functions of religion. For example, Wilson's

group-selection theory of religion does not try to explain why people are religious in the first place, but just assumes that they are and argues that such a propensity to believe in supernatural beings is functional on the group level. Similarly, scholars in the field of terror management theory argue that religious belief might help people to deal with the salience of their own mortality. Yet terror management theory is rather silent about how humans are able to trick their mind into believing in an afterlife, which would then help them to deal with their death anxiety.

It is as if evolutionary psychology would argue that language evolved because it is easier to communicate with language than without it. Even if the premise holds that communication is facilitated by language this does not explain at all how language ever could *evolve* from a state where humans did not have language (Pinker 1994).

Most theories that deal actually with the evolution of religiosity come from the field of cognitive anthropology and cognitive psychology and essentially regard religiosity as a byproduct of otherwise adaptive cognitive modules (see Richert this volume; Atran 2002; Barrett 2004; Boyer 2001).

Although some of their work currently is speculative (as is much work on the evolution of language) their attempts seem to me the most promising in the field.

Furthermore, these theories stimulated a vast number of empirical studies in the last years that took place under controlled experimental conditions and tested falsifiable hypotheses. This distinguishes them from other attempts to explain religiosity that often rather rely on anecdotic evidence.

I would argue that one important future task for scholars of religion would be to integrate cognitive analyses of *religiosity* with historical, anthropological, and sociological studies of different *religions* in different countries and under different societal, historical, and material conditions.

19.3.2 Possible Evolutionary Perspectives on Religion

Theoretically, there are a number of alternatives how religion might be explained from an evolutionary perspective: religion can either be (1) adaptive, (2) a byproduct, or (3) dysfunctional (Philipse 2006).

To regard religiosity as dysfunctional might appear absurd: why could it have evolved if it lowered the inclusive fitness of its believers? Yet, there are many behaviors in modern humans that might have been adaptive in earlier times, but are maladaptive under current conditions (at least in Western societies). The most prominent example is humans' preference for sweet and fat food that served the intake of as many as possible calories under conditions of scarcity, but today leads to obesity and other health problems.

In evolutionary biology and evolutionary psychology there are – often hidden beyond the surface – two meta-theoretical paradigms that are highly relevant for the explanation of religion, namely the concept of *fitness-maximizing* vs. the concept of *adaptation executing*(Tooby and Cosmides 1992; Daly and Wilson 1999; Smith et al. 2000).

On the one hand, scholars in the tradition of fitness-maximizing theories argue that organisms of all species, including humans and including humans in modern societies behave in a way that is suited to maximize their long-term inclusive fitness. On the other hand, scholars regarding humans merely as adaptation executers argue that today's human behavior is governed by a number of cognitive modules that evolved in the environment of evolutionary adaptedness, but that the resulting behaviors might not be adaptive under current circumstances.

When reading the chapters of the present volume, but also when reading the general literature on religion and evolution, this distinction is hardly ever mentioned or even taken into account. To the contrary, most scholars of religion take the adaptedness of religion as their starting point, a minority of them considers religion to be a byproduct, but hardly anybody considers that religiosity might lower a person's inclusive fitness (at least under current conditions).

Irrespective of whether religion is regarded as adaptive, as a byproduct or as dysfunctional it can be analyzed on different levels:

1. *The group level*. It is often argued that religion serves the function of increasing group cohesion and make members of the group sacrifice own resources for the common good thereby increasing the fitness of the group as compared to other competing groups (see Sect. 19.4). It has to be noted, however, that religion might simply be a byproduct of other factors that determine the cohesion of a given group. For example, in many modern societies, group members define themselves by a certain ethnical identity, which might spuriously be correlated to a certain religious affiliation (e.g., a citizen of England might identify with his country, but as an atheist might not identify himself with the church of England). Moreover, it might be that at least under certain circumstances a strong religion decreases the chances of a certain group to compete with another group (e.g., take the example of religions that forbid their members to use violence under any circumstances).
2. *The level of conflicting groups within a certain society*. In many societies there is a division of labor between religious "professionals" and ordinary believers (see also above). Whenever that is the case there are at least potential conflicts between both groups about material and/or reproductive resources. Given such conflicts it is in the self-interest of the religious professionals to exploit the rest of the society they live in. One way to legitimize such exploitation is to argue that certain rules and norms are sacred (i.e., the Gods command these norms to be enforced). One example, in Islam males are allowed to have four wives, only Muhammad was allowed to have eight. Such conflict theories of religion have long been favored by sociological thinkers (e.g., Marx and Feuerbach), but are totally neglected by modern evolutionary theory. To the contrary, many adherents of group-selection theory regard religious communities as "super-organisms" in which the religious leaders are forced to work for the good of their religious community (Wilson 2002). I guess that most political scientists would regard a similar assumption on the behavior of politicians (in both non-democratic and democratic societies) as unforgivably naïve (see also Sect. 19.2). Obviously,

what is good for one group of a society (e.g., religious professionals) might be bad for other groups of a society (e.g., ordinary believers).

3. *The individual level*. Many scholars have argued that religiosity is adaptive as it enables humans to deal with adverse life events, gives their lives sense and meaning, might help them to overcome self-control problems (via the fear of being punished by God for potential misbehavior), or might increase their reproductive success (more on that below). Euler (2004) has argued that religiousness might also help to be successful in terms of sexual selection. Contrarily to these positions, most scholars from the area of cognitive evolutionary psychology (e.g., Atran 2002; Boyer 2001; Barrett 2004) argue that religiosity is to be regarded as a mere byproduct of otherwise adaptive cognitive modules. Again, hardly anyone follows the theoretical possibility that religiosity – at least under certain societal circumstances – might simply lower one's fitness (e.g., committing religiously motivated suicide attacks).
4. *The level of memes*. Some scholars (e.g., Dennett 2007) argue that religious belief systems should be analyzed from a memetic perspective. The unit of selection in this case would not be an individual organism or a group of individuals, but would be religious belief systems themselves or parts and pieces of such belief systems. For space reasons I will not dig into this conception in more detail.
5. *The level of (selfish) genes*. Theoretically, it would be possible to regard religion as the product of some selfish genes that would profit from humans' religiosity. However, I am not aware of any theory that would follow such a line of reasoning.

To summarize, the phenomenon of religion can be tackled from many different perspectives. I would argue that a thorough understanding of religion can only be reached if we develop theories that are able to integrate these different perspectives with each other (Philipse 2006) and do not arbitrarily try to answer one single aspect of religion and tend to ignore most others.

Feierman (this volume) argues that it is necessary to divide religion into bits and pieces that should be analyzed separately. Such an approach to a complex phenomenon might sometimes indeed be successful, but always implies the danger that scholars in different sub-branches of the field specialize on certain topics and then turn to ignore (or even denigrate) the others. As Abraham Maslow once said, "to the man who only has a hammer, everything he encounters begins to look like a nail."

We should try to avoid this trap and be always aware of that religion is a highly complex phenomenon that should be investigated as such.

19.4 The Functionalist Fallacy of Group-Selection Theories

In recent years, some scholars have argued that the evolution of religion needs to be explained by some variant of group-selection theory (see Wilson 2002). The reasoning is that a shared religion serves to increase the stability of groups and

motivates members of a certain society (e.g., a tribe or a modern nation state) to sacrifice their own resources for the common good of their group. Therefore, groups consisting out of highly religious members should fare better than groups that miss such a social kit.

None of the authors of the present volume directly refers to this approach, but at times I was not sure which position they would take on that issue.

From a historical perspective the renaissance of group-selection theory as a means to explain the evolution of altruism as well as religion is highly remarkable. Arguing with group-selection ideas in biology was for a long time like arguing with psychoanalytic ideas in psychology, namely an embarrassing signal of being old-fashioned and outdated. When some years ago I was giving a course on the evolution of human altruism at the department of biology at the University of Groningen I was told that I should not even mention group selection. The idea was regarded as so absurd it was not even worth of being refuted.

Obviously, this has changed and variants of group-selection theories are prominent with regard to both the evolution of altruism and the evolution of religiosity (Wilson 2002).

Have these theories been right all the time? Interestingly, regarding societies or communities as functional units has been the dominant program in anthropology and sociology for many decades since the pioneering work of Emile Durkheim (1895). Yet, within the social sciences such methodological collectivism has been harshly criticized as "the functionalistic fallacy" and today is mostly regarded as erroneous and falsified.

For example, no economist or sociologist would accept claims that organizations are super-organisms and that employees work for the good of the firm. To the contrary, companies are regarded as a net of exchange relations and they exist because its members value their belonging to the organization as advantageous (as compared to all other alternatives at hand).

The concept of methodological individualism that is constituent for rational choice theories in sociology and the whole field of economics argues that to explain a phenomenon by its function for an aggregate of people (be that a firm, a country or a religious sect) does not explain the behavior of its individual members. This is especially important when different group members differ in their own material or genetic self-interests – as they do in far the most societies.

It is remarkable that biologists, who adhere to theories of group selection, persistently ignore such intra-group conflicts. Generally speaking, most authors simply forget to acknowledge that in each society (be it a country like the United States with 300 millions inhabitants, be it a tribe of hunters and gatherers) members have both overlapping and competing interests.

This does not imply that all humans behave selfish all the time, but it does imply that humans will be under selection pressure not to let themselves be exploited for "the good of the group." D.S. Wilson ignores that humans do not only have a motivation to free-ride (i.e., not to contribute to a common good), but that those in power have a motivation to let others work for them (and make this appear as working for the common good).

This ignorance of intra-group conflicts is also remarkable because biologists in other contexts are very well aware that individuals have competing interests even if they are highly genetically related to each other (see, for example, the theory of parent–offspring conflicts by Trivers).

The theory of group selection is often stated as an explanation for religiosity, confirmed by singular (and often anecdotal) evidence, but never empirically tested in a systematic fashion. What is worse, it is not so very clear, which empirical predictions could be derived from that theory. For example, when comparing modern societies with each other, will there be a relationship between the average religiosity of its members and indicators of social cohesion?

When running such an analysis with the data of the World-Value-Survey you will find that such a relationship does not exist. If there is a general trend, it rather goes in the opposite direction. For example, on the one hand the United States is one of the most religious postindustrial countries of the world and at the same time has one of the highest homicide rates (by the way, both facts might be due to the high level of social inequality in the United States). On the other hand, Scandinavian countries are amongst the most peaceful countries in the world – and amongst the least religious countries as well (by the way, both facts might be due to their low level of social inequality).

Thus, at least on a country level Voltaire's fear that "if there is no God everything is permissible" does not seem to be true.

Adherents of group-selection theories of religion often argue that religiosity strengthens the ties of group members with each other by (religiously) distinguishing themselves from some out-groups. However, is there any evidence that religion served this function in the EEA? I doubt that anthropological studies would back such a hypothesis. For example, in studying religious systems in Melanesia Schiefenhövel (this volume) mentions that hostile tribes often share their religious beliefs. The same holds true for medieval Europe, when Christian countries were constantly fighting each other. It seems much more plausible that humans' willingness to strongly distinguish their ingroup from any outgroup presumably evolved totally independently from religion to distinguish between kin and non-kin and that religion piggybacked on such a cognitive/emotional module.

Another point of criticism refers to the easiness that group-selection theorists reveal when searching for anecdotal evidence for their theory. For example, seemingly "heroic deeds" (like suicide attacks) might not be motivated by an altruistic concern for the group, but might be explainable simply as self-interest or kin altruism (Atran 2008, p. 478), as the perpetrators might anticipate to be rewarded in heaven or might try to elevate the social status of their kin.

19.5 Fertility and Religiosity – Now and Then

Quite a number of authors in the present volume are impressed by the idea that there might be a substantial correlation between fertility and religiousness (i.e., interpersonal differences in religiosity) (Blume this volume). Their excitement is

understandable: if religious people have more offspring than non-religious people, we might have a clue to why religiosity is so persistent. Atheists may have the better arguments, but get fewer children than religious people, the idea of atheism would not be very successful in evolutionary terms. The argument of a causal link between religiosity and number of offspring seems to be the more convincing as there is evidence that religiosity is heritable to quite some degree (Bouchard this volume).

Thus, we do have a heritable trait that varies between different individuals and is related to the inclusive fitness of its bearers. It is nearly like seeing natural and/or sexual selection in action.

Yet, the findings by Blume reveal a general weakness of many evolutionary theories of religion, namely that the empirical evidence for them is both limited to certain kinds of societies and merely correlational. What is missing is the proximate mechanism that would link both variables with each other. Why do religious people get more children? This question remains largely unclear.

By the way, there is evidence showing that making people aware of their own mortality increases their wish to reproduce and to get offspring. Terror management theory regards this as a proof that mortality salience increases humans' need to make oneself immortal (by the means of propagating one's own genes into future generations). If this actually is the case, religious people (at least when they adhere to a variant of Islam or Christendom) should have a lower desire for getting offspring, as they do not need own children to overcome their own mortality. Rather, they might try to strictly adhere to the rules of their God to make sure they actually come into heaven (e.g., by becoming a monk and totally refrain from sexuality).

Indeed, many highly religious people (at least in Christendom) chose and still choose exactly such a strategy.

Another and even more important criticism on the idea that religiosity is adaptive because religious people get more children is the following: What Blume (and all others that follow his idea) neglects is the difference between different reproductive strategies. As Gangestad and Simpson (Gangestad and Simpson 2000) have shown (human), males can follow either a long-term or a short-term reproductive strategy. A long-term strategy implies faithfulness to one partner and a high level of parental investment.

As Blume argues, this is exactly what females want, taking males' religiosity as an indicator of such personality traits. Yet, Gangestad and Simpson show that many males (and especially the attractive ones) prefer another strategy, namely to engage into many different short-term relationships. As males can sire literally hundreds of children over a life-course such a short-term strategy is more successful than a long-term strategy if one finds females who are willing to accept such behavior. Following Gangestad and Simpson, females will only then be willing to do this, if a male has to offer "good genes." In this case, females might get pregnant by such highly attractive males, but let them get raised by their nice and less attractive long-term partners (who would usually not be aware of such a deal).

Bouchard (this volume) shows that religiosity is related to a number of personality traits that can be described in terms like conventionalism or traditionalism and I would argue that such personality traits are indicators of a long-term rather than a

short-term reproductive strategy. If that is the case, male religiosity might function as the marker of a certain reproductive strategy.

If that were the case there should be a correlation between religiosity on the one hand and sexual strategies on the other hand. And indeed such correlations exist: the more religious a person is the lower is her level of sociosexuality (i.e., her willingness to engage in sex without feelings of love and commitment) (Penke and Asendorpf 2008).

Thus, females searching for a reliable and faithful partner might indeed be well advised to choose a religious partner. Yet, there is much evidence that for males both long-term and short-term strategies have been reproductively successful in the past.

This relationship, however, might not show up in modern societies for one simple reason: the availability of contraceptives. There is evidence from student samples that males (and females) scoring high on sociosexuality have more sex, but are less inclined to get children and would more often intend to have an abortion if they or their partner got pregnant in the nearer future (Rohde 2005).

To summarize, there is evidence that religiosity is linked to a long-term reproductive strategy and that this strategy is reproductively more successful under the conditions of modern societies. Yet, there is no reason to believe that such a strategy has been more successful in the EEA and therefore it is doubtful whether the evolution of religion can be explained by a causal link between religiosity and fertility – at least not with the data that we presently have at our disposal.

One could argue that Blume and other authors of the present volume do not argue about differences in reproductive success between individuals within certain religions, but that they argue about differences with regard to the average fertility of different religious groups.

Yet, such a finding cannot explain the evolution of religion in humans, as throughout human evolution by far the most societies have been religiously homogenous (i.e., there were no different religions competing with each other by trying to get as much offspring as possible).

19.6 Why Are People So Gullible?

The universality of religion both in all parts of the earth and over time makes it plausible that humans have at least a genetic predisposition to believe in supernatural entities. Richert (this volume) shows that young children have a mental conception of God even if they have not been religiously educated.

This being said, we should not forget that all specific religions are human inventions. Christians believe Jesus to be the son of God because they have been told so be other humans. Muslims believe that Allah is the only God and Muhammad is his prophet because Muhammad declared he was.

Why should humans believe the religious revelations of others? It is often argued that concepts of supernatural beings need to have certain attributes to be convincing to others. For example, it has been shown that supernatural beings often highly resemble human beings, but differ in one important attribute from them (e.g., being

invisible). Boyer (2001) argues that such "minimally counterintuitive" beings can easily be remembered because they are surprising enough to grab one's mind and not too complex to be memorized (see also Atran 2008).

Still, these supernatural beings do not exist and thus they do not interfere in humans' lives. Why did it take so long for the human race to find out about it? And why do so many still believe in such supernatural beings? This is the more remarkable as religions very often involve some humans (i.e., the religious leaders) trying to influence the behavior of other humans (i.e., the religious followers).

Why then are humans so easily manipulated by others to engage in certain behaviors for religious reasons?

This is the more remarkable as humans have a certain ability to engage into rational thinking. Yes, we are prone to many cognitive biases in our everyday life and even in science (see Frey this volume). Still, in many occasions we are intuitively following the rules of logic and scientific reasoning.

One anecdote might explain what I mean: when I was about 17 years old I went on a school trip with my classmates. One of the girls in our class was a "medium" who claimed that by the means of touching the hands of others she could see into their past and into their future. Most times, her auguries were rather vague, but in one case she told a female classmate of us that her brother had died. However, the classmate declared that she never had a brother and this basically broke the spell. Later this evening, on the phone that classmate told that story to her mother who immediately started crying because there actually had been a brother, but he died before his sister was even born.

I guess you can imagine what happened at this evening and how the credibility of that "medium" skyrocketed. But, what does that mean? Validly post-dicting a dead brother was indeed remarkable, because the base rate of such a fact is so extremely low (at least with regard to a 17-year-old sibling of the deceased). Thus, all of us at this evening intuitively understood one core principle of Popper's logic of falsification, namely that to confirm a hypothesis is the more remarkable the larger the number of potential outcomes that would falsify the hypothesis. None of us had ever visited a course on formal logic or on the philosophy of science, but still we intuitively understood this logic.

Why then do religious leaders get constantly away with their vague predictions which are not falsifiable?

This fact is the more remarkable as it is humans that function as religious leaders (remember, there is no God whose word they are telling). Why should anyone believe them?

To understand the importance of that question, one has to realize that there must have been a strong selection pressure against gullibility. This can be derived from the fact that humans may be the most manipulative species on earth. Admittedly, there are many other species that use deception and manipulation, but humans have a tool at their disposal that other species miss, namely language. When humans try to manipulate others they often do this by "talking them into it." Most religions might come with impressive rituals and ceremonies, but the core of all religions is always storytelling (see Palmer this volume). Yet, as all humans try to influence others by

the means of talking at the same time they should have modules that shield them from being manipulated by others themselves. As Jonathan Haidt puts it, humans should "be prepared for other people's attempts to deceive and manipulate [them]" (Haidt 2007, p. 1000).

Why then would anyone believe another person telling him what to believe as regards vague and illogical stories about some supernatural beings?

I do have no answer to that question, but I think that most of the time we fail to acknowledge the peculiarity of this fact. Quite often in science, it is the most obvious facts that might be the most important and the most difficult to explain. This might be one of them.

19.7 How Costly Is Religiosity?

It is often argued that religion is costly. Bill Gates supposedly once said, "just in terms of allocation of time resources, religion is not very efficient. There's a lot more I could be doing on a Sunday morning" (cited in Atran 2008, p. 478). Voland (Voland this volume) states that religiosity serves as an honest and not easy to fake signal – undergoing costly rituals serve as a signal of willingness to sacrifice for the group.

However, this argument is only convincing in situations, in which individuals live in religiously heterogeneous societies in which they have the chance to leave their religious group and switch to another belief (or flock together with other non-believers). In such a situation the willingness to participate in religious rituals can indeed be regarded as a costly signal. However, which alternative does one have to participate in the religious services of one's tribe if all others are participating?

Thus, when analyzing the costliness of religion from the perspective of the individual group member, one should not ignore what economists would call opportunity costs. When you are a member of a certain religious community to which all your relatives and peers belong, the opportunity costs of stepping out of that community might be much higher than staying within this community although this might imply time preserved for prayer and religious ceremonies. By the way, many religious ceremonies are rewarding both on a spiritual and on a social level – when all your friends and neighbors go to the church on a Sunday morning, the reasoning of Bill Gates simply might not be true.

This points to another problem that is often not sufficiently taken into account, namely the distinction between religious feelings and convictions on the one hand and religious behaviors on the other hand. Many scholars – for good reasons – are skeptical of asking people about their inner states and rather try to infer such inner states from an individuals' behavior. One implicit premise of this approach is the assumption that the more costly a behavior, the higher the actors' preference for such a behavior. Besides the fact that one must not forget the opportunity costs of the behavior in question there is a large number of studies in social psychology that question whether there is always a link between preferences and behavior.

One example that might be highly relevant to religious communities is the phenomenon of so-called "binge drinking" at college campuses in the United States.

Many students participate in this costly behavior (drinking too much alcohol is toxic and might even be lethal). In many respects binge drinking resembles religious rituals: they take place in groups and they alter the participants' state of mind into an ecstatic mood. Thus, do students simply engage in it because it is rewarding?

Not necessarily. Social psychologists have found out that many participants actually do not like to participate in binge drinking events, but they do so because most others seem to like it and they do not want to be outsiders in their own peer group. This phenomenon is called "pluralistic ignorance." Just like many scientists ordinary humans derive preferences from others' behaviors and are often wrong with it.

This insight might be very important for scholars of religion as well. To see that most members of a certain group engage in certain religious behaviors might not tell us so much about their inner feelings and convictions.

For most humans in most societies the least costly option will often be to simply "follow the herd" and at least pretend to believe in the supernatural beings one is supposed to believe in Richerson and Boyd (2005). Often, there is nothing to be gained by contemplating about whether one actually believes in one's Gods, as it would be extremely expensive to "break the spell" and formulate one's intellectual doubts (remember that Giordano Bruno and many others were killed for denying the existence of God). Consequently, many believers might not even privately know whether they believe in their Gods or not.

Additionally, it might be cheaper to err on the side of religion. If one prays to Gods that do not exist, what does one lose? However, not praying to Gods that actually do exist and might get angry about one's skepticism can be very costly indeed. Blaise Pascal developed such an argument in a highly sophisticated manner, but it seems plausible that many humans intuitively follow such a strategy as well.

To summarize then, from the perspective of most members of most human societies, believing in one's local religion – or at least pretending to do so to oneself and to others – is not costly at all. Compared to the alternatives, it will often be the cheapest thing to do.

Therefore, all arguments that rest on the assumption that religiosity is costly only hold in societies in which members of a given religious group have the alternative to leave it and to join other competing religious sects. Only then can the willingness to participate in religious rituals and to follow certain religious rules be regarded as a hint to a person's religious commitment. Otherwise, publicly stating one's belief in God is what stating one's believe in Marx and Lenin is in a communist dictatorship – forced compliance that cannot serve as a hint to internal commitment. Not surprisingly, anthropologists rarely describe occasions in which young men refuse to participate in religiously motivated rites de passage that are meant to mark their transfer from adolescence to adulthood.

19.8 The Social and Historical Contingencies of Religion

What's often forgotten: Religiosity might be a universal phenomenon, but its manifestation is extremely diverse.

Thus, something like a genetic predisposition to belief in supernatural beings combined with specific social circumstances (e.g., cultural norms and values, objective living conditions) leads to a specific belief system.

If we really want to have a thorough understanding of religion we need to do both, analyze the universals and also the peculiarities of different belief systems.

This refers to a general problem of evolutionary theory, namely its adverse relationship to most other social sciences. For example, in their introductions most textbooks of evolutionary psychology (e.g., Gaulin and McBurney 2004) claim that behavior can only be understood as the interaction of genetic predispositions and specific cultural conditions, but then ignore this statement, focus on genetic influences on human behavior, and refer to cross-cultural research mainly as a means to claim the universality of human nature.

One (implicit) conclusion derived from such a theoretical perspective is the assumption that one can study religion in any culture one likes and will later be able to extrapolate the results of that study to all human societies.

One might argue that such criticism is not warranted toward the field of behavioral ecology, in which behavior is often analyzed as a genetically programmed, yet conditional response to an organism's physical and social environment.

Unfortunately, this discipline is even more unwilling to acknowledge that modern humans live in environments to which no facultative adaptations exist (e.g., when having to explain why in modern societies a negative correlation between social status and fertility can be observed) (Rohde 2005).

Contrary to such a position I would argue that we need much more empirical and cross-cultural fieldwork that is aimed to *empirically* and *systematically* test hypotheses about religion. These studies should govern heterogeneous (and at best random) samples of both, modern industrialized countries and agricultural or even hunter and gatherer societies.

To give just three examples:

1. Is it possible to conceptualize religiousness as a personality trait across cultures and to which other personality traits is religiousness related? For example, is religiousness linked to traditionalism and conventionalism also in humans that adhere to a certain religion that is highly unconventional in the society they live in (e.g., Christians in China)?
2. Is there a correlation or possibly even a causal link between religiosity and fertility in hunter and gatherer societies? Does that link remain stable when controlling for illegitimate children (e.g., by DNA-tests)?
3. How many societies do actually use religion as a means to define their social identity (when controlling for other markers of social identity like language or ethnicity)?

To summarize, I would argue that we are still far away from an overarching theory of religion. But that should not discourage us – humans possibly believe in God for more than tens of thousands of years and evolutionary theory tries to explain this behavior only since some decades.

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