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Chapter Two

Scientific versus Religious 'Knowledge' in Evolutionary Perspective

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Throughout the twentieth century, evolutionary and religious explanations of life have mostly been discussed as conflicting and exclusive. Even those models that tried to separate these perspectives into non-overlapping magisteria indicated that religious lore would lose parts of its functionality. But over the last few years, new and interdisciplinary evolutionary studies of religiosity and religions have yielded empirical findings supporting a hypothesis first formulated by Friedrich August von Hayek in 1982: religious beliefs in super-empirical agents watching and motivating behaviour may be adaptive or even necessary for human life, although they seem to conflict with modern scientific knowledge. For example, religious demography has been able to explain a central factor in ongoing struggles between proponents of evolutionary theory and advocates of religious creation mythologies in the US, Israel and other countries: although evolutionists emphasizing empirical methodology tended to bring up far more scientific arguments, creationists believing in a God endorsing community and family life tended to bring up far more children. This holds empirically true even if other variables such as education, income or urbanization are controlled for. And the philosophical weight of these findings is indicated by a central assumption of evolutionary theories of cognition and evolutionary epistemology: all of our senses are assumed to have evolved by approximating aspects of reality, with 'better' information resulting in higher chances of survival and reproduction. Therefore, recent evolutionary and cognitive studies indicate the need to reassess our established perspectives on the functionality of scientific versus

religious 'knowledge', on the role of women in evolutionary history and on epistemological pluralism.

Evolutionary Studies of Religiosity and Religions

A century before evolutionary theory was formulated, David Hume presented a proto-evolutionary scenario of religious history in his eminent *Natural History of Religion* (1757). According to him, 'polytheism was the primary religion of man', rooted in human cognition inadvertently detecting agencies and forming theories of mind:

There is an [*sic*] universal tendency among mankind to conceive all beings like themselves, and to transfer to every object, those qualities, with which they are familiarly acquainted, and of which they are intimately conscious. We find human faces in the moon, armies in the clouds; and by a natural propensity, if not corrected by experience and reflection, ascribe malice or good-will to every thing, that hurts or pleases us. (Hume 1757/2014: 7)

Hume further assumed a foundational role of women in the formation of religious groups: 'The leaders and examples of every kind of superstition, says Strabo, are the women. These excite the men to devotion and supplications, and the observance of religious days. It is rare to meet with one that lives apart from the females, and yet is addicted to such practices' (ibid.: 8). And in naming the functions of polytheist pantheons, Hume started with two goddesses and matters of reproduction. 'Accordingly, we find, that all idolaters, having separated the provinces of their deities, have recourse to that invisible agent, to whose authority they are immediately subjected, and whose province it is to superintend that course of actions, in which they are, at any time, engaged. Juno is invoked at marriages; Lucina at births' (ibid.: 5).

Charles Darwin was influenced by Hume's many works, including *The Natural History of Religion*. In his account of the evolution of religion in his *Descent of Man* (1871), he concurred with Hume on many points, such as the rejection of the still popular thesis of a primary monotheism ('Urmonotheismus'). Being a learned theologian, he also agreed in assuming cognitive processes were the source of early animist and (later) polytheist and finally monotheist conceptions of 'spiritual agencies' – temporarily called supernatural or (more precisely) super-empirical agents.

Adding a social perspective to these cognitive processes, Darwin further assumed that the thus perceived monitoring might contribute to stabiliz-

ing and enhancing social and cooperative behaviour within groups, thereby increasing their chances in evolutionary competition. But then, Darwin referred to males and their purported tasks only, as he observed that

It is almost necessary for him to avoid the disapprobation, whether reasonable or not, of his fellow men. Nor must he break through the fixed habits of his life, especially if these are supported by reason; for if he does, he will assuredly feel dissatisfaction. He must likewise avoid the reprobation of the one God or gods, in whom according to his knowledge or superstition he may believe; but in this case the additional fear of divine punishment often supervenes. (Darwin 1871: 89)

Following Malthusianism, which predicted un-stated, inherited means of massive reproduction in any human population 'surviving' competition, Darwin did not discuss reproductive advantage or female contributions in his evolutionary studies of religion. Instead, his male-centred assumptions can be directly linked to contemporary 'Gods of War' hypotheses, which assumed that religion primarily served to promote in-group cohesion in violent 'intra-group competition' (Johnson 2008).

After many trials and errors, contemporary evolutionary perspectives slowly returned to many terms and observations very close to those brought up by Darwin. Religiosity can indeed be defined as 'beliefs in super-empirical agents' such as ancestors, spirits, demons, angels, hidden space aliens, god or God. As with other biocultural traits, it seems to have emerged in evolutionary history by bringing together older, cognitive and emotive foundations into a new system of thoughts, beliefs and observable behaviour by promoting in-group cooperation (Wilson 2002; Volland and Schiefenhövel 2009; Frey 2010).

Although there have been assumptions about much earlier origins, the first widely acknowledged burials – emerging among *Homo sapiens* and *Homo neanderthalensis* – have been dated to about a hundred thousand years, while symbolic figurines and cave paintings have been around for at least forty thousand years. Recent findings of a complex temple site at Göbekli Tepe are refuelling debates whether religious behaviour may have brought about the formation of settled civilizations (Mann 2011).

But why did it take so long for many to accept the obvious argument already formulated by Darwin himself: that religiosity turns out to be an adaptive and successful trait of human evolution? The root of the assumed and popular 'conflict' between science(s) and religion(s) is a philosophical one. Many self-declared 'Darwinists' added an epistemological monism to their world-view that the learned theologian Darwin himself never endorsed: that

there is only one kind of knowledge which is best accessed by empirical science(s).

As an example of scientism, Sam Harris argues that: 'The conflict between religion and science is inherent and (very nearly) zero-sum. The success of science often comes at the expense of religious dogma; the maintenance of religious dogma always comes at the expense of science' (Harris 2006: 1). But ranging from the Ancient Greeks right through great philosophers such as Immanuel Kant to contemporary evolutionary epistemology (Vollmer 2010), there has been the other possible assumption: that 'knowledge' is inherently multi-dimensional. Therefore, it is best explored by various means such as empirical science, arts and metaphysics, which are able to enrich, but not to replace, each other. For example, in his acknowledgement of evolutionary theory as 'more than a hypothesis', Pope John Paul II discerned 'various branches of knowledge'. In answering him, the eminent evolutionary biologist Stephen Jay Gould (a non-believer with a Jewish background) accepted the 'non-overlapping magisteria (NOMA)' of science(s) and religion(s) (Gould 1997).

Therefore, we might readily acknowledge that the famous painting *Guernica* by Pablo Picasso does not compete with an empirical photograph of the destroyed city, nor does it offer any peer-reviewed, scientific and statistical data about the bombs. But formed in the mould of a Christian triptych, the painting conveys a specific kind of partially emotional 'knowledge' about the terror and the losses caused by the Spanish civil war. It has prompted numerous human beings to remember the fate of Guernica and to rethink their stance on warfare ever since. We could argue that no scientific paper could have produced the same kind of 'knowledge' that Picasso's painting brought to the world.

In the same way we could ask whether religious myths such as God creating Adam and Eve may be offering 'symbolic truths' as a special, socially motivating and evolutionary successful kind of knowledge, as assumed for example by von Hayek (1988). After all, if Hume had been right in assuming that there is 'a universal tendency among mankind to conceive all beings like themselves, and to transfer to every object, those qualities, with which they are familiarly acquainted, and of which they are intimately conscious', this would imply that we are not functioning simply as calculating computers devising empirical hypotheses about our surroundings. Instead, we could be seen as evolved beings perceiving ourselves and the world we live in primarily in terms of social and meaningful relations. We might want to take notice that Michelangelo painted his image of God in the form of a human brain, possibly hinting at such an interactive, social constructivism,

and preceding respective modern 'neurotheologies' by about five centuries (see Blume 2011).

We no longer have merely to speculate on these topics. After all, evolutionary theory offers us a way of empirically testing conflicting hypotheses of epistemological monism and epistemological pluralism. If religious myths constitute no more than an outdated or inferior kind of 'knowledge' as assumed by scientific monisms, its application to life should lower the average reproductive success of its adherents – that is, its evolutionary fitness. In contrast, if religious lore constitutes a magisteria or realm of knowledge beyond empirical science, it should, on average, go with higher numbers of offspring across subsequent generations.

The Reproductive Potentials of Religiosity

In a nearly forgotten lecture given by von Hayek in 1982, the evolutionary scientist noted that the first commandment given by God to the freshly created human pair is to 'be fruitful and multiply'. And he assumed that this myth could be one of many 'symbolic truths' functionally nurturing human life and culture in the course of its evolutionary history 'because' it reached beyond rational, scientific and immanent arguments (von Hayek 1982, 1988). After years of researching and probing this assumption, I no longer hesitate in acknowledging that von Hayek was right empirically: religious lore is even more adaptive than he or Darwin could have imagined. In fact, it may even be necessary for human culture(s) to survive the centuries.

As one of many examples, Dominik Enste tested the correlation of religious worship and the average number of children with data from waves of the World Value Surveys spanning eighty-two countries from all continents and world religions. The result was statistically solid across nations and cultures: regardless of denomination, the devout tended to have far more children among Christians, Muslims, Jews, Hindus, Buddhists and other religions. Those participants of the World Value Surveys who did not attend religious services were reported to have on average 1.65 children. Their contemporaries worshipping once a month averaged 2.01 kids. And those that went to a church, mosque, synagogue or temple more than once a week had the biggest families, with 2.5 children. Statistically highly significant, religiously affiliated humans reproduce (on average) more successfully than their secular peers (Enste 2007).

On closer scrutiny, the exploration not only of statistical correlations but also of qualitative case studies turned up numerous variants of non-reproductive religious traditions, such as the Christian Shakers. But then,

only those communities survived to grow into world religions that endorsed marriage and large families. Of course, this does not imply that religion is the only demographic factor, but that it is an independent one.

Interestingly, the findings help us understand why scientific monists have not been able to defeat their fundamentalist adversaries: while non-religious evolutionists tend to bring up far more scientific arguments, religious creationists tend to bring up far more children. It is a surprising stalemate with a deep and informative, evolutionary irony. In fact, the far higher numbers of children among the religious recently became a central topic in sociology and politics. For example, ultra-Orthodox Jews (Haredim) in Israel formed a miniscule minority of about 1 per cent of the population at the formation of the state in 1948. However, they not only managed to retain their birth rate of more than six children per woman right until the 1980s, they managed to increase it to 7.6 children per woman in 1995, at the same time as the overall total fertility rate in Israel declined by 0.24 to barely above 2 children per woman. Doubling their numbers about every two decades, Haredim now form more than 10 per cent of the Israeli population and have become a major player in the Israeli parliament. And it is interesting to observe that specific religious traditions such as Orthodox Judaism have managed to retain extremely high fertility rates across subsequent generations, both with state support in Israel and outside it in the US (Berman 2009: 85–89; Kaufmann 2011).

Surveys comparing Muslim families in various countries that sent their children to religious schools (madrasas) to those that did not showed a respective fertility gap. Those families preferring madrasas had 0.67 more children on average in Indonesia than other Muslim families, 0.77 more children in the Indian provinces of Uttar Pradesh and Bihar, 0.58 more children in Bangladesh, 0.66 more children in Pakistan and 0.81 more children in the Cote d'Ivoire (Berman 2009: 92–94).

The Old Order Amish comprise another case, and one which I have had the opportunity of studying in detail. Although they hesitate to accept converts and are losing members in every generation, their numbers doubled during the twentieth century every fifteen to twenty years, rising from a meagre 5,000 people in 1900 to more than 200,000 adherents in 2005 (Blume 2010b). Other examples of religious traditions whose adherents have high fertility rates include Hutterites, Old Order Mennonites, Mormons, the Quiverfull movement and orthodox Muslims (e.g. Kraybill and Bowman 2002; Joyce 2009). Some of them actively avoid scientific education in order to secure their religious world-views, lifestyle and, ultimately, their evolutionary success.

In European societies with lower levels of religious and educational liberties, such as Switzerland (where the Amish originated, but had to flee), the demographic potentials of religiosity are visible, too. For example, we found that the religiously non-affiliated showed the lowest fertility rates in comparison to 'all' religious denominations differentiated by the Swiss Office of Statistics. In contrast, the Jewish as well as some smaller Christian denominations managed to combine higher percentages of academic education and membership of leading occupational classes with nearly double as many births than the non-religious (Blume 2009).

Finally, I would like to point out another finding with maybe far-reaching implications: in exploring the reproductive outcomes of diverse human populations, communities and traditions, we found a lot of religious variants that managed to retain high levels of fertility across many generations. In contrast, we did not find even a single example of a non-religious human group past or present that was able to maintain at least the replacement level of two children per woman for a century. Wherever the potential 'social glue' of religious traditions dissolved, family structures crumbled as well.

The Proximate Mechanisms Linking Religious 'Knowledge' and Evolutionary Fitness

Of course, the proximate mechanisms linking religious affiliation to evolutionary potentials are complex and diverse: At the individual level, (bio)cultural evolution selects for prolific religious commandments such as injunctions to marry early, to have many children and to regard them as a duty as well as a blessing from super-empirical agents. At the social level, commandments are selected for if they manage to bolster in-group cooperation such as long marriages, in-group loyalty and reciprocal charity. And at the institutional level, those religious traditions endorsing institutions of child-care such as kindergartens, schools, home-schooling networks or hospitals enjoy on average higher demographic and thus evolutionary success.

Actually, a range of diverse religious traditions established celibate roles, whose inhabitants do not form families of their own but are trying to support the survival and reproduction of their communities by service and example. In diverse configurations, such 'helpers at the nest' are found among many animal species. And it is interesting to see that, for example, the term 'nun' shares its etymological root with the family-supporting 'nanny'. In exploring the demographics of various Catholic countries, Berman et al. even went so far as to measure the reproductive impact of religious alloparenting in a special index: children per nun (Berman 2004).

If broken down to a single mechanism, the core, evolutionary potential of religiosity lies in its possibility of personal attachment by providing culturally 'tested' mythologies, rituals and symbols about 'watching' super-empirical agents and their behavioural expectations (Shariff et al. 2009). We are not evolved to accept 'commandments' by non-living things, but instinctively ready to adjust our behaviour if we believe we are being observed and judged by relevant (if super-empirical) agents (Bering 2011).

For example, although evolutionary scholars agree on the central importance of differential reproductive success as the main indicator of evolutionary fitness, most would not accept this finding as a personal commandment to have many children, rightfully discovering that this would constitute an ontological fallacy. There is no direct way from the empirical and evolutionary 'is' to a binding 'ought'.

But if we believe we are seen, judged and maybe even loved and awaited by specific super-empirical agents, that is another situation. The ancestors might expect us to 'multiply' or to cooperate faithfully among our extended as-if kin, our 'brothers and sisters'. There is a motivational potential among religious beliefs that can be shaped into such diverse forms as extreme submission to cult leaders, to terrorism or even outright suicide – or into pro-social, life-supporting activities and dedicated communities and families. By (bio)cultural evolution, religious communities endorsing those rules helping them to prosper will do just that (cf. von Hayek 1988; Wilson 2002). The non-religious may be no less able to live moral and happy lives, but they seem to find (on average) fewer motivations, rules and institutions guiding them into cooperative groups and bigger families. Moral 'values' are not confined to religious people. But religious beliefs in super-empirical agents may endorse their impact by sanctioning them beyond rational deliberation.

Are There Biological Bases to 'Religiosity'?

In an attempt to avoid exploring religious traditions and their 'symbolic truths', a proponent of naturalistic reductionism could argue that the reproductive potential of religious traditions might be 'just cultural', and therefore without relevance to evolutionary biology and epistemology. But on closer scrutiny, this reductionist approach has long been overcome. For example, the human traits of preparing and cooking food are primarily transmitted 'just' by culture(s). Nevertheless, they have been proven to be enormously adaptive, hugely influencing human genes, brains and anatomy by providing larger amounts of easy and quickly digestible nutrients. In fact, cooking is one of many examples emphasizing the fact that it is not possible to un-

derstand human nature by excluding human culture – both are part of the same, intertwined evolutionary history (Wrangham 2010).

Concerning religiosity as a cognitive trait of the human brain, one would expect respective tendencies to be at least partially heritable by genes underlying neuronal architecture. In fact, a range of empirical twin studies concluded just that: religiosity turned out to constitute a polygenetic trait transmitted by many genes and neuronal structures with a medium to large heritability and individual variance just like many other human personality traits such as intelligence or musicality (Vance et al. 2010). Therefore, Kaufmann's (2011) rhetorical question – 'shall the religious inherit the earth?' – could be answered as follows: given contemporary genetic as well as demographic data, we should indeed expect further growth of religious inclinations in future generations (Rowthorn 2010).

The evolutionary process has not stopped and it seems to favour those capacities of our brains constructing multidimensional perspectives of reality and meaning. What is more, whereas an epistemological monism would turn out as gender-blind, the reproductive potentials brought about by the formation of religious networks and groups indicate an indispensable role of both sexes in the evolutionary process.

Religiosity Evolving by Enhancing Social Cognition and Cooperative Breeding

In the light of these evolutionary findings, Hume's hypotheses about female members of religious groups trying to 'excite' men into joining them resonate strongly with evolutionary scenarios of 'cooperative breeding' (CB). In evolutionary biology, CB is assumed to almost exclusively begin among females (such as in many social insects and mammals) and to potentially expand to include fathers and other males (such as in primates and, most profoundly, in humans). As Burkart, Hrdy and van Schaik put it:

In many non-human primates and mammals in general, cooperative breeding is accompanied by psychological changes leading to greater prosociality, which directly enhance performance in social cognition. Here we propose that these cognitive consequences of cooperative breeding could become more pervasive in the human lineage because the psychological changes were added to an ape-level cognitive system capable of understanding simple mental states, albeit mainly in competitive contexts. Once more prosocial motivations were added, these cognitive abilities could also be used for cooperative purposes, including a willingness to share mental states, thereby enabling the emergence of shared intentionality. (Burkart et al. 2009: 175)

Whereas it is safe to assume that our capacities to do modern science emerged on our evolved bases of rational cognition (for example deducing non-personal laws of gravitation), we are now able to see that religiosity grew out of our inherited social cognition – for example, deducing another person's state of mind – further strengthening them via reproductive success. A range of behavioural and brain-scanning studies exploring the neurological correlates to religious activities support this perspective.

Nina Azari, Petra Stoerig and colleagues have explored the brain activities of participants reading Psalm 23, and compared a group of devout (German) Christians with one of declared atheists. Among the believers, they found distinctive patterns in the frontoparietal lobes indicating processing of perceived, social interactions with God, a super-empirical agent purportedly hearing and answering prayers. The non-believers, however, did not show these respective brain activities (Azari et al. 2001). Jesse Bering, meanwhile, was able to observe changes in the behaviour of children towards rule-observance if they had been told that they were observed by a nice but invisible 'Princess Alice' in contrast to a control group purportedly not observed (Bering and Johnson 2006). Ara Norenzayan and Azim Shariff have found higher levels of pro-social behaviour among participants in a game if they had been unconsciously primed by concepts of a (watching) God (Norenzayan and Shariff 2007). Finally, Shihui Han (2009) has presented a comparison of neurocognitive processes of the self by participants who saw pictures of religious and political personalities. Han found distinctive differences of self-processing patterns among groups of participating (Chinese) Christians and seculars.

All of these – and many more – studies point to the complex immersion of human brains and cognitions in their biographies, and social and cultural surroundings. Rational cognition is important in itself, but it forms only an aspect of the multi-dimensional processes by which we are constructing ourselves, our world-views and behaviour. Being a species depending on social life to flourish, our perceptions evolved to be fundamentally social too. Both science and (human) breeding turn out to be cooperative projects, but the latter is clearly the indispensable foundation of the first. Sciences and religions are addressing different magisteria or realms of human experience (McCauley 2011).

Conclusions

I would like to end by formulating three main hypotheses based on recent findings among evolutionary studies of religiosity and religions.

First, religiosity evolved on the basis of social cognition to become a successful evolutionary trait. By motivating believers, the trait shows the potential and tendency to raise cooperative and thereby reproductive potentials across generations. Of course, this does not prove the existence of super-empirical agents, but neither does it prove the opposite. It is possible to interpret these evolutionary findings in the frame of an 'adaptive illusion' (see Bering 2011). However, it is also possible to see it as a strong indication that successful religious traditions are bringing forth specific knowledge approaching a fundamentally personal and social reality through the ongoing evolution of religiosity and religions (see Dowd 2009).

Second, the role of women in the evolution of religiosity and religions has been greatly underestimated. Recent empirical findings, as well as the symbolically rich artwork depicting female 'Venus figurines' throughout long time spans and expanded regions of Stone Age humanity, all seem to indicate that religiosity did not evolve as a means to augment cooperative killing, but to support cooperative breeding. As forcefully described by Sarah Blaffer Hrdy (2009), the role of women and child-care has been greatly underestimated in evolutionary studies of humanity. Unfortunately, the same holds true in still-prevalent perspectives on the evolutionary history and present of religiosity and religious traditions (cf. Slone 2008; Blume 2009). Purported gender neutrality quite often disguised simple neglect of female contributions to our shared, evolutionary history.

Third, epistemological monism is refuted empirically. Sciences, arts and religions offer different kinds of knowledge(s). Both scientific and religious radicals got it wrong: Religious mythologies are not primarily outdated, scientific hypotheses. They are symbolic narratives motivating believers by social and communal attachment to perceived, super-empirical agents. Religious traditions such as the Old Order Amish or Hutterites manage to flourish by abstaining from scientific knowledge that they call 'worldly wisdom'. In contrast, we do not know of any human community past or present that has been able to survive demographically with the narratives offered by empirical science(s) alone. Rationality may be indispensable in itself, but it is not enough in a species depending on social relations, love and cooperative breeding of increasingly expensive children.

Evolution shaped us to be epistemological pluralists capable of valuable discoveries in all the 'various branches of knowledge' of rationalistic science(s), symbolic art(s) and social religion(s). Instead of wasting more years with fruitless strife among anti-theists and religious fundamentalists, we should proceed our quest to understand the multi-dimensionality of 'knowledge' with readiness for dialogue and open-minded curiosity.

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