ON THE SIDE OF THE ANGELS?
NEUROSCIENCE AND RELIGIOUS EXPERIENCE

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Abstract

> ... it is the neurophysiologists today who appear, if I may use the expression, to be "on the side of the angels".[1] (Sir Alister Hardy)

The contributions made by the biological sciences to the study of religious experience cover a broad range of topics and issues including, fasting, sex, drugs, exercise, sensory deprivation, and the healing effects of prayer to name just a few[2]. However, it is in the field of neuroscience that some of the most intriguing and controversial findings have recently been made. In an attempt to assess what progress has been made in the study of religious experience by the biological sciences this essay relates the recent work performed by neuroscientists Eugene d'Aquili and Andrew Newberg to ideas put forward previously by another biologist, Sir Alister Hardy.

A Living Stream and the Divine Flame

The neuropsychological model of religious experience proposed by Newberg and d'Aquili is complex and highly detailed. In essence they suggest that two neurological systems are intimately involved in the generation of religious experiences; the sympathetic nervous, or 'arousal', system and the parasympathetic nervous, or 'quiescent', system. The balance of these two systems interacts with neurological areas of the brain called 'association areas', for example the 'orientation association area' which generates our sense of three-dimensional space. Conceptual units called cognitive operators function at a psychological level in order to give structure to our thoughts, whilst the limbic system provides the emotional values which we assign to our thoughts and experiences. Rather than describe this model in detail at the outset I will instead refer to and explain the relevant components of it where they relate to the ideas put forward by Hardy.

The bulk of Sir Alister Hardy's first book dealing with religious experience, *The Living Stream*[3], aims to provide an argument to refute a materialistic view of reality stemming from the theory of evolution. Hardy tried to argue the case for a non-physical, psychic factor to evolution; the living stream. This then left open a gap into which 'God', or the 'transcendent', could be fitted. However, Hardy's 'God' may not be recognised as such by the more traditional religions as we shall see later.

Hardy's argument seems to hinge on the idea that there operates a 'behavioural' or 'organic' selection in addition to the environmentally imposed forces of natural selection such as competition for food resources, habitat, and the threat of predators. Crucial to this process of behavioural-selection is an organism's ability to choose to experiment with or to explore

new behaviours and environments. The new habits formed from these new patterns of behaviour would then contribute in a major way, Hardy argued, to the selection of biological adaptations promoting survival of the species; that is adaptation to the environment or "survival of the fittest"[4].

It is only towards the end of *The Living Stream* where the link between Hardy's biological argument and religion becomes more explicit and, for a respected scientist, in an unusual and daring way. Hardy was intrigued by the research being carried out into parapsychology, specifically thought-transference or telepathy. First of all Hardy speculated, and he greatly emphasised that this was indeed speculation, that a similar process to telepathy may form a kind of 'group mind' between conspecifics (members of the same species) through which new patterns of behaviour could be established thus influencing the course of biological evolution. This group mind, Hardy conjectured, could be what we refer to as 'God' projecting upon it an anthropomorphic image and orienting ourselves to it in a child-parent relationship due to our own evolutionary and childhood development.

The second innovative idea put forward by Hardy was that, as such, anyone with sincere intent, could engage in an experimental faith, in effect to test his hypothesis that communication with the 'transcendent' could result in personal experience.

Hardy's second book, *The Divine Flame*[5], outlined a multidisciplinary approach to the study of religious experience. The contributions that several academic disciplines could make to the study were outlined, such as social anthropology and psychology, and Hardy focused on viewing religious experience as an important and natural factor in the evolution of human beings. However, Hardy wanted to include the 'softer sciences' in a more holistic approach which he termed, as others had before him, a 'Natural Theology'. Newberg and d'Aquili also seem to approach such a position but without exploring it in any great detail saying that,

> ... a clean break with traditional science is neither required nor desirable. But we also strongly agree that a broadening of what is meant by science, perhaps a total realignment toward cognitive science, is required for any systematic study of consciousness or awareness.[6]

Hardy's Natural Theology posited that there is, in effect, a natural religious impulse within us which has been preserved over time due to being evolutionarily advantageous.

Hardwired for Religious Experience

Newberg and d'Aquili also reassure us that religion is hardwired into our biological make-up and also that it is a healthy response to the world in which we live. They point out that in their neurobiological studies religious experience was not abnormal but, whilst unusual, part of normal brain function.[7] They also suggest that, '... spiritual experience, at its very root, is intimately interwoven with human biology.'[8]

Alister Hardy fully expected this to be the case saying,

> Religion indeed seems to be some fundamental feature in Man's make-up: something which can be as powerful as any other urge ... It would not surprise me if the roots of religion went much deeper down into biological history than is generally conceded, and that it *is* part of the very nature of the living stream.[9]

Hardy's idea of a "divine flame" within human beings may be reflected in Newberg and d'Aquili's concept of the "causal imperative" which is based on a neuropsychological concept called the "causal operator". This causal operator allows us to view reality as a sequence of

cause and effect and is so strong that our brains are compelled to do so, possibly from infancy. In adult life it is a fundamental component in the formation of myth, especially religious myths. This urge they refer to as the 'causal imperative'[10].

Newberg and d'Aquili argue against religious experiences, even those of the mystics, as resulting from emotional distress, neurotic delusion, or pathological states[11], concluding that,

> ... the remarkable tenacity of religion is rooted in something deeper, simpler, and healthier than weak-minded denial or sheer psychological dependence.[12]

Hardy took a similar stance, refuting the idea that the religious experiences of the mystics were a form of sadomasochism.[13]

Whilst d'Aquili and Newberg seem to have come to similar conclusions as Hardy before them, neuroscientist Michael Persinger appears to be more sceptical basing his own model of religious experiences on pathological origins principally epilepsy[14]. This approach is challenged by d'Aquili and Newberg who list a number of ways in which mystical experiences differ from experiences due to pathological states. They compare the characteristics of mystical experiences with the characteristics of psychotic experiences, observing that the former are generally pleasant, occur less frequently, to a variable pattern, contain multiple complex sensory elements, and are viewed afterwards as being real. The latter are conversely unpleasant, occur relatively frequently, display a consistent and repetitive pattern, often involve only a single sense, and are recognised as unreal afterwards[15].

However, this immediately raises the question of what kinds of experiences count as religious experiences?

In 1969 Hardy founded the *Religious Experience Research Unit* (RERU) at Manchester College, Oxford. He advertised for accounts of religious experiences by asking,

> All those who feel that they have been conscious of, and perhaps influenced by, some Power, whether they call it God or not, which may either appear to be beyond their individual selves or partly, or even entirely, within their being, are asked to write a simple account of these feelings and their effects.[16]

This question took several slightly different forms and eventually resulted in the publication of *The Spiritual Nature of Man*[17] in 1979. This was a summary of the research so far, consisting of an analysis of the first 3,000 accounts submitted to the RERU. Whilst Hardy's broader aims remained the same, he now focused on two questions in particular; firstly what was the prevalence of religious experience in the contemporary population? And secondly, how could these experiences be classified?

Which Experiences are Religious?

Hardy seemed to be chiefly looking for certain kinds of religious experiences; those which everyday people experience as opposed to the more exaggerated and dramatic forms dealt with by William James[18]. He was also looking for a more continuous sense of spiritual power, presence or support, which helped people in their day-to-day lives. When talking about answer to prayer he referred to appeals for guidance, a better way of life, and worthwhile purpose which seem to draw on a power apparently beyond the self.[19] He also spoke of the perceived structuring of events which leads to a sense of destiny[20] and even more

broadly of "a love of the non-material things of life such as natural beauty, art, music, or moral values ..."[21] The most important element common to all of this though, was the "strong feeling of a transcendental reality ..."[22] felt by many, whether numinous as defined by Rudolph Otto[23] or mystical.

In distinction to this d'Aquili and Newberg appear to concentrate more on the dramatic experiences, sometimes using the term 'mysticism' as a synonym for religious experience but mostly focusing on the dramatic experience of what they term 'Absolute Unitary Being' (AUB) or states close to it achieved by mystics and in some Buddhist meditators. AUB is the experience of becoming one with Reality, whilst the state immediately preceding it is a sense of union with an object of contemplation. They list characteristics such as: time and space perceived as non-existent, normal rational thought replaced by intuition, the presence of the sacred, contradictory emotions, and insight into the essential meaning of things.[24] Whilst their neuropsychological model focuses on these types of experiences they also propose the existence of a 'unitary continuum' where these dramatic states form the extreme of a range of states of consciousness[25]. Lesser states, they argue, may give rise to lesser religious and spiritual experiences. However, whilst their model may go some way to explaining phenomena such as feelings of union when worshipping within a group, it is harder to see how it can account for the diverse nature of experiences reported, for example, by Timothy Beardsworth[26] or by Hardy in *The Spiritual Nature of Man*[27]. Indeed Hardy emphasised a feeling of 'Something Other than the self – whether felt as a sense of presence or not'[28] as a significant characteristic of many experiences. This element, however, is not directly accounted for by Newberg and d'Aquili and, in fact, seems almost the exact opposite of the unitary experiences that they consider. Neuroscientist Michael Persinger, however, does have a theory to explain this sensed presence. He suggests that our right-hemispheric 'self', of which we are normally unconscious, can break through into left hemispheric awareness and thus be experienced as an alien presence[29]. This can happen in normal individuals in a hypnopompic (between sleeping and waking) or anxious state. This may explain many 'entity' experiences and, claims Persinger, also those of Cosmic Consciousness although it is not clear how, as Cosmic Consciousness and AUB are usually experienced as impersonal and devoid of *any* ego whatsoever.

Hardy differs even further from Newberg and d'Aquili in what kind of experiences he considers to be under the microscope, including in the spiritual nature of the individual not only, 'that side of him which experiences spiritual and religious feelings' but also, 'loves adventure, natural beauty and the arts.'[30] This addition provides one link between Hardy's evolutionary theory of behavioural-selection and the development of religious experience.

The Evolutionary Advantage of Religious Experience

Strangely, although arguing for the religious urge being an important element in the evolution of human beings, Hardy fails to give many explicit examples of exactly *how* or *why* this urge has provided us with a selective advantage over the course of our evolutionary development. He does, however, suggest a link between our tendency to subjugate ourselves to a god and the behaviour of wolves when they subjugate themselves to a superior conspecific in a fight.[31]

Hardy also went on to say, '... at the basis of our natural theology we have this important link with the evolutionary system: a building into the mind of man of a *capacity for belief*.'[32] This capacity for belief may have been described in greater detail by Newberg and d'Aquili in their neuropsychological model of religious experience. As already mentioned this model

involves the function of units called cognitive operators. The binary operator, for example, allows us to separate objects or concepts into dyads. The holistic operator allows us to view a system of discrete parts as an integrated whole, and the causal operator compels us to attribute potential causes to what we observe. These operators were crucial to human beings' survival; allowing them to perceive and resolve threats.[33]

'Where,' asked Hardy, 'in this long history did the theistic or (to use Otto's term) numinous thread begin?'[34] Newberg and d'Aquili may provide us with an answer; in an early ancestor of modern *Homo sapiens*, *Homo erectus*, who, they argue, had a level of neurophysiological development necessary to 'perceive a spiritual reality' and transform that experience into myth[35]. They go on to illustrate how the ability to create and believe a myth may have a selective advantage by hypothesising a primitive hunter surprised by a sound from the nearby woods. The causal imperative immediately forces the causal operator to propose explanations for the sound; it could be some harmless animal or it could be a dangerous leopard. This conclusion is reached drawing on the hunter's memory and under the influence of his emotional reaction to the situation. The binary operator presents the problem in terms of a potential life or death situation. The possibility of the leopard takes precedence, the hunter believes this may well be the true explanation, and flees. The myth of the leopard in the trees may, or may not, have been true but the behaviour it produced may well have saved the hunter's life, the whole neuropsychological process thus proving evolutionarily advantageous.[36]

Newberg and d'Aquili provide us with another hypothetical example when they describe a tribal chieftain's insight about a soul surviving death becoming a religious experience which in turn gives rise to a myth. This myth then allows other members of the tribe to experience, to a lesser extent, the chieftain's original insight.[37] The initial insight depended on the same neuropsychological structures as the hunter's experience in the woods, but this time focused on a more 'religious' theme; the problem of survival of death. Similarly, John Bowker has put forward a 'theory of limitation' suggesting that undifferentiated physiological responses are interpreted as religious only in certain contexts; specifically where certain limitations are reached in an individual's attempt at control[38]. These 'compounds of limitation' are interpreted as religious if they relate to existential concerns such as death[39] .

Hardy also suggested that psychological and social effects as a result of religious experience, such as greater confidence and courage in the face of an adverse environment, may provide a selective advantage for the tribe[40]. Newberg and d'Aquili concur suggesting that ritual behaviour, whether religious or not, may have evolved due to its positive influence on social cohesion within a tribe[41]. Indeed the correlation between religiosity and mental health are currently areas of much interest amongst researchers. For example, a few recent studies have focused upon the health benefits of forgiveness[42], praying for others[43], and other measures of religiosity[44].

In addition to these psycho-social advantages Hardy also adds that evolution has disposed us not only to a capacity for belief, but also with a tendency to project our child-parent affectations onto a new 'tribal leader',

> It seems to me possible that man, who, like the dog, has juvenile characters, e.g. this prolonged period of childhood and a strong child-parent affection, may, also like the dog, have transferred part of the submissiveness which he had shown to his tribal leader, together with his filial affection, to a new master – one of a very unusual kind.[45]

Further research undertaken by David Hay supported the importance of childhood development in relation to developing a sense of spirituality. He suggested that spirituality naturally present in children is removed by social conditioning as they mature.[46]

Persinger's hypothesis of the sensed presence of the right-hemispherical 'self', mentioned earlier, may also provide us with selective advantages. He points out that differential activation of the left and right hemispheres may result in increased immunological activity[47] and that the right-hemisphere may be more sensitive to subtle environmental cues useful for survival[48].

Megatheology and an Experimental Faith

Hardy and Newberg and d'Aquili come to various conclusions as a result of their theorising. Hardy arrives at the notion of a Natural Theology as a foundation for an 'experimental faith' whereby an agnostic or atheist with sincere intent could put prayer to the test.[49] He even went on to suggest that such an experimental faith, whilst not being a universal form of religious practice, may be able to relieve some of the disagreements experienced between the different religions[50]. Similarly, Newberg and d'Aquili speculate that their own concept of a 'megatheology', which they define as, 'general and basic theological content, derived from neurotheology'[51], could be adopted by many religious traditions without damage to their essential doctrines, potentially providing a basis for a more universally acceptable theology for humanity.[52] It may be interesting to discover whether these ideas have been put into practice.

Dissections of religious experience such as demonstrated by Hardy and Newberg and d'Aquili run the risk of becoming two-edged scalpels. Whilst Hardy uses his theory to support a Natural Theology and Newberg and d'Aquili see their theory as vindicating the primacy of subjective reality, more sceptical readers can readily adopt the same theories to bolster reductionist views.

Starting Points

Whilst it should now be readily apparent that there are many parallels between Hardy's ideas and those of Newberg and d'Aquili it should be noted that the scientists do have differing starting assumptions which may influence their subsequent theories and conclusions.

Hardy sees himself as carrying on the tradition of a Natural Theology which he describes as concerning '...a Theism which is derived empirically from the study of nature, man, and human history.'[53] In defining 'theism' he says,

> ... by theism I do not mean a belief in a deity with an anthropomorphic image. I do, however, at least mean ... a belief in an 'extra-sensory' contact with a Divine Power which *is greater than, and in part lies beyond, the individual self*; towards this we have a feeling, no doubt for good biological or psychological reasons (linked with the emotions of an early child-parent affection, but none the worse for that) of a *personal* relationship, and we can call it God.[54]

A definition which obviously coloured the form of the key question, quoted earlier, which Hardy later published in magazines and newspapers to elicit accounts of religious experience from the public. Also, incidentally, a description of God sufficiently different from the traditional concept which may predestine Hardy's ecumenical hopes to the flames of orthodox criticism.

Dr David Hay points out a subtle but important difference between Hardy's Natural Theology and the natural philosophy which had gone before,

> Instead of coming at the sacred indirectly by means of natural philosophy or the argument from design (as did Newton and Paley), he urged the necessity of looking directly at our religious experience.[55]

This is because Hardy was absolutely convinced of the truth of the theory of evolution, claiming to be a Darwinian[56]. It was the theory of evolution which largely undermined Paley's argument from design.

Newberg and d'Aquili appear to have no such methodological presuppositions, preferring a more reductionist, or traditionally scientific approach. This is perhaps summed up by their definition of what they term the 'mind/brain',

> The brain is a collection of physical structures that gather and process sensory, cognitive, and emotional data; the mind is the phenomenon of thoughts, memories, and emotions that arise from the perceptual processes of the brain.[57]

And further,

> ... our hypothesis specifically holds that 'mind' and 'brain' are two views of the same reality – mind is how the brain experiences its own functioning, and brain provides the structure of mind.[58]

Paradoxically their subsequent theorising leads them to a conclusion which states that subjective, that is non-material, reality is primary. They reach this surprising conclusion by arguing that in principle it is impossible to determine whether subjective or material reality is the more fundamental starting point[59]. They then go on to propose that a pure and creative consciousness gives rise to, and inter-relates, both of these realities.[60] A position perhaps more akin to Eastern monism and possibly reflecting the fact that much of their research has been based upon experiments with Buddhist meditators[61].

Hardy, at first, seems more cautious about the problem of consciousness recognising that physics and chemistry cannot currently explain the mind-body relationship and speculating that the dualism may be due to our perception only.[62] But by the end of his last book on religious experience, *Darwin and the Spirit of Man*, confidently declares himself to be a confirmed dualist[63]. This, of course, leaves open the question of how material and non-material realities can interact, a problem which Hardy recognises but does not solve[64].

Interestingly, however, the scientists have very different opinions about the value of parapsychological research. Hardy makes explicit use of such research relating to telepathy, including it within the outline of his Natural Theology, and invoking evidence from telepathy as a key element in his hypothesis linking religious experience with evolution. He speculates that if two minds can communicate telepathically this suggests a non-material, transcendental aspect to the universe which we may call 'God' and with which we can commune in a telepathic way by prayer.[65]

Hardy does attempt to legitimate his recourse to such evidence by using the term 'para-physical' in place of 'paranormal' or 'supernatural'[66]. However, the idea that the subconscious may act as a mediator with the divine was suggested around 63 years earlier by none other than William James[67]. Hardy's idea that this telepathic link could make available a 'species blueprint' has been developed much further by biologist Rupert

Sheldrake[68]. However, regarding parapsychology, Newberg and d'Aquili are more sceptical, saying that paranormal events are far from proven.[69] Their hypothesis for the generation of both Out-Of-Body and Near-Death Experiences is very much reductionist in form, positing psychological and neurophysiological mechanisms[70].

Interestingly Hardy's speculations about this telepathic 'species mind' seem to have disappeared without trace in *Darwin and the Spirit of Man*; perhaps dropped due to lack of scientific evidence or due to academic scepticism?

Language, Experience and Neuropsychology

In seeming contradiction to George Lindbeck's cultural-linguistic hypothesis[71] Hardy suggests that religious experience predates speech and language, the development of which gave the opportunity of comparing experiences and the genesis of religion.[72] Thus, clearly implying that there is in fact a pure, unmediated experience underlying our evolutionarily more modern verbal and conceptual apparatus. Newberg and d'Aquili's model seems to agree as the area of the brain responsible for the sensation of unity, the 'orientation association area', becomes deafferented (blocked) from the 'verbal-conceptual area'.[73] If the orientation association area, which in Newberg's and d'Aquili's model is crucial to religious experience, is deafferented from the verbal-conceptual area and the senses, how can culture or language contribute to this type of experience? This may rule out the idea that religious experiences are dependent on, and partially mediated by, our prior culturally determined expectations. It would, however, still leave open the possibility that a 'pure' experience is culturally coloured afterwards, in its subsequent interpretation and expression as suggested by Peter Antes[74] and others. Certainly, Newberg and d'Aquili seem to acknowledge the influence of culture and language through the action of the analytic and verbal activity of the left hemisphere in the formation of religious myth[75] but subsequent to the experience itself. That is, after the experience is over, deafferentation is finished, and the brain working normally again. Newberg and d'Aquili's model suggests that religious experience leads to myth formation and results in formation of religion. Therefore *religious experience* could be possible prior to evolution of the neocortex but myth, and thus religion, could not as the association areas would not exist in the evolutionarily older mind.

Circumstances and Triggers

The differences discussed earlier regarding what experiences count as religious comes to the fore when considering the triggers of these experiences. In Newberg and d'Aquili's model the major triggers seem to be rhythmicity[76] or willed intention to achieve an altered state of consciousness exemplified by religious ritual and meditation respectively[77]. These triggers result in various states along the unitary continuum but ultimately in AUB.

However, Hardy seems to be considering not only a wider range of experiences but also a greater variety of triggers. When reporting on results gained by David Hay, solitude and silence, and stress were the two most frequent circumstances in which experiences were found to occur[78]. This may tie in well with Newberg and d'Aquili's quiescent and arousal model respectively. A point also noted by Emma Heathcote-James in her research on contemporary experiences of angels saying that they often occur during extreme relaxation or imminent danger[79]. This observation also seems to fit with Hardy's emphasis on religious experience being evolutionarily advantageous, as the majority of experiencers all benefited either physically or psychologically from their angelic experience.

However, church services and devotions, that is, those possibly containing elements of rhythmicity, were less frequent triggering circumstances. Other triggers were times of great peace or happiness, nature, company of friends, dim light, artwork, and even, no special circumstances[80]. All triggers perhaps not so easily explicable in terms of Newberg and d'Aquili's model. It also seems that a clearer distinction between a trigger of experience and an aspect of the experience itself is necessary; is a feeling of great happiness and peace a trigger or part of the experience?

Closely related to the question of triggers and circumstances is that of age. Hardy reports that Hay and Morrisy found that positive responses to the key question increased with age[81]. How does this fit with Newberg and d'Aquili's model? Perhaps it lends further support to John Bowker's idea of compounds of limitation with the existential concern about death increasing with old age. Perhaps another possibility is a psychological sublimation transferring energy associated with a declining sexual drive to a spiritual one? Newberg and d'Aquili observe that,

> ... the neurobiological machinery of transcendence may have arisen from the neural circuitry that evolved for mating and sexual experience.[82]

Whilst noting that sexual experience is neurologically different from mystical experience they also point out the role of rhythmicity in both and that the latter may have evolved from the former.

Another aspect not accounted for by Newberg and d'Aquili is that of why more women than men seem to have religious experiences. If this is not simply a cultural phenomenon it could be a biological one. Persinger suggests just this when discussing his hypothesis of right-hemispheric intrusions interpreted as a sensed presence being found mainly in right-brain orientated individuals including females[83]. Testosterone levels have also been implicated as a determining factor in religiosity[84] but no firm conclusions have yet been drawn.

Summary

In summary, it seems that many aspects of the neuropsychological model of religious experience proposed by Newberg and d'Aquili do indeed serve to expand upon the ideas put forward by Sir Alister Hardy. Both strongly argued for a biological impulse within individuals which drive them towards religious experiences and beliefs. Newberg and d'Aquili's model would appear to add a wealth of detail to this hypothesis, although it is not yet generally accepted on all fronts. Pathological states may still prove to be intimately related to religious experience as may some form of culturo-linguistic explanation. The scientists under discussion have all had their own starting assumptions and goals which have possibly influenced their subsequent theories and conclusions. Significantly, all seem to have gained confidence in the idea of a non-material aspect of reality and also shared the hope that their ideas may help to promote spirituality and tolerance between religions in the future. The only sure conclusion possible after this short analysis is perhaps best summed up, as it began, in the words of Sir Alister Hardy,

> Hypothesis is the fuel of scientific progress – it is only by the testing and rejection of ideas that we come nearer to the truth.[85]

NOTES

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33. Newberg, A. d'Aquili, E. & Rause, V. *Why God Won't Go Away*, p60.
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