

Can Religion be Explained?

The Role of Absorption in Various Religious Phenomena

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Abstract

This article claims that the study of religion has overlooked a feature of the human mind that may yet help to explain certain aspects of religion. Awareness, it is here argued, can vary along a dimension that is characterized by the density of associations and other inputs that accompany it. The mechanism behind this is concentration, including the stronger form of concentration here called absorption. Absorption has cognitive effects, and is at least in part responsible for the human tendency to believe in a different, “higher,” reality. Various other features usually associated with religion—including ritual behavior and asceticism—also make sense in the light of this observation.

Keywords

religion – cognition – absorption

Introduction

If Martians were to study human beings, they might be struck by some of the behaviors that we, earthlings, collectively designate *religion*. They might be

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puzzled by the fact that some of these behaviors do not appear to bring any obvious advantages, neither to the individuals concerned nor to the communities to which they belong. They would notice that certain people voluntarily reduce their sexual activity, or abstain from it altogether, in the name of religion. Some inflict harm upon themselves, once again in the name of religion. Many part with a considerable portion of their limited wealth in order to build monuments that appear to have no other function than to carry out religious rituals. These rituals themselves can take outrageous forms, as when a part of available resources is voluntarily destroyed, 'sacrificed,' including things, animals or people that are dear to the performer. On top of that, human beings adopt and cling with tenacity to beliefs about the world that stand in the way of a more functional—and presumably more correct—understanding.¹ The Martians will notice that animals different from humans do not manifest these same behaviors and will wonder how and why these dysfunctions have come to be part of this otherwise biologically successful species, *Homo sapiens sapiens*.

Our Martians would of course be aware that all life-forms on earth, as on their own planet, are the results of long developments in which less fit organisms disappear and only the fittest survive. In other words, they will know that human beings, too, are the result of Darwinian evolution. They will not, of course, fail to notice the considerable cultural diversity between human beings, but will not be misled into thinking that this diversity is sufficient explanation for the recurring features of religion (Bloch 2012). Modern (human) researchers have indeed addressed the question what survival value religion might possibly possess, for example by pointing out that religion can facilitate cooperation with other members of the own group and in this manner contribute to the coherence and cohesiveness of human societies.² Such research is important and yet may not be fully satisfactory. Even if it were to be shown beyond doubt that this or that religious feature, or religion in general, has survival value, must we then conclude that there is a gene (or several genes) for it and leave the matter at that? Would that then count as a full and sufficient explanation of that religious feature (or of religion in general)? Clearly not.

1 For a similar list of puzzling aspects of religion, see Henrich 2009: 245.

2 Among the numerous studies of this kind we may mention D. S. Wilson (2002), Alcorta & Sosis (2005), Bering (2006), Wade (2009), Norenzayan (2012; 2013, to be read with Stausberg 2014, and the literature there summarized), Wiebe (2013), and many others; see also the various contributions to the thematic section on "Evolutionary approaches to the study of religion" in *Religion* volume 41, issue 3 (Slingerland & Bulbulia 2011; Kirkpatrick 2011; Sosis & Bulbulia 2011; Bulbulia & Sosis 2011).

What is more, scholars have pointed out that explanations in terms of natural selection do not succeed in showing that *every* feature of human religiosity is adaptive. Indeed, “the by-product view is . . . [not] even at odds with an account that looks to natural selection, so long as such an account does not take *every* feature of human religiosity as adaptive” (McCauley 2011: 295 n. 23). And again, “[t]here is no empirical evidence that humans do have a *specific* capacity for ritual. There are no evolutionary grounds to consider that such a specific capacity would be adaptive . . .” (Boyer & Liénard 2006: 609). As a matter of fact, “[f]rom an evolutionary standpoint, it’s odd that natural selection wouldn’t have forestalled the emergence of such an expensive ensemble of brain and body behaviors” (Atran 2002: 264). Clearly more is required to arrive at a satisfactory explanation of religion or of some of its more striking features.

Certain researchers realize this and point out that an understanding of the human mind is a prerequisite for explaining religion. Some express themselves critically: “Sociobiology (unknown genes direct religious behaviors) and group selection theory (religious cultures are superorganisms) ignore minds as causes of religion” (Atran 2002: 271). Kirkpatrick “suggest[s] that ongoing debates in the evolutionary study of religion, such as whether religion is an adaptation or a byproduct, often conflate biological, psychological, and cultural levels of analysis, and often fail to appreciate the indispensable role of the psychological level of analysis between biological and cultural levels” (2011: 329). Others, like Pascal Boyer in his book *Religion Explained*,³ emphasize that “[t]he explanation for religious beliefs and behaviors is to be found in the way all human minds work” (2001: 2). It is hard to see how one could disagree with this last statement, even though it is important to recall that the ‘mind’ is not a ‘thing’ but rather a process (Capra & Luisi 2014: 252).

Does this mean that religion is a feature of the human mind? Boyer is careful not make any simplistic suggestions. In fact, he is suspicious of general explanations of religion. Throughout his book he emphasizes the great complexity of the mental systems (plural!) that are, among other things, responsible for religion. The explanation he offers—as he points out toward the end—“is *not* a quick, shoot-from-the-hip solution of the kind that many people, either religious or not, seem to favor. There cannot be a magic bullet to explain the existence and common features of religion, as the phenomenon is the result

3 Interestingly, the subtitle of Boyer’s book, in its American edition, is *The evolutionary origins of religious thought*; the British edition changed this into *The human instincts that fashion gods, spirits and ancestors*, thus illustrating the potential of confusion between evolutionary and psychological explanations. The emphasis on religious *thought* at the expense of religious *feeling* in both subtitles, as in the book as a whole, is significant; see further below.

of *aggregate relevance*—that is, of successful activation of a whole variety of mental systems” (298). Atran expresses himself similarly where he says: “there are multiple elements in the naturally selected landscape that channel socially interacting cognitions and emotions into the production of religions” (2002: 266). Other researchers agree. One example is Robert McCauley who, in his book *Why Religion is Natural and Science is Not*, states:

Religion enlists a variety of regular psychological propensities that are otherwise basically unconnected in what are often elaborate arrangements of beliefs and behaviors, many of which are utterly superfluous to handling the practical, intellectual, and social problems on which they are brought to bear. The standard features of religious mentality and conduct are cobbled together from sundry psychological dispositions that develop in human minds on the basis of very different considerations—different both from one another and from anything having to do with the roles they might play in religions. (2011: 155)

Also McCauley has no place for a single predominant feature of the human mind that might be responsible for religion. Indeed, he looks upon humans’ religious predilections as “by-products of our natural cognitive capacities” (154). Pyysiäinen (2009: 187) goes further and proposes that religion is not ‘natural,’ precisely because it is a by-product and therefore ‘derived.’⁴

It will be clear from these few quotations that several prominent researchers concur that there is *no* general explanation of religion. Pyysiäinen (2013: 6) rightly sums up the predominant view among certain scholars of religion by saying: “the idea of constructing a general theory of religion is rejected by many CSR [= Cognitive Science of Religion, JB] scholars.”⁵

The present article intends to draw attention to a feature that should be taken into account in the study of religion in many of its manifestation. It does not explain all of religion—far from it. Nor does it replace the explanations proposed by Boyer, McCauley and so many others. It may yet invite scholars of religion to rethink the models they currently use. This is what Bulbulia recently called for, when he said: “While there can be no substitute for experimentation when evaluating hypotheses, naturalists should not be too satisfied with

4 Geertz & Markússon (2010) argue for a merger of “the cognitive (naturalness) and memetic (unnaturalness) hypotheses of religion.”

5 Even without general theory, there is a primary paradigm within the cognitive science of religion, which Bering (2011: 230 n. 38) describes as “the ‘cultural epidemiological’ model of religious concept transmission and acquisition.”

the models that inspire current investigations” (2013: 126). The feature to be discussed, it is hoped, may contribute to the construction of a new and more satisfactory model.

Another Dimension of Awareness

What is this feature? Point of departure is the well-known fact that ordinary awareness is *interpreted* awareness. Already William James (as cited in Sacks 2012: 91) pointed out that “[o]ur normal waking consciousness, rational consciousness, as we call it, is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different.” More recent authors express themselves in similar terms: “What I perceive are not the crude and ambiguous cues that impinge from the outside world onto my eyes and my ears and my fingers. I perceive something much richer—a picture that combines all these crude signals with a wealth of past experience” (Frith 2007: 132). “We perceive through our sensory organs, to be sure, but no less through our concepts; in other words, we perceive not just physiologically but also intellectually” (Hofstadter & Sander 2013: 171). Indeed, if Llinás and Paré are right, wakefulness and dreaming are fundamentally equivalent brain states, the main difference lying in “the weight given to sensory afferents in cognitive images” (Llinás & Paré 1991; see further Domhoff 2002; Fox et al. 2013). Bickerton expresses himself similarly: “If random activation is ultimately responsible for dreams, then dreaming and stream of consciousness are modes of the same phenomenon, differing only to the extent that censorship and editing are more relaxed in sleep” (2014: 267). The interpreted nature of ordinary awareness is illustrated in a most interesting manner in the ‘strange-face-in-the-mirror illusion’ (see Caputo 2010; Heaven 2013). Given that “brains are prediction machines” (Clark 2013) it is barely surprising that ordinary awareness is interpreted, rather than a faithful reproduction of incoming signals (see further Searle 2010; Hoffman 2012).

It follows, then, that sensory and other impressions that reach us are ordered and made sense of in the light of earlier experiences and reflections; to these we must add numerous other signals that inform us about the state of our body and much else (see below). Our experiences, therefore, are embedded in webs of associations that order them and connect them with other mental contents, including memories of past experiences and expectations about the future. Searle (2010: 31-32; 2015: 36 ff.) speaks in this connection of the *Network* or the *Background*, and says (2015: 73): “What I am arguing is that the interpretation of a visual experience . . . will be a function of the conceptual apparatus that

the interpreter brings to the experience.” The driving force behind these associations appears to be analogy, which some look upon as the core of cognition (Hofstadter & Sander 2013; Leech, Mareschal & Cooper 2008). Some of these associations are conscious; many more remain below the threshold of consciousness.

As stated above, not only associations ‘feed into’ awareness. We may have to add proprioception, the constant implicit presence of the state of one’s body. Craig says the following about it: “interoceptive re-representations . . . substantialize (that is, provide de basis for) all subjective feelings from the body and perhaps emotional awareness, consistent with the essence of the James-Lange theory of emotion and Damasio’s ‘somatic marker’ hypothesis” (2009: 59). He argues that the anterior insular cortex (AIC) plays a vital role in these (and goes to the extent of claiming that the AIC therefore needs to be considered as a potential neural correlate of consciousness) (see also Enders 2015: 114).

Awareness is by its nature variable. It varies depending on what it is ‘about’: the awareness of a table is different from the awareness of a chair. It also varies in accordance with the conscious or unconscious associations that contribute to it: Marcel Proust’s awareness of the cakes called *petites madeleines* was strongly colored by memories from his childhood, and no doubt different from the way others (or he himself at other occasions) would perceive these cakes. And our normal perception of a banknote is colored by mental associations that assign value to it: those who do not have these associations will see only a piece of paper; and one has to draw on past experience even in order to know that it is paper. This coloring is perhaps most prominent in our awareness of other human beings: we experience our mother, or our monarch, not just as the persons they are, but also in terms of the social roles they play.

The central claim of this study is that there is a further dimension along which awareness can vary: the web of associations and other inputs can be more or less dense. The same table, at the same place and in the same light conditions, can be cognized differently depending on the density of the web of associations that feed into that awareness. The banknote, if and when the appropriate associations are somehow interrupted, will no longer look like a banknote but like the piece of paper it is. And our mother will not look like our mother. Reduced associations with memories and expectations about the future will make it appear that time passes more slowly, or comes to a standstill altogether (Glicksohn & Lipperman-Kreda 2007). It is possible to generalize and state that reduced associations make us experience the world and ourselves differently. We will see that this further dimension of awareness is behind many of the behaviors we call religious, and behind others.

The above claim is not altogether new. “There is by now considerable evidence of a single dimension of individual differences for proclivity to altered states experience . . .” (Hunt 2007: 221). Lewis-Williams acknowledges what he calls a *consciousness spectrum* that accounts for altered stages of consciousness (and much else) (2010: 140 ff.; further Lewis-Williams & Hudson 2005: *passim*).⁶

In most normal situations, the variation of awareness along this extra dimension is small, so small that we do not consciously record it. “[C]onsciousness’ encompasses multiple simultaneous ‘micro-states’, which people enter and exit throughout the day, without being cognizant of these shifts” (Sidky 2010: 81, with a reference to “Gregory Maskarinec, 2008, personal communication”). It is consciously recorded by those who, either unexpectedly or as a result of prolonged training, experience what I will globally refer to as *mystical states*. I am aware that this choice of terminology, and indeed of subject matter, may evoke negative reactions amongst cognitive scientists. However, it is not possible to “discuss certain classically spiritual phenomena, concepts, and practices in the context of our modern understanding of the human mind . . . while restricting [oneself] to the terminology of ordinary experience” (Harris 2014: 7). Certain scholars of religion have a tendency to overlook mysticism and related phenomena, an attitude that is hard to justify. “Knee-jerk negative reactions to this observation [about altered states of consciousness] from academics and others who are committed to social and psychological explanations of religion are common. They fail to acknowledge what seems to me to be an undeniable fact: universally, many human beings are intrigued by the ‘autistic’ (inward-directed, but not pathological) end of the consciousness spectrum . . .” (Lewis-Williams 2010: 142-143).

Since, *ex hypothesi*, the awareness of people in what I call mystical states will be less embedded in associative links, such people can be expected to report a different awareness of reality. This often takes the shape of a claim that they experience a different reality altogether. This ‘different reality’ has both an objective and a subjective aspect, as it concerns both the outside world and the experiencing self. Awareness of the world outside us will be *less* interpreted than it normally is, and will rightly be experienced as more direct and therefore more real than ordinary awareness. (*Reports* about such experiences will of course be highly interpreted, usually in the light of the cultural or religious context in which they take place. Such reports cannot therefore be used as sources of information about the world.) Since also the experiencing self is

6 Note that there are important differences in details with the ideas suggested in the present article, and in the mechanism proposed.

a mental construct based on experiences and expectations, i.e., on associative and proprioceptive links, mystics tend to record a changed perception of the self. As in the case of the world outside us, they may and often do claim to experience their true or spiritual self and the disappearance of their ego.

I will call the other dimension of awareness that I just introduced its *mystical dimension*. For reasons that will become clear, this mystical dimension of awareness is behind much that we associate with religion. This does not mean that religion can or must be derived from deep mystical experience. Deep mystical experience is interesting because it provides us with extreme and therefore (relatively) clear information about what happens in *all* minds, for the mystical dimension is an extension of ordinary awareness that belongs to all of them. Mystical experiences of the more extraordinary kind are no more than extreme illustrations of the variability along the mystical dimension that characterizes the awareness of *all* humans. “Vergleicht man die Beschreibungen der Entwicklungsstufen—sofern solche überhaupt existieren—sowie die zahlreichen Erfahrungen von Erleuchteten und Mystikern, erscheint es zumindest phänomenologisch vertretbar, von einer kultur- und methodenunabhängigen, universellen Dimension auszugehen, für die sich in der wissenschaftlichen und vor-wissenschaftlichen Literatur der Begriff ‘Tiefe’ eingebürgert hat” (Veitl 2012: 19-20). The range of experiences even of those without deep mystical experiences suffices to predispose them to the belief that a ‘deeper’ or ‘higher’ reality hides behind ordinary reality, and that their ordinary sense of self covers something deeper that is their ‘inner’ self (or, in the case of certain Buddhists, no self at all). Indeed, it may well be that certain recognized mystics—i.e., people whose teachings are generally considered ‘mystical’—never had any deep mystical experiences; an example is Meister Eckhart, sometimes considered the founder of Rhineland mysticism, who never claimed to have experienced anything of the kind (Hackett 2013: xxii-xxv).

In what follows I will speak of *the* (rather than *a*) higher or deeper reality, to emphasize the dichotomy between ordinary and higher reality that often (but perhaps not always) prevails in religious traditions.

The Mechanism

What mechanism is responsible for the fact that awareness varies along the mystical dimension? As pointed out above, it is the variable density of the web of associations and other inputs. Humans (and many other animals) can temporarily exclude or reduce associative links (including non-pertinent sense impressions) by means of the faculty of *concentration* or focused *attention*

(Desimone & Duncan 1995). While concentrating on a task, we cut out or reduce irrelevant impressions and associative links. But clearly, ordinary concentration does not provide us with the experiences reported by mystics. Something puts a stop to the depth that ordinary concentration can reach. Extreme situations, on the other hand, can sometimes evoke extraordinary depths of concentration, i.e., exclusion of ‘unimportant’ impressions and associations; this is the way we have to understand reported cases of soldiers wounded in battle who initially do not feel the pain of a lost limb, and other such accounts (Linden 2015: 161). Clearly the potential reach of concentration is far greater than ordinary experience might suggest.

[It would be tempting at this point to bring in the neurological counterpart of the process here described, and consider, for example, the observation made by Damasio: “Marcus Raichle called attention to the fact that when subjects are at rest, not engaging in a task requiring focused attention, a selective subset of brain regions appears consistently active; when attention is directed to a specific task, the activity of these regions decreases slightly” (2010: 227).⁷ However, at the present state of our knowledge it would be premature to jump too easily from psychological to neurological processes and vice versa: “Neuroscience has seeped into our conversation and into new areas of inquiry, many of them previously assumed to fall under the humanities. But has this advance really transformed the way that we see ourselves? Has neuroscience truly revolutionized the subject areas onto whose territory it has so recently trespassed? The evidence to date suggests not” (Jarrett 2015: 118). Apart from the Appendix below, we will therefore leave the neurological dimension of the phenomenon we are investigating on one side.]

We have to distinguish between two kinds of concentration: concentration as a result of effort, and *effortless* concentration (on this notion, see Bruya 2010; further Austin 2006: 322). The former typically accompanies tasks that are imposed on us; the latter rather accompanies activities that we carry out of our own free will (here the word *flow* is sometimes used, a term introduced by Mihaly Csikszentmihalyi [see, e.g., 2002]). Effortless concentration reaches in certain people the depths that give rise to ‘mystical’ awareness. (Since it is not reached through effort, some mystics reach these depths involuntarily, through ‘the grace of God’.) In these pages the term *absorption* will be used to cover the full range of effortless concentration, from relatively innocent *flow* to the extraordinary states experienced by certain mystics. It is the “total attention that occup[ies] representational resource mechanisms, thereby leading

⁷ The reference is to Gusnard & Raichle 2001. See further Raichle 2010; Brewer et al. 2011.

to transient states of altered self and reality perception” (Cahn & Polich 2006: 201).⁸

Since mystical experiences are not infrequently accompanied by hallucinations, it is important to be clear about the difference between absorption and hallucination. Our point of departure was that ordinary awareness is *interpreted* awareness. Well, hallucination is *differently interpreted* awareness. This has, of course, already been observed by others: “It makes no sense to regard a hallucination as a unique and generally pathological instance of subjective-turned-objective phenomenon, and to enquire into the reason for this, if, according to Kant and Schopenhauer, normal perception is achieved in exactly the same way . . .” (Cutting 1997: 83).⁹ “The nature and phenomenology of hallucinations can be explained more fruitfully within a framework that accepts that, similarly to hallucinations and dream imagery, normal conscious awareness of the world during wakefulness is a fundamentally subjective and dreamlike experience . . .” “Normal perception, dreaming, and hallucinations are equivalent because even normal perception in wakefulness is fundamentally a state of hallucinations, one however that is constrained by external physical reality” (Behrendt 2012: 19 & 27). We cannot hallucinate at will, and there are limits to the extent to which we can on purpose differently interpret our ordinary awareness. This means that the interpreting is done at a level that is at least in part unconscious. And since we understand interpretation in terms of mental associations, some (or even most) of these associations must be unconscious.

The observation that many if not most of the associations that feed into ordinary awareness are unconscious (and inaccessible to conscious inspection) helps to explain the difference between ordinary concentration and deep absorption. Deep absorption, unlike ordinary concentration, has access to (normally unconscious) associations to which ordinary concentration has no access. What absorption does with these newly accessible associations is no different: it reduces them, just like the other associations to which it has access.

Conscious associations can, to at least a certain extent, be the object of mental focus. Unconscious associations cannot. However, if and when unconscious associations become conscious (for whatever reason and by whatever means), they too can be focused on. As a result, more weight may then be attributed to some of them, less to others. All this will affect the way we interpret our

8 See further Vaitl 2012a: 205; Glicksohn & Barrett 2003; Glicksohn & Berkovich-Ohane 2011; 2012; Luhrmann et al. 2010; Luhrmann 2012.

9 Cited in Behrendt 2012: 17.

perceptions. The result is what is called a hallucination. “In hallucinations, *attentional* mechanisms are in a position to determine the content of conscious experience without regard for external sensory stimulation” (Behrendt 2012: 19; emphasis added).

The mechanisms by which people gain access to unconscious associations (with hallucination as a possible consequence) may be multiple, as we have seen. Deep absorption gains access to them, but it does not use them *as associations* but rather as a means to deepen absorption (by reducing them).¹⁰ Seen this way, absorption and hallucination, though in themselves different from each other, are operating in the same part of the mind, a part that is not accessible to ordinary states of consciousness.

The absorption discussed in this article is a (variable) mental state. Confusingly, the same term is sometimes used in connection with a disposition or personality trait. This trait—not the mental state—is measured by the Tellegen Absorption Scale. Those who score high on this scale have easier access to the part of the mind responsible for both absorption and hallucination. This does not necessarily mean that such people find themselves in a deeper state of absorption. It does mean that they are more likely to suffer from hallucinations, as is indeed confirmed by experiment (Glicksohn & Barrett 2003). It is equally important to realize that research that brings to light the “dark side of absorption” (McClure & Lilienfeld 2002) concerns the personality trait, not the mental state.

A feature of absorption (the mental state) is that it is experienced as *pleasurable*. *Why* it does so is a question that cannot here be addressed, but the evidence *that* it does so is undeniable. Some of this evidence has been collected in Appendix 1 (“Absorption and pleasure in mysticism and meditation”) of my book *Absorption* (2012c).¹¹ We may here add that certain traditions, among them the Indian tradition of Vedānta, look upon pleasure or bliss (*ānanda*) as a fundamental feature of the (deepest) self (Olivelle 1997). And a wandering

10 Of course, absorption does not *only* reduce associations. It may *also* focus on one or some of them, thus contributing to the modified interpretation of awareness.

11 Pp. 142ff. of that book offer an attempt to explain *why* absorption gives rise to pleasure. Nathaniel Barrett attempts a different explanation: “Though it cannot be manufactured at will, there is nothing particularly mysterious about the special satisfaction of flow. It is the pleasure that attends complete absorption, and complete absorption occurs when a person is so well attuned to details of her present situation that her experience attains a balance of diversity and continuity, allowing attention to feed on itself” (2011: 697). I am not sure whether I understand this statement.

mind, which is a mind without absorption, is an unhappy mind (Killingsworth & Gilbert 2010; Brewer et al. 2011). Pleasure as a feature of mysticism, in spite of its prominence in reports, has been ignored or undervalued in modern scholarship from William James onward. The article “Mysticism” in the online *Stanford Encyclopedia of Philosophy* (Gellman 2011; latest revision Feb 9, 2010), for example, still does not even mention pleasure or bliss, except in passing while discussing Perennialism.

For our present concerns it is important to note that the degree of pleasure will vary from light or moderate in relatively superficial states of absorption (carrying out a task we enjoy; listening to music), to the ecstasy (and ‘enstasy’)¹² recorded in mystical literature.

This last claim would seem to be the very opposite of what is claimed by Moshe Bar in a recent article in which he “propose[s] that there is a direct reciprocal relation between the cortical activation of associations and mood regulation, whereby positive mood promotes associative processing, and associative processing promotes positive mood” (2009). Since absorption implies reduced associations, and positive mood equals pleasure (approximately), Bar’s proposal would seem to imply that absorption does the opposite of producing pleasure, contrary to what is maintained in this article.

The contradiction is only a contradiction in appearance. The associations in Bar’s theory are conscious associations, and Bar is no doubt right in observing that a depressed person has fewer conscious associations than a cheerful one. However, beside conscious associations there are, both in depressed and in cheerful people, numerous associations that are not conscious but that yet contribute to determining ordinary perception; this we have seen.

Concentration, it would appear, depends on access to associations. Difficulty to concentrate is, as a matter of fact, a prominent symptom of depression, as is diminished capacity for pleasure.¹³ Broad associative activations (Bar’s expression) are, it appears, a precondition for the ability to concentrate. This may explain the positive mood that Bar discusses.

As pointed out above, absorption can go beyond ordinary concentration, presumably by extending into the realm of unconscious associations. How and why this happens is not fully clear; deep relaxation appears to play a role.¹⁴ But the notion that absorption based on an extended realm of associations (which

12 This term is often, but mistakenly, attributed to Mircea Eliade; see Friesen 2011: 1.

13 DSM-5, s.v. Major Depressive Disorder, Diagnostic Criteria, 160-161.

14 Notice the role that deep relaxation plays in hypnotizing subjects (Brown 2006: 165).

it then reduces) will give rise to greater pleasure is in agreement with the theory proposed in this article.

Religion

Absorption, then, has a double effect. In varying degrees, it modifies awareness and it provides pleasure. It does so to an extreme degree in those we call mystics, but to at least some degree in all human beings. This has a number of consequences.

We have already seen that, as a result of the mystical dimension of awareness, human beings tend to believe that there is a ‘higher’ or ‘deeper’ reality, beyond the reality of our everyday awareness. Indeed, “people everywhere naturally have some tacit supernatural beliefs; these arise in children regardless of the culture” (Bloom 2007: 148). The mystical dimension further provides ideas as to what this higher reality is like, and will determine in what ways people try to gain access to it. Let us begin with the latter of these two.

One effective way of deepening absorption is through communal repetitive behavior, preferably in favorable settings.¹⁵ This, of course, covers religious ritual (beside much else). Rituals, it has often been pointed out, tend to be strictly rule-bound and repetitive; deviations from the norm invalidate a ritual, or call for sometimes complicated remedies.¹⁶ Such predictable and repetitive activities, when carried out in appropriate circumstances, can evoke states of deepened absorption in those who participate or attend, along with the accompanying degree of pleasure. They also, for the reasons given above, provide access (or rather: are felt to provide access) to a different, higher reality: “rituals have a definitely *transcendent* flavor” (Boyer 2001: 257; See also Morgain 2012).

There are other ways to deepen absorption and thus gain access to this presumed higher reality. Lewis-Williams enumerates the following means by which people try to intensify ‘autistic’ consciousness (as he calls it): ingestion

15 The question whether this is linked to the fact that repeated stimuli result in reduced neural activity (Grill-Spector et al. 2006) needs further investigation, but cannot be addressed here.

16 See, e.g., Hüsken 2007. Dan Jones (*NewScientist* of 17 January 2015: 36-39; with references to Herrmann et al. 2013 and Watson-Jones et al. 2014) draws attention to the strong imitative tendency in young children when copying aimless behaviors, and the role this tendency may play in explaining ritual.

of psychotropic substances; intense, rhythmic dancing; auditory driving (e.g., chanting, clapping, drumming); electrical stimulation; flickering light; fatigue; hunger; sensory deprivation; stress; extreme pain; intense concentration (meditation) (2010: 143). We may add prayer (Luhrmann 2012), which, like meditation, is extremely common in many religions. The former is more or less by definition connected with a belief in god(s); the latter can be practiced without such belief, and certain religious currents do indeed emphasize meditation at the expense of gods and other supernatural entities (Roth 2008). I will say no more about prayer and meditation at present, but return to ritual below.

What is the higher reality supposed to be like? Scholars have observed that certain beliefs recur in altogether different societies. Pyysiäinen, for example, states: “We find recurrent patterns in concepts and beliefs within and across cultures because some ideas are more appealing to the human mind than some others; they are ‘contagious’ as it were” (2013: 6-7; with a reference to Claidière and Sperber 2007; 2010). Neither he nor the authors he refers to tell us what makes ideas ‘contagious’; Claidière and Spencer only propose ‘attractors’ that “may have to do with psychological dispositions or with environmental constraints and affordances” (2007), and “other psychological and ecological factors” (2010). But clearly, these remarks tell us very little about the nature of recurring ideas in different cultures.

Once again, it will be clear that the most common notions about higher reality are inspired by the experiences that absorption provides. Most often, higher reality is thought of as populated by one or more mind-possessing supernatural entities: “the *only* feature of humans that is *always* projected onto supernatural beings is the mind” (Boyer 2001: 144; see further Westh 2013). The precise shape of those supernatural entities will in most cultures be determined by tradition, but the fact that they tend to be mind-possessing has a more general explanation. It has to do with the modified notion of the self that was mentioned earlier. The inner, or ‘spiritual,’ self of a person is experienced as an observer not involved in that person’s activities. This inner self easily lends itself to objectification: persons feel that they are being observed, either by their own deeper self, or more frequently by a different entity (or entities, in the plural) that in some mysterious way is connected with their deeper self. Sometimes this takes the form of ‘spirit possession’ (McNamara 2011; Smith 2006). Alternatively, the notion of a supernatural entity that observes us in all we do is widespread (Pettazzoni 1955). What is more, numerous religions find God through their inner self, or as being essentially identical with it. Some Asian contemplative traditions reduce the notion of their deeper self even further: sometimes to zero, as in certain forms of Buddhism; or to mere consciousness (Brahma),

as in Vedānta. Also the Dao of Chinese Daoism has shed most or all personal characteristics, yet it is to be found through contemplation.

Language

The factors so far considered are not exclusive to humans. And yet, no non-human animals, as far as we can tell, manifest religious behavior. Our reflections up to this point make it hard to deny other animals the ‘mystical dimension’ that we introduced. Concentration, moreover, is a faculty that we no doubt share with many other animals; absorption, in the sense of effortless concentration, is also likely to occur in at least some of them. Our theoretical reflections so far might therefore suggest that some animals—say certain primates—could acquire the idea that there is a different, ‘higher’ reality; it would therefore be conceivable that they engage in ritual or ‘meditative’ behavior to enter into contact with that higher reality. And yet, that does not seem to happen.¹⁷ What explains the difference?

The answer here proposed is: language. In order to learn its language, a child passes through a very complicated process, so complicated indeed that the development of language and the evolution of the human brain went hand in hand (Deacon 1997). It needs to be able to extract words and morphemes out of utterances such as sentences. It also needs to master the extremely complex system of relationships that exists between words on one hand, and between words and what they signify on the other. This process implies the systematic ordering and conceptualization of experienced reality.¹⁸ Language becomes in this way one of the most important factors, if not *the* most important factor, contributing to the fact that ordinary awareness is *interpreted* awareness. Experiments show that language influences perception already at pre-conscious and non-linguistic levels (Evans 2014: 215). Once acquired, language allows its users to create abstract worlds and narratives of a virtually limitless variety by a process that has been called *blending* (Fauconnier

17 An exception may have to be made for the dances of chimpanzees, if Jane Goodall is right; see <https://www.youtube.com/watch?v=jjQCZClpaaY>.

18 See Bickerton—esp. chapter 4—on the difference between human and nonhuman concepts, and the role that language plays in the former. Bickerton, following a fallback position of Darwin, argues “that [abstraction, self-consciousness, etc.] are the incidental results of other highly-advanced intellectual faculties; and these are mainly the result of the continued use of a highly-developed language” (2014: 6, citing from Darwin 1871: 105).

2001; Fauconnier & Turner 2002; Turner 2014; see also Bickerton 2014: 264). What is more, language facilitates the creation of narratives.¹⁹ “Narrative need not involve language. It can operate through modes like mime, still pictures, shadow-puppets, or silent movies. It need not be *restricted* to language, and often gains impact through enactment or the emotional focusing that music offers in dance, theater, opera, or film, or the visual focus in stage lighting, comics, or film. But language of course makes narrative more precise, efficient, and flexible” (Boyd 2009: 159). The language users may figure themselves in their narratives. Indeed, the self becomes a character in these narratives, and thus a constructed entity.²⁰

We have already seen that the modified awareness of the self in absorption is a crucial factor that frequently finds expression in religion. We may add that, because of language, the webs of associations that contribute to awareness are far denser in humans than they are in other animals, so that the effects of reducing the density of those webs will be far more drastic. The schemes that language imposes upon reality will weaken and disappear in deep absorption, leaving those affected not only in an unrecognizable reality, but in a state where they do not recognize themselves.

It follows from what precedes that non-interpreted or less interpreted awareness resulting from profound absorption is beyond language, and therefore inexpressible in language, ineffable. Given that the acquisition of language imposes divisions—divisions between words, divisions between the objects referred to by words, etc.—, profound absorption will give rise to awareness that tends to present the world as holistic, as an undivided whole. Ineffability and holism are, of course, frequent themes in religious discourse and mythology.

Evolution

Having made the claim that not all aspects of religion can be evolutionary adaptations, we have to return to Atran’s question how natural selection wouldn’t have forestalled the emergence of such an expensive ensemble of brain and body behavior. The answer cannot but lie in the close connection between the aspects of religion we have studied and language. It is only with

19 In pre-modern small-scale societies, stories tend to be told at night in the firelight; indeed, story telling (beside many other things) may be a consequence of the control of fire. See Wiessner 2014.

20 This is Damasio’s autobiographical self.

the development of language that our ordinary awareness became so heavily interpreted that any important reduction of the level of interpretation leads to a profoundly different awareness; this state of affairs is responsible for the wide-spread conviction that there is a higher reality, with all the consequences we have considered. It is impossible to doubt the evolutionary advantage of language.²¹ Fortunately or unfortunately, this blessing did not come for free. Religion—or at least the aspects of religion we have considered in this article—appears to be the price that had to be paid for the acquisition of language.

Conclusion

The cognitive study of religion has a tendency to ignore (or discard) religious experience and mysticism (McCutcheon 2012; 2012a), and has not yet fully incorporated the “new respect for subjective phenomena” that characterizes the fields of cognitive science, neurophysiology, and brain imaging (Dehaene 2014: 8); religious experience is yet something that others (and not only spiritually inclined people) may justifiably look upon as one of its central features. The present study provides religious experience with the place to which it is entitled, by pointing out that awareness has a mystical dimension: Normal awareness is accompanied by a dense web of associations and other inputs, which leaves us no choice but to interpret our awareness. The density of this web is variable. Exceptional reduction of its density leads to extraordinary experiences, *mystical experiences*. On a more limited scale such reductions occur in all human beings. They are responsible for the widespread human conviction that there is a higher reality, but also for the fact that this higher reality tends to be populated by one or more mind-possessing entities. Religion in a number of its manifestations, including some of its more puzzling ones (see below), results at least in part from the urge to gain access to this higher reality.

It must here once more be emphasized that accepting the importance of religious and/or mystical experience is not the same as accepting reports of such experiences as reliable sources of information. A credible attempt at explaining religion must have a place for such experiences in the sense that it seeks to explain that and why they take place. It should *not* take reports of such experiences as a reliable point of departure on which a theory of religion can be based. Indeed, the theory presented in this article explains why they are not reliable in any literal sense: these experiences are linked to positions

21 One can of course doubt the evolutionary advantage of language at its first beginnings (see Bickerton 2014: ch. 4), but that is an altogether different question.

along the mystical dimension where language-related conceptualizations have no place, so that reports of such experiences cannot but be interpretations or even distortions.

Does the theory here presented help to answer the questions that puzzled our Martians at the beginning of this article? Does it explain some of the brain and body behaviors that natural selection should have forestalled? It does. We have already seen that our theory makes sense of the human tendency to engage in rituals. It does not tell us what kind of ritual activity they will engage in. As it so happens, one major concern of many individuals and societies is hierarchy; hierarchy can lead to the exploitation or destruction of those who are inferior. Many rituals—among them the most violent ones, including ‘sacrifices’—are about hierarchy. Since I have dealt with this topic at length elsewhere, I will say no more about it here (Bronkhorst 2012; further 2012a; 2012b; 2013).

Our theory also accounts for asceticism in many of its forms. As shown elsewhere, a recurring theme in asceticism is the disinclination to identify with one’s body and mind, and the tendency to remain aloof even when faced with extreme conditions (Bronkhorst 2001).²² This is the attitude that one is not involved in one’s activities, an attitude that is inseparable from the notion of an inner self that is predicted by our theory, as we have seen.

One question remains: Can the claims made in this article be tested? Testability is not the strongest side of recent theories in the study of religion. To cite Armin Geertz: “So far, hardly any of the theories and hypotheses of Boyer, Lawson and McCauley, or Whitehouse have been ‘proven’ in the natural sciences sense of the term” (2009: 251). Geertz then adds: “They are, however, good tools to think with.” It is no doubt nice to have good tools to think with, but it is nicer to have a theory that is testable. Recall at this point that the central claim made in this study is that there is a dimension along which awareness can and does vary that has not hitherto received the attention it deserves: the web of associations and other inputs that feed into awareness can be more or less dense. If this claim can be verified, for example by neurological means, the other claims made in this article will gain in strength. The Appendix will reflect on a possible experiment.

Appendix: Testing the Theory

A central claim of this article is that awareness can and does vary along a so far neglected dimension of the mind: the mystical dimension. Along this extra

²² Note that the present article goes beyond the theoretical reflections presented there.

dimension a person's degree of absorption varies, which is characterized by reduced density of the web of associations: deeper absorption corresponds to a less dense web of associations. How could this claim be tested?

We are here confronted with two practical problems. Few people can regulate the depth of their absorption at will; indeed, few people can put themselves at will in a state of deepened absorption at all. Nor are there known ways to do so from the outside: experimenters have few, if any, means to put their subjects in a state of deepened absorption.

Second, subjects who find themselves in states of deepened absorption cannot easily participate in psychological tests without the risk of breaking the spell and disturbing the state they are in. In other words, psychological tests that aim at measuring density of associations are likely to disturb the depth of absorption. And yet, density of associations must be measured while the subject is in a more or less deep state of unperturbed absorption.

To overcome the first problem, tests might concentrate on people who have a certain amount of control over the process of putting themselves into deepened states of absorption; practitioners of certain forms of meditation come to mind. Here we have to remember that the term *meditation* applies to a variety of diverse practices, which may also vary in terms of the neurological processes that correspond to them (Lutz et al. 2007: 500). We are here only interested in forms of meditation that evoke deepened states of absorption, whatever differences there may be between them. Not all practices described as 'meditation' in the literature involve deepened states of absorption (Bronkhorst 2014). Some reduce mind wandering, others do the opposite.²³ Perhaps also hypnotized people should be taken into consideration.

There are, of course, many ways in which people try to put themselves into deepened states of absorption, different from meditation and hypnosis. In addition to the means enumerated earlier, such states (of various depths) are attained in flow, near-death experience (Blanke & Dieguez 2009: 310), possession (McNamara 2011), and orgasm; note that orgasm can occasionally turn into an altogether spiritual experience (Wade 2004; Dodson 1996: 117), and that male ejaculation is accompanied by deactivations throughout the prefrontal cortex (Georgiadis et al. 2007). Few, if any, of these alternatives lend themselves to the laboratory tests here envisaged. The same applies, *a fortiori*, to mystical experience in the narrow religious sense, for "God can't be summoned at will" (Schjoedt 2009: 326, with a reference to Beauregard & Paquette 2006: 187).

23 Eifring forthcoming, with references to Brewer et al. 2011, Hofmann et al. 2011 and Hölzel et al. 2007 for the former; and to Xu et al. 2014, Jang et al. 2011 and Travis et al. 2010 for the latter.

To solve the second problem, density of associations must be measured in a manner that does not distract the attention of the subject. This might be done if (a big *if*, for the time being) the corresponding brain processes can be identified and measured.

What brain processes correspond to reduced density of associations? An intuitively plausible (but not for that reason necessarily correct) answer would be that reduced density of associations is reflected in reduced brain activity of the relevant kind. However, it is important to heed Christian Jarrett's advice: "Beware of seductive metaphors" (2015: 8). Reduced brain activity and reduced density of associations do not *have* to go together. So what brain activity should we be looking for?

Neural synchronization,²⁴ a phenomenon that has been observed and much discussed in the relevant literature, might conceivably provide an answer that is worth exploring. Lutz et al., referring to some studies, do indeed suggest "that neural synchronization subserves not simply the binding of sensory attributes, but the overall integration of all dimensions of a cognitive act, including associative memory, affective tone and emotional appraisal, and motor planning" (2007: 533).

Neural synchronization²⁵ plays a role in an experiment to which Michael Herzog (EPFL, Lausanne) draws my attention, and which combines transcranial magnetic stimulation (TMS) and high-density electroencephalography (hd-EEG). Marcello Massimini and collaborators have applied this method to sleeping subjects (Massimini et al. 2005; 2007; 2012); they describe the outcome as follows: "During quiet wakefulness, an initial response (~15 milliseconds) at the stimulation site was followed by a sequence of waves that moved to connected cortical areas several centimeters away. During non-rapid eye movement sleep, the initial response was stronger but was rapidly

24 What I call 'neural synchronization' covers what is known in the literature by various names, among them 'recurrent calculations,' 'synchronized or oscillating neural activity,' 'winner-take-all computations stabilized in resonance with the presynaptic neurons,' 'closed loop action-perception processing,' 'reentry.' See in general Cosmelli 2007: 738 ff.

25 Strictly speaking, Massimini et al. (2012: 45) base themselves on a theory developed by one of their co-authors, Giulio Tononi (2004; 2008 [see also 2012, JB]), viz. Information Integration Theory of Consciousness (IITC), which "suggests that consciousness depends not so much on the overall level of neural activation, on the occurrence of specific patterns of synchronous activity, or on the ability of cortical neurons to respond to sensory inputs, but rather on the brain's capacity to sustain complex patterns of internal communication." Note in passing that Tononi's theory "leads to panpsychism, the view that any connected system, be it a colony of bacteria or a galaxy, has a certain degree of consciousness" (Dehaene 2014: 279 n. 35).

extinguished and did not propagate beyond the stimulation site” (Massimini et al. 2005: 2228).

If the distance traveled by the sequence of waves resulting from the TMS stimulus—and therefore presumably the neural synchronization (integration) between different parts of the brain—can be looked upon as an indicator of the density of associations, an experiment of this kind may conceivably provide us with the information we are looking for.

Caution is required. Massimini and his collaborators rather look upon the distance traveled, and consequently upon neural synchronization, as an indicator of consciousness: a shorter distance traveled by the waves would in that case indicate lack of consciousness rather than reduced associations. Neural synchronization is indeed widely considered a signature of conscious thought.

This last position has been criticized (Herzog et al. 2007). Indeed, recent experimental evidence appears to throw doubt on the theory of neural synchronization (Ananthaswamy 2015; with reference to Silverstein et al. 2015). What is more, the experiments that are supposed to lend credence to the view that neural synchronization is an indicator of consciousness concern subjects who become conscious of a *specific* stimulus (Dehaene 2014: *passim*); that is, these subjects are already conscious in a general sense but subsequently become conscious of a *specific* (usually visual) input presented to them. It is not surprising that there is no neural synchronization in subjects in a state of dreamless sleep, but it is not evident that neural synchronization must characterize *all* conscious subjects, including those whose attention is not drawn to a specific stimulus.²⁶ Massimini’s experiment, this time carried out on meditators in a state of deep absorption, may clarify the situation.

Here another point is to be kept in mind. The experiments that are supposed to show that consciousness and neural synchronization co-occur, measure *actual* brain activity. Massimini’s experiment, on the other hand, measures a *potential*. The *potential* measured by means of a TMS stimulus may very well be present in subjects in whom the *actual* brain activity corresponding to associations has been reduced, thus leaving us with a serious question of interpretation: Do waves that travel far in the TMS experiment reliably indicate that a

26 The fact that the brain structure called claustrum appears to play an essential role in consciousness may be relevant in this connection; see Thomson 2014, with a reference to Koubeissi et al. 2014. Note in particular Thomson: “Counter-intuitively, Koubeissi’s team found that . . . loss of consciousness [by stimulating the claustrum] was *associated with increased synchrony* of electrical activity, or brainwaves, in the frontal and parietal regions of the brain that participate in conscious awareness” (2014: 11, emphasis added).

dense web of associations feeds into the awareness of the meditator? This does not seem at all certain.

In a modified experiment of the kind suggested above, we must of course be sure that the subjects are not asleep at the moment of measurement (because in that case we would simply be repeating Massimini's experiment). What is more, we must be sure that the subjects are conscious at that time. For this we depend crucially on the subjects' testimony at the end of the experiment.

Depth of absorption may be harder to measure. EEG measurements may one day provide reliable information about this. Most promising may be activity in the theta band, which in meditating subjects increases with increased sense of bliss;²⁷ this measurement is in need of further refinements and is for the time being approximate at best.

The results of the TMS experiment proposed above will have to be interpreted with care. If, for example, a subject enters into a state of deep absorption (according to his or her own testimony and, say, EEG measurements in the theta band) and yet has far-travelling sequences of waves caused by TMS, this would not by itself constitute a refutation of our theory: it might merely confirm Massimini's hypothesis according to which far-travelling waves are a sign of consciousness. The only outcome of the experiment that might be really significant for our theory would be a combination of deep conscious absorption and TMS waves that do not travel far. All other outcomes would, in the present state of our knowledge, neither confirm nor refute the theory.

References

- Aftanas, L. I. & Golocheikine, S. A. (2001). Human anterior and frontal midline theta and lower alpha reflect emotionally positive state and internalized attention: High-resolution EEG investigation of meditation. *Neuroscience Letters* 310, 57-60.
- Alcorta, Candace S. & Sosis, Richard (2005). Ritual, emotion, and sacred symbols: The evolution of religion as an adaptive complex. *Human Nature* 16(4): 323-359.
- Ananthaswamy, Anil (2015). Consciousness theory rocked. *New Scientist* 3046 (7 November): 14.

27 Aftanas & Golocheikine 2001; Vaitl 2012: 33. Note also Vaitl: "Die EEG-Untersuchungen haben gezeigt, dass die hypnotisch induzierte Schmerzreduktion mit einer deutlichen Zunahme im Theta- und Delta-Frequenzbereich einhergeht. Diesen Befund konnten Larbig und seine Mitarbeiter... auch in transkulturellen Feldstudien (griechische Feuerläufer, Schmerzrituale in Sri Lanka) erhärten. So kam es während der Rituale zu einer Verschiebung der EEG-Powerspektren von den schnellen Frequenzen (z.B. Beta-Frequenz) in Richtung der langsameren Theta-Aktivität" (2012a: 274).

- Atran, Scott (2002). *In Gods We Trust: The Evolutionary Landscape of Religion*. Oxford: Oxford University Press.
- Austin, James H. (2006). *Zen-Brain Reflections: Reviewing Recent Developments in Meditation and States of Consciousness*. Cambridge, Massachusetts & London, England: The MIT Press.
- Bar, Moshe (2009). A cognitive neuroscience hypothesis of mood and depression. *Trends in Cognitive Sciences* 13(11): 456-463.
- Barrett, Nathaniel F. (2011). *Wuwei and flow: Comparative reflections on spirituality, transcendence, and skill in the Zhuangzi*. *Philosophy East & West* 61(4): 679-706.
- Beauregard, Mario & Paquette, Vincent (2006). Neural correlates of a mystical experience in Carmelite nuns. *Neuroscience Letters* 405(3): 186-90.
- Behrendt, Ralf-Peter (2012). Consciousness, memory, and hallucinations. In Jan D. Blom and Iris E. C. Sommer (eds), *Hallucinations: Research and Practice*, 17-31. New York: Springer.
- Bering, Jesse M. (2006). The cognitive psychology of belief in the supernatural. *American Scientist* 94(2): 142-149.
- Bering, Jesse (2011). *The God Instinct: The Psychology of Souls, Destiny, and the Meaning of Life*. London: Nicholas Brealey.
- Bickerton, Derek (2014). *More than Nature Needs: Language, Mind, and Evolution*. Harvard University Press.
- Blanke, Olaf & Dieguez, Sebastian (2009). Leaving body and life behind: Out-of-body and near-death experience. In Steven Laureys & Giulio Tononi (eds.), *The Neurology of Consciousness: Cognitive Neuroscience and Neuropathology*, 303-325. London, UK: Academic Press.
- Bloch, Maurice (2012). *Anthropology and the Cognitive Challenge*. Cambridge: Cambridge University Press.
- Blom, Jan Dirk & Iris E. C. Sommer (eds.) (2012). *Hallucinations. Research and Practice*. New York: Springer.
- Bloom, Paul (2007). Religion is natural. *Developmental Science* 10(1): 147-151.
- Boyd, Brian (2009). *On the Origin of Stories: Evolution, cognition, and fiction*. Cambridge, Massachusetts & London, England: The Belknap Press of Harvard University Press.
- Boyer, Pascal (2001). *Religion Explained: The Evolutionary Origins of Religious Thought*. New York: Basic Books. (English edition: *Religion Explained: The Human Instincts that Fashion Gods, Spirits and Ancestors*. London, Sydney, etc.: W. Heinemann).
- Boyer, Pascal & Pierre Liénard (2006). Why ritualized behavior? Precaution systems and action parsing in developmental, pathological and cultural rituals. *Behavioral and Brain Sciences* 29: 595-650.
- Brewer, Judson A.; Worhunsky, Patrick D.; Gray, Jeremy R.; Tang, Yi-Yuan; Weber, Jochen & Kober, Hedy (2011). Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National Academy of Sciences (PNAS)* 108(50): 20254-20259.

- Bronkhorst, Johannes (2001). Asceticism, religion and biological evolution. *Method and Theory in the Study of Religion* 13: 374-418.
- (2012). Rites without symbols. *Method and Theory in the Study of Religion* 24: 236-266.
- (2012a). Buddhism and sacrifice. *Asiatische Studien / Études Asiatiques* 66(1): 7-17.
- (2012b). Can there be play in ritual? Reflections on the nature of ritual. In Philippe Bornet & Maya Burger (eds.), *Religions in Play: Games, Rituals and Virtual Worlds*, 161-175. Zürich: Pano Verlag.
- (2012c). *Absorption. Human Nature and Buddhist Liberation*. Wil / Paris: UniversityMedia.
- (2013). Des sacrifices humains dans l'Inde ancienne. In Àgnes A. Nagy & Francesca Prescendi (eds.), *Sacrifices humains: Dossiers, discours, comparaisons*, 99-105. Actes du colloque tenu à l'Université de Genève, 19-20 mai 2011. Turnhout: Brepols. (Bibliothèque de l'École des Hautes Études, Sciences religieuses, 160.)
- (2014). Can there be a cultural history of meditation? With special reference to India. In Halvor Eifring (ed.), *Hindu, Buddhist and Daoist Meditation: Cultural Histories*, 27-40. Oslo: Hermes Publishing.
- Brown, Derren (2006). *Tricks of the Mind*. Channel 4 Books.
- Bruya, Brian (ed.) (2010). *Effortless Attention: A New Perspective in the Cognitive Science of Attention and Action*. Cambridge, Massachusetts & London, England: A Bradford Book, The MIT Press.
- Bulbulia, Joseph (2013). Towards an evolutionary cognitive science of mental cultures: Lessons from Freud. In Dimitris Xygalatas & William W. McCorkle (eds.), *Mental Culture: Classical Social Theory and the Cognitive Science of Religion*, 110-127. Durham & Bristol, USA: Acumen.
- Bulbulia, Joseph & Richard Sosis (2011). Signaling theory and the evolution of religious cooperation. *Religion* 41(3): 363-388.
- Cahn, B. Rael & John Polich (2006). Meditation states and traits: EEG, ERP, and neuroimaging studies. *Psychological Bulletin* 132(2): 180-211.
- Capra, Fritjof & Pier Luigi Luisi (2014). *The Systems View of Life: A Unifying Vision*. Cambridge: Cambridge University Press.
- Caputo, Giovanni B. (2010). Strange-face-in-the-mirror illusion. *Perception* 39: 1007-1008.
- Claidière, Nicolas & Dan Sperber (2007). The role of attraction in cultural evolution. *Journal of Cognition and Culture* 7: 89-111.
- Claidière, Nicolas & Dan Sperber (2010). Imitation explains the propagation, not the stability of animal culture. *Proceedings of the Royal Society B* 277: 651-659.
- Clark, Andy (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences* 36(3): 181-253.

- Cosmelli, Diego; Lachaux, Jean-Philippe & Thompson (2007). Neurodynamical approaches to consciousness. In Philip David Zelazo, Morris Moscovitch & Evan Thompson (eds.), *The Cambridge Handbook of Consciousness*, 731-772. Cambridge: Cambridge University Press.
- Craig, A. D. (2009). How do you feel—now? The anterior insula and human awareness. *Nature Reviews, Neuroscience* 10(1): 59-70.
- Csikszentmihalyi, Mihaly (2002). *Flow*. Revised and updated edition. London: Rider.
- Cutting, J. (1997). *Principles of Psychopathology: Two Worlds—Two Minds—Two Hemispheres*. Oxford: Oxford University Press.
- Damasio, Antonio (2010). *Self Comes to Mind: Constructing the Conscious Brain*. New York: Pantheon Books.
- Darwin, Charles (1871). *The Descent of Man, and Selection in Relation to Sex*. Vol. 1. London: John Murray.
- Deacon, Terrence (1997). *The Symbolic Species. The Co-Evolution of Language and the Human Brain*. Harmondsworth: Penguin Books.
- Dehaene, Stanislas (2014). *Consciousness and the Brain: Deciphering How the Brain Codes our Thoughts*. New York: Viking.
- Desimone, Robert & John Duncan (1995). Neural mechanisms of selective visual attention. *Annual Review of Neuroscience* 18: 193-222.
- Dodson, Betty (1996). *Sex for One: The Joy of Selfloving*. New York: Three Rivers Press.
- Domhoff, G. William (2002). *The Scientific Study of Dreams: Neural networks, Cognitive Development, and Content Analysis*. Washington, DC: American Psychological Association.
- DSM-5 (2013). *Diagnostic and Statistical Manual of Mental Disorders*. Fifth edition. American Psychiatric Publishing, Washington DC & London England.
- Eifring, Halvor (forthcoming). Meditation and the wandering mind—spontaneous thoughts in contemplative traditions.
- Enders, Giulia (2015). *Gut: The Inside Story of Our Body's Most Under-Rated Organ*. Melbourne-London: Scribe.
- Evans, Vyvyan (2014). *The Language Myth: Why Language is Not an Instinct*. Cambridge: Cambridge University Press.
- Fauconnier, Gilles (2001). Conceptual blending and analogy. In Dedre Gentner, Keith J. Holyoak & Boicho N. Kokinov (eds.), *The Analogical Mind: Perspectives from Cognitive Science*, 255-285. Cambridge, Massachusetts & London, England: Bradford Book.
- Fauconnier, Gilles & Mark Turner (2002). *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.
- Fox, Kieran C. R.; Nijboer, Savannah; Solomonova, Elizaveta; Domhoff, G. William & Christoff, Kalina (2013). Dreaming as mind wandering: Evidence from functional

- neuroimaging and first-person content reports. *Frontiers in Human Neuroscience* 7 (article 412): 1-18.
- Friesen, J. Glenn (2011). Enstasy, ecstasy and religious self-reflection: A history of Dooyeweerd's ideas of pre-theoretical experience. <http://www.members.shaw.ca/aevum/Enstasy.html>.
- Frith, Chris (2007). *Making up the Mind. How the Brain Creates our Mental World*. Blackwell.
- Geertz, Armin W. (2009). New atheistic approaches in the cognitive science of religion. In Michael Stausberg (ed.), *Contemporary Theories of Religion: A Critical Companion*, 242-263. London & New York: Routledge.
- (ed.) (2013a). *Origins of Religion, Cognition and Culture*. Durham & Bristol, USA: Acumen.
- Geertz, Armin W. & Guðmundur Ingi Markússon (2010). Religion is natural, atheism is not: On why everybody is both right and wrong. *Religion* 40(3): 152-165.
- Gellman, Jerome (2011). Mysticism. In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Summer 2011 Edition). <http://plato.stanford.edu/archives/sum2011/entries/mysticism/>.
- Georgiadis, Janniko R.; Simone Reinders, A. A. T.; Van der Graaf, H. C. E.; Paans, Anne M. J. & Kortekaas, Rudie (2007). Brain activation during human male ejaculation revisited. *NeuroReport* 18(6): 553-557.
- Glicksohn, Joseph & Terry R. Barrett (2003). Absorption and hallucinatory experience. *Applied Cognitive Psychology* 17: 833-849.
- Glicksohn, Joseph & Aviva Berkovich Ohana (2011). From trance to transcendence: a neurocognitive approach. *The Journal of Mind and Behavior* 32(1): 49-62.
- (2012). Absorption, immersion, and consciousness. In Jayne Gackenbach (ed.), *Video Game Play and Consciousness*, 83-99. Nova Science Publishers.
- Glicksohn, Joseph & Lipperman-Kreda, Sharon (2007). Time, thought, and consciousness. *The Journal of Mind and Behavior* 28(3-4): 289-306.
- Grill-Spector, Kalanit; Henson, Richard & Martin, Alex (2006). Repetition and the brain: neural models of stimulus-specific effects. *Trends in Cognitive Sciences* 10(1): 15-23.
- Gusnard, Debra A. & Marcus E. Raichle (2001). Searching for a baseline: Functional imaging and the resting human brain. *Nature Reviews, Neuroscience* 2(10): 685-694.
- Hackett, Jeremiah M. (2013). *A Companion to Meister Eckhart*. Leiden-Boston: Brill. (Brill's Companions to the Christian Tradition, 36)
- Harris, Sam (2014). *Waking Up. A Guide to Spirituality Without Religion*. Simon & Schuster.
- Heaven, Douglas (2013). Mirror, mirror. *New Scientist* 2941 (2 November 2013): 39-41.
- Henrich, Joseph (2009). The evolution of costly displays, cooperation and religion: Credibility enhancing displays and their implications for cultural evolution. *Evolution and Human Behavior* 30: 244-260.

- Herrmann, Patricia A.; Legare, Cristine; Harris, Paul L. & Whitehouse, Harvey (2013). Stick to the script: The effect of witnessing multiple actors on children's imitation. *Cognition* 129: 536-543.
- Herzog, Michael H.; Esfeld, Michael & Gerstner, Wulfram (2007). Consciousness & the small network argument. *Neural Networks* 20: 1054-1056.
- Hölzel, Britta K.; Ott, Ulrich; Hempel, Hannes; Hackl, Andrea; Wolf, Katharina; Stark, Rudolf & Vaitl, Dieter (2007). Differential engagement of anterior cingulate and adjacent medial frontal cortex in adept meditators and non-meditators. *Neuroscience Letters* 421: 16-21.
- Hoffman, Donald D. (2012). The construction of visual reality. In Jan Dirk Blom & Iris E. C. Sommer (eds.), *Hallucinations: Research and Practice*, 7-15. New York: Springer.
- Hofmann, Stefan G.; Grossman, Paul & Hinton, Devon E. (2011). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical Psychology Review* 31: 1126-1132.
- Hofstadter, Douglas & Sander, Emmanuel (2013). *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking*. New York: Basic Books.
- Hüsken, Ute (ed.) (2007). *When Rituals Go Wrong: Mistakes, Failure, and the Dynamics of Ritual*. Leiden – Boston: Brill. (Numen Book Series, 115)
- Hunt, Harry T. (2007). 'Dark nights of the soul': Phenomenology and neurocognition of spiritual suffering in mysticism and psychosis. *Review of General Psychology* 11(3): 209-234.
- James, William (1979 [1902]). *The Varieties of Religious Experience*. Reprint: Glasgow: Fount Paperbacks.
- Jang, Joon Hwan; Jung, Wi Hoon; Kang, Do-Hyung; Byun, Min Soo; Kwon, Soo Jin; Choi, Ch-Hoon & Kwon, Jun Soo (2011). Increased default mode network connectivity associated with meditation. *Neuroscience Letters* 487: 358-362.
- Jarrett, Christian (2015). *Great Myths of the Brain*. Wiley Blackwell.
- Killingsworth, Matthew A. & Daniel T. Gilbert (2010). A wandering mind is an unhappy mind. *Science* 330 (12 November): 932.
- Kirkpatrick, Lee A. (2011). The role of evolutionary psychology within an interdisciplinary science of religion. *Religion* 41(3): 329-339.
- Koubeissi, Mohamad Z.; Bartomolei, Fabrice; Beltagy, Abdelrahman & Picard, Fabienne (2014). Electrical stimulation of a small brain area reversibly disrupts consciousness. *Epilepsy & Behavior* 37: 32-35. (not seen)
- Leech, Robert; Mareschal, Denis & Cooper, Richard P. (2008). Analogy as relational priming: A developmental and computational perspective on the origins of a complex cognitive skill. *Behavioral and Brain Sciences* 31: 357-414. (includes open peer commentary)
- Lewis-Williams, David (2010). *Conceiving God: The Cognitive Origin and Evolution of Religion*. London: Thames & Hudson.

- Lewis-Williams, David & David Pearce (2005). *Inside the Neolithic Mind: Consciousness, Cosmos and the Realm of the Gods*. London: Thames & Hudson.
- Linden, David J. (2015). *Touch: The Science of Hand, Heart, and Mind*. Viking.
- Llinás, Rodolfo R. & Denis Paré (1991). Of dreaming and wakefulness. *Neuroscience* 44(3): 521-53.
- Luhrmann, T. M. (2012). *When God Talks Back: Understanding the American Evangelical relationship with God*. New York: Vintage Books.
- Luhrmann, T. M.; Nusbaum, Howard & Thisted, Ronald (2010). The absorption hypothesis: Learning to hear God in Evangelical Christianity. *American Anthropologist* 112(1): 66-78.
- Lutz, Antoine; Dunne, John D. & Davidson, Richard J. (2007). Meditation and the neuroscience of consciousness: An introduction. In P. D. Zelazo, M. Moscovitch, E. Thompson (eds.), *The Cambridge Handbook of Consciousness*, 499-551. Cambridge: Cambridge University Press.
- Massimini, Marcello; Ferrarelli, Fabio; Huber, Reto; Esser, Steve K.; Singh, Harpreet & Tononi, Giulio (2005). Breakdown of cortical effective connectivity during sleep. *Science* 309 (30 September): 2228-2232.
- Massimini, Marcello; Ferrarelli, Fabio; Esser, Steve K.; Riedner, Brady A.; Huber, Reto; Murphy, Michael; Peterson, Michael J. & Tononi, Giulio (2007). Triggering sleep slow waves by transcranial magnetic stimulation. *Proceedings of the National Academy of Sciences (PNAS)* 104(20) (May 15, 2007): 8496-8501.
- Massimini, M.; Ferrarelli, F.; Sarasso, S & Tononi, G. (2012). Critical mechanisms of loss of consciousness: Insight from TMS/EEG studies. *Archives Italiennes de Biologie* 150: 44-55.
- McCauley, Robert N. (2011). *Why Religion is Natural and Science is Not*. Oxford University Press.
- McCutcheon, Russell T. (2012). Introduction. In Craig Martin & Russell T. McCutcheon (eds.), *Religious Experience: A Reader*, 1-18. Equinox Publishing.
- (2012a). I have a hunch. *Method and Theory in the Study of Religion* 24: 81-92.
- (2015). *A Modest Proposal on Method: Essaying the Study of Religion*. Leiden – Boston: Brill. (Supplements to Method & Theory in the Study of Religion, 2)
- McNamara, Patrick (2011). *Spirit Possession and Exorcism: History, Psychology, and Neurobiology. Volume 1: Mental States and the Phenomenon of Possession*. Santa Barbara: Praeger.
- Morgain, Rachel (2012). On the use of the uncanny in ritual. *Religion* 42(4): 521-548.
- Norenzayan, Ara (2012). The idea that launched a thousand civilisations. *New Scientist* 213 (17 March): 42-44.
- Norenzayan, Ara (2013). *Big Gods: How Religion Transformed Cooperation and Conflict*. Princeton University Press.

- Olivelle, Patrick (1997). Orgasmic rapture and divine ecstasy: the semantic history of *ānanda*. *Journal of Indian Philosophy* 25: 153-180.
- Pettazzoni, R. (1955). On the attributes of God. *Numen* 2(1/2): 1-27.
- Pyyssäinen, Ilkka (2009). *Supernatural Agents: Why We Believe in Souls, Gods, and Buddhas*. Oxford University Press.
- (2013). Cognitive science of religion: state-of-the-art. *Journal of the Cognitive Science of Religion* 1(1): 5-28.
- Raichle, Marcus E. (2010). The brain's dark energy. *Scientific American*. <http://www.scientificamerican.com/article.cfm?id=the-brains-dark-energy>.
- Roth, Harold D. (2008). Against cognitive imperialism: A call for a non-ethnocentric approach to cognitive science and religious studies. *Religion East & West* 8: 1-26.
- Sacks, Oliver (2012). *Hallucinations*. London: Picador.
- Schjoedt, Uffe (2009). The religious brain: A general introduction to the experimental neuroscience of religion. *Method and Theory in the Study of Religion* 21: 310-339.
- Searle, John R. (2010). *Making the Social World: The Structure of Human Civilization*. Oxford: Oxford University Press.
- Searle, John R. (2015). *Seeing Things as They Are: A Theory of Perception*. Oxford: Oxford University Press.
- Sidky, Homayun (2010). On the antiquity of shamanism and its role in human religiosity. *Method and Theory in the Study of Religion* 22: 68-92.
- Silverstein, Brian H., Michael Snodgrass, Howard Shevrin, & Ramesh Kushwaha (2015). P3b, consciousness, and complex unconscious processing. *Cortex* 73 (December): 216-227.
- Slingerland, Edward & Bulbulia, Joseph (2011). Introductory section: Evolutionary approaches to the study of religion. *Religion* 41(3): 307-328.
- Smith, Frederick M. (2006). *The Self Possessed: Deity and Spirit Possession in South Asian Literature and Civilization*. New York: Columbia University Press.
- Sosis, Richard & Bulbulia, Joseph (2011). The behavioral ecology of religion: The benefits and costs of one evolutionary approach. *Religion* 41(3): 341-362.
- Stausberg, Michael (ed.) (2009). *Contemporary Theories of Religion. A Critical Companion*. London & New York: Routledge.
- Stausberg, Michael (2014). Big gods in review: Introducing Ara Norenzayan and his critics. *Religion* 44(4): 592-608.
- Thomson, Helen (2014). Consciousness—we hit its sweet spot. *New Scientist* 2976 (5 July): 10-11.
- Tononi, Giulio (2004). An information integration theory of consciousness. *BMC Neuroscience* 5: 42.
- Tononi, Giulio (2008). Consciousness as integrated information: A provisional manifesto. *Biological Bulletin* 215: 216-242.

- Tononi, Giulio (2012). *PHI: A Voyage from the Brain to the Soul*. New York: Pantheon Books.
- Travis, Fred; Haaga, David A. F.; Hagelin, John; Tanner, Melissa; Arenander, Alaric; Nidich, Sanford; Gaylord-King, Carolyn; Grosswald, Sarina; Rainforth, Maxwell & Schneider, Robert H. (2010). A self-referential default brain state: Patterns of coherence, power, and eLORETA sources during eyes-closed rest and Transcendental Meditation practice. *Cognitive Processing* 11: 21-30.
- Turner, Mark (2014). *The Origin of Ideas. Blending, Creativity, and the Human Spark*. Oxford: Oxford University Press.
- Vaitl, Dieter (2012). *Meditation: Neurobiologische Grundlagen und klinische Anwendung*. Stuttgart: Franz Steiner.
- (2012a). *Veränderte Bewusstseinszustände: Grundlagen—Techniken—Phänomenologie*. Stuttgart: Schattauer.
- Wade, Jenny (2004). *Transcendent Sex: When Lovemaking Opens the Veil*. New York etc.: Paraview.
- Wade, Nicholas (2009). *The Faith Instinct: How Religion Evolved and Why It Endures*. New York: The Penguin Press.
- Watson-Jones, Rachel E.; Legare, Cristine H.; Whitehouse, Harvey & Clegg, Jennifer M. (2014). Task-specific effects of ostracism on imitative fidelity in early childhood. *Evolution and Human Behavior* 35: 204-210.
- Westh, Peter (2013). Anthropomorphism in god concepts: The role of narrative. In Armin Geertz (ed.), *Origins of Religion, Cognition and Culture*, 396-413. Durham & Bristol, USA: Acumen.
- Wiebe, Donald (2013). Pseudo-speciation of the human race: religions as hazard-precaution systems. *Method and Theory in the Study of Religion* 25: 410-430.
- Wiessner, Polly W. (2014). Embers of society: Firelight talk among the Ju/'hoansi Bushmen. *Proceedings of the National Academy of Sciences* (doi/10.1073/pnas.1404212111).
- Wilson, David Sloan (2002). *Darwin's Cathedral: Evolution, Religion, and the Nature of Society*. Chicago and London: The University of Chicago Press.
- Xu, Jian; Vik, Alexandra; Groote, Inge R.; Lagopoulos, Jim; Holen Are; Ellingsen, Øyvind; Håberg, Asta K. & Davanger, Svend (2014). Nondirective meditation activates default mode network and areas associated with memory retrieval and emotional processing. *Frontiers in Human Neuroscience* 8, article 86 (doi: 10.3389/fnhum.2014.00086)
- Xygalatas, Dimitris & William W. McCorkle (eds.)(2013). *Mental Culture: Classical Social Theory and the Cognitive Science of Religion*. Durham & Bristol, USA: Acumen.
- Zelazo, Philip David; Moscovitch, Morris & Thompson, Evan (eds.)(2007). *The Cambridge Handbook of Consciousness*. Cambridge University Press.