

WHERE GOD AND SCIENCE MEET

How Brain and Evolutionary Studies
Alter Our Understanding of Religion

VOLUME 2
The Neurology of Religious Experience

Edited by Patrick McNamara

PRAEGER PERSPECTIVES

Psychology, Religion, and Spirituality

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CONTENTS

VOLUME 2 THE NEUROLOGY OF RELIGIOUS EXPERIENCE

| | |
|--|------|
| <i>Series Foreword</i> by J. Harold Ellens | vii |
| <i>Acknowledgments</i> | xi |
| <i>Preface</i> by Patrick McNamara | xiii |
| CHAPTER 1 The Chemistry of Religiosity: Evidence from Patients with Parkinson's Disease <i>Patrick McNamara, Raymon Durso, Ariel Brown, and Erica Harris</i> | 1 |
| CHAPTER 2 Religious and Spiritual Practices: A Neurochemical Perspective <i>Andrew B. Newberg</i> | 15 |
| CHAPTER 3 Neuroimaging Studies of Religious Experience: A Critical Review <i>Nina P. Azari</i> | 33 |
| CHAPTER 4 Religion and the Life Course: Is Adolescence an "Experience Expectant" Period for Religious Transmission? <i>Candace S. Alcorta</i> | 55 |

| | | |
|------------|--|-----|
| CHAPTER 5 | Neurotheology: A Science of What? <i>Matthew Ratcliffe</i> | 81 |
| CHAPTER 6 | Religion as a By-Product of Evolved Psychology: The Case of Attachment and Implications for Brain and Religion Research <i>Pehr Granqvist</i> | 105 |
| CHAPTER 7 | Religious Conversion, Spiritual Transformation, and the Neurocognition of Meaning Making <i>Raymond F. Paloutzian, Erica L. Swenson, and Patrick McNamara</i> | 151 |
| CHAPTER 8 | Religion and the Brain: Evidence from Temporal Lobe Epilepsy <i>Steven C. Schachter</i> | 171 |
| CHAPTER 9 | The Frontal Lobes and the Evolution of Cooperation and Religion <i>Patrick McNamara</i> | 189 |
| CHAPTER 10 | Mind Design and the Capacity for Ritual Performance <i>Carl Seaquist</i> | 205 |
| CHAPTER 11 | The Brain, Religion, and Baseball: Comments on the Potential for a Neurology of Religion and Religious Experience <i>Warren S. Brown</i> | 229 |
| | <i>Index</i> | 245 |
| | <i>About the Editor and Contributors</i> | 255 |
| | <i>About the Advisory Board</i> | 261 |

SERIES FOREWORD

The interface between psychology, religion, and spirituality has been of great interest to scholars for a century. In the last three decades a broad popular appetite has developed for books which make practical sense out of the sophisticated research on these three subjects. Freud expressed an essentially deconstructive perspective on this matter and indicated that he saw the relationship between human psychology and religion to be a destructive interaction. Jung, on the other hand, was quite sure that these three aspects of the human spirit, psychology, religion, and spirituality, were constructively and inextricably linked.

Anton Boisen and Seward Hiltner derived much insight from both Freud and Jung, as well as from Adler and Reik, while pressing the matter forward with ingenious skill and illumination. Boisen and Hiltner fashioned a framework within which the quest for a sound and sensible definition of the interface between psychology, religion, and spirituality might best be described or expressed.¹ We are in their debt.

This series of General Interest Books, so wisely urged by Greenwood Press, and particularly by its editors, Deborah Carvalko and Suzanne I. Staszak-Silva, intends to define the terms and explore the interface of psychology, religion, and spirituality at the operational level of daily human experience. Each volume of the series identifies, analyzes, describes, and evaluates the full range of issues, of both popular and professional interest, that deal with the psychological factors at play (1) in the way religion takes shape and is expressed, (2) in the way spirituality functions within human persons and shapes both religious formation and expression, and (3) in the ways that

spirituality is shaped and expressed by religion. The interest is psycho-spiritual. In terms of the rubrics of the disciplines and the science of psychology and spirituality this series of volumes investigates the *operational dynamics* of religion and spirituality.

The verbs “shape” and “express” in the above paragraph refer to the forces which prompt and form religion in persons and communities, as well as to the manifestations of religious behavior (1) in personal forms of spirituality, (2) in acts of spiritually motivated care for society, and (3) in ritual behaviors such as liturgies of worship. In these various aspects of human function the psychological and/or spiritual drivers are identified, isolated, and described in terms of the way in which they unconsciously and consciously operate in religion, thought, and behavior.

The books in this series are written for the general reader, the local library, and the undergraduate university student. They are also of significant interest to the informed professional, particularly in fields corollary to his or her primary interest. The volumes in this series have great value for clinical settings and treatment models, as well.

This series editor has spent an entire professional lifetime focused specifically upon research into the interface of psychology in religion and spirituality. These matters are of the highest urgency in human affairs today when religious motivation seems to be playing an increasing role, constructively and destructively, in the arena of social ethics, national politics, and world affairs. It is imperative that we find out immediately what the psychopathological factors are which shape a religion that can launch deadly assaults upon the World Trade Center in New York and murder 3,500 people, or a religion that motivates suicide bombers to kill themselves and murder dozens of their neighbors weekly, and a religion which prompts such unjust national policies as pre-emptive defense; all of which are wreaking havoc upon the social fabric, the democratic processes, the domestic tranquility, the economic stability and productivity, and the legitimate right to freedom from fear, in every nation in the world today.

This present set of three volumes, the project on religion and the brain, is an urgently needed and timely work, the motivation for which is surely endorsed enthusiastically by the entire world today, as the international community searches for strategies that will afford us better and deeper religious self-understanding as individuals and communities. This project addresses the deep genetic and biological sources of human nature which shape and drive our psychology and spirituality. Careful strategies of empirical, heuristic, and phenomenological research have been employed to give this work a solid scientific foundation and formation. Never before has so much wisdom and intelligence been brought to bear upon the dynamic linkage between human physiology, psychology, and spirituality. Each of these three aspects

has been examined from every imaginable direction through the illuminating lenses of the other two.

For fifty years such organizations as the Christian Association for Psychological Studies and such Graduate Departments of Psychology as those at Boston University, Fuller, Rosemead, Harvard, George Fox, Princeton, and the like, have been publishing significant building blocks of empirical, heuristic, and phenomenological research on issues dealing with religious behavior and psycho-spirituality. In this present project the insights generated by such patient and careful research are synthesized and integrated into a holistic psycho-spiritual world view, which takes the phenomenology of religion seriously.

Some of the influences of religion upon persons and society, now and throughout history, have been negative. However, most of the impact of the great religions upon human life and culture has been profoundly redemptive and generative of great good. It is urgent, therefore, that we discover and understand better what the psychological and spiritual forces are which empower people of faith and genuine spirituality to give themselves to all the creative and constructive enterprises that, throughout the centuries, have made of human life the humane, ordered, prosperous, and aesthetic experience it can be at its best. Surely the forces for good in both psychology and spirituality far exceed the powers and proclivities toward the evil that we see so prominently perpetrated in the name of religion in our world today.

This series of Greenwood Press volumes is dedicated to the greater understanding of *Psychology, Religion and Spirituality*, and thus to the profound understanding and empowerment of those psycho-spiritual drivers which can help us transcend the malignancy of our earthly pilgrimage and enormously enhance the humaneness and majesty of the human spirit, indeed, the potential for magnificence in human life.

J. Harold Ellens

NOTE

1. Aden, L., & Ellens, J. H. (1990). *Turning points in pastoral care: The legacy of Anton Boisen and Seward Hiltner*. Grand Rapids, MI: Baker.

PREFACE

In recent years, several lines of evidence have converged on the conclusion that religiousness is associated with a specific and consistent set of biological processes. Religion appears to be a cultural universal. There may be a critical period (adolescence) during the life cycle of normally developing persons when religiousness is best transmitted from an older to a younger generation (see volume II, chapter 4). Individual differences in religiosity are associated with consistent health benefits (see volume I, chapter 7; volume III, chapter 2) as well as unique health risks (see volume III, chapters 4 and 8). Twin studies have shown that religiousness is moderately to highly heritable (see volume I, chapter 3). Genetic studies have implicated specific genes in religiousness (mostly genes that code for regulatory products of monoamine transmission in limbic-prefrontal networks; for reviews, see Comings, Gonzales, Saucier, Johnson, & MacMurray, 2000; D'Onofrio, Eaves, Murrelle, Maes, & Spilka, 1999; Hamer, 2004; see also volume I, chapter 3). Consistent with these preliminary genetic studies, neurochemical and neuropharmacologic studies have implicated limbic-prefrontal serotonergic and dopaminergic mechanisms in mediation of religious experiences (see volume II, chapters 1 and 2; volume III, chapters 1 and 10). Neuroimaging and neuropsychologic studies have implicated a consistent set of neurocognitive systems and brain activation patterns in religious activity (mostly limbic-prefrontal networks (see volume II, chapters 2, 3, 8, and 9; volume III, chapter 7). A cognitive psychology of religious belief has revealed both the unique aspects of religious cognition as well as its commonalities with other basic cognitive processing routines (see volume I, chapters 6, 9, and 10; volume II, chapter 10). Finally, changes in self-reported

religious experience by individuals suffering from obsessive-compulsive disorder; schizophrenia, Parkinson's disease, and temporal lobe epilepsy are in the expected direction if the previously mentioned neurocognitive networks (limbic-prefrontal) do in fact mediate core aspects of religiousness (see volume II, chapters 1 and 8; volume III, chapter 1).

Although the array of previously mentioned findings suggests to some investigators that it is reasonable to speak about potential neurocognitive specializations around religiosity, caution is in order when attempting to interpret the findings (see volume II, chapters 3, 5, 6, and 8; and all three commentaries). As in every other scientific enterprise, what is investigated in any given study is not the whole phenomenon of interest but rather only a small constituent part of the whole. The previously cited studies could not investigate "religion" *per se*. That is too vast a phenomenon to be studied in a single project. Instead, they tried to operationalize religiousness in various ways—with everything from a score on an inventory about religious practices to measurements on those practices themselves. Thus, we are reduced to making inferences about the nature of religiousness from data we collect via these questionnaire and observational/experimental methods. Making inferences about the nature of religion as a whole from neurobiologic correlations of one aspect of religiosity is, of course, fraught with danger (as all three commentators and several of our authors point out), but there is simply no other way to proceed. Inference and extrapolation from observations you collect on operationalized measures of the phenomenon you are interested in is necessary if you want to make progress. What is all-important, however, is to extrapolate, infer, and proceed with caution and humility. Constraints on incautious claims and inferences can often be obtained if you have a good theoretical framework from which to generate inferences about data meanings and from which you can develop falsifiable hypotheses. When it comes to biologic correlates of religiousness, the best available theory is evolution. Thus, several of the essays in these volumes discuss potential evolutionary and adaptive functions of religion.

Claims, however, about potential adaptive functions of religiousness also need to be treated with great caution and tested against the evidence. Several authors in these volumes address the question of whether religiousness can be considered an evolutionary adaptation (see volume I, chapters 1, 4, 5, 7, 8, and 10; volume II, chapter 4; volume III, chapter 6; and all three commentaries). For those scientists who think the evidence supports some variant of an adaptationist position (see volume I, chapters 4, 5, 7, and 10; volume II, chapter 4; volume III, chapter 6), the questions shift to what part of religiousness is actually adaptive and what functions might religiousness enact? Some theorists suggest that it is reasonable to speak about a "common core" religious experience fundamental to all forms of religiosity (see volume I, chapter 7; volume III, chapters 5 and 6). Some investigators suggest that the aspect of religiousness that was "selected" over evolutionary history was the

capacity for trance, placebo responding, or altered states of consciousness, or ASC (see volume I, chapters 5 and 7; volume III, chapter 6). The capacity for trance, placebo responding, and ASC, of course, would yield both health benefits and arational or even irrational belief states over time. Other theorists (see volume I, chapters 4 and 5; volume II, chapter 4) suggest that the aspect of religiousness that was selected over evolutionary history was its ability, primarily via ritual displays and other “costly signals” (see volume I, chapters 2, 4, and 5; volume II, chapter 10), to solve the free-rider problem (where unscrupulous individuals exploit the benefits of group cooperation without paying any of the costs of that cooperation) and thereby promote cooperation among individuals within early human groups. Other theorists who tilt toward some kind of adaptationist position emphasize both costly signaling theory as well as gene–culture interactions to explain particular associations of religiosity, such as its ability to promote character strengths (volume I, chapter 2), its ability to protect against death-related fears (volume I, chapter 9; volume III, chapter 8), its ability to generate life meanings (volume III, chapter 3), its ability to address attachment needs (volume I, chapter 8; volume II, chapter 6), its links with the sources and phenomenology of dreams (volume III, chapter 9), and its similarities with special perceptual capacities of the aesthetic sense (volume II, chapter 7).

Although it has to be admitted that all these investigators have marshaled an impressive array of evidence to support their claims concerning religion’s potential adaptive functions, all the authors of these theories realize that it is nearly impossible to demonstrate conclusively that some biopsychologic process is an adaptation, in the classical sense of that term. Several authors in these volumes have pointed out just how easy it is to get muddled when attempting to think through evolutionary approaches to a phenomenon as complex as religiousness (see volume I, chapters 1, 8 and 10; volume II, chapter 6; and all three commentaries). It is all too easy to overlook the harmful (and presumably nonadaptive) aspects of religiousness (see volume I, chapters 1 and 6; volume III, chapters 4 and 8). Ignorance of the complexity of religious phenomena, an underappreciation of the pervasive effects of social learning and cultural transmission on cognitive functions, and confusion around technical terms in evolutionary biology (such as adaptation, exaptation, and so forth) all militate against progress in this new science of the biology of religion.

To help think through problems of evolutionary change and adaptations in animals, the evolutionary biologist has often utilized the principles and methods of cladistics and phylogenetic analysis. Debates on potential adaptive functions of religion may benefit by taking a look at these methods. Cladistic methodology is used to analyze phylogenetic relationships in lineages that are recognized by the presence of shared and derived (advanced) characteristics. When cladistic methodology is supplemented with the advanced

statistical tools of “phylogenetic analysis,” you get precise and powerful techniques for reconstructing evolutionary history. These techniques have now been successfully used in the cultural arena, as in analyzing biocultural changes (e.g., language evolution). Scholars of ritual and religious practices have now amassed a huge amount of data on the historical development of ritual practices and on ritual practices in premodern human groups. There may therefore be enough data to reconstruct the evolutionary history of ritual practices in certain human lineages. If there is also enough data available on the history of various forms of healing practices of cooperative enterprises (e.g., farming or herding), it may be possible to assess change in ritual practices against change in these other forms of human activity. By superimposing phenotypic features (e.g., ritual practices) over accepted language phylogenies, one can reconstruct the history of evolutionary change in ritual practices as well as potential correlated change in health or in cooperative practices. Thus, hypotheses about potential adaptive functions of key aspects of religiousness may be tested quantitatively using these sorts of methods. With these sorts of methods, one could also potentially assess whether some aspect of religiousness (e.g., ritual practices) fit criteria for an adaptation or an exaptation. An adaptation involves the modification of a phenotypic feature (e.g., a particular ritual practice) that accompanies or parallels an evolutionary acquisition of a function (new healing practices or new forms of cooperation). However, in exaptation, the feature originates first rather than in parallel and only later is co-opted for the function in question. In short, because phylogenetic analysis involves quantitative reconstruction and analysis of histories of shared and derived traits, it provides powerful methods for identification of potential adaptive functions of religion. I draw attention to these techniques only to point out their potential. They have significant limitations, and they have not yet been applied to many problems in biocultural evolution. In particular, phylogenetic techniques have not yet been brought to bear on questions of the evolutionary history of religious practices. Nevertheless, they may be one way to shed some light on the problem of potential adaptive functions of religion.

The fact that reasonable speculations about potential adaptive functions of religion can be advanced at all is partly due to the startling consistency of the evidence summarized in these volumes on the neurobiologic correlates of religiousness. While tremendous progress has been made in identifying neurobiologic correlates of religiousness, it will be a challenge to place these findings in new theoretical frameworks that can do justice to the richness and complexity of the religious spirit. The essays in these volumes provide the necessary first tools to do just that.

Patrick McNamara

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NEUROTHEOLOGY: A SCIENCE OF WHAT?

Matthew Ratcliffe

INTRODUCTION

There is considerable current interest in the question of what, if anything, neuroscience can tell us about religion. Discussion of the topic is not confined to academia, but has captured the public imagination and found its way into the popular press. For example, an article appeared in the *LA Times* on October 29, 1997 and, subsequently, in other publications announcing that a “God spot” had been found in the brain. The story referred to the finding reported by V. S. Ramachandran and colleagues that heightened emotional response in certain subjects with focal temporal lobe epilepsy was specific to stimuli of a religious nature (Ramachandran & Blakeslee, 1998). Some work by Michael Persinger has also received considerable attention.¹ Persinger used a device called a transcranial magnetic stimulator to focus a weak magnetic field on areas of the brain and reported that stimulation of a particular area often resulted in a religious experience (Persinger, 2002b). The growing field of research on religion and the brain, which has taken its lead from such findings, often goes by the name “neurotheology,” a term that was in use at least as far back as the 1980s but has been employed increasingly during the last few years.

Why all the interest? The possibility of neural circuits specifically associated with religion raises all sorts of intriguing questions concerning the biological basis, function, and evolutionary history of religion. Perhaps it might even cast light on the question of God’s existence. But before such questions can be coherently addressed, it is important to be clear about

just what it is that is being studied. When claims are made about neural circuitry associated with “religion” or with “religious experience,” how are those terms to be understood? My aim here is to explore this question and, in so doing, to raise a number of related philosophical concerns that arise in connection with some of the better known recent work in neurotheology.

If the claim were that certain brain areas are specifically associated with religion, it would be highly problematic. Studies such as those of Ramachandran and Persinger do not investigate the neural correlates of *religion* but of certain kinds of *experience*, and brief reflection suffices to make clear that there is a lot more to religion than just religious experience. Religions incorporate texts, rituals, roles, statuses, ceremonies, practices, and shared belief systems. They interact in numerous ways with a broader culture and allow for many different levels and kinds of commitment and conviction on the part of their diverse practitioners.

Much of the structure of religion cannot be understood in terms of the cognitive dispositions of religious individuals, given that religion is also a cultural-historical framework into which those individuals are born or introduced and shaped. Religion, it seems, is not just a matter of the properties of individual brains, but of a shared way of life through which words, deeds, and experiences are interpreted (Phillips, 1986). Furthermore, religions differ in all manner of ways and, even if an essence common to all religions could be distilled, it would most likely not be something that could be wholly captured in terms of the beliefs and experiences of individuals viewed in isolation from culture.

The way to avoid such tricky issues is to stress that these studies are concerned not with religions as historical and cultural phenomena, but with the religious experiences of individuals. Now it might well be that all religions were originally inspired by such experiences, or, alternatively, it could be that religious experience is only one contributing factor in the formation of religions. Turning to individual practitioners, some people’s religious beliefs might originate in religious experience, while those of others might arise wholly from other sources, such as enculturation, indoctrination, or rational deliberation. However, regardless of the specifics, it is clear that religious experience is an important element of most, if not all, religions. Hence, discoveries about religious experience are likely to have at least some repercussions for a more general understanding of religion.

Unfortunately, focusing on religious experience does not dispense with the problem of identifying one’s subject matter, since it is by no means clear what religious experience is or whether various religious experiences have anything interesting in common. One might reply that a religious experience is just an experience of God. For instance, Persinger (2002a) repeatedly refers to

“the God experience,” suggesting that a distinct kind of experience has indeed been identified. However, other authors have described several different kinds of religious experience, some of which do not seem to incorporate the presence of the God of monotheism. For example, Caroline Franks Davis (1989, chap. 2) offers the following taxonomy:

1. Interpretive experiences: Experiences, such as fortuitous co-incidences, which are interpreted in religious terms.
2. Quasi-sensory experiences: These include visions, voices, dreams and tactile sensations.
3. Revelatory experiences: Sudden moments of insight that seem to come from elsewhere.
4. Regenerative experiences: Profound feelings of strength, comfort or joy.
5. Numinous experiences: Feelings of insignificance before the majesty of God.
6. Mystical experiences: The experience of encountering ultimate reality, often associated with feelings of oneness, serenity and a loss of the sense of space and time.

These experiences need not be mutually exclusive, and they might combine in all sorts of ways. The question is what, if anything, they all have in common. If some are very different from others, the search for neural correlates of a single type of religious, mystical, or spiritual experience would be futile, analogous to looking for the neural correlates of metal object experience, hairy thing experience, car experience or any other category that arbitrarily brought together many different kinds of phenomena. Thus, if neurotheology is to get off the ground, it must have as its subject matter a distinct experiential category or set of experiential categories.

This is not just a hypothetical concern. Seemingly different kinds of experience *do* run together in some of the literature. For example, Persinger (2002b, p. 280) hypothesizes that an experience of the “‘sensed presence’ of a Sentient Being,” as induced through weak magnetic stimulation of an area of the brain, is the prototype or experiential foundation for full-blown religious experiences. Why, he asserts this is unclear. Feelings of sensed presence often involve experiencing another being as utterly other than oneself, as detached and alien (Cheyne, 2001). In contrast, many religious experiences are characterized by a feeling of oneness with the cosmos, of a mystical union that is quite different from the sense that another sentient being, wholly distinct from oneself, is present.² So if such claims are to be made plausible, a clearer account is needed of why these experiences are similar in kind.

To demarcate its subject matter, neurotheology not only requires a plausible, explicit taxonomy of different religious, mystical, and spiritual experiences, but it also needs to draw a clear line between these and mundane, everyday experiences. If one is to study the neural correlates of *religious experience*, one must assume that there is such a thing as an intrinsically religious experience. An alternative possibility is that religious, mystical, or spiritual characteristics are not *part of* the experience at all but, rather, religious *interpretations* of experiences that possess no intrinsic religious elements. For example, it could be that many religious experiences are just emotionally charged experiences that are interpreted in religious terms by certain people.

Furthermore, many nonreligious experiences are far from mundane. Take intense feelings of grief, love, guilt, estrangement, and surreality. All of these can be very intense and utterly imbued with meaning, but they do not fall into the familiar categories of religious, spiritual, or mystical? Thus, there is the concern that attempts to study religious experience and the brain risk throwing a diverse range of experiences together while ignoring others, despite there being no arbitrary division between those studied and those cast aside.

All of this is not to say that religious experiences do not all have a common, underlying core. Perhaps they do. A well-known unitary account is that of William James. In his famous *Varieties of Religious Experience*, James (1902) suggests that there is a “nucleus” uniting superficially diverse religious experiences. This nucleus involves a sense that something is not quite right about oneself, the world, or one’s relation with the world. The unease is followed by a solution, whereby one discovers a higher part of oneself, a part that is not isolated from the rest of the universe but is instead bound up with a higher power.

James (1902) claims that differences between religious experiences are the result of different “over-beliefs,” by which he means culture-specific narratives through which the core experience is interpreted and communicated. God is not intrinsic to the experience but is just one over-belief in terms of which it can be interpreted and communicated to others (pp. 507–508).

Maybe neurotheology could adopt a description along similar lines. However, there might be a price. James’s account explicitly focuses on those rare individuals for whom religion is an “acute fever,” rather than a “dull habit” (p. 6), and it is perhaps not applicable to religious experiences more liberally construed. There may also be serious problems with James’s view, which rests on his questionable prioritizing of individual experience over cultural expression. According to James, the over-beliefs are imposed *upon* the core experience. However, it seems that our habits, our practices, our abilities and so forth also feed into our experiences and shape them in all manner of ways. To give an obvious example, think about seeing a sign that says “no smoking.” It is nearly impossible to look at this sign without comprehending its meaning, a grasp of which seems inseparable from one’s

experience of the sign. However, to experience it in that way, one must know how to read a particular language and also be a competent participant in a culture that recognizes both a practice known as smoking and the concept of an environment-specific prohibition applicable to all. Generalizing from any number of similar examples, it is arguable that the notion of a core experience, untainted by culture, is not sustainable. As Charles Taylor puts it:

The ideas, the understanding with which we live our lives, shape directly what we could call religious experiences; and these languages, these vocabularies, are never those simply of an individual. (Taylor, 2002, p. 28)

Any account focusing solely on individuals, or indeed on brains, runs the risk of neglecting the shared social contexts through which experiences are structured. By analogy, if one were to study the nature of baseball, an account that referred solely to the biological capacities of individuals that dispose them to play baseball would not only be incomplete, but largely beside the point, given that the activity of playing baseball is only possible given a particular cultural context. It is this context that explains the *existence* of baseball, rather than “baseball areas” in people’s brains.

Perhaps religious experiences are comparable. Even solitary meditation is performed in accordance with established norms and shared practices that are passed on from generation to generation via cultural, rather than biological, transmission. If historically stable cultural conditions are required before individuals can have experiences of a certain type, interpret their mundane experiences in a certain way, or categorize certain experiences as religious, spiritual, or mystical, then perhaps the brain is not the right place to start looking for answers.

Of course, just as there is variability in people’s expertise at baseball, there may well be differing individual propensities for religious experience, which are explicable in neurobiological terms. However, one could never arrive at an understanding of what baseball *is* just by studying the biological traits of individuals. One would have to start with an understanding of the game before one could make sense of what individuals were doing, how they came to do it, and why they do it. The same may well be true of religious experience and the brain. Unless one already understands something of what religious experience is, studies of relevant brain processes run the risk of descending into confusion.

THE NEURAL CORRELATES OF SOMETHING RATHER VAGUE

So far, I have briefly sketched some problems concerning the nature of religious experience,³ which will need to be addressed by any account of the

relationship between religious experience and the brain. However, it is not unreasonable to suggest that, although neurotheologists need to be mindful of such problems, they are not required to solve them before they can start work. It might well turn out that scientific studies will themselves play a role in distinguishing and clarifying the different categories of experience. To give an overly simple example, if several subjects all volunteer similar verbal reports of an experience but it turns out that two quite different patterns of neural activity are involved, with roughly half the subjects exhibiting each pattern, we might look at their descriptions of the experience again, note subtle differences between them, and realize that what we previously thought was an experience of type A is actually two quite different types of experience, A and B. Neurotheology does not need to solve all the philosophical problems before it can even get off the ground. Instead, it can seek progressive clarification of its subject matter as it proceeds.

With this in mind, I will now look at some specific claims made on behalf of neurotheology. I will suggest that some of the best known work in the area has not satisfactorily resolved the kinds of problems mentioned above, with the consequence that many of the bolder claims made concerning the successes of neurotheology are premature. Although I will focus primarily on a well-known book by Andrew Newberg, Eugene d'Aquili, and Vince Rause (2001), many of the problems I discuss are common to work in neurotheology more generally.

Perhaps the strongest claim that Newberg et al. (2001) make on behalf of neurotheology is that neuroscience has demonstrated that religious, mystical, and spiritual experiences do indeed exist. As they put it, "mystical experience is biologically, observably, and scientifically real" rather than "wishful thinking" (p. 7). The claim is that, regardless of whether or not these experiences turn out to be veridical, they are at least shown to be real. By analogy, the experience of seeing a chocolate cake is a real experience, regardless of whether it is a dream or a veridical perception. But is this claim on behalf of neuroscience defensible? The suggestion seems to be that, without the intervention of science, there would be doubt concerning whether mystical experiences do in fact occur. However, such skepticism certainly does not apply to most other experiences. If I claim to be recalling the holiday I had in Tobago last summer, you would presumably not doubt my testimony until you had scanned my brain to check that the neural pattern was appropriate. And you would not suspend your belief that other people experience trees, stars, music, and the taste of curry until neuroscience had come to your assistance. But perhaps mystical experiences are different, in that they are outside the norm and cannot be supported by other evidence, such as several photographs of me in Tobago or a spoonful of meat vindaloo in the mouth of the person claiming to taste curry. Hence, it might be argued, they warrant a greater degree of skepticism.

Nevertheless, skepticism concerning their existence is still hard to defend. Religious, mystical, and spiritual experiences have been discussed and written about by many thousands of people over the course of thousands of years. Now it seems safe to assume that all these people have had some kind of experience, regardless of philosophical problems involved in specifying what, precisely, such experiences consist of. The alternative would be to brand them all liars or proclaim them incompetent to report in any way on what their experiences are like. So it is unclear why neural correlates should be required to corroborate such a substantial body of testimony. However, maybe neurotheology tells us something more specific about the *nature* of the experience, something absent from subjective reports. Newberg et al. (2001) state that “. . . neurology makes it clear that spiritual insights are born in startling moments of mystical transcendence” (p. 139) and that “[t]he wisdom of the mystics, it seems, has predicted for centuries what neurology now shows to be true: In Absolute Unitary Being, self blends into other; mind and matter are one and the same” (p. 156).

Is this so? Imagine that you had never had a religious experience and had never heard of religious experience. In fact, all you had to go on was the neurobiological data. What could you ascertain about experience from this alone? Could you look at the results of brain imaging studies and conclude that “Absolute Unitary Being” was experienced or that “mystical transcendence” was occurring? The answer is no. Newberg et al. *presuppose* a conception of what the relevant experiences consist of. They claim to discover specific patterns of neural activity correlated with an experiential type, but this discovery clearly does *not* underlie their understanding of what the experiential type consists of or their belief that it exists.

Furthermore, suppose that someone claimed to be having a religious experience and that her pattern of neural activity differed from what is the norm in such cases. Would this be reason enough to dismiss her claim? I suspect not. Consider a fictional scenario where 100 people have their brains scanned in all manner of ways while entertaining the belief that “the Eiffel Tower is in Paris.” Now suppose that in 99 of these people, a specific area of the brain is active while they claim to entertain the belief. In the other person, that area is comparatively inactive, and several other areas are “lit up” instead. Would this be sufficient warrant for maintaining that the anomalous person had a different belief to the others? It would not, given that nobody claims that specific belief contents—such as “*Revenge of the Sith* is a *Star Wars* film,” “Santa Claus exists,” or “Sydney is warmer than the North Pole”—require the same patterns of brain activity in all people. Hence, there are clearly cases where we would not want to say that neuroscience overrides personal testimony. But, one might reply, Paris beliefs are not an appropriate object of study at all, given that they do not comprise an informative psychological kind. Anything one might learn about Paris beliefs would be equally informative with respect

to just about any other belief content; Paris and The Eiffel Tower are incidental. It could be added that Paris beliefs can be associated with all sorts of very different experiences and that neurotheology is preoccupied with certain kinds of experience, rather than abstract beliefs stripped of their connection to concrete experience.

However, the same concern about psychological kinds arises in relation to experience. Suppose one were to study cat experiences in constrained laboratory conditions. A variety of subjects are asked, one after the other, to sit in a chair in the corner of a monochrome square room. At the other end of the room is a large white cat, asleep in a basket. Participants are asked to focus solely on the cat for one minute, and, during that time, their patterns of brain activity are recorded, using whatever technique you like. Now suppose that there are common patterns of activity associated with the experience in all participants. What would this tell us about cat experience? Such studies might well tell us something about *experience and the brain*, but they would not tell us anything about specifically catty experiences because cat experience is not an informative experiential category. We do not ordinarily identify distinct kinds of experience by identifying different kinds of experiential objects, such as dogs, cats, chainsaws, and oranges, given that anything we learn about the structure of experience more generally will be equally applicable to experiences of all these things. Thus, a correlation between experience of entity X and brain activity A need not be remotely informative with respect to the experiential content X.

If correlations between neural activity and religious experience are to be informative, it must be the case that religious experiences, unlike cat experiences, comprise an experiential type about which illuminating generalizations can be made. So, what makes an experience religious? The obvious answer is its content, what it is about, as indicated by Persinger's (2002a) references to the God experience. However, we have just seen that, in other cases, types of experiential object, such as cats and dogs, do not serve to distinguish experiential types. Now, it may be contested that other types of experiential object are different. Take an experience of emotion. Surely this is a common *kind* of experience in a way that a cat experience is not. However, the comparison does not work. Experiences of emotions are not generally experiences of objects called emotions. One experiences objects *emotionally*, rather than experiencing the emotions themselves as objects. Perhaps one might similarly maintain that religious, spiritual, and mystical experiences are ways of experiencing things or forms of experience rather than categories of experiential objects. But this is hard to reconcile with the fact that many such experiences are described as experiences *of* something. So neurotheology seems to be caught on the horns of a dilemma. If the experiences it explores constitute a type in virtue of their objects, then it is hard to see why that type would be worthy of study in its own right.

And, if they involve a way of experiencing, the question arises as to how they can be described so as to make clear what binds them together as a group, without appealing to their objects.

Do Newberg et al. (2001) manage to say anything in support of mystical experience being a distinctive experiential type with informative neural correlates? Consider the following passage:

[humans] are natural mystics blessed with an inborn genius for effortless self-transcendence. If you ever “lost yourself” in a beautiful piece of music, for example, or felt “swept away” by a rousing patriotic speech, you have tasted in a small but revealing way the essence of mystical union. (p. 113)

This seems to indicate that mystical experiences form a continuum with everyday experiences. Now, all our experiences are intricately structured and incorporate different elements to differing degrees and so the question arises as to what makes mystical elements stand out from the rest in such a way that they can be regarded as a distinctive experiential type. Newberg et al. emphasize a sense of oneness with things as the core characteristic and state that in everyday life, by contrast, “we experience that world as something from which we are clearly set apart” (p. 115). However, such pronouncements about everyday experience are simplistic to say the least. In a recent paper (Ratcliffe, 2005b), I try to make explicit some of the many different ways in which we experience our relationship with the world during the course of our everyday lives. Consider feeling detached from things, at home in the world, slightly lost, removed from it all, abandoned, disconnected, empty, powerless, in control of things, trapped and weighed down, at one with nature, part of a greater whole, out of it, at one with life, there, not quite there, part of things, cut off from reality, brought down to earth or unreal. And the list seems to go on indefinitely. There are feelings of strangeness, unreality, oneness, intangibility, belonging, familiarity, completeness, power, fragility, disjointedness, coherence, meaningfulness, emptiness, mystery, unintelligibility, separation and so forth. Some of these terms are synonyms for others, whereas others seem to point to subtly distinct experiences. But the bottom line is that any attempt to force all our experiences into the categories of either mundane separation or mystical oneness would fail to do justice to the varieties of experience and their complex relations to each other.

Even if we assume that mystical oneness is a distinctive way of experiencing, it is clear that we have drifted a long way from specifically religious experience and thus from anything warranting the name neurotheology. In discussing ritual, Newberg et al. (2001) state that “when the unitary states generated by the neurobiology of ritual occur in a religious context, they are usually interpreted as a personal experience of

the closeness of God" (p. 90). This suggests that God, religion, and all manner of other contents are not part of the mystical experience of unity, but are imposed upon it through acts of interpretation. So we seem to have arrived at a rather Jamesian view, according to which multifarious interpretations rest upon an underlying way of experiencing one's relationship with things.

Can worthwhile neurobiological generalizations be made with regard to this way of experiencing? In an earlier publication, Newberg and d'Aquili (2000) acknowledge that the experiences in question are not simple states:

Religious and spiritual experiences are highly complex states that likely involve many brain structures including those involved in higher order processing of sensory and cognitive input as well as those involved in the elaboration of emotions and autonomic responses. (p. 251)

This suggests a recurrence of the cat experience problem, which is not avoided by a shift in emphasis from the objects of experience to oneness as a way of experiencing. Suppose that all the constituents of mystical, religious, or spiritual experiences are common to other kinds of experiences and that there are no neural correlates specific to these experiences and only these experiences. Consider a type of experience A, which is already known to incorporate elements B, C, D, and E, these elements also being present to varying degrees in many other kinds of experience. Now assume that there are neural correlates of B, C, D, and E. Will this tell us anything specific about A? The answer is no. A common pattern of argument in neurotheology is as follows:

1. A incorporates B.
2. There are interesting neural correlates of B.
3. Therefore there are interesting neural correlates of A.

However, what is true of B here need not be true of A. For example, there are all sorts of neural processes specific to visual experiences but that does not make them informative with respect to visual experiences of cats.

Consider Newberg, d'Aquili, and Rause's work on meditating subjects. They report that unusual neural activity is consistently found in the "posterior superior parietal lobe" at the peak of meditation (p. 4). This area is associated with a sense of spatial orientation and so Newberg et al. (2001) hypothesize that the area is starved of input during prolonged periods of physically inactive meditation, resulting in a breakdown of spatial boundaries and a sense of oneness (p. 28). Now it is clear from subjective reports that certain mystical experiences involve a loss of spatial and temporal locatedness. Thus, it should

come as no surprise that brain areas associated with spatial and temporal locatedness are implicated in the experience. However, there is no evidence to suggest the experience is wholly constituted by a loss of spatial and temporal boundaries. Newberg et al. do not enquire as to whether similar brain activities can be found in other unremarkable or very different experiences. So it is not clear that the correlations discovered through such studies pick up on something specific to mystical experience, as opposed to an element common to many, although not all, kinds of experience.

The problem is illustrated more clearly in other claims made by Newberg et al. (2001). For example, they state that “the visual association area may . . . play a prominent role in religious and spiritual experiences that involve visual imagery” (p. 27). It will, presumably, play a role in any experience associated with visual imagery. That neural circuits are specific to B and that B is involved in A need not say anything remotely informative about A. The same kind of logic could be applied equally to experiences of cups of tea. There are plenty of similar examples. For example:

We believe that part of the reason the attention association area is activated during spiritual practices such as meditation is because it is heavily involved in emotional responses—and religious experiences are usually highly emotional. (Newberg et al., p. 31)

If the claim were simply that many religious experiences are emotional, it would hardly come as a surprise. The fact that certain religious experiences are highly emotional is readily apparent from a huge body of testimony and from observation of people lying prostrate on the floor wailing, with tears streaming down their faces, to cite but one of many obviously emotional behaviors that are frequently associated with religious experience. The claim is instead about the neural basis of religious experience. However, it actually relates to emotion and only trivially to the many experiences that involve emotion. All it amounts to, so far as I can see, is that religious experiences have similar constituents to other experiences and will involve brain areas that are associated with those constituents. It says nothing informative about the category “religious experience” and does nothing to address the still unresolved question of whether such experiences even comprise a distinctive experiential category.

This explanatory pattern is not just evident in the work of Newberg and colleagues. Consider one of the best known studies of the neural basis of religious dispositions, carried out by Ramachandran and colleagues (Ramachandran & Blakeslee, 1998). Ramachandran’s findings show that heightened affective response in certain subjects is not stimulus-general, but specific to religious words and icons. Given this finding, Ramachandran goes on to speculate about there being neural structures dedicated to the mediation

of religious experiences. Now, what the study certainly does achieve is a clear distinction between two possibilities, “globally heightened affect” and “specific affective responsiveness,” plus a good empirical case for the latter. What it does not do is tell us anything at all about the relationship between specifically *religious* tendencies and the brain. How can that be? Well, it seems safe to assume that affective responsiveness to particular religious icons is not hard-wired from birth but learned. With this in mind, consider an alternative scenario. Throughout his life, Arnold, who perhaps suffers from focal temporal lobe seizures, has been obsessed by the films of Steven Seagal. Indeed, such is the extent of Arnold’s obsession that his interest in all other stimuli is rather diminished. One day Arnold is taken into a laboratory, and his galvanic skin response is monitored while he is presented with various stimuli.⁴ Among these stimuli are the DVD covers of several as yet unreleased Steven Seagal films, none of which Arnold has yet acquired or even heard of. Sure enough, we find that Arnold’s skin response to these stimuli is far higher than his response to any of the others, including stimuli of a horrific, religious, or sexual nature. What can we conclude from this? Well, we can certainly say something about response specificity, but the content of the stimulus is utterly contingent; it could have been anything. One would certainly not be justified in speculating about a Steven Seagal spot in the brain or embarking on the new science of neuroStevenSeagalology.

What is the difference between the two cases? Granted, the structure of our culture and the significance attached by many people to religious iconography and language make it more likely that Arnold will be aroused by religious stimuli than by Steven Seagal. However, in both cases, I do not think the results tell us anything informative about the relationship between the stimulus *content* and brain biology. Areas of the brain associated with emotion are only contingently related to religion, and studies that tell us something about emotion and the brain need not tell us anything interesting about religion and the brain.

In summary, it seems that certain work in the general area of neurotheology suffers from confusion about its subject matter. It is difficult to see how this science can make significant progress unless these problems can be sorted out or at least lessened. Unless one has a reasonably good sense of the experiential category that one is studying, one’s conclusions will either turn out to be vague or about something else altogether.

Further problems may well arise due to this lack of clarity. For example, without a good sense of what religious experience is, it is difficult to draw a clear line between genuine cases of religious experience and other, perhaps pathological, cases that resemble religious experiences in some superficial respect. For example, the serial killer Peter Sutcliffe, who terrorized the North of England in the 1970s, notoriously claimed that he heard voices of Divine origin ordering him to kill women (Mackie, 1982, p. 180).

Presumably one would want to distinguish Sutcliffe's experiences (if he indeed had these experiences) from those of a meditating Buddhist monk. Perhaps one could restrict talk of religious experiences to nonpathological cases. For instance, Franks Davis (Chapter 8 of this volume) suggests that it is possible to distinguish between healthy religious experiences from various pathologies that are superficially similar. William James (1902, Lecture 1), in contrast, argues that religious experiences are both inextricably entangled with psychopathology *and* of profound spiritual significance. So the issue is not an easy one to resolve. Of more direct relevance to neurotheology is the worry that laboratory studies of religious experience might be exploring artifacts brought about by experimental conditions, experiences that differ from genuine religious experiences had by people in their natural environments. Without a clear sense of what the relevant experiences are, the boundary cannot be drawn.

FUNCTIONS, FABLES AND FAITH

I do not wish to suggest that the problems discussed above are *irresolvable*. Indeed, it is at least conceivable that religious experience will turn out to be a quite distinctive way of experiencing things, supported by dedicated neural circuitry. My conclusion is, rather, that there is insufficient evidence for such a view and, more importantly, that the issue is obscured by substantial conceptual problems. In this section, I want to look at further issues that would arise should the claim turn out to be true. Once we have identified a type of experience and an associated neural structure, where do we go next?

One important question is whether the structure in question has the *function* of generating religious experiences. In addressing this question, it must be kept in mind that, even if there are certain circuits associated with religious experience, they may not comprise a discrete system that does most of the work of generating religious experience. Instead, they could be part of a much larger system. By analogy, my hands are very active when I type but do not constitute an autonomous typing system, the operation of which can be understood in isolation from a plethora of other capacities. Thus, if A plays a role in generating B, it should not be assumed that A is primarily or wholly responsible for B. But let us suppose for now that some such system does exist. What might the function of a biological capacity for religious experience be?

I will start by looking at a currently popular hypothesis concerning the function of religious experience and will suggest that it is problematic in a number of respects, some of which are also likely to plague rival hypotheses. I will then address the question of whether a functional account of the capacity for religious experience could, in principle, tell us anything about whether

such experiences are veridical or illusory, that is, whether they reveal something real or whether they are merely psychological in nature.

Accounts of function are intimately connected with evolutionary accounts of how a biological structure evolved. Indeed, the function of X is taken by many to be synonymous with what X was selected or adapted for. Thus, functional accounts of religious experience often take the form of evolutionary narratives, which explain how a biological structure evolved and why it was favored by natural selection.

When speculating as to the evolutionary origins of any psychological or behavioral trait, it is important to exercise considerable caution, given that much work in sociobiology and evolutionary psychology has been charged with concocting superficially plausible stories on the basis of inadequate evidence. This failing was famously satirized by Stephen Jay Gould and Richard Lewontin (1979), who branded adaptationist accounts concerning the evolved functions of various traits just so stories, no more respectable than Rudyard Kipling's account of how the elephant got his trunk, which involved a crocodile attached to the elephant's nose and a python pulling in the opposite direction, resulting in considerable elongation of the appendage. Similar accusations continue to be made against various hypotheses proposed by evolutionary psychologists.⁵ Are they fair? For present purposes, I remain agnostic with respect to the charge leveled against evolutionary psychology in general. However, I will suggest that the label "just so story" is quite appropriate for certain evolutionary explanations of a capacity for religious experience. I will focus on the claim that belief in God has the function of lessening the fear of death, which would otherwise detrimentally affect the psychological well-being of thoughtful creatures like us, impairing our ability to survive and reproduce. An account along these lines has been proposed by Persinger (2002a), among others:

A biological capacity for the God experience was critical for the survival of the species. Without some experiences that could balance the terror of personal extinction, the existence of the human phenomenon called the "self" could not be maintained. (p. 274)

Persinger claims that by associating oneself with the infinite or with a greater whole, one manages to escape the unpleasant burden of one's finitude and impending death. What can be said for this hypothesis? Well, even leaving aside the concern that there may be no such thing as a species-universal God experience, it is still beset with problems. First of all, correlation is not cause. The experience may have arisen for some other role and only by happy coincidence have the effect of making unavoidable death more bearable. Association of a capacity with a beneficial effect does not entail that the capacity arose because it produced that effect. Second, there is a difference between religious belief and religious experience. Religious belief could, presumably, have arisen

without religious experience. Thus, it is not clear why the death avoidance adaptation should involve a capacity for experience rather than belief by some other means. And, if there are many different routes to religious belief, then a single adaptationist account is unlikely to encompass all of them. Third, there is a failure to consider the possibility that all sorts of other mechanisms could have evolved to block out thoughts of one's inevitable demise or cope with such thoughts. A death thought prevention system would do the job nicely. Another solution would be to wire death thoughts into the sex drive, so that as soon as you start having them, you procreate instead. The question of whether or not we *do* have such mechanisms, which, for the most part, satisfactorily perform the function ascribed to religion, is not even addressed. By analogy, one would not hypothesize that the nose is a propulsion system without first having given due consideration to the role played by limbs. Fourth, and perhaps most problematic, is the assumption that an understanding of death really did pose a threat to our ancestors' survival. Last week, I had a pub conversation with a lecturer from the English Department at Durham University, who informed me at length that inevitable death without hope of an afterlife did not bother him in the slightest. Despite my own protestations that death was horrific and somehow metaphysically unacceptable, he would not concede. Now I don't know how many people are indeed troubled by the prospect of death, in what ways, and to what extent. And I don't know whether religious people are less preoccupied with it than others or, alternatively, equally preoccupied by it but not as horrified by it. Even if death did pose less of a problem for them, the direction of causation would be unclear. Do people become religious because they are *already* unable to grasp the possibility that death really is the end, or do they have fewer problems with death because of their religious dispositions?

Such questions need to be carefully addressed before one starts positing death-avoidance functions. Furthermore, even if current humans, atheists in particular, are often troubled by death, it by no means follows that our ancestors were. I tend to think about death rather more when I'm not concentrating on other, more immediate things. An urgent piece of work or a particular threat to my well-being tends to shift my attention somewhat. Furthermore, as an academic philosopher, I have far more time to think about death than many people, including, I suspect, our Pleistocene ancestors. They may well have had so much else to contend with that the prospect of eventual death was the last thing on their minds. So it is unclear that death thoughts amounted to a problem in the first place, and it is also unclear why religious experience should have emerged as a solution. It might also be argued that unwavering religious belief could have a similarly detrimental effect to behavioral paralysis in the face of death. If you know you have eternal life in a better place, why worry about this world? The resultant apathy would surely not have conferred a survival advantage. So this all looks suspiciously like a just so

story. To make things worse, Persinger (2002b) just assumes that religious experience has some function:

From a Darwinian perspective, we might appreciate the maintenance of the temporal lobe experiences that promote the God belief. If there had not been survival value associated with both the experience and the belief in gods, these behaviors should have been selected against long ago. They should have been deleted from our genetic expressions. (p. 290)

The argument is that for any current human trait X, X would not now exist unless X conferred some past survival advantage. Presumably this must apply to traits such as a disposition toward heart attacks, brain hemorrhages, unpleasant skin growths, constipation, and lung cancer. In response, it could be argued that such things are not normal, healthy everyday features of organisms, whereas a capacity for religious experience, like eyes, ears, and lungs, is. However, even if one were to accept the highly questionable view that the capacity for religious experience is a healthy trait that many of us exercise frequently, the argument still fails. Tooth decay, bad breath, and occasional instances of very poor reasoning are pretty much universal throughout the species but don't merit functional explanations. The same applies to countless other bodily characteristics, capacities and behavioral traits. So the argument doesn't even get off the ground.⁶

Now perhaps other such stories have more going for them. However, this case study does bring to light a more general question; that of how any such account could be supported by adequate evidence. What evidence could possibly arbitrate between a host of rival stories, given that most of the historical facts may not just be currently unavailable but irrevocably unavailable? As Robert Richardson (2001) has argued, in the case of many evolutionary stories concerning human cognition, the relevant evidence may be impossible, in practice, to obtain and "without history, evolutionary explanation is empty" (p. 334).

But let us suppose that the conceptual and evidential problems are eventually overcome and that a plausible functional account of religious experience is formulated. The question I want to look at now is that of whether such an account could constitute evidence for or against the view that religious experiences incorporate genuine communication with the Divine, apprehension of the true nature of Being, or something along similar lines. Ramachandran and Blakeslee (1998) explicitly adopt a stance of principled agnosticism concerning this question. Newberg, d'Aquili and Rause (2001), however, suggest that mystical experiences do indeed comprise grounds for belief in a higher reality:

[We] saw evidence of a neurological process that has evolved to allow humans to transcend material existence and acknowledge and connect

with a deeper, more spiritual part of ourselves perceived of as an absolute, universal reality that connects us to all others. (p. 9)

However, what is clear from their discussion is that this view has no empirical basis. None of the studies cited provide any evidence whatsoever for or against a “universal reality that connects us to all others.” It is just unsubstantiated speculation, unconnected with the science (Pigliucci, 2002).

Nevertheless, I want to suggest that a *comprehensive* account of the neurobiology of religious experience would *inevitably* have considerable repercussions for the view that such experiences involve contact with something real, be it God or a higher reality. Thus, it would also have repercussions for the question of whether religious beliefs are well grounded, in so far as such beliefs are based on religious experiences. This is something that I argued in a 2003 article. I will summarize the argument here and elaborate it in certain respects.

Why should a biological account of religious experience have any implications for the epistemological question of whether one should believe in the reality of what one experiences? Well, consider, first of all, the possibility that religious experience is the result of a malfunction. Massimo Pigliucci (2002) succinctly states the implications of such a hypothesis:

if we realize that mystical experiences originate from the same neurological mechanisms that underlie hallucinations from sensorial deprivation and drug-induced “visions,” I bet dollar to donut that the reality experienced by meditating Buddhists and praying nuns is entirely contained in their mind and is not a glimpse of a “higher realm,” as tantalizing as that idea may be. (p. 270)

The bottom line is that incredulity is the best bet when an experience arises from malfunction and, if that is so with religious experience, it is best explained without reference to the supernatural. Cheyne (2001) advocates a similar position with regard to certain sensed presence experiences, which he explains in terms of malfunctioning activation of vigilance systems in the brain. Given that these experiences can be traced to specific brain processes *going wrong*, rather than the intervention of an external source, Cheyne maintains that they call for a “straightforward naturalistic explanation” (p. 136).

The tension between a malfunction explanation and the claim that the resultant experiences are veridical becomes unavoidable if one accepts a noncontingent connection between function and well-formed belief. Certain theists and atheists alike have argued that well-formed beliefs just are those that are generated by properly functioning cognitive apparatus operating in normal environmental conditions.⁷ If this is the case, then any belief arising as a result of malfunction is, by implication, not to be trusted.

Of course, malfunction is only one possibility. Another is that religious experience is an unavoidable by-product or side-effect of some other functional cognitive process. An analogous example would be the human chin, which, it has been argued, emerged as an inevitable side-effect of building a functional human-type jaw (Gould & Lewontin, 1979). Again, this would seriously threaten the case for veridicality. If the historical emergence of something can be fully accounted for in terms of some other wholly non-mysterious phenomenon, then there is no need to resort to an additional supernatural element to explain its presence.

However, what about an account that assigns a *function* to religious experience? Again, no such account will be neutral with respect to the question of veridicality. If a *comprehensive* functional account made no reference to the causal role of the supernatural in producing the experience, this would imply that the supernatural had no role to play in the genesis of the experience. Otherwise the account would be incomplete. If the function of religious experience were, say, to communicate with God, then any functional account that did not make reference to God would be either false or highly impoverished.

Thus, it would seem that any *complete* functional account will constitute evidence either for or against veridical religious experience and, consequently, for or against the credibility of any religious beliefs that are founded in the experience. However, things are not so simple. Investigation of the function of religious experience cannot be a wholly empirical affair, meaning that one cannot simply read functions off the natural world without first making significant assumptions. For example, if one were to examine a fish and attempt to explain the function of its fins, one could only do so if one entertained, at some point in one's examination, the possibility that water were a feature of the fish's environment. To venture a more vivid example, in *The Country of the Blind*, a short story by H. G. Wells (2004), the protagonist, Nunez, finds himself in the valley of the blind, where all the inhabitants lost their sight hundreds of years ago and passed on the trait to future generations. This valley has cut off from the rest of the world for hundreds of years and so the whole population has been deprived of any experience of sighted people until the arrival of Nunez. Indeed, they have even lost the concept of sight. Nunez tries repeatedly to convince them that he can see. However, they refuse to admit the possibility of sight and instead interpret his various assertions as reports of delusional experiences. They hypothesize that these delusions have their source in the enlarged, rapidly moving globes on either side of Nunez's nose and thus propose to cure his delusions by removing them.

The point of the example is that biological structures are interpreted and assigned functions only on the basis of prior assumptions about possible constituents of the environment, such as the ambient optic array in the case of sight. If such things are denied, the biology will be interpreted differently,

albeit wrongly in the case of Nunez's eyes. The same applies to the function of brain areas, which will be interpreted through a backdrop of presuppositions concerning what the world is like. Now this is not a problem in the majority of cases, where everyone agrees as to what the relevant features of the environment are. However, it is extremely problematic when it comes to religious experience, a case where some people take God to be a very real part of the world that it is possible to commune with, while others begin with the assumption of a Godless world. To pursue the analogy with Wells' story, we don't know who is blind and who is not.

Neuroscience cannot provide decisive evidence for or against the existence of cats, coriander, kestrels, or curtains solely by monitoring the brain processes that occur when such entities are perceived, given that the processes in question would only be interpreted as relating to those entities if their existence and presence were already presupposed or at least regarded as likely. And I suggest that a similar lesson applies to so-called religious experiences. Regardless of whether or not one believes in a higher being or greater reality beyond the mundane world, one can interpret the data so as to accord with one's prior beliefs. The science itself will not, in this case, be able to arbitrate between conflicting presuppositions.

What I am *not* suggesting here is that naturalism and various religious belief systems amount to utterly rigid standpoints that cannot be arbitrated between. So the result is not endorsement of a species of relativism, according to which two radically divergent worldviews can assimilate all the information they like, in such a way as to cohere with their own basic assumptions. I am making the more modest suggestion that neuroscience just does not have enough of an empirical kick to do the job. Something far less subtle and easy to absorb into one's prior worldview would be required to break the deadlock and challenge entrenched patterns of interpretation. Why should we expect neuroscience to come up with the goods when much more dramatic evidence pertaining to the grounds for religious conviction is available to us in the form of famines, plagues, tsunamis, genocidal maniacs, acts of self sacrifice, visions of futility, feelings of meaningfulness, the beauty of nature and the brutality of nature, the combined impact of which has failed to settle the issue?

FEELING IS BELIEVING?

I will conclude these rather skeptical musings on a more positive note. Despite the various empirical and conceptual problems associated with research on religion and the brain, I do think that neuroscience can cast at least some light on the nature of religious experience and belief. In this section, I will provide a brief sketch of what I take to be an interesting avenue of research.

Subjective reports and neurobiological studies generally emphasize the central role of *emotion* in religious experience, and I suspect that research into the nature of emotion can contribute to an understanding of religion. The research in question is not specific to religion. However, it is something that can be applied to the topic of religious belief and experience. Hence, the outcome would be an interdisciplinary study of certain aspects of religion, rather than a new science of neurotheology. There are insufficient grounds for positing religion-specific brain processes, and many, if not all, of the emotions involved will not turn out to be religion-specific. So I don't think talk of God spots or a bold new science of religious experience is defensible. But it is still possible to understand certain aspects of religious belief and experience by exploring the role of emotion.

Believing in the existence of God is not like believing that the Eiffel Tower is in Paris. For many believers, it is a very different *kind* of commitment; it is imbued with feeling rather than being a proposition that one can indifferently assert from a standpoint of neutral detachment. The emotional element is not just something that accompanies religious experience and commitment but is integral to it.

Philosophical discussion of religious belief is littered with attempts to prove the existence of God or at least provide good grounds for religious belief on the basis of reason and evidence. Accompanying these, there are various arguments aimed at showing religious belief to be unwarranted. For example, there are many arguments starting from the well known problem of evil, which attempt to show that the world contains too much evil for it to be the product of an all good, all knowing, all loving God.⁸ Although many such arguments and counter-arguments are extremely sophisticated, I, like many others, have always had the feeling that they somehow fail to connect with the realities of religious belief. Belief in God is not, ordinarily at least, a proposition that one asserts on the basis of reason or evidence. Rather, it is something that is *felt*. And the same can be said for other spiritual and mystical convictions that do not incorporate a monotheistic God. That heightened emotions play a role in religious experiences and temperaments is indicated by recent work on God and the brain, which emphasizes the role of affect in religious experience (Newberg et al. 2001) and the emotional nature of many people's responses to religious language and imagery (Ramachandran & Blakeslee, 1998). As Ramachandran and Blakeslee (1998) say:

I find it ironic that this sense of enlightenment, this absolute conviction that Truth is revealed at last, should derive from limbic structures concerned with emotions rather than from the thinking, rational parts of the brain that take so much pride in their ability to discern truth and falsehood. (p. 179)

Such a view does not depend on more specific hypotheses concerning religion-specific brain structures or religion-specific experiences. All it requires is that the various experiences that we term mystical, religious, or spiritual often incorporate heightened emotion. And the neuroscience does at least indicate that much. Even so, it should be noted that this is hardly a new discovery, given that the role of emotion in religious experience was recognized long before neuroscience came along. Nevertheless, neuroscience does perhaps provide further corroboration for it and also has the potential to cast new light on the nature and role of the relevant emotions.

But surely, one might object, the claim that emotion plays a pivotal role runs the risk of trivializing religious conviction, by reducing it to mere feeling. However, this is not the case at all. Recent work on emotion increasingly recognizes that emotions and feelings are not just bodily twinges; they are ways of experiencing the world that contribute to our deepest commitments, our sense of how things are.⁹ One experiences the world and thinks about things through a framework of commitment, which does not take the form of a set of deeply entrenched propositions but, rather, a background feeling of what is and should be the case. This is beautifully articulated in numerous works by William James and applied specifically to religion in his *Varieties of Religious Experience*.¹⁰

According to James, one believes as a whole person, as an active, feeling agent rather than a cold, calculating mind that could, for all events and purposes, be disembodied. Our most fundamental sense of “what is” is not something we acquire by prowling around and looking for evidence. It is felt with a form and degree of conviction that is much deeper. As James (1902) puts it:

Individuality is founded in feeling; and the recesses of feeling, the darker, blinder strata of character, are the only places in the world in which we catch real fact in the making, and directly perceive how events happen, and how work is actually done. Compared with this world of living individualized feelings, the world of generalized objects which the intellect contemplates is without solidity or life. (pp. 501–502)

Religious belief, he says, is something had at the level of these “living individualized feelings.” To believe in God is not simply to place a tick next to the sentence “God exists.” Such utterances are superficial and imperfect articulations of the underlying conviction. The convictions that comprise one’s deepest sense of how the world is are constituted by feeling, and it is only upon these unarticulated core convictions that reason goes to work:

in the metaphysical and religious sphere, articulate reasons are cogent for us only when our inarticulate feelings of reality have already been

impressed in favor of the same conclusion. . . . The unreasoned and immediate assurance is the deep thing in us, the reasoned argument is but a surface exhibition. (p. 74)

Both having a sense of “the more” and having a sense that “this is all there is” are, for James, forms of responsiveness to the world that come preformed before reason even gets a look in. Whether one is an atheist, a theist, or something else is not usually an outcome of deliberation. It is a presupposed receptivity to things, a background sense of how things are with the world. Any understanding that fails to recognize this element of our lives and takes a belief in God to be the explicit positing of some entity, analogous to positing the existence of Paris, will thus lead to a distorted conception of religious conviction. One can draw on such insights without committing to James’s individualism, which I criticized in the first section of this chapter.

Is there any way of arbitrating between different background convictions, of deeming some well-formed and others not? This question is complicated by James’s claim that certain truths can only be recognized by one who is already committed in some way, just as a true friendship can only reveal itself as what it is if one first adopts a background of trust and commitment. As James (1956) puts it, “there are . . . cases where a fact cannot come at all unless a preliminary faith exists in its coming” (p. 24). Thus, it is not enough to simply look and judge.

All sorts of tricky questions then arise as to whether some feelings are better guides than others, whether some are intrinsically religious, mystical, or spiritual, and how one might go about demarcating healthy, truth-disclosing backgrounds of commitment from pathological experiential forms and dead ends. Further questions arise concerning the relationships between believing, feeling, emoting, and experiencing. Answering these questions will not be an easy task and applying the answers so as to cast light on the nature of religion will require a level of understanding, caution, and careful interdisciplinary engagement between philosophy, theology, and various scientific disciplines that is absent from so-called neurotheology.

NOTES

I am grateful to Beth Hannon and Benedict Smith for helpful comments on an earlier draft of this chapter.

1. See, for example, the article “This is your brain on God” in *Wired Magazine* 7, no.11 (November 1999).

2. As Emmons and Paloutzian (2003, p. 381) observe, “how religion and spirituality are conceived and measured vary from study to study.”

3. I will alternate between the terms “religious,” “mystical,” and “spiritual,” as I address different authors and arguments. I will sometimes use them interchangeably, with “religious” as my default term. This will not have any repercussions for my overall argument.

4. Galvanic skin response is an indirect way of measuring emotional arousal. When one is emotionally aroused, even slightly, the palms sweat and moisture content increases. This can be detected through increased electrical conductance.

5. For several such criticisms, see the essays edited by Rose and Rose (2000).

6. This kind of argument structure is sadly not restricted to Persinger’s work. For example, Alper (2002) claims that “every trait we possess, from stereoscopic vision to our opposable thumbs, must have a specific reason for having emerged in us. Since the driving force underlying all evolutionary processes is the preservation of a species, every trait must somehow serve to increase our species’ chances of survival” (2002, p. 293). Even leaving aside the fact that natural selection seldom, if ever, acts upon species, this kind of assertion is clearly misguided. Alper, like Persinger, assumes it as a premise for a death-avoidance account of religious experience.

7. See, for example, Plantinga (1993) for a theistic version of this view and Papineau (1993) for a naturalistic account.

8. See Mackie (1982) for one of many excellent discussions of such arguments.

9. See, for example, Damasio (1995, 2000). For several recent philosophical accounts of emotion, see Solomon (2004).

10. See Ratcliffe (2005a) for a detailed discussion of William James’s view of emotion.

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THE BRAIN, RELIGION, AND BASEBALL:
COMMENTS ON THE POTENTIAL FOR A
NEUROLOGY OF RELIGION AND
RELIGIOUS EXPERIENCE

Warren S. Brown

SETTING THE STAGE

The neurological study of religion, religiousness, and religious experience described in this volume is a new and developing field. While religious symptoms manifested by particular patients with neurological disorders have been described in the neurological literature over the last century, in the past decade there has been a significant increase in experimental research in this area. Thirty years ago an entire volume on the neurology of religious experience scarcely would have been possible. The development of a significant body of experimental research on neural correlates of religious behavior and experiences has even led some to designate this a unique field of study, variously called “neurotheology” or “theobiology” (Rayburn & Richmond, 2002).

This field of study, like the neuroscience study of other important high-level human capacities, has been notably accelerated by the development of techniques of relatively noninvasive forms of functional imaging of brain activity (e.g., functional MRI, PET, SPECT, multichannel EEG, MEG, etc.). These techniques have allowed investigators to study brain function *in vivo* during many forms of cognitive, emotional, and psychosocial mental activity.

The chapters of this volume cover a wide variety of perspectives on the neurology, neuroscience, and developmental psychology of religiousness and the religious experiences of persons. However, before we can adequately understand this research, a number of issues regarding the nature of religion

and its study need to be resolved. This concluding chapter will discuss the chapters of this volume and, more generally, the field of the neurology of religion and religious experience with respect to several more general questions and issues.

In the second section (“What Sort of Thing Is Religion”), I take up the issue of what sort of thing religion is and what other domains of human thought and behavior religion is most like. In the third section (“Appropriate Levels of Scale and the Scientific Study of Religion”), I consider the neurology of religious experience with respect to levels of scale of scientific study (micro to macro) in attempt to determine if religion and religious experience, as scientific variables, are at a level of scale appropriate for neurological study. The fourth section (“Neurology of Religion and the Cartesian Worldview”) describes the effects of a Cartesian worldview on our thinking about religion. The issue of abstract concepts and misplaced concreteness is addressed in the fifth section (“Reductionism versus Emergence”). Finally, in the sixth section (“Guidelines for a Nonreductive Neurology of Religiousness”), I offer my opinion regarding how the neurology of religion and religious experience ought to proceed and what might be accomplished in this area.

WHAT SORT OF THING IS RELIGION?

To have a coherent and meaningful neurology of religion, it is important to have clearly in mind what it is that one wishes to study. Is religion a fundamental and unique form of brain function? Or is it a human capacity reliant on an interactive combination of many basic brain functions—that is, a conglomerate of individual human capacities such as intelligence? Or is religion not a phenomenon of individual persons at all but, rather, a form of human interrelatedness and social activity?

One way to approach this issue is to consider what other domain of human functioning religion is most like. First, let us consider whether religiousness is a human cognitive ability that is like the capacity for language or music and thus can be studied in a manner similar to the neurological study of these capacities. Candace Alcorta (Chapter 4, this volume) argues that religiousness is such a basic human capacity. She says, “Music, language, and religion are all cultural constructions that must be learned through social transmission; however, both the capacity for and constraints on such learning appear to be ‘hard wired’ in all human brains. . . . [O]ur ability to speak any language, enjoy any musical tradition, or engage in any religious experiences all appear to derive from genetically encoded neural capacities common to all humans” (p. 3). From the point of view of neurology, the critical claims made by Alcorta are that, while the specific expressions of religion are learned, religiousness itself is “hard wired.” Such “hard wiring” implies that there exists a unique neurophysiological substrate that is not shared by other

neurocognitive processes, and that this substrate is genetically endowed. In favor of this view of religiousness, Alcorta relies primarily on cultural similarities in religions and religiousness, as well as her theory that religion is an “experience expectant” system with a critical period for its development.

Before discussing further the claim that religion is like language or music in its neurological substrates, we must recognize that neither “language” or “music,” per se, are capacities specific enough for neurological study. With respect to language, it has become increasingly clear that the neurology of language must be studied with respect to more refined cognitive contributions. In fact, even the division of language into “expressive” versus “receptive” capacities, widely utilized in clinical settings, is not sufficiently fine grain for neuroscience study. To track the neural systems involved one must focus on such subparts of language as syntax, semantics, lexicon, phonology, graphemics, etc. Only by fractionating language into such cognitive subcomponents can one make reasonable sense of the neural systems that participate in the emergent, abstract property we refer to as language (e.g., see Boller, Grafman, & Berndt, 2001).

Music is very similar to language with respect to neurological study. Like language, there is the expression of music and the appreciation of music. Both of these sub-domains are composed of multiple contributing capacities, each of which are more likely to have discrete neural systems that would be amenable to neurological study. For example, musical appreciation requires perception of rhythm, pitch, melody, harmonics, and emotional engagement. Expression of music also engages various motor skills that contribute to vocal or instrumental musical expression. Finally, music involves, in some circumstances, a unique form of written notation. (For a review of the neuropsychological study of music, see Peretz and Zatorre, 2005).

So, to the degree that individual religiousness is like language or music, it is also not itself a thing that can be studied at the level of neurology. One must first fractionate the behaviors and experiences into their cognitive subcomponents and then study the many contributing processes to find relatively unique or specific neural systems.

However, there are some very critical ways in which religiousness is not like either language or music. First, for both language and music there exists an extensive literature suggesting specific syndromes associated with relatively localized areas of damage to the brain. For example, various forms of language disorder (aphasia, alexia, or agraphia) are associated with damage to specific brain areas such as the left superior temporal gyrus, the left angular gyrus, and left inferior frontal lobe (Boller et al., 2001). While neuroimaging has made it clear that language processing always involves a large bihemispheric network, there are nevertheless rather specific symptom complexes associated with localized left hemisphere brain damage. While the syndromes are less clearly described for music, again there are consistent

reports of syndromes of musical disability associated with localized brain damage (Peretz, 2002; Peretz & Zatorre, 2005).

In contrast, there are not religion-specific syndromes or disorders that are associated with any particular areas of the brain. The closest candidate is the religious manifestation of temporal lobe epilepsy (TLE), well described by Stephen Schachter (Chapter 4 of this volume). However, the religious symptoms associated with TLE are only a small part of a wider variety of symptoms, and these symptoms can all be fairly well subsumed within more basic problems associated with deepened emotional responses and increased attribution of personal significance. Similarly, the impact of Parkinson's disease on religiousness (as describe by McNamara et al. in Chapter 1 of this volume) is a reflection of a more general outcome related to reduced interest in most daily activities and reduced initiative. Thus, religiousness is clearly not like language and music with respect to specific neuropathology and specific behavioral outcomes.

Behind much of the discussions of a neurology of religiousness is the assumption that genetics has endowed humankind with religious capacities or tendencies. Linden Eaves (2004) has presented evidence suggesting genetic contributions to religious tendencies such as church attendance, self-transcendence, and conservatism. However, these tendencies are hard to distinguish from more general aspects of personality and temperament, and Eaves does not present data that would support distinct genetic contributions to these aspects of religiousness. Alcorta (Chapter 4, this volume) argues in favor of a genetic contribution to religiousness because religious practices can be found in nearly all cultures. However, it would be difficult to identify aspects of religiousness that are sufficiently consistent across cultures to be a candidate for common genetic influence. Despite the fact that we can group the wide variety of cultural manifestations within the single abstract concept "religion," the variety of cultural expressions of religion are arguably much greater than the cultural variations associated with either music or language. Similarly, it would be hard to argue that there has been a sufficient duration of time since the appearance of complex cultures within *homo sapiens* for the genetic evolution of specific brain systems for something as complex as religiousness. Thus, it is more likely that religion is ubiquitous due to cultural evolution and transmission, rather than genetic evolution (Ayala, 1998), and that the genetic factors that have been suggested by Eaves have an influence on the form and degree of participation of specific persons via more general personality factors.

All of this suggests that we must look elsewhere for an appropriate metaphor for understanding the nature of religiousness. Matthew Ratcliffe (Chapter 5 of this volume) suggests the possibility that religion is more like baseball—a cultural and sociological concept that summarizes a wide variety of group and individual activities, events, and experiences. Certainly the

concept of “baseball” includes a very complex array of behaviors and experiences. It encompasses group participation as either spectators or players. For participants, baseball represents a particular set of motor skills and a form of group activity. For the dedicated fan, it is a topic of continual interest, conversation, and occasional attendance at games. Baseball can involve moments of intense emotional involvement (e.g., the emotion released by a walk-off home run to end an important game), longer periods of routine (e.g., practice sessions for participants or spring training for the fan), and certain ritual-like practices (e.g., pre-game and between-inning warm-up for players, the seventh-inning stretch, singing the National Anthem, etc.). For some, baseball is a complex entertainment business. Clearly, baseball involves many complex layers of interpersonal and social organization. We should consider the possibility that religion is not itself a basic cognitive process like language or music but, rather, is a more broadly inclusive social phenomenon like baseball.

The one critique of the baseball metaphor is that baseball is culturally not as prevalent as religion. Alcorta (Chapter 4, this volume) believes religion to be a fundamental human capacity because it is culturally ubiquitous. However, it would not be hard to argue that soccer (or “football” for most of the world) is a reasonable analogy since most of the world plays soccer. In addition, a wide variety of other games with the basic structure of soccer (e.g., American football, rugby, and basketball) are played within many different countries and cultures. A game not unlike soccer was played even by the ancient Aztecs and Maya.

If baseball (or soccer) is a better model for religion than either language or music, what would be the implications for neurological study? First, we would not expect to find a specific neurology of baseball—that is, no unique neurological systems that would contribute specifically to baseball and not to other forms of life. Baseball is neither sufficiently unitary as an experience or event, nor sufficiently temporally bound for study at the level of neurology. Second, we would not expect neuropathology specific to baseball, although many forms of neurological disorder might have an impact on different forms of participation in, or appreciation of, baseball. Thirdly, it would be somewhat far-fetched to imagine an evolution of the specific capacity for baseball, or to argue for the survival advantages of baseball to individuals or social groups, or to argue that the specific capacity for baseball is “hard wired.”

It is more reasonable to consider baseball a complex social emergent of many more basic sociocultural systems involving a wide variety of activities and experiences that, in turn, piggy-back cognitively, neurologically, and evolutionarily on a large number of more general cognitive capacities and skills. Thus, both religion and baseball are abstract concepts incorporating a wide range of human behaviors and experiences that should not be reified in a way that presumes these abstract concepts point to unitary and fundamental

human capacities available for study at the level of the brain. Thus, from the point of view of a naturalist neuroscience (although not from the viewpoint of theology), religion is more accurately understood as a large encompassing social and cultural phenomenon like baseball, rather than a fundamental human capacity like language or music.

To put this same point in a slightly different light, part of the question to be considered prior to engaging in any neurological study of religion is whether religion is essentially individual or corporate—within individuals persons or between persons (or persons and social contexts). If religion is primarily corporate—that is, if it exists in the interpersonal, social, and cultural domains—then any study at the level of neurology cannot be about religion, but must be about the neurology of more general cognitive and psychosocial functions that are engaged by a very particular form of interpersonal and social interactions in particular contexts. There would, therefore, not exist a neurology of religion, *per se*, nor would there be a neurology of particular forms of religious behavior or experience but, rather, a neurology of contributory neuropsychological systems that interact within the individual and between the individual and the socio-cultural environment, such as to allow for the emergence of religious behaviors and experiences.

APPROPRIATE LEVELS OF SCALE AND THE SCIENTIFIC STUDY OF RELIGION

The nature of an appropriate neuroscientific study of religion and religious experience can also be understood in terms of a hierarchy of the sciences with respect to level of scale of the phenomena being observed—extending from micro levels to more macro views of human functioning. At the most micro level are physics and chemistry. Moving to a slightly more macro level is biochemistry, including study of biological molecules like DNA or neurotransmitter receptors. At a higher level would be the study of the activity of neural cells. At an even higher level, we encounter research on neural interactions in local networks (such as studies of cellular interactions within the spinal cord, hippocampus, or olfactory bulb). Further up the hierarchy is the study of how such local systems interact to allow for properties like visual and auditory sensation, basic motor control, control of vegetative systems, and stereotypic behavior patterns.

At a still higher level, we begin to be able to use low-level psychological terms to describe what is being studied, such as perception, memory, attention, emotion, planning, and so forth. Here it becomes clear that the specifics of the functioning of these neural systems are formed by environmental interactions, mostly during childhood. For example, the specifics of the phonological systems of language are formed during early language experience, although the local circuits for this processing can be found at similar locations

within the brains of almost all normal individuals in all cultures. At a more macro level still, we encounter more global attributes such as personality or intelligence. Here we are referring to aspects of whole persons to which many brain areas and brain systems contribute. This micro-to-macro continuum extends on into the social and cultural domains in which higher-level systems emerge from the interaction of individual persons.

One of the important implications of this roughly described micro-to-macro continuum is that appropriate scientific conclusions regarding relationships between phenomena are difficult to draw when skipping over many levels. At the most extreme, it would be hard to conceive of a neurochemistry of baseball, since this would skip over very many levels of human functioning. While a neurochemical change might alter one's experience of baseball, it would do so indirectly by altering neurological and neurocognitive functions at many intervening levels that would have impact on a very wide variety of behaviors and experiences beyond just baseball. It would not be very scientifically meaningful to attempt to establish a direct relationship between a biochemical change and the participation in or experiences of baseball. The appropriate scientific conclusion would be about the effect of the biochemical change on particular forms of brain function, and the impact of these changes on rather generic forms of human behavior or experience that, in turn, might be involved in baseball. Conclusions about baseball, *per se* (even if baseball provided the context for observing the behavioral impact of the biochemical observation), would be inappropriate without considerable discussion about, and experimental evidence regarding, changes at many levels of intervening human function that are contributors not only to baseball, but also to many other domains of human life.

Let me take as an example of this hierarchy of complexity the relationship between neurochemistry, frontal lobe function, and religiousness described by McNamara (Chapter 9 of this volume). A wide range of neurophysiological, neurological, and behavioral data are surveyed to suggest the important role of dopamine systems and the prefrontal cortex on behavioral inhibition, cooperative social behavior, and religion. One might parse the data that McNamara presents into something like the following micro- to macro-hierarchy of function: First we have genetic contributions to the neurochemistry of dopamine (particularly the enzyme COMT), as well as genetic contributions (most likely less direct) to whatever processes control growth (and size) of the prefrontal cortex. Second, during the very complex interactive biological processes of prenatal development, dopamine neurons extend their axons to innervate the prefrontal cortex, and prefrontal neurons extend their axons "downstream" to innervate and modulate lower-level brain systems. This, then, allows for the emergence of the fundamental neuropsychological processes of executive control and inhibition of action. Capacities for inhibition of action lead, in turn, to the possibility of engaging in cooperative social behavior, including

the potential for those behaviors that constitute, in the evolutionary story provided, “costly signaling.” This capacity allows, in turn, for the social and cultural emergence of religious rituals, mores, and beliefs, which work recurrently back on the individual to develop virtues and character. Thus, in this quite plausible story, there are many steps between basic brain processes (genetics, neurochemistry, and functional systems) and complex social behaviors such as religiousness. The relevant neurological processes described are not specific to religiousness, but are properties of brain processing that serve the more general neuropsychology capacity of executive function.

A similar view might be taken of the description of religious conversion presented by Paloutzian, Swenson, and McNamara (Chapter 7 of this volume). In their theory, religiousness (and, thus, religious conversion) is a product of a more general cognitive capacity for meaning making (involving “emotions, actions, beliefs, expectations, and contingencies,” p. 6). Meaning making is, in turn, the product of interactions of a number of brain systems (involving the frontal, parietal, and medial temporal lobes). I suspect that even this 3-level analysis, while a very useful theory, is nevertheless a simplified summary encompassing a number of additional, discernable, intervening levels of function.

So, with respect to the micro-to-macro hierarchy of increasingly complex systems, we need to be clear where religion lies and whether it is sufficiently “close” to brain function to imagine specifically religious brain systems and to allow the search for correlations that are scientifically meaningful (i.e., correlations that imply direct, or nearly direct, causal relationships). Is religion an immediate cognitive emergent property of brain function involving domain-specific brain systems, or is religion a phenomenon many levels of emergent properties removed from brain functioning? Nobel Laureate Roger Sperry once expressed the problem of the gap between psychological and neurological phenomena in this way: “An objective psychologist, hoping to get at the physiological side of behavior, is apt to plunge immediately into neurology trying to correlate brain activity with modes of experience. The results in many cases only accentuates the gap between the total experience as studied by the psychologist and neuronal activity as analyzed by the neurologist” (Sperry, 1939, p. 295). It would seem to me that religion is not just psychological but, rather, a very high-level property of human sociocultural participation that is dependent on interactive contributions of many psychological (cognitive) systems that themselves emerge from interactions between a number of more basic brain systems. If religion entails social interactions, the gap described by Sperry becomes even greater.

My use of the term “emergent” is not meant to imply that something emerges that is nonmaterial (like a soul or mind in the Cartesian sense). New *properties* can emerge in a complex dynamic system by harnessing the activity of the lowest level physical constituents (atoms, molecules, or neurons) into

causally efficacious interactive patterns (see the discussion of complex dynamic systems in the fifth section).

NEUROLOGY OF RELIGION AND THE CARTESIAN WORLDVIEW

Study of the neuroscience of important, high-level human capacities is plagued by the remnants of a Cartesian worldview. Descartes gave Western culture a strong notion of the distinction between body and soul (or body and mind). The body, for Descartes, was a physical machine. However, unable to imagine how rationality could be manifest by a machine, Descartes argued that the soul (or mind) is a distinct nonmaterial entity. As the seat of rationality, the soul was presumed to be hierarchically superior to the body, and more important. In addition, this hierarchically more important soul (or mind) was presumed to reside inside the body.

The discussions of religious experiences and behaviors and brain function within this volume lean strongly toward an embodied (nondualistic) view of human religiousness. However, even within such a nondualist and generally materialist understanding of persons, it is hard to avoid the idea that the most important aspects of being human resides inside the head. The mind is still considered to be an entity that is found entirely inside the head in the form of brain functions that are distinct from the rest of the physical person and also distinct from the social environment. Instead of a body and an inner soul (or mind), we have a body and inner brain function (i.e., a brain-body dualism). This is the view that Daniel Dennett (1991) has referred to as “Cartesian materialism.” Consequently, we implicitly assume that all that is important and critical about human life must be identified with functions or properties that are inside individual human persons. This view relegates interpersonal relations and social systems to a secondary status with respect to our understanding of the most unique and important aspects of human nature. Within the Cartesian worldview, everything that is important about humanity must be both *inner* and *individual*.

By definition, a *neurology* of religiousness would deny that religiousness is exclusively about the experiences of a Cartesian nonmaterial mind or soul. However, an implicit assumption of this research is the Cartesian view that any important property of humanness, such as religion, must be resident inside individual human persons (presumably in some unique form of brain functions). Even though the chapters of this volume indicate that it is possible to contemplate religiousness outside of Cartesian body-soul dualism, it does not seem to be the case that we have moved past the Cartesian assumptions regarding innerness and individuality. If religion is a critically important part of what it means to be human, then (in this view) it must be the case

that religion resides inside of the person—within neural systems that are uniquely responsible for one’s religiousness and religious experiences.

For example, what is the rationale for discussing ritual (Seaquist, Chapter 10 of this volume) or adolescent religious awakening (Alcorta, Chapter 4 of this volume) in a way that presumes that the important determinants of these human events are within individual persons, rather than within the culturally bounded social networks in which persons are embedded? Might not even personal religious conversion (Paloutzian, Swenson, and McNamara, Chapter 7 of this volume) be better understood as a relationship between a whole complex person and a religious community or institution, or between a person and God (as the monotheistic religious traditions would suggest), rather than a primarily an internal event of individual meaning making? The neurochemical perspective on religious experience offered by Newberg (Chapter 2 of this volume) presumes religious experience to be entirely internal, and the existence of these internal mechanisms is “why God won’t go away” (Newberg & d’Aquili, 2001b). While Azari’s view of religious experience (Chapter 3 of this volume) points primarily to inner brain properties, her theory of religious experience has the merit of also pointing outward in that a religious experience is a form of “relational cognitvity.”

An alternative view that gains more distance from the Cartesian view is that, although humans have uniquely developed neural and bodily machinery, what is unique about humankind is the way the machinery is used to interact with the physical and social environment (and, some might believe, interactions with the Divine). The uniqueness of humankind is not about the neural machinery, per se, which, after all, is merely an extension and expansion of biological machinery found also in apes. Rather, human uniqueness resides in the social environment that our machinery allows us to create and to participate in. Thus, when studying uniquely human capacities like religiousness, the critical questions are not about the machinery itself (i.e., about brain systems), but about how, when we are embedded in the social processes of human culture, we are capable of remarkably more complex social interactions and experience notably increased degrees of freedom in thought and behavior compared to the rest of the animal world.

REDUCTIONISM VERSUS EMERGENCE

Reductionism relates to the hierarchy of micro-to-macro levels of scale described earlier in that it presumes that the laws governing lower-level processes (e.g., brain functions) can account for higher-level phenomena (e.g., religious experience) *without residual*. That is, all of the variance at the higher level can be exhaustively explained, in principle, by phenomena at some lower level. *Emergence*, on the other hand, presumes that new properties emerge at higher levels that, while dependent on lower-level functions,

cannot be entirely accounted for or explained by lower-level processes. Real *causal* properties emerge as lower-level phenomena form into larger interactive patterns. An account of the lower-level properties cannot do justice to higher-level emergents.

Dynamic systems theory gives the best account of emergence (for a good description of dynamic systems theory with respect to the human brain and behavior, see Juarrero, 1999). The massively and recurrently interconnected neuronal network that is the cerebral cortex is beautifully suited for emergence of the sort of higher-level properties described by the theory of complex dynamic systems. When pushed far from equilibrium by environmental interactions, dynamic systems self-organize into larger *patterns* that are constituted by *relational constraints between elements*. Thus, the elements of the system work together in a coherent or coordinated manner to create the larger-scale functional system. This larger system operates internally by restraining (or entraining) the future possibilities for each constituent element. Once organized into a system, lower-level properties interact (bottom-up) with the relational constraints created by the higher-level patterns (top-down), without implying any exceptions to lawfulness at the micro-level. As Juarrero explains it:

when parts interact to produce wholes, and the resulting distributed wholes in turn affect the behavior of their parts, interlevel causality is at work. Interactions among certain dynamical processes can create a systems-level organization with new properties that are not the simple sum of the components that create the higher level. In turn, the overall dynamics of the emergent distributed system not only determine which parts will be allowed into the system: the global dynamics also regulate and constrain the behavior of the lower-level components. (Juarrero, 1999, pp. 5–6)

These patterns self-organize (and reorganize) as demanded by the continual give-and-take of interactions with the environment. A new pattern of constraints will manifest new properties of the whole system that were not present prior to this process of self-organization.

In such systems, interactions with novel aspects of the environment cause repeated reorganizations that create increasingly more complex and higher-level forms of system organization. Thus, multiple smaller systems can be organized into even larger systems. Gibbs (2006) explains dynamic self-organization of behavior as follows: “an individual’s behavior emerges from interactions of brain, body, and environment. Simple and complex behavioral patterns are higher-order products of self-organization processes. Virtually all living organisms self-assemble, or are self-organizing systems, . . . Self-organized patterns of behavior emerge as stable states from the interaction of many subsystems” (Gibbs, 2006, p. 10). In this way, the dynamics of reorganization result in a

nested hierarchy of more and more complex functional systems, reminiscent of the micro-to-macro hierarchy of levels of scale described above.

In addition, *constraints* between individual elements or smaller patterns existing at lower levels result in the emergence of higher-level system properties that manifest substantially *greater freedom*. The system has a substantially greater number of possibilities with respect to its interactions with its surrounding environment than it had prior to each new level of self-reorganization. Again, as Juarrero expresses it, “The higher level of organization, whether thermodynamic, psychological, or social, possesses a qualitatively different repertoire of states and behavior than the earlier level, as well as greater degrees of freedom” (Juarrero, 1999, p. 145).

Thus, dynamic systems theory specifies how truly emergent, nonreductive properties are possible in complex interactive systems, most particularly within the hypercomplex human brain, as well as the social networks in which persons are embedded. Since the emergent properties of a complex dynamic system are interactive patterns that interface with the environment as a whole system, the properties of the patterns themselves cannot be entirely reduced to rules of action specifiable at lower levels. What is implied by emergence and dynamic systems analysis is an ontology of relationships and interactions—that is, *real things* emerge in the form of interactive patterns that are as real (at least in a causal sense) as the physical elements that constitute the patterns.

With respect to the study of neurology of religion and religious experience, one must ask whether the descriptions of the results published thus far have implied an unwarranted reduction of the phenomena of religion to brain systems (i.e., the neural components and sub-systems that are inside single individuals). In the descriptions of research outcomes, is it assumed that the activity of the brain systems that are identified as engaged during the religious experiences can entirely account for the higher-level properties of religious behavior and experiences? Might several levels of emergence of nonreductive causal properties (both individual and social) intervene between neurological descriptors and important aspects of human life such as religion?

GUIDELINES FOR A NONREDUCTIVE NEUROLOGY OF RELIGIOUSNESS

In this concluding chapter I have attempted to formulate a meta-view of the field of the neurological study of religiousness or religious experience—a view from which to both understand the research that has been done thus far, and to consider further research. In so doing, this chapter has been rather negative with respect to what might be learned about religion from neurological study. Nevertheless, a number of the chapters of this volume describe

interesting scientific outcomes that, if properly understood, represent progress in our understanding of the relationship (however distant) between brain function and religious experiences and behaviors.

How does one go about doing and evaluating studies of brain processes involved in religious behavior and experience? In what follows, I will venture some guidelines for both doing such research and evaluating how much has been learned from existing studies.

1. *We should study a specific, narrowly defined component of religiousness, and explicitly recognize the narrowness.* What is meant here is more than simply an explicit operational definition of the religious variable to be studied (although this is always a critically important task). Rather, we must choose to study a contributing component of religion that exists at a level appropriately narrow and specific for neurological study. Equally as important, we must not allow the introduction and discussion of the research to extend too far beyond this specificity. For example, if the study is about a certain form of meditation (e.g., the research of Newberg and colleagues described in Chapter 2 of this volume), the discussion of the research should be confined to this particular form of meditation and not wander beyond this particularity to a discussion of religion or religious experiences in general, as if experiences associated with a circumscribed form of meditation could adequately stand in for all or most religious experiences.
2. *We must consider all of the intervening cognitive contributions to the specific component of religious behavior or experience that we study, and, if possible, we should explicitly manipulate or measure in the research the contributions of the various intervening cognitive variables.* It is my contention that the religious variables are manifestations of the interaction of many lower-level cognitive processes, each with its own neural substrates. Manipulating or measuring intervening cognitive variables would make clear the degree to which the neurological correlates of religiousness are secondary manifestations of more general neurocognitive outcomes. A good example is the research on religiousness in patients with Parkinson's disease reported by McNamara and his colleagues (McNamara, Durso, Brown, and Harris, Chapter 1 of this volume). The impact of Parkinson's disease on religiousness was found to be primarily manifest in reduced participation in the private practices of religion and was paralleled by reduced participation in leisure activities and hobbies. To further clarify the impact of variables intervening between religious participation and brain processes, these authors also administered neuropsychological measures of executive function that showed that the outcome in religiousness was secondary to a more general abnormality affecting a wide range of behaviors strongly influenced by frontal lobe function.
3. *If possible, we should study the developmental path to the religious behavior or experience.* What neural systems must develop before the behavior or

experience can emerge? Are these systems general or specific to religiousness? The developmental timing of the appearance and maturation of the religious behavior or experience in question, when compared to the development of various cognitive capacities and social skills, will give further clues to the intervening neurocognitive skills and abilities manifest in the religious variable. Chapters in this volume by Alcorta (Chapter 4) and Granqvist (Chapter 6) describe the importance of prior social and cognitive development for the emergence of various forms of religiousness in children and adolescents.

4. *Any conclusions implying that a neural system or pattern of neural activation is specific to a religious state or behavior need to be supported by incorporation of many similar but nonreligious control conditions.* Considerable work needs to be done comparing the outcome associated with the religious variable and the possibility of the same outcome when manipulating similar, but nonreligious variables. For example, in the research of Newberg and his colleagues (Newberg et al., 2001a; Newberg, Pourdehnad, Alavi, & d'Aquili, 2003; described by Newberg in Chapter 2 and by Azari in Chapter 3), it would be important to know if any nonreligious practices or experiences would also result in the same pattern of increase in frontal lobe activation and reduction in right parietal lobe activation that was found during religious meditation studied. Without such information, the conclusion that a particular brain state is in any way specific to religious experiences is unwarranted.
5. *We must be clear about the social scaffolding (past and present) necessary for the behavior, experience, or event to be considered religious by the participant.* Religion may well be a contextual variable that controls a person's subjective interpretation of a neural event, not a primary outcome of the neural state itself. The cases of religious experiences associated with temporal lobe epilepsy described by Schachter (Chapter 4 of this volume) are important to consider. Would the experience of temporal lobe epileptic discharge be interpreted as religious by a person with no religious background whatsoever? Does a religious social history predispose a person to interpret a seizure experience as a religious manifestation? Variations in the interactions between the subjective experience resulting from a seizure and a prior religious history, and/or a concurrent religious context, might explain some of the variability in the findings regarding a relationship between temporal lobe epilepsy and religious experiences.
6. *We should avoid reductionist statements in describing research outcomes that imply that functions at one level are "nothing but" the operation of lower levels.* Emergence implies that real, novel, and causal properties emerge in the patterns of interaction of component parts that cannot be reduced to the properties of the parts themselves. So, as important as the brain is to human behavior and experience, no important human psychological property, much less a human sociocultural phenomenon like religiousness, can be reduced to nothing but the activity of a particular neural

system or specific pattern of neural activation. If nothing else, since the operation of neural systems is always embedded in ongoing interactions with the physical or social environment, appropriate interpretation of research findings necessitates specification of the nature of these ongoing interactions.

SUMMARY AND CONCLUSIONS

In these concluding remarks for this volume on *The Neurology of Religious Experience*, I have attempted to take the widest possible view of the field to gain perspective on what can and cannot be accomplished. I have suggested that the property of religion and religiousness might best be placed outside of the individual in characteristics of the sociocultural environment (like baseball), rather than within persons as a unique property of individual neurocognitive functioning (as in language). I have also suggested that attention needs to be paid to levels of scale when attempting to find associations between brain function and religiousness by asking whether the two domains are sufficiently close for study of their relationships, unmediated by many levels of intervening variables. I have also critiqued the basic formulation of the problem of human religiousness from the point of view of a Cartesian worldview, where everything that is important about humanness (like religion) must be both within the person and a property of the individual. Finally, I have used these arguments to make suggestions regarding things to consider in the further development of a neurology of religion and religious experience.

These perspectives and considerations suggest that the designation “neurology of religious experience” should be considered a convenient summary phrase, referring to for what is in reality a neurology of the cognitive contributions to specific behaviors and experiences labeled by the individual as “religious” due to social context (present or past). From my own theological perspective, the concept of “behaviors and experiences labeled by the individual as religious due to social context” would include the possibility that the “social context” includes a detectable presence of a nonmaterial God. However, as Ratcliffe suggests (Chapter 5 of this volume), nothing can be concluded about the reality (or nonreality) of God or his action in the world by a neurological study of religious behaviors and experiences. Existence of a divine being is a theological question, not a neuroscientific question.

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