

PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

Theme Issue: Psychology, Neuroscience, and Issues of Faith

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

Biology of Spirituality

Spirituality Research: Measuring the Immeasurable?

Conscious Experience and Science: Signs of Transition

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

The Erosion of Biblical Inerrancy, or Toward a More Biblical View of the Inerrant Word of God?

*"The fear of the Lord
is the beginning of Wisdom."*

Psalm 111:10

VOLUME 62, NUMBER 2

JUNE 2010

Perspectives on Science and Christian Faith

© 2010 by the American Scientific Affiliation

Editor

ARIE LEEGWATER (Calvin College)
1726 Knollcrest Cir. SE
Grand Rapids, MI 49546
leeg@calvin.edu

Managing Editor

LYN BERG (American Scientific Affiliation)
PO Box 668
Ipswich, MA 01938-0668
lyn@asa3.org

Book Review Editors

LOUISE M. FREEMAN (Mary Baldwin College)
Pearce Science Center
Staunton, VA 24401
lfreeman@mbc.edu

JAMES C. PETERSON (McMaster University Divinity
College and Faculty of Health Sciences)
1280 Main St. West
Hamilton, ON L8S 4K1 Canada
peterso@mcmaster.ca

ARIE LEEGWATER (Calvin College)
1726 Knollcrest Cir. SE, Grand Rapids, MI 49546
leeg@calvin.edu

Editorial Board

CHARLES C. ADAMS, *Dordt College*

HELSEL BOUMA III, *Calvin College*

WALTER L. BRADLEY, *Baylor University*

WARREN S. BROWN, *Fuller Graduate School of
Psychology*

JEANNE BUNDENS, *Eastern University*

HARRY COOK, *The King's University College, Canada*

JANEL M. CURRY, *Calvin College*

EDWARD B. DAVIS, *Messiah College*

KARL V. EVANS, *Lakewood, CO*

LOUISE M. FREEMAN, *Mary Baldwin College*

OWEN GINGERICH, *Harvard-Smithsonian Center for
Astrophysics*

JOHN W. HAAS, JR., *Gordon College*

WALTER R. HEARN, *Berkeley, California*

D. GARETH JONES, *University of Otago, New Zealand*

CALVIN JONGSMA, *Dordt College*

CHRISTOPHER B. KAISER, *Western Theological
Seminary*

H. NEWTON MALONY, *Fuller Theological Seminary*

SARA MILES, *Eastern University*

KEITH B. MILLER, *Kansas State University*

GEORGE L. MURPHY, *Trinity Lutheran Seminary,
Columbus, OH*

ROBERT C. NEWMAN, *Biblical Theological Seminary*

JACK C. SWEARENGEN, *Santa Rosa, CA*

WALTER R. THORSON, *Calgary, Alberta, Canada*

DAVIS A. YOUNG, *Calvin College*

ESTHER MARTIN, Manuscript Editor

Perspectives on Science and Christian Faith

(ISSN 0892-2675) is published quarterly for \$40 per year by the American Scientific Affiliation, 55 Market Street, Ipswich, MA 01938-0668. Phone: 978-356-5656; Fax: 978-356-4375; asa@asa3.org; www.asa3.org

Periodicals postage paid at Ipswich, MA and at additional mailing offices. POSTMASTER: Send address changes to: *Perspectives on Science and Christian Faith*, The American Scientific Affiliation, PO Box 668, Ipswich, MA 01938-0668.

Manuscript Guidelines

The pages of *Perspectives on Science and Christian Faith (PSCF)* are open to original, unpublished contributions that interact with science and Christian faith in a manner consistent with scientific and theological integrity. Published papers do not reflect any official position of the American Scientific Affiliation.

1. Submit all manuscripts to: **Arie Leegwater, Editor, Calvin College, De Vries Hall, 1726 Knollcrest Circle SE, Grand Rapids, MI 49546-4403. E-mail: leeg@calvin.edu.** Submissions are typically acknowledged within 10 days of their receipt.
2. Authors must submit **an electronic copy of the manuscript formatted in Word** as an email attachment. Typically 2–3 anonymous reviewers critique each manuscript submitted for publication.
3. Use endnotes for all references. Each note must have a unique number. Follow *The Chicago Manual of Style* (14th ed., sections 15.1 to 15.426).
4. While figures and diagrams may be embedded within the Word text file of the manuscript, authors are required to also send them as individual electronic files (JPEG or TIFF format). Figure captions should be provided as a list at the end of the manuscript text. Authors are encouraged also to submit a sample of graphic art that can be used to illustrate their manuscript.

ARTICLES are major treatments of a particular subject relating science to a Christian position. Such papers should be at least 2,000 words but **not more than 6,000 words in length**, excluding endnotes. An abstract of 50–150 words is required. Publication for such papers normally takes 9–12 months from the time of acceptance.

COMMUNICATIONS are brief treatments of a wide range of subjects of interest to *PSCF* readers. Communications **must not be longer than 2700 words**, excluding endnotes. Communications are normally published 6–9 months from the time of acceptance.

NEWS & VIEWS are short commentaries on current scientific discoveries or events, or opinion pieces on science and faith issues. Lengths range **from 200 to 1,500 words**. Submissions are typically published 3–6 months from the time of acceptance.

BOOK REVIEWS serve to alert the readership to new books that appear significant or useful and engage these books in critical interaction. Guidelines for book reviewers can be obtained from the book review editors. Note respective subject areas:

- **Louise Freeman** (lfreeman@mbc.edu): anthropology, biology, environment, neuroscience, origins, and social sciences.
- **James C. Peterson** (peterso@mcmaster.ca): apologetics, biblical studies, bioethics, ethics, genetics, medical education, philosophy, and theology.
- **Arie Leegwater** (leeg@calvin.edu): cosmology, engineering, history of science, mathematics, non-bio technologies, and physical sciences.

The viewpoints expressed in the books reviewed, and in the reviews themselves, are those of the authors and reviewers respectively, and do not reflect an official position of the ASA.

LETTERS to the Editor concerning *PSCF* content may be published unless marked not for publication. Letters submitted for publication **must not be longer than 700 words** and will be subject to editorial review. Letters are to be submitted as electronic copies. Letters accepted for publication will be published within 6 months.

ADVERTISING is accepted in *PSCF*, subject to editorial approval. Please address inquiries for rates or further information to the Managing Editor. The ASA cannot take responsibility for any orders placed with advertisers in *PSCF*.

AUTHORIZATION TO PHOTOCOPY MATERIAL for internal, personal, or educational classroom use, or the internal or personal use of specific clients, is granted by ASA, ISSN: 0892-2675, provided that the appropriate fee is paid directly to Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923 USA for conventional use, or check CCC online at the following address: www.copyright.com/. No registration with CCC is needed: simply identify the article being copied, the number of copies, and the journal title (*Perspectives on Science and Christian Faith*). For those who wish to request permission for other kinds of copying or reprinting, kindly write to the Managing Editor.



Matthew S. Stanford

Psychology, Neuroscience, and the American Scientific Affiliation

Matthew S. Stanford

Several years ago my wife and I attended a fund-raising dinner for an international ministry with which we are involved. I was excited to go to the dinner for two reasons. First, I am very supportive of this ministry's work in advancing the gospel message around the world. Second, I wanted to hear the invited presenter. The guest speaker, a retired professor of psychiatry, was to talk about his involvement with the ministry's efforts in several foreign countries. But that is not why I was so interested. What piqued my curiosity was the qualifying label that had been printed under his name on the flier, "Born Again Brain Scientist." When I first read that description, I laughed. I thought, "Isn't it obvious that anyone invited to speak by the ministry would themselves be a Christian?" Or is there something inherent in the title "brain scientist" that would lead people, especially people of faith, to think that such an individual is not a believer? Unfortunately, I think the latter may be true. The fact that many in the Christian community equate the title "brain scientist" with an atheist is troubling to me, because much like the invited speaker I also am a "brain scientist."

As a believing neuroscientist, I recognize that God's majesty is reflected in how our neurons function, the biological and environmental factors that affect the formation of our personalities, the mechanism by which memories are brought to consciousness, and the precise balance of neurotransmitters that are the foundation of our thoughts and behaviors. Sadly, my own research on mental illness and the local church has shown that many in the Christian community are fearful of psychology and neuroscience and often deny the very existence of mental disorder.¹ As one who recognizes that the church has a significant role to play in the recovery and

treatment of the mentally ill, I am passionate in my belief that Christians in the psychological and brain sciences must work to build bridges with the faith community. I also recognize that the American Scientific Affiliation (ASA) is uniquely positioned to help in such an endeavor.

From its inception, the ASA has always provided a unique and open forum for discussions on issues of faith and psychology and later neuroscience. For example, in only its second year of publication, the *Journal of the American Scientific Affiliation* published two articles on the topic of psychology and faith: M. J. Beukema's *Christian Treatment of the Mentally Ill*² (a paper originally presented at the 3rd annual meeting of the society) and Bernard Ramm's *Behaviorism and Philosophical Psychology*.³ More recently the ASA has attempted to facilitate discussion and debate in these areas by designating *Neuroscience and the Image of God* as the theme of the 59th annual meeting and by inviting prominent neuroscientists such as Bill Newsome (Stanford University) and Mario Beauregard (University of Montreal) to conduct plenary sessions at subsequent meetings. The points of intersection between psychology, neuroscience, and issues of faith are immense and increasing every day. Evolutionary psychology, the development of moral behavior, the biology of belief (neurotheology), faith-based treatments for mental illness, mind/consciousness, and the relationship between faith and health/well-being are only a few of the controversial and important topics being discussed today within the discipline.

Despite the openness to the topic and many proactive attempts at engaging members within the discipline, the ASA has few members who designate their main area of interest as either psychology or

Guest Editorial

Psychology, Neuroscience, and the American Scientific Affiliation

neuroscience. This lack of involvement from the psychology and neuroscience community first became apparent to me while I was setting up my online profile through the ASA website (www.asa3.org). When attempting to select my academic discipline from a drop-down menu, I found that neither psychology nor neuroscience were listed as options, and I fell into the highly prestigious and much envied *Other* category.

While I have found my interactions with ASA members outside my discipline to be intellectually stimulating and spiritually edifying, I have longed for a greater level of involvement from my Christian psychology and neuroscience colleagues. In conversation with Walter Bradley, a fellow Baylor faculty member and at the time president-elect of ASA, on how to increase the involvement of psychologists and neuroscientists in the ASA, the idea of a special issue of *Perspectives on Science and Christian Faith (PSCF)* focusing on psychology, neuroscience, and issues of faith came up. That led to several conversations with *PSCF* Editor Arie Leegwater, which have resulted in the issue of the journal you are presently reading.

This special issue was developed with two goals in mind: first, to continue the long tradition of the ASA and *PSCF* in publishing quality, academic discussions in science and faith; and second, to serve as a resource that ASA members might use to engage their Christian psychology and neuroscience colleagues. It is anticipated that a common point of contact, such as this special issue, will open opportunities to invite your colleagues to attend the annual meeting or at least to visit the website to learn more about the society. The strength of the ASA has always been in its diversity—chemist meeting with anthropologist, physician talking with physicist, biologist debating philosopher—men and women of science, regardless of discipline, who recognize the hand of the Creator in the creation they have been given the honor of studying. Increasing the involvement of those in the behavioral sciences within the ASA will only strengthen us as a society and hopefully open new areas of inquiry and discussion for years to come. □

Notes

¹Matthew S. Stanford, "Demon or Disorder: A Survey of Attitudes toward Mental Illness in the Christian Church," *Mental Health, Religion and Culture* 10 (2007): 445-9; Matthew

S. Stanford and Kandace McAlister, "Perceptions of Serious Mental Illness in the Local Church," *Journal of Religion, Disability and Health* 12 (2008): 144-53; Matthew S. Stanford and David Philpott, "Baptist Senior Pastors' Knowledge and Perceptions of Mental Illness," *Mental Health, Religion and Culture*, in press.

²M. J. Beukema, "Christian Treatment of the Mentally Ill," *Journal of the American Scientific Affiliation* 2 (1950): 24-7.

³Bernard Ramm, "Behaviorism and Philosophical Psychology," *Journal of the American Scientific Affiliation* 2 (1950): 28-37.

Matthew Stanford, *Guest Co-Editor*

Matthew_Stanford@baylor.edu



In This Issue

As indicated in the guest editorial by Matthew Stanford (Baylor University), this special issue of *PSCF* is devoted to "psychology, neuroscience, and issues of faith." As co-editors of this theme issue, Matt and I invite you to read the five major articles which explore these matters. The articles by Paul Moes (Calvin College), Kevin Seybold (Grove City College), David Moberg (Marquette University), Thaddeus Trenn (University of Toronto), and D. Gareth Jones (University of Otago), take the reader on an exciting journey: viewing humans as being embodied persons, exploring the biological basis of human spirituality, evaluating research on "measuring" spirituality, reflecting on conscious experience and its objective correlates, and investigating neuroscience's intrusion into our brains. All of the book reviews explore recent reflection on the intersection of religion and psychology.

In addition, this issue contains an essay by Denis Lamoureux (University of Alberta) reviewing a book by G. K. Beale that treats the erosion of biblical inerrancy in evangelicalism. Several letters complete the issue.

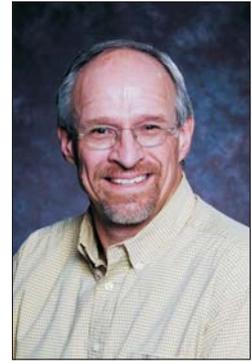
I welcome further suggestions for a *PSCF* theme issue. Such a venture requires sustained planning and a relevant topic.

Arie Leegwater, *Editor*

leeg@calvin.edu □

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

Paul Moes



Paul Moes

This article addresses concerns that the “nonreductive physicalism” (NRP) approach to understanding human nature may lead to a new form of determinism. The principal thesis of the article is that we can retain the idea of willful and responsible action even within the NRP perspective. Three additional positions are advanced: (1) Emotional processes are an essential part of our willful nature; (2) Emotions participate in the emergent nature of thought that leads to the quality of “souliness”; and (3) We can self-regulate our emotions, even within a seemingly “closed” physical system. The article draws from current psychological theories as well as a number of studies in neuropsychology to support these positions.

The client undergoing psychotherapy declares, “I can’t help feeling angry.” Are such emotions outside a person’s control, or is it possible for persons to regulate their own behavior—including their emotions? This seemingly simple question and its seemingly obvious answer has become less obvious as mainstream psychology and neuroscience have moved away from a dualist position toward a more unified or monistic view of body, mind, and soul.

A dualist account that separates bodily actions from an immaterial mind and/or soul provides a relatively simple account for how emotions might be controlled. Rene Descartes viewed the processes of reason and will as the exclusive purview of the mind-soul. Emotions were viewed as being part of both body and soul. Primitive emotions, such as fear and anger, were reflexive or mechanical responses to sensory stimulation; more noble emotions, such as contentment and courage, were the willful acts of the soul, and could override or regulate more primitive responses.¹ Therefore, not only was soul separable

from body, but mental activity was divided into higher (i.e., controlling and willful) and lower (i.e., mechanical and passive) components.

However, a view of persons that stresses nonreductive physicalism (NRP)—which I embrace—posits that we are embodied persons, and that no immaterial mind or soul can exist without some form or substance. NRP also assumes that there is no central focal point for “a will” but that many mental processes emerge to form unified thoughts and actions. Finally, as Nancey Murphy suggests, NRP maintains the essential nature of our

‘higher’ capacities that we think of as being essential for our humanness: rationality, emotion, morality,

Paul Moes is a professor of psychology at Calvin College (Grand Rapids, Michigan). After receiving his PhD in experimental psychology from Texas Christian University, he was professor of psychology at Dordt College (Sioux Center, Iowa). Paul also spent one year as a visiting researcher/instructor at the University of St. Andrews, Scotland. His special interest is cognitive neuroscience, and his empirical research has focused on the interaction of left and right brain hemispheres. Recent publications include studies on the behavioral impact of agenesis of the corpus callosum (i.e., congenital absence of the “bridge” between the hemispheres) and gender differences in the time to transfer electrical impulses between hemispheres, as measured by electroencephalography. Correspondence can be sent to pmoes@calvin.edu.

Article

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

free will, and, most important, the capacity to be in relationship with God.²

One difficulty in moving away from a dualistic account of human nature is that it creates a new concern when considering the regulation of emotions. One might ask in response to NRP, “How could a system that possesses no ‘central control unit’ (i.e., a ‘soulful will’) regulate the very elements that constitute that system?”

There have been philosophical and theological challenges to the idea of NRP which others have addressed in a variety of sources.³ The focus of the present article is to address the concern that NRP may lead to a form of Christian determinism, and to discuss the related issues raised by James Stump of “supervenience (and emergence) relation, and downward causation.”⁴ Indeed, *if* we are mere passive products of our material substance in interaction with a changing environment, then such a view would, in my estimation, constitute a serious concern for any Christian adopting an NRP position. The principal thesis of this article is that we can retain the idea of self-regulation and willful action even within an NRP perspective. These willful tendencies arise not from an immaterial soul, but from the nonreducible emergent properties of a living person within a social context. While no empirical study can confirm or disconfirm this position, I will present research evidence and theoretical positions from psychology and neuroscience that make the possibility of willful self-regulation tenable and plausible within an NRP framework.

In addition to this primary thesis, I hope to accomplish three additional goals. The first goal is to show that emotional processes are an essential part of our relational nature. Christian neuroscientist Warren Brown has argued that “soulfulness” is not a thing but a quality that “arises out of personal relatedness, and that personal relatedness is an emergent property of human cognition.”⁵ Therefore, our emotional qualities are integral to that emergent nature of thought. These emotions are not simply fixed mental or biological elements existing in a biological space, but they are, as Alan J. Torrance has suggested, “incomplete [processes] until they meet with a response from the other” [person].⁶ Similar to the position taken by Warren Brown,⁷ Torrance argues that humans are constituted by their relations to other

persons. Recent research examining the emotional interaction between parent and infant, and the subsequent impact on neural development, will provide a vivid illustration of the idea that emotions are relational in nature and involve fluid mental processes within an agent responding to an ever-changing world.

A second goal is to provide illustrations for the way in which emotions participate in the emergent nature of thought that can lead to the quality of “soulfulness.” Our subjective experience, along with cultural assumptions infused with Cartesian dualism, produces the impression that emotions are very distinct bodily elements that come entirely from within the individual. They also appear to be fixed, primitive, irrational, untrustworthy, and in need of downward control from some “higher unit.” Even past physicalist accounts of neural organization often fall into a new form of dualist thinking by attributing willfulness exclusively to the higher, rational cortex, and placing the inferior emotional processes in the lower brain regions.

By demonstrating how emotions participate fully in the unity of mental phenomena, and that neither reason nor emotions rule some entity called “the will,” I hope to show that it is the dynamic union of our mental activity that gives rise to our willful actions, and that emotions should not be relegated to a lower status. Case studies of individuals with brain damage or developmental disabilities, along with research on the normal interaction of emotional and cognitive brain “modules,” will be used to demonstrate the need for persons to merge these streams of thought for their very survival in negotiating a social environment. In addition, Piaget’s concept of “groupement” — a unified interpersonal perspective — will be used to illustrate how emotional and cognitive modules are able to merge diverse perspectives of reality into a single stream. I also hope to show that this union of emotional and cognitive streams is built into the fabric of our neurological functions. Thus, as many philosophers and psychologists have suggested, we are inherently motivated to be “meaning-seeking” creatures. Such creatures not only attempt to categorize, problem solve, and form mental schemas,⁸ they are also motivated to form an emotional/evaluative understanding of events.

Finally, consistent with Malcolm Jeeves' view that some form of top-down causation is a necessary condition of NRP⁹—and essential to my primary thesis that we can regulate our own emotions—an additional goal of this article is to show that these unified emotional/cognitive processes can provide a top-down regulation of future behavior. Once we develop these emotionally informed mental schemas, we can use these streams to down-regulate future emotional responses, personal ethical decisions, and the selection of appropriate behavior. Therefore, positive emotional self-regulation—as well as appropriate moral decision making—is possible only by persons who have had healthy relational experiences, have informed their cognitive processes with emotional valuations, and have exercised and tested these streams with genuine involvement in moral issues. These streams become ever more powerful—either for good or ill—when we exercise them enough to become nearly automatic “goal pursuits” regulating the responses we make.

The Relational Nature of Emotion

The work of developmental psychologist Allan Schore provides an illustrative example of the relational nature of emotions and how emotional development is entirely dependent on healthy human relationships and interpersonal experiences.¹⁰ In a sense, he is describing how we develop emotional soulfulness through a very intimate relationship with our parents.

Schore summarizes a fascinating series of studies focusing on the intricate interplay that occurs between an infant and his or her mother. Careful analysis using stop-action photography of facial expression from the mother and the infant, along with measurement of internal physiological and neurological responses, has been able to show the way in which appropriate social-emotional responsiveness becomes intricately tied to brain development. The research focuses special attention on the medial orbitofrontal¹¹ areas of the frontal lobe. These key areas receive rich information from the amygdala¹² and other limbic system structures, which convey information from body systems informing other limbic system structures about bodily conditions. In addition, this area receives information about facial expressions from posterior cortical areas such

as the parietal, temporal, and occipital lobes. This “appraisal system” helps the frontal lobe to assign value to incoming information, based on past experience and genetic instructions. The mother's emotional expressions are first mirrored reflexively by the infant and gradually become more internally regulated as the mother and infant continue to engage in mutual gaze. As the infant begins to store these interchanges in his or her memory, the child becomes ever more capable of responding to the emotional cues of the mother. As social interaction becomes more complex, the mother provides cues about other aspects of the environment, as to what is important, valued, approachable, or to be avoided.

Schore suggests that this social interchange is vital for emotional self-regulation later in life:

... the establishment of an attachment bond of emotional communication with the mother ... enables the child to receive the mother's affective appraisals of objects in the nonmaternal environment in late infancy. These interactively transmitted, affectively charged external appraisals provide the developing individual with the requisite experiences that ultimately allow for the organization, in the second year, of brain networks that can generate internal evaluations of the personal significance of what is happening in an encounter with the environment and can elicit emotions to actual or expected changes in events that are important to the individual.¹³

Therefore, the ability to develop self-regulated emotional responses can only occur in interaction with a responsive caregiver. In fact, there is good evidence that infants deprived of this type of intense social interaction over a substantial period of time develop very deficient emotional, social, and even moral self-regulation that may be very difficult to reverse.¹⁴ So whereas the brain may possess a self-organizing property, this property is not expressed unless a person is interacting with the environment. But *emotional* organization may be unique, in contrast to cognitive organization, since the former process seems to occur “only in the context of a relationship with another brain.”¹⁵ In other words, cognitive development may occur by an individual interacting with *both* objects and persons, but early emotional development seems to be peculiarly tied to social experience. Indeed, Diamond, Balvin, and Diamond have called the

Article

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

mother an “auxiliary cortex” in that her experience with emotional self-regulation can be modeled, and this helps to mold the early infant experience of emotional understanding.¹⁶

Emotion-Cognition Emergence: Illustrative Clinical Cases

To underscore the importance of emotions in the emergent property of mind, three clinical cases of brain damage—one, very unusual; the other two, painfully typical—provide clear evidence that emotions are essential elements in our normal mental life. As described earlier, the Cartesian view of emotions—along with many physicalist approaches—has relegated emotions to an inferior position in the hierarchy of mental processes. These cases underscore the necessity of emotionally informed thinking for our everyday functioning.

The first case is the unusual case of Capgras’ syndrome described by neurologist V. S. Ramachandran.¹⁷ Arthur, a thirty-year-old male, sustained a significant head injury from a car accident. While he recovered many of the sensory and motor losses experienced shortly after the accident, one puzzling difficulty remained—he believed that his parents were not really who they said they were; he believed they were, in fact, imposters, masquerading as his parents. He was still able to recognize all familiar objects, including his parents, and his unusual delusion was not associated with casual friends or with other objects—it occurred mostly in relation to his parents. Ramachandran believes that Arthur’s problem resulted from damage to communication systems between the visual cortex that recognizes familiar objects and people, and parts of the emotionally responsive limbic system, in particular, the amygdala. Therefore, the patient has visual, but not emotional, recognition, resulting in a blunted emotional response to the people he recognizes as his parents. Because he does not have the typical emotional experience that people have when seeing their parents, he concludes that they only *look* like his parents; thus they must be imposters.¹⁸ Most likely the emotional memories associated with his parents were formed through the types of early interactions described by Schore.

What this unusual case illustrates is the importance of emotional input for a full comprehension of

our environment. The notion that we can perceive and negotiate a complex environment without access to emotional input is an unfortunate legacy of the Cartesian dualism of reason and emotions. The case also underscores the importance of having a fully functioning neurological system for a complete understanding of issues that we consider most human and personal.

Other illustrations of the need for emotion/rationality interaction come from cases of frontal lobe damage. While many clinicians have described intriguing cases, a case provided by neuropsychologist Jenni Ogden is quite typical.¹⁹ Phillipa was an intelligent, positive, well-mannered, thirty-five-year-old wife, and mother of two children. She had a university degree in English literature and was employed as a primary school teacher. Following an assault, which resulted in severe damage to her frontal lobes (particularly the right and medial orbitofrontal²⁰ areas), Phillipa experienced a profound change in personality and emotional responsiveness. The most easily observed change in her behavior was a marked disinhibition of her emotions and behavior. Whereas she had previously been mild mannered and positive in her outlook, she now became impolite, unruly, and lacking in consideration of others. Many capacities, such as language comprehension, visual perception, and movement, remained unchanged, but her emotional life was markedly different. She would often use coarse language when visitors came to see her, and she seemed indifferent to admonitions from others to stop.

Phillipa’s case further demonstrates the importance of emotional input for social interaction and cognitive understanding. It is not that Phillipa is incapable of learning or appreciating the cognitive aspects of social rules, or that she does not have any creative capacity, it is that she has become emotionally disconnected from these events. So, for Phillipa, external events do not trigger the normal internal signals (at least as processed at the cortical level) as part of a feedback system telling us that our actions may be inappropriate, that we should alter our strategy, or that we should consider an alternative understanding of a situation. In sum, without an appreciation for the emotional feedback from others, and the internal emotional consequences of our actions, we fail to make reasonable and responsible judgments concerning the world.

One last case comes from neurologist and storyteller Oliver Sacks. He describes a patient with frontal lobe damage and a corresponding emotional change as follows:

... [He] would read the daily papers conscientiously, taking in everything, but with an uncaring, indifferent eye. Surrounded by all the emotions, the drama, of others in the hospital ... he himself remained entirely unmoved, seemingly incapable of feeling. He retained the forms of his previous civility, his courtesy, but we had a sense that these were no longer animated by any real feeling.²¹

Do these cases suggest that emotions, in fact, rule over cognitive or perceptual decision making? No, we should avoid the temptation of simply reversing the typical reason-over-emotion hierarchy, since these cases seem to suggest that emotions and reason are of equal value. These two elements seem to form an integrated or unified dynamic that can direct behavior.

Emotion-Cognition Emergence: Piaget's Notion of Groupement

While the evidence from developmental research and cases of brain damage underscores the essential nature of emotional input for complex behavior, these illustrations do not address how reason and emotions come to interact or emerge into a whole that we call "a willful mind." To further explore this dimension, I am drawing from the notion of "groupement" first described by the famous Swiss developmental psychologist, Jean Piaget. While not originally applied to the development of emotionally informed concepts that I am proposing in this article, Piaget's notion has broad utility in describing the development of higher-order abstractions from lower-order information. These higher-order abstractions can then be used "off-line," as Brown has described elsewhere, in directing future behavior.²²

Bradley paraphrases Piaget's definition of groupement as

the final form of logic in a system of operations that generates a stable order of human actions ... It provides the means to get from mental images of virtual actions to effective intentional action in the material world.²³

Piaget felt that human mental processes such as schemata and groupement are parallel to mathematical principles. For example, the mathematical formula, $A + (-A) = 0$, is a corollary to the idea that objects or their representations have constancy and that there is reversibility to concepts. He felt that children gradually acquire these more abstract concepts through interaction with the world, but more importantly through interaction with *people*. So by age six or seven, children understand the schema of constancy, i.e., an object retains its mass, despite a change in shape. The child also begins to learn that if he has a sibling, that the sibling has him or her as a sibling (i.e., reversibility)—something a typical three-year-old does not understand. The notion of groupement not only captures some presumed final state of affairs (i.e., a cognitive abstraction or schema), but also the process and conditions through which that abstraction occurs. The abstraction is accomplished through the interaction *with significant others* whereby the child comes to a more complete understanding of the concept than would be possible from a single perspective. The process is considered complete when the child no longer requires additional input or interaction to form a complete working model that appears to accurately represent the process or situation.

Psychologist E. C. Tolman proposed something similar with his notion of cognitive maps in which spatial representation becomes abstracted from individual experiences, so that the representation no longer matches the separate representations of each trial or moment but has become consolidated into a complete picture.²⁴ In other words, concepts achieving groupement are greater than the sum of the parts. However, groupement is also a social concept in that it always involves development through shared and compared ideas, and is now held in common by group members. For example, groupement might also include a musical score (e.g., a musical piece in a minor key) which has properties that are independent of individual elements and is not only understood but *valued* by a group of people. Other examples might include an intricate group of plays in football that all team members have helped to develop and now understand and value, or roles from a theatrical script enhanced by diverse perspectives that become mutually shared.

Article

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

Piaget suggested that three elements are required for groupement: a commonly shared symbol or language system, a way to maintain commonly understood propositions (i.e., memory systems), and reciprocity of thought. The interaction of individuals breaks down “autistic” (i.e., individual) and egocentric thought. The introduction of new perspectives and ideas provides the opportunity for individuals to compare the current state of their perspective with alternative views, thus joining new and old perspectives into unique or creative concepts. Bradley suggests that Piaget’s analysis is consistent with Searle’s notion²⁵ that “genuine cooperative behavior” is the basis for a nonreductionist order of social life that he calls “collective intentionality.”²⁶ In other words, Searle argues that individual intentionality is derived from the sense of sharing in the group’s collective values. Bradley also argues that Schore’s description of the early social-emotional exchanges between infant and parent provides for “the requisite neurological organization for the development of a psychologically stable and effective social self.”²⁷ Bradley concludes by suggesting that “cooperation also is the basis for purposeful social action and hence the source of the active agent in the psychosocial life.”²⁸

This cooperative interaction that occurs in what Piaget called the “collective,” along with the resulting shared concepts and values, is also consistent with the recurring theme in this article, that persons are constituted by relationships. Most of our uniquely human qualities appear to develop through the variety of social and environmental interactions that we experience. But this still begs the question of whether an individual’s mental activities possess a unique self-organizing and self-directing capacity that can exist once the person has experienced the shared interaction with others. While I do not have a complete answer to that question, I would like to use groupement as a metaphor for what may happen intra-psychically as well as inter-psychically.

Emotion-Cognition Emergence: The Example of Hemisphere Specialization

To illustrate further how thought might become emergent through the process of groupement, I will apply this notion to the interaction of emotional and

cognitive modules found in the left and right hemisphere. The left hemisphere is known for superior processing and control over certain language functions and for more detailed analysis of visual and auditory information.²⁹ The right hemisphere is often characterized as having superior spatial processing, better analysis of larger aspects of stimuli (e.g., a whole face), and greater responsiveness to emotional information—along with greater control over emotional expression. However, as with many generalizations, the details of left-right differences are more complex than I have just presented. Such brain modules generally show a more-or-less continuum of function rather than an all-or-none specialization. In addition, contrary to the belief that each brain area can perform a variety of functions independently of other components, these specialized units are also highly interdependent with other modules for their operation.

For example, Richard Davidson and colleagues³⁰ have suggested that whereas the posterior visual-perceptual regions of the right hemisphere are probably more attuned to face and voice emotional expression of all types, the left hemisphere contributes a good deal of processing power to positive emotional expressions.³¹ In other words, the left hemisphere may be slightly more responsive to positive emotional expression; the right hemisphere, more responsive to negative emotions, such as anger, anxiety, and depression. Davidson summarizes these differences by calling the left hemisphere, the “approach” hemisphere; the right hemisphere, the “avoidance” hemisphere. Therefore, the left signals that a stimulus has positive “valence” or value; the right signals that a stimulus is dangerous, or may cause distress or difficulty, and should be avoided. This left-right difference is most pronounced when comparing the activity of the left and right frontal lobes in the expression of emotion. For example, greater electrical activity in the left frontal lobes has been associated with children who are more extroverted and more likely to approach novel situations, and who have a more positive or optimistic outlook.³² Children or adults with less left frontal activity tend to be more withdrawn, shy, anxious, or even depressed.

Another recent research review described a series of studies that demonstrate how the left and right hemispheres interact in response to emotional and

cognitive changes.³³ This review showed that the activation of left hemisphere cognitive (i.e., language) components and emotional modules can modulate right hemisphere emotional components—and vice versa. Therefore, these left-right hemisphere perspectives become unified into a cohesive perspective that is ultimately shared by both, in other words, an “inter-module groupement.”

An additional illustration of the value of this intermodule perspective sharing is evident in individuals with the neurological condition called Agenesis of the Corpus Callosum (AgCC). In this congenital condition, the corpus callosum, which is a neurological communication bridge between the left and right hemisphere, fails to develop.³⁴ A series of studies by Brown and colleagues has shown that some of these individuals can have reasonably normal intellectual functioning³⁵ and few other neurological difficulties, but that they still experience difficulty in a variety of social and emotional domains.³⁶ One could consider this condition as a natural neurological laboratory for what happens to emergent thought when the specialized modules and perspectives of the left and right hemisphere are unable to interact.

Imagine, if you will, that the specialized cognitive and emotional modules of the left and right hemisphere are analogous to the “collective” described by Piaget. This neurological equivalent of a community meets all of Piaget’s requirements for the collective; it has a shared symbol system, a conservation of valid propositions and obligations, and uses reciprocity of thought among the “individuals” involved. When the elements of this system are allowed to communicate freely and share slightly different perspectives from a common overall value system, they can arrive at a more dynamic, fully informed perspective that best matches the situation. While each component may maintain differing perspectives and specializations, they would also experience a commonality of understanding that would be shared among the elements. This final understanding would be richer and more complete than any element alone. Focusing specifically on emotional modules, a well-balanced and fully functioning emotional system involves not only the activation or inhibition of various emotional circuits, but the *coming together* of those circuits. In other words, a full appreciation of emotional experience

and a balanced emotional response require a groupement of cognitive and emotional modules from several brain areas, including modules distributed between the left and right hemispheres.

The condition of AgCC may then illustrate what might be missing in the development of emotional comprehension when all the processing modules are intact but cannot communicate or come together. Based on studies by Brown and colleagues, examining only those individuals who have AgCC and few other difficulties, these individuals have difficulty in perceiving complex humor,³⁷ other forms of non-literal language (e.g., proverbs and idioms), and prosody (i.e., emotional tone).³⁸ In addition, they are generally socially naive, lack self-awareness and social understanding, and have difficulty verbalizing emotions.³⁹ While some of these difficulties may relate directly to a straightforward inability to transfer specific information from the more emotional right hemisphere to the more verbal left hemisphere, there may also be subtle difficulties due to the loss of dynamic interchange between cognitive-emotional modules in each hemisphere. If the more negative emotional modules cannot interact with the “approach” modules, as well as the sites for executive decision making, individuals with AgCC may not only lack specific concrete information, but they may lack a “gestalt” or completeness of emotional understanding that comes from comparing, testing, and combining emotional cues. Brown and colleagues put forth this perspective when they summarize various explanations for the humor deficits experienced by individuals with AgCC:

An alternative model [in contrast to a less dynamic model] would focus on the absence of rapid and efficient bi-directional interactions that would allow for the formation of wider processing networks necessary to imagine, construct, and ultimately reconstruct coherent alternative scenarios for the recognition of the humorous outcomes.⁴⁰

While individuals with AgCC can be taught specific responses to concrete situations and can learn to identify specific emotional cues, they may forever lack a deeper level of abstraction related to emotional processing.

Where are such deep-level abstractions stored or controlled within the brain? Brown has argued that

Article

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

there is no unique final control center that is needed for this deeper level of abstraction. Rather, it is controlled by the interaction and interplay of modules found in several locations. Each of these modules then come to possess a portion of the total perspective, but each requires continued input from other modules to form a complete picture. Therefore, neither whole brain responses nor individual modular responses truly capture the nature of mental phenomena. It appears that we require both outer (i.e., interpersonal) and inner (i.e., intermodular) “collectives” in order to form a cohesive mental stream.

Emotion-Cognition Emergence: Additional Brain Research

Admittedly, the evidence for this groupement derived from brain inter-module interaction is indirect at best. The model presented is not designed to suggest the final word on the issue, but to present a possibility, or a way of thinking, about how such higher-level abstraction may occur. While not providing the necessary and sufficient evidence for the existence of intermodule groupement, two elegant studies examining brain activity and emotion regulation provide additional research detail concerning possible mechanisms for the interplay of mental/brain modules and the process of emotional self-regulation.

A review of several studies concerning implicit (i.e., unconscious) attitudes by Stanley, Phelps, and Banaji illustrates the interplay between brain modules as individuals regulate their own emotional response to individuals of another race.⁴¹ One study they described was particularly instructive in showing this interplay.⁴² These researchers first assessed explicit (i.e., conscious or self-aware) racial attitudes by gauging the amount of executive (i.e., self-control) effort that individuals used to reduce anti-Black implicit attitudes during an interracial interaction. These researchers then scanned and analyzed brain activity using functional magnetic resonance imaging (fMRI) while the participants viewed black or white faces. They found that the amygdala (known to be involved in assessing threat) was more active for other-race faces than for same-race faces, but that this activity was reduced when two other areas were activated. One area, the dorsolateral prefrontal cortex (dlPFC),⁴³ is known to be involved in cognitive

assessment of social goals as well as the regulation of emotional centers. A second area, the anterior cingulate cortex (ACC),⁴⁴ is thought to be involved in the detection of discrepancies between cognitive or social goals, and emotional reactions (in addition to functions described previously). Thus, the ACC detects that the emotional reaction (i.e., prejudicial response) of the amygdala does not match with the social or cognitive goals held by the dlPFC. These areas then work in concert to reduce the activity and negative emotional reaction of the amygdala. A particularly interesting finding from the study was that the more capable individuals were in regulating their own racial attitudes—as measured at the outset of the study—the more active were the regulatory areas of the dlPFC and ACC. Thus, individuals who learn to control emotional responses in life demonstrate this control through specific brain areas.

Another superior study by Ochsner and colleagues goes even further in showing how the “conjoining” of various cognitive-emotional brain modules can lead to better self-regulation of emotions and behavior.⁴⁵ These researchers were able to use fMRI to observe specific brain activation changes as individuals engaged in emotional self-regulation. They started with a baseline condition during which individuals were instructed to simply attend to a variety of emotionally disturbing pictures. When participants attended to these images, they showed increased activation of the right amygdala and the left orbitofrontal regions. The right amygdala is known to be especially involved in “preattentive detection and recognition” of threatening or disturbing images or thoughts.⁴⁶ The amygdala also arouses behavioral response systems and memory systems for the generation of action and for the activation of declarative or conscious memory. The orbitofrontal region has been known to be involved in “representing the pleasant or unpleasant affective value of a stimulus in a flexible format that is sensitive to momentary changes in social and motivational context.”⁴⁷ The activation of the left orbitofrontal area is most likely associated with signaling to the normally positive-responding left hemisphere that a threatening stimulus is present, resulting in reduced activation of other left frontal areas.

When participants were asked to engage in cognitive reappraisal of the negative images (e.g., explaining the situation in less threatening terms), they were

able to reduce their subjective emotional response to the images, which corresponded to a significantly altered brain activation. The dorsal medial and lateral prefrontal cortex⁴⁸ became more active—especially on the left side—while the orbitofrontal cortex and amygdala nucleus showed reduced activation. In addition, increased activation of the right anterior cingulate cortex⁴⁹ was associated with decreasing fear or anxiety. The dorsal lateral prefrontal cortex has been shown previously to be involved in generating a cognitive strategy for coping with a situation and regulating working (i.e., active) memory. The dorsal medial prefrontal cortex is associated with reevaluation of the relationship between externally prompted conditions and internal evaluations coming from the lateral area. For example, this region is particularly active when individuals engage in generating attributions (i.e., explanations) for their own emotional states or the emotional states of others.⁵⁰ The anterior cingulate is particularly important for monitoring conflicts between “bottom-up” activation of arousing events and “top-down” reappraisals of the situation.

So which of these areas is controlling the other? Given that activation of dorsal prefrontal areas is associated with the down-regulation of orbitofrontal and amygdala regions, it would be tempting to conclude that ultimate control rests with these areas. The authors of this study suggest a different way of thinking about the self-regulation process:

On our view, the cognitive processes supporting reappraisal, *as well as* the emotional processes supporting context-sensitive evaluation, *may both exert* regulatory effects, albeit in different ways. Whereas the evaluation processes supported by [orbitofrontal cortex] may support the selection of appropriate, and the transient suppression of inappropriate, affective responses, the reappraisal processes supported by lateral and medial prefrontal regions may be important for modulating these evaluation processes themselves. By down-regulating *multiple types of evaluation* processes, reappraisal may shift from an emotional to an unemotional mode of stimulus analysis.⁵¹ [Emphasis added]

In essence, they are suggesting that one brain module does not simply control another module. Rather, each area contributes a cognitive or emotional perspective that is joined together, resulting in a “joint self-regula-

tion.” This appears analogous to the “groupement” or final shared perspective described earlier. However, in this case, it is brain modules that defer or voluntarily give control to another module. This form of interchange is only possible following a lifetime of interaction with other complex modules—other human beings—through significant relationships.

Constraints and Contours for Emotionally Informed Schemas

What can we conclude from the arguments presented thus far? I believe the arguments and evidence provide compelling support for the fact that emotions are essential in our relatedness, that emotions merge with cognition, and that brain modules interact to direct complex behavior. However, these examples do not provide irrefutable evidence for the notion that we can self-regulate emotions or that self-regulation is at all possible within an NRP framework. One could still argue that emotionally informed schemas depend on random interactions with the world. It is also still possible that the affective schemas we develop are constrained entirely by our genetic or biological composition—causing some individuals to come to certain final perspectives and others to come to a completely different point of view.

Although a full response to these questions is beyond the scope of this article—and very likely beyond my capacity to grasp the answers—I would like to present some guiding assumptions that might help our thinking about these issues. First of all, while there appear to be biological constraints on the complexity and quality of emotionally laden schemas, there is little evidence that biology constrains the ultimate choice of what we value—at least for more complex forms of social decision making. On the other hand, there appears to be good indirect evidence that we possess a biologically grounded motivational process that pushes us to develop emotionally informed schemas. In other words, all individuals have a pre-existing and built-in tendency that *initiates* emotional and moral action, but does not dictate the outcome. This is consistent with many philosophers and psychologists who have argued that we are “meaning-seeking” creatures. In their book entitled *Why God Won't Go Away: Brain Science and the Biology of Belief*, Newberg, d'Aquili, and Rause have suggested that survival pressures have

Article

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

endowed individuals with a fundamental motivation to seek greater meaning for their existence.⁵² They provide historical-cultural evidence as well as recent neuroscience studies to support their claim. Although space does not permit a full critique of their thesis, I believe that they have struck upon a plausible possibility—that seeking meaning and attempting to find some greater purpose, value, and place in the world could, indeed, be built into the fabric of our mental processes. In other words, this motivation is not only the result of some learned tendency to seek meaning, but is pushed by some inherent predisposition.

While our biological tendencies along with our social/moral cultural systems may help to initiate and possibly direct the development of emotionally informed schemas, these processes become “guidance systems” for future behavior. So while we continue to be guided by external events, we are increasingly capable of responding to situations based on internalized guiding principles. Once we establish these emotionally informed schemas, we can direct, in a top-down fashion, future situations that we encounter. This direction setting could be viewed either as a constraint or as a positive force, depending on the context or the value placed on the emotionally informed schemas. Certainly, adults desire for young people to develop an appropriate internalized set of perspectives and values which can guide them through a maze of complex issues. This guidance system then operates in an “off-line” fashion that can consciously or unconsciously maintain their “goal pursuits.”

As emotionally informed schemas become more and more practiced, I believe they also become increasingly unconscious, and once we walk a certain path we will have increasing difficulty in deviating from that path. In other words, we start out in life pushed by broad internal forces, then we develop internal guidance systems which are exercised willfully, but eventually we become more and more constrained by our own actions and repeated thoughts. As the early American psychologist William James suggested:

The hell to be endured hereafter, of which theology tells, is not worse than the hell we make for ourselves in this world by habitually fashioning our characters in the wrong way. Could the young but realize how soon they will

become mere walking bundles of habits, they would give more heed to their conduct while in the plastic state. We are spinning our own fates, good or evil, and never to be undone. Every smallest stroke of virtue or of vice leaves its never so little scar.⁵³

Conclusions and Contemplations

The descriptions of the modular and interacting nature of brain function certainly do not provide sufficient empirical support for a nonreductive physicalist approach to mind. However, I believe that this view of mental activity provides an essential element in arguing the *possibility* of a closed, but self-directing, system, and helps to address a concern raised by those who favor a more dualist view. An illustration of this objection was raised by C. Stephen Evans who recently challenged the position of nonreductive physicalism by proposing a thoughtful alternative—what he calls a “minimal dualism.” Part of his objection to the NRP view is that understanding the relationship between mental processes and brain function is not aided by understanding the specifics of how the brain works. In responding to the descriptions of brain injury provided by Malcolm Jeeves, Evans questions Jeeves’ conclusion that such examples of localized damage and the resulting behavioral problems represent any challenge to dualism. Evans states,

Is it a problem that the causal effects should be a product of specific regions of the brain? Why should the fact that the source of the effects are localized regions of the brain, rather than the brain as a whole, be a problem for the dualist? It is hard for me to see why dualism should be thought to entail that the causal dependence of the mind on the brain should stem from holistic states of the brain rather than more localized happenings.⁵⁴

While Evans is certainly correct that the existence of specialized brain regions do not necessarily create a problem for dualism, I believe that having a modular (i.e., localized) but interacting system is essential for the NRP position. In other words, the evidence and analogies provided so far do not refute dualism so much as they provide a means for the NRP position to envision self-directed behavior within a closed physical system. Since the research does not support

the existence of a final “homunculus” (i.e., brain module) directing an emotional or cognitive free choice, how can a seemingly closed system, as posited by the NRP approach, yield such a choice? Michael Gazzaniga, who has pioneered many studies concerning consciousness and brain function, answers this question by arguing that the existence and interaction of “semi-independent brain modules” are critical both to the development of self-directed mental activity and for the application of top-down management of our behavior.⁵⁵ This view is illustrated by research showing the dynamic ways by which modules interact, but even more so by the ways in which individuals experience difficulties when modules cannot interact (e.g., cases of AgCC).

This perspective of NRP that maintains the “free agency” of humans also does not deny the constraints placed on us within a physical system. Certainly, genetic, biological, cultural, and behavioral mechanisms will constrain or direct the choices we make, the emotional valence we attach to events, the moral tendencies we have, and ultimately, the meaning that each of us achieves. However, it is important to keep in mind that God can certainly direct all of these processes through everyday experiences, or by whatever means God would choose. As an adherent to covenant theology, I believe that Scripture is clear on the importance of biological connections, social relationships, training, and habits that we experience or possess in developing an understanding of God. Therefore, it is often through our mundane experiences, our relationships and our choices—all of which exist within a physical context—that God directs our lives.

However, I also believe that once we have experienced all of these influences and have achieved an abstracted set of principles or worldviews, we are then responsible agents capable of directing our future values and views. I know of no compelling philosophical or biological necessity that limits persons who possess interacting brain modules, with a unified abstraction of emotional-cognitive principles, in the context of a socially integrated and dynamic system, from freely directing the development of their future value systems and from directing future behavior. Therefore, whether guided by an immaterial soul, or comprised solely of substance, we will still stand as responsible individuals before a God who will call us to account for our decisions

and actions. Since I know that I personally will be found lacking in those actions, I am grateful that God provided a divine, yet embodied, substitute for my justification. □

Notes

- ¹Rene Descartes, “The Passions of the Soul,” in *The Philosophical Works of Descartes*, ed. E.S. Haldane and G. R. Ross (Cambridge, MA: The University Press, 1968), 331–54.
- ²Nancey Murphy, “Human Nature: Historical, Scientific, and Religious Issues,” in *Whatever Happened to the Soul? Scientific and Theological Portraits of Human Nature*, ed. W. S. Brown, N. Murphy, and H. N. Maloney (Minneapolis, MN: Fortress Press, 1998), 1–29.
- ³C. Stephen Evans, “Separable Souls: Dualism, Selfhood, and the Possibility of Life after Death,” *Christian Scholar’s Review* 34 (2005): 327–40; James B. Stump, “Non-Reductive Physicalism—A Dissenting Voice,” *Christian Scholar’s Review* 36 (2006): 63–76.
- ⁴Stump, “Non-Reductive Physicalism—A Dissenting Voice,” 63.
- ⁵Warren S. Brown, “Neurobiological Embodiment of Spirituality and Soul,” in *From Cells to Souls – and Beyond: Changing Portraits of Human Nature*, ed. M.A. Jeeves (Grand Rapids, MI: William B. Eerdmans Publishing Co., 2004), 101.
- ⁶Alan J. Torrance, “What Is a Person?” in *From Cells to Souls – and Beyond*, ed. Jeeves, 202.
- ⁷Brown, “Neurobiological Embodiment of Spirituality and Soul.”
- ⁸Schemas refer to cognitive structures or frameworks of thought that organize and help us interpret new information.
- ⁹Malcolm A. Jeeves, “Brain, Mind, and Behavior,” in *Whatever Happened to the Soul?* ed. Brown, Murphy, and Maloney, 73–97.
- ¹⁰Allan N. Schore, “The Experience-Dependent Maturation of an Evaluative System in the Cortex,” in *Brain and Values: Is a Biological Science of Values Possible*, ed. K. H. Pribram (London: Lawrence Erlbaum Associates, 1998), 337–58.
- ¹¹The orbitofrontal cortex is located on the ventral or “bottom” surface of the frontal lobes—just above the eye “orbits.” The medial or middle portion is often particularly important for emotional-cognitive regulation. This specific portion lies at the bottom of the frontal lobe, but also curves up the middle surface along the space that divides the cerebral hemispheres.
- ¹²The amygdala actually consists of two sets of nuclei (clusters of cell bodies)—one set in each brain hemisphere. The amygdala nuclei lie embedded deep within the left and right temporal lobes (located near ears) of each hemisphere. These clusters of cells communicate richly with the temporal lobes (to the side) and the frontal lobes (forward), as well as with many parts of the limbic system—an interconnecting circle of subcortical structures involved in emotion and motivation.
- ¹³Schore, “The Experience-Dependent Maturation of an Evaluative System in the Cortex,” 338.
- ¹⁴R. Karen, “Investing in Children and Society: What We’ve Learned from Seven Decades of Attachment Research,”

Article

Minding Emotions: The Embodied Nature of Emotional Self-Regulation

Commission on Children at Risk, *Working Paper 7* (New York: Institute for American Values, Vol. 8, 2002).

- ¹⁵Schore, "The Experience-Dependent Maturation of an Evaluative System in the Cortex," 339.
- ¹⁶S. Diamond, R. Balvin, and F. Diamond, *Inhibition and Choice* (New York: Harper and Row, 1963).
- ¹⁷V. S. Ramachandran and S. Blakeslee, *Phantoms in the Brain: Probing the Mysteries of the Human Mind* (New York: William Morrow and Company, 1998).
- ¹⁸Interestingly, Arthur did not experience this delusion when listening to his parents on the phone. Presumably, his auditory perception areas did connect with his emotional processing areas, so his emotional recognition was normal for purely auditory perception.
- ¹⁹Jenni Ogden, *Fractured Minds: A Case-Study Approach to Clinical Neuropsychology* (New York: Oxford University Press, 1996).
- ²⁰Medial refers to the midline close to the area between the two hemispheres. The term "orbital" refers to the eyes, so medial orbitofrontal refers to the middle area in the frontal lobes just above the eye "sockets." This area is known to be involved in regulating emotions and associating emotion with "reason."
- ²¹Oliver Sacks, *Musicophilia: Tales of Music and the Brain* (New York: Random House, Inc., 2007), 334.
- ²²Brown, "Neurobiological Embodiment of Spirituality and Soul," 58.
- ²³Raymond T. Bradley, "Values, Agency and the Theory of Quantum Vacuum Interaction" in *Brain and Values: Is a Biological Science of Values Possible*, ed. K. H. Pribram (London: Lawrence Erlbaum Associates, 1998), 478.
- ²⁴Frank A. Logan and Douglas P. Ferraro, *Systematic Analysis of Learning and Motivation* (New York: John Wiley & Sons, 1978).
- ²⁵John R. Searle, *The Construction of Social Reality* (New York: The Free Press, 1995).
- ²⁶Bradley, "Values, Agency and the Theory of Quantum Vacuum Interaction," 479.
- ²⁷Ibid.
- ²⁸Ibid., 480.
- ²⁹Bryan Kolb and Ian Q. Whishaw, *Fundamentals of Human Neuropsychology* (New York: W. H. Freeman and Company, 1990).
- ³⁰R. J. Davidson, P. Ekman, W. V. Friesen, C. D. Saron, and J. A. Senulis, "Approach-Withdrawal and Cerebral Asymmetry: Emotional Expression and Brain Physiology I," *Journal of Personality and Social Psychology* 58 (1990): 330-41.
- ³¹For a more recent study confirming this finding using fMRI, see G. P. Lee, K. J. Meador, D. W. Loring, J. D. Allison, W. S. Brown, L. K. Paul, J. J. Pillai, and T. B. Lavin, "Neural Substrates of Emotion as Revealed by Functional Magnetic Resonance Imaging," *Cognitive and Behavioral Neurology* 17 (2004): 9-17.
- ³²James A. Coan and John J. B. Allen, "The State and Trait Nature of Frontal EEG Asymmetry in Emotion," in *The Asymmetrical Brain*, ed. K. Hugdahl and R. J. Davidson (Cambridge, MA: The MIT Press, 2003).
- ³³K. N. Ochsner, S. A. Bunge, J. J. Gross, and J. D. Gabrieli, "Rethinking Feelings: An fMRI Study of the Cognitive Regulation of Emotion," *Journal of Cognitive Neuroscience* 14 (2002): 1215-29.
- ³⁴P. Moes, K. Schilmoeller, and G. Schilmoeller, "Physical, Motor, Sensory and Developmental Features Associated with Agenesis of the Corpus Callosum," *Child: Care, Health and Development* 35 (2009): 656-72.
- ³⁵Normal intellectual functioning is defined as having an IQ score greater than 80 (WAIS). In addition, individuals with AgCC are only included in these studies if they have no significant neurological disorders or deficits and no significant psychiatric diagnosis. W. S. Brown and L. K. Paul, "Cognitive and Psychosocial Deficits in Agenesis of the Corpus Callosum with Normal Intelligence," *Cognitive Neuropsychiatry*, 5 (2000): 135-57; W. S. Brown, M. Symington, D. Van Lancker, R. Dietrich, and L. K. Paul, "Paralinguistic Processing in Children with Callosal Agenesis: Emergence of Neurolinguistic Deficits," *Brain and Language* 93 (2005): 135-9.
- ³⁶L. K. Paul, B. Schieffer, and W. S. Brown, "Social Processing Deficits in Agenesis of the Corpus Callosum: Narratives from the Thematic Apperception Test," *Archives of Clinical Neuropsychology* 19 (2004): 215-25.
- ³⁷W. S. Brown, L. K. Paul, M. Symington, and R. Dietrich, "Comprehension of Humor in Primary Agenesis of the Corpus Callosum," *Neuropsychologia* 43 (2005): 906-16.
- ³⁸Brown, Symington, Van Lancker, Dietrich, and Paul, "Paralinguistic Processing in Children with Callosal Agenesis," 135-9; L. K. Paul, D. Van Lancker-Sidtis, B. Schieffer, R. Dietrich, and W. S. Brown, "Communicative Deficits in Agenesis of the Corpus Callosum: Nonliteral Language and Affective Prosody," *Brain and Language* 85 (2003): 313-24.
- ³⁹Paul, Schieffer, and Brown, "Social Processing Deficits in Agenesis of the Corpus Callosum: Narratives from the Thematic Apperception Test."
- ⁴⁰Brown, Paul, Symington, and Dietrich, "Comprehension of Humor in Primary Agenesis of the Corpus Callosum," 914.
- ⁴¹D. Stanley, E. Phelps, and M. Banaji, "The Neural Basis of Implicit Attitudes," *Current Directions in Psychological Science* 17 (2008): 164-70.
- ⁴²J. A. Richardson, A. A. Baird, H. L. Gordon, T. G. Heather-ton, C. L. Wyland, S. Trawalter, and J. N. Shelton, "An fMRI Investigation of the Impact of Interracial Contact on Executive Function," *Nature Neuroscience* 6 (2003): 1323-8.
- ⁴³The term dorsolateral refers to the "top" (dorsal) and "side" (lateral) part of the frontal lobe. Prefrontal refers to an area in front of those parts devoted to movement.
- ⁴⁴The anterior cingulate cortex lies along the medial (middle) aspect of the two hemispheres. It is considered part of the limbic system (emotional/motivational control), but is also closely tied to the medial orbitofrontal area. The anterior part refers to the front one-third of the cingulated cortex. The ACC is known to be involved, not only in positive emotional states, but also in moral decision making and making personal judgments.
- ⁴⁵Ochsner, Bunge, Gross, and Gabrieli, "Rethinking Feelings: An fMRI Study of the Cognitive Regulation of Emotion," 1215-29.
- ⁴⁶A. K. Anderson and E. A. Phelps, "Lesions of the Human Amygdala Impair Enhanced Perception of Emotionally Salient Events," *Nature* 411 (2001): 305-9.
- ⁴⁷Ochsner, Bunge, Gross, and Gabrieli, "Rethinking Feelings: An fMRI Study of the Cognitive Regulation of Emotion," 1216.

⁴⁸The dorsal prefrontal cortex lies on top of the brain in the frontal lobe, in front of the area devoted to the voluntary control of movement. The lateral part refers to the side, while the medial part refers to the areas close to the middle.

⁴⁹The anterior cingulate is part of the cortical surface that lies along the middle surface area along the deep gap between the left and right hemispheres. The anterior portion includes the front one-third of the cingulate.

⁵⁰H. L. Gallagher, F. Happe, N. Brunswick, P. C. Fletcher, U. Frith, and C. D. Frith, "Reading the Mind in Cartoons and Stories: An fMRI Study of 'Theory of Mind' in Verbal and Nonverbal Tasks," *Neuropsychologia* 38 (2000): 1121.

⁵¹Ochsner, Bunge, Gross, and Gabrieli, "Rethinking Feelings: An fMRI Study of the Cognitive Regulation of Emotion," 1223.

⁵²A. Newberg, E. d'Aquili, and V. Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine Books, 2001).

⁵³W. James, "Emotions and Habit (1890/1968)," in *History of Psychology*, ed. W. S. Sahakian (Itasca, IL: F. E. Peacock Publishers, Inc., 1968), 213.

⁵⁴C. Stephen Evans, "Separable Souls: Dualism, Selfhood, and the Possibility of Life after Death," *Christian Scholar's Review* 34 (2005): 334.

⁵⁵M. S. Gazzaniga, "Cerebral Specialization and Interhemispheric Communication: Does the Corpus Callosum Enable the Human Condition?" *Brain* 123 (2000): 1293-326.

ASA BLOGS

"I love to speak of Persons with Civility, though of Things with Freedom ... railing at a Mans Person [is] such a quarrelsome and injurious way of writing [that] does very much mis-become both a Philosopher and a Christian ..."

Robert Boyle, *Certain Physiological Essays* (1661)

For more than fifteen years, ASA has sponsored an email discussion group. With newer technology, we can now provide a more appropriate forum to help facilitate dialog on issues of science and faith.

The primary discussion forum is called **ASA Voices**, www.asa3online.org/Voices. It is a general forum for thoughtful discussion of various issues in science and faith. The public can read all posts and comments, but only ASA members have permission to write comments.

The ASA Voices home page also contains links to two other discussion groups. **ASA Book Discussion** hosts a series of discussions on various seminal books on science and faith. **ASA PSCF Discussion** entertains discussions of articles published in our journal.

Check them out and submit your comments.

www.asa3online.org/Voices



THE CHRISTIAN APOLOGETICS PROGRAM BIOLA UNIVERSITY

Master of Arts in Christian Apologetics
Specialized Distance Learning Program

First Rank Faculty

Outstanding scholars, authors, debaters,
and active apologists

Graduates Leading a New Movement

Join the ranks of graduates who are now
broadcasters, writers, teachers, doctoral students,
evangelists, researchers, missionaries,
campus ministry staff, church staff, seminar
speakers, and much more

Unique Program and Courses

No other M.A. program like it. Thirty-six
semester hours and fully accredited

Distance and On-Campus Learning

Convenient classes for busy people like you
no matter where you live.

For more information
call toll free:

888.332.4652



BIOLA
UNIVERSITY

Christian Apologetics
13800 Biola Avenue
La Mirada, CA 90639

e-mail:

apologetics@biola.edu

website:

www.biola.edu/give-an-answer

Learn from the Best

Craig J. Hazen, Ph.D.

Director of Graduate Studies

J. P. Moreland, Ph.D.

William Lane Craig, Ph.D., D. Theol.

Lee Strobel, M.S.L.

Phillip E. Johnson, J.D.

William A. Dembski, Ph.D., Ph.D.

Gary R. Habermas, Ph.D.

Scott B. Rae, Ph.D.

John Mark Reynolds, Ph.D.

Kevin A. Lewis, Th.M., J.D.

R. Scott Smith, Ph.D.

David A. Horner, D.Phil.

Garrett J. DeWeese, Ph.D.

Clay B. Jones, D.Min.

John A. Bloom, Ph.D., Ph.D.

Greg Koukl, M.A.

Kenneth R. Samples, M.A.

Master of Arts in Science & Religion Specialized Distance Learning Program

Master the Toughest Questions in Science and Religion

- Are science and religion at war?
- Is "intelligent design" science?
- Body and soul: What are human persons?
- What is the significance of cosmic fine tuning?

...and much more!

THE SCIENCE & RELIGION PROGRAM BIOLA UNIVERSITY



e-mail: scienceandreligion@biola.edu

www.biola.edu/perspectives

Biology of Spirituality

Kevin S. Seybold



Kevin S. Seybold

The idea that there is a biological basis for human spirituality is controversial to many people. There is, nevertheless, a growing body of empirical evidence coming from neuroscience, psychology, cognitive science, and related disciplines interpreted by some as suggestive of a biological basis for belief in God or the transcendent. The purpose of this article is to (1) review some of that evidence, (2) address the issue of how such a biological foundation to spirituality might have developed, and (3) construct a rationale as to why, from a Christian perspective, a biology of spirituality should be expected.

Biology of Spirituality

The notion that there might be a biological basis for human spiritual awareness or that spirituality might have evolved via natural selection is troubling to many people, both those with religious beliefs and those without. Alister Hardy proposed exactly that, however, when he suggested that what he called “the divine flame” is an important and necessary part of the human evolutionary process. The evolutionary process identified by Hardy was a combination of biological and cultural evolution whereby certain *Homo sapiens* ancestors “consciously chose” to attend to such spiritual awareness because it enabled them to better cope with existence.¹ As a zoologist, Hardy argued that “an empirical study of nature, man and human history can give us important evidence in support of a belief in a theistic universe.”²

While the question of God’s existence certainly cannot be answered by science, there is, nevertheless, a growing body of empirical evidence coming from neuroscience, psychology, cognitive science, and related disciplines, suggesting to some the existence of underlying physiological mechanisms that subserve spirituality. The purpose of this article is to (1) review some of that evidence, (2) address the issue of how such a biological foundation to spirituality might

have developed, and (3) construct a rationale as to why, from a Christian perspective, a biology of spirituality might be understandable and even expected.

Before discussing the empirical evidence for the biology of spirit, however, a definition of spirituality must be offered. I understand spirituality to be a property that emerges out of the brain; it is an embodied capacity which enables us to have personal relatedness. An emergent property is a mode of functioning that comes into being on the basis of the interactive operations of less complex subsystems.³ In the case of spirituality, these operations are of the brain. Personal relatedness is the capacity to relate to and have a cognitive representation of the self, to have

Kevin Seybold is professor of psychology at Grove City College (Pennsylvania) where he teaches courses in physiological psychology, learning and cognition, psychology of religion, history and systems of psychology, research methods, and science and religion. A graduate of Greenville College (BA) and Marquette University (MA), he received his PhD in physiological psychology from the University of Wisconsin-Milwaukee. Seybold has published articles in *Physiology & Behavior*, *the International Journal of Neuroscience*, *Biological Psychiatry*, *Current Directions in Psychological Science*, *the Journal of Behavioral Medicine*, and *the Journal of Psychology and Christianity among others*. During the summers of 2003–2005, he was a Research Fellow in Science and Christianity at Oxford University. His book *Explorations in Neuroscience, Psychology and Religion* (Ashgate Publishing, 2007) was a product of that three-year fellowship. Seybold is a member of the Association for Psychological Science and the American Scientific Affiliation. Correspondence can be sent to ksseybold@gcc.edu.

Article

Biology of Spirituality

relatedness with others, and to have relatedness to God.⁴ This view of spirituality is consistent with that of Thomas Aquinas who defined spirituality as the sum of all the unique, embodied human capacities and functions.⁵ Aquinas also argued that God calls all creatures to return to him for the fulfillment of their being. What define us as creatures made by God are our relationships, and God calls us to relationship with him (the lure of the Divine). In maintaining that we naturally long for God, Aquinas is consistent with Augustine who famously said of God, “You have made us for Yourself, and our hearts are restless, until they rest in You.”⁶ In order to establish this personal relatedness, it is necessary to first have certain cognitive abilities, and these cognitive abilities have a clear neurobiological basis. It is in this way that spirituality emerges out of the brain and can be said to be embodied.

Is there any scientific evidence for the views of Aquinas and Augustine? This article will argue that there is empirical evidence that can be drawn from various scientific disciplines. Such evidence, however, invites a second question. Why should we care if there is empirical support for the views taken by theologians 700–1,500 years ago? Or, why should theology today concern itself with trying to integrate what it has to say with what is taken from the scientific disciplines of psychology, neuroscience, biology, and cognitive science? We live, for good or ill, in a postmodern society that values science. We depend upon science for our continued health, for our way of life, and, at a more abstract level perhaps, for its path to uncovering truth. We also live in a society that has, in the view of many, become increasingly secular and unchurched. Because of the importance of science in our society, if Christians want to have any significant input in the ongoing debates in our society and want to be taken seriously in the marketplace of ideas in our culture, they must not only be conversant in and knowledgeable about science, they must also be able to show how their theological ideas relate to science. In addition, if Christians hope to convince the non-Christians or unchurched in our society to reflect on the claims of Christ, they must be able to articulate how the positions taken within Christianity can be seriously considered by a postmodern individual who has been raised in a culture that has such a high view of science, its methods, and its findings.

The approach to the study of spirituality adopted in this article reflects the stratified nature of reality itself. According to this view, reality is complex and multileveled, requiring many different perspectives, each with its own methods and goals. No single approach to a particular part of reality (such as spirituality) is complete in and of itself. So, spirituality can be studied from a variety of perspectives, including the theological, sociological, psychological, and biological. Each of these levels of analysis will have its own methods to bring to the study of this particular part of reality. While one can, using methodological reductionism, begin to study spirituality at the biological level, this does not mean that only that level of analysis is appropriate or complete. Other methods more appropriate for the other levels must also be employed. It is in this way that one can speak of a nonreductive study of spirituality without explaining spirituality away as “nothing more than” a bunch of neurons firing or neurochemicals released into synapses.⁷

If spirituality has a biological foundation, one might expect to observe a “basic core” or universality that can be identified across cultures. David Hay, like Hardy a zoologist by training, believes he has found evidence for a biological basis for spiritual awareness, a kind of sense that, because it has survival value, developed through the process of natural selection. In his recent book *Something There*, Hay provides evidence, based upon years of interviews with individuals, many of them children, that spiritual experience or awareness is a built-in biologically structured component common to all humans. Examples of spiritual experiences reported by Hay include (1) awareness of the presence of God, (2) awareness of prayer being answered, (3) awareness of a sacred presence in nature, (4) awareness of the presence of the dead, (5) awareness of an evil presence, and (6) awareness of a transcendent providence or a patterning of events. Hay reports that in his home country of Britain, where a noticeable decline in church attendance and religious participation has occurred, there has nevertheless been an increase over the past twenty years in each of these spiritual experiences.⁸ While not all of these examples correspond to spirituality defined as personal relatedness, certainly awareness of the presence of God, awareness of a sacred presence in nature, and an awareness of a transcendent providence or

a patterning of events can be seen to correspond to having a relationship with God as discussed above.

In addition, Hay and his colleague, Rebecca Nye, interviewing six- to ten-year-old children who had no connection to any religious institution nor any type of religious training, found that those children nevertheless used spiritual language in discussing issues such as awareness of mystery (e.g., wonder and awe), awareness of value (e.g., meaning and ultimate goodness), and awareness of the here and now (e.g., empathy and unity with something beyond oneself). In analyzing the responses, Hay and Nye identified a concept they termed “relational consciousness” that seemed to emerge from the children’s conversations, a tendency for the children to understand themselves and their world in relational terms. Hay and Nye speculate (consistent with Alister Hardy) that relational consciousness evolved because it encourages and enables cooperation.⁹

Azari, Missimer, and Seitz suggest that current neuroimaging data (neuroimaging consists of taking pictures of the brain while a person engages in some kind of task) point to a cross-cultural invariability in religious and spiritual experiences which involves brain regions utilized in and essential for relational cognition. If these authors are correct, this would support a possible biologically based universal component to human spirituality which could nevertheless be expressed differently from culture to culture.¹⁰ One need not conceptualize this biological mechanism as being uniquely suited for relatedness to God or the transcendent. As will be discussed below, these mechanisms can be used to support a variety of social relationships, including those with the transcendent or God.

Evidence for a Biology of Spirituality

In September 2003, the Commission on Children at Risk released a report which addressed reasons for the increased incidence of behavioral and mental health problems in US children. The commission, consisting of thirty-three physicians, research scientists, and mental health specialists, argued that the best scientific evidence from psychology, neuroscience, medicine, education, and other related disciplines suggests that human beings are “hardwired to connect,” born to form “close connections to other

people, and deep connections to moral and spiritual meaning.”¹¹ The opportunity to make these important connections to others and “for moral meaning and openness to the transcendent” has decreased in recent decades. Our society no longer makes it easy to develop these necessary relationships.

Robert Putnam in his book *Bowling Alone* describes how American society has become less community oriented and more individualistic since the decade of the 1960s. Putnam notes a decline in political, civic, and religious involvement and interest in the last fifty years. He also identifies a decrease in forming relationships in the workplace and in making informal social connections (e.g., bowling leagues and card clubs), and describes a corresponding decrease in altruism, trust, volunteering, and philanthropy in American society during the same time period.¹² The decline in relatedness among adults also impacts the number of opportunities for children to make connections. The Commission on Children at Risk argues that it is the lack of these opportunities that has contributed to the increase in problems seen in children in this country. Among other findings, the Commission reports that

- *The mechanisms by which we become and stay attached to others are biologically based and are identifiable within the brain.* Evidence from the neurosciences shows that the brain organizes itself in the context of relationships with others and that there is a biochemistry (e.g., oxytocin) to the connection process.¹³ Relationships are not just nice to have, they are essential for the proper development and functioning of the brain.
- *The beginning of morality is primed biologically and is associated with the parental attachment process.* The innate attachment process that a newborn has to a primary caregiver is the foundation for the emergence of conscience and morality. Biological systems prepare us to associate certain emotionally toned messages, that some behaviors are good (and therefore permitted) and that other behaviors are bad (and not permitted), with reactions from the attachment figure.¹⁴ Behaviors that “please” the attachment figure evoke positive emotions in the infant and are felt to be “good,” while behaviors that displease the attachment figure produce a negative emotional response in the infant and are felt to be bad. In this way, attachments help guide a child’s moral development.

Article

Biology of Spirituality

- *Early nurturing relationships, for example, with one's primary caregiver, influence early spiritual development, and that spiritual development also affects us biologically.* Studies in developmental psychology suggest that children form their conceptions of God, in part, from their conceptions of their parents (or other attachment figures). As a result, early experiences with parents, for example, the happiness or disappointment that comes with relationships with parents, can facilitate or inhibit the development of a person's religious faith later in life. In addition, religiosity and spirituality can have positive and beneficial effects on the individual throughout life in the form of reduced morbidity and mortality and greater psychological well-being. These physical and mental health benefits are similar to those associated with effective early parental nurture.¹⁵
- *Spirituality (and religiosity) influence physical and mental well-being.* As mentioned above, studies of religiosity and spirituality suggest a positive benefit of these concepts to mental and physical health. One of the mechanisms through which spirituality and religiosity are thought to promote these health benefits is via social connectedness or social capital.¹⁶ Being in a relationship with others that is linked by social ties and common values can have a salubrious effect on physiological mechanisms involved in health and illness.
- *The human brain is organized to ask ultimate questions and seek ultimate answers.* Humans seem to have an innate drive to find meaning and order within reality. Recent studies in the neuroscience of religion point to various areas of the brain which are involved in the mediation of religious or spiritual experience. The work of David Hay suggests that young children, even those raised in unchurched or atheistic households, use spiritual language in discussing questions of death, life, and so forth (at least until they learn from their parents and/or society as a whole that such language is inappropriate).¹⁷

In the last decade, researchers in neuroscience, psychology, cognitive neuroscience, and related disciplines have investigated topics that, up until the last fifteen years or so, had been beyond the reach of empirical investigation.¹⁸ Included in this research is evidence suggestive of a biological basis for human spirituality. In the next section, some of this evidence

will be reviewed, including a discussion of mirror neurons, theory of mind, the role of the prefrontal cortex, neurotheology, and social cognition.

Mirror Neurons, Theory of Mind, and Social Cognition

Originally discovered in the early 1990s in monkey premotor cortex, mirror neurons are brain cells that discharge both when the monkey performs a particular response (e.g., opening and closing a hand) or sees another monkey perform the same behavior. The mirror neuron system, we now know, is also present in humans and goes beyond the motor cortex (in the frontal lobe) to include regions of the occipital, parietal, and temporal cortices as well. It is thought to be involved in various social behaviors in humans, including imitation, language, and theory of mind.¹⁹ Language development and communication have clear implications for the establishment of social relationships, and language itself is acquired within a social context. It is not enough to merely hear words being spoken independently of context (e.g., hearing words coming from a television set); we acquire our knowledge of language by hearing and practicing language in relationship with others. It is by hearing what another person says to us in a social context and responding to that person within that social environment that language is acquired and mastered.

The development of a theory of mind (ToM) also has implications for social relationships. A ToM is the recognition in a person that other individuals have separate minds and, therefore, have their own thoughts, beliefs, feelings, and so forth. This understanding is not present in newborns; it develops over the first four years of life. With a ToM, an individual can begin to understand what another person is thinking and feeling as well as what the other person might do in a given situation. (One might go further to suggest that the development of a ToM is necessary to begin to understand what God might want or expect from us.) This knowledge is important in establishing a relationship with the other person.²⁰ Seeing the world from another's perspective, thinking another's thoughts, knowing what another individual might do, are important pieces of information as we interact socially. Without such knowledge, having relationships with others is difficult or impossible, and mirror neurons are thought to mediate the development of a ToM. If spirituality involves

the ability to relate to oneself, others, and God, the above evidence suggests that our spirituality is in some way tied to the functioning of these mirror neurons.

While various regions of the brain demonstrate mirror neuron activity and are implicated in a ToM, the frontal lobes are particularly important in the mediation of these abilities. The frontal lobes are thought to mediate many of the characteristics that are believed to be uniquely human. One frontal lobe area which is particularly important in a ToM is the prefrontal cortex which is subdivided into different sections (e.g., orbitofrontal, medial, and ventromedial prefrontal). Brain imaging studies show that the prefrontal cortex is activated during ToM tasks and is involved in the control of impulsive behavior, judgment, and decision making, so-called “social cognition,” which is important in the development and maintenance of healthy, positive relationships.²¹ Indeed, the specific subsections of the prefrontal cortex are linked to the regulation of interpersonal relationships, moral behavior, and social cooperation. For example, one researcher in this area suggests, “It could be that the integration of information about other people and oneself, and the social relationship between the two, are the hallmarks of medial prefrontal processing.”²² Damage to particular brain regions can illustrate the importance of that neural area to the performance of specific behaviors. Damage to the orbitofrontal region is implicated in our ability to recognize deception in others and to perform effectively in various kinds of social exchanges, limiting our ability to develop and maintain positive, functional relationships with those individuals.

The evidence from neuroscience on mirror neurons, ToM, and social cognition suggests that specific regions of the brain, particularly the prefrontal regions, are involved in social-relational cognitive processes. When these brain areas are not functioning effectively, we will experience a deficit in our ability to fully relate to others; we might say that our spirituality is affected. Glenn Weaver reports on how Alzheimer’s disease not only affects the victim’s cognitive processes involved in memory, but how it can also dramatically impair how one relates to others. Weaver interviewed “partner observers” of Alzheimer’s patients. They noted a number of changes in spiritual expression in their loved ones. Observed changes included loss of the patient’s

spiritual life narrative, a sense of spiritual emptiness, diminished participation in spiritual practices (e.g., personal prayer and corporate worship), difficulty experiencing God’s comfort, and experienced guilt about the loss of close relationships in a community of faith.²³ We do not, of course, question the spirituality of these individuals just because they are suffering from a terrible disease and are not participating in private or corporate worship as they once did. It is important to note, however, that those patients who tended to rely on these kinds of activities in their spiritual practice often found it more difficult to feel close to God and to benefit from his presence, as a result of the disease.

Neurotheology and the God Gene

In the last ten years, several research centers began investigating the role of the brain in religious and spiritual experiences.²⁴ Neurotheology—an inaccurate term in that neurotheology does not deal with theology per se—is the name some give to this field of research, and the findings of these researchers attract the attention of not only their fellow scientists, but of the general public as well. Several articles in popular magazines such as *Newsweek* and books in Barnes & Noble attest to the general interest this kind of research generates.

Mario Beauregard, a neuroscientist at the University of Montreal, in his 2007 book, *The Spiritual Brain*, documents his studies of Carmelite nuns, finding that spiritual experiences are mediated via complex neural pathways and distributed brain regions.²⁵ The brains of these nuns were imaged (using functional magnetic resonance imaging) during a contemplative mystical experience. A widespread pattern of activity was observed throughout the prefrontal, temporal, parietal, and occipital cortices. Subcortical regions (e.g., insula, caudate, and brainstem) were also involved.²⁶

Similar findings are reported by Andrew Newberg at the University of Pennsylvania in his study (using single photon emission computed tomography, or SPECT) of Buddhist monks during spiritual meditation and Franciscan nuns during contemplative prayer.²⁷ Again, widespread activation of the brain was observed, including the frontal cortex, and a reduction of activity was noted in some parts of the parietal lobe.²⁸

Article

Biology of Spirituality

Changes in frontal and parietal lobe activity, as well as in amygdala, were also reported in a study measuring regional cerebral blood flow during glossolalia.²⁹ Decreased activity in the frontal lobe was seen as supportive of the hypothesis that glossolalia is related to a perceived loss of intentional control, and increases in amygdala activity were consistent with the emotional nature of glossolalia.

Findings such as these suggest that complex neural activity occurs in distributed brain areas during various kinds of spiritual and religious practices, reflecting the multifaceted nature of these experiences. The importance of these findings is not that they suggest a “God spot” in the brain, as some in the mainstream media have said in misrepresenting this work, or that God is just in one’s head. It is also important, as Azari and Slors caution, not to try to explain too much from these neuroimaging data.³⁰ Even so, the brain is involved in all of our behavior and experience. All that we think, do, feel, or believe involves the brain in some way. While acknowledging that what we perceive and what we know are influenced by context and culture, it is nevertheless accepted, by scientists at least, that the neural electrical patterns in our brains are accurate representations of reality. If the reality in which we find ourselves is accurately represented in the neural activity of the brain (which evolved in this reality), then we should not be surprised or in any way troubled by the fact that we experience God, who we believe is also part of the reality in which we find ourselves, by using our brains as well. If we as embodied creatures are made for a relationship with God, would not God have made it possible to experience him through our embodied natures?

Other researchers are interested in a genetic contribution to belief and faith. Studies of twins at the University of Minnesota suggest that upwards of fifty percent of one’s religious attitudes and values are influenced by genetic factors.³¹ More recently, Dean Hamer, a geneticist at the National Cancer Institute (USA), gained attention with the publication of his provocatively titled book *The God Gene*, which suggests that human spirituality is an instinct that is “hardwired into our genes.”³² Hamer’s “God gene” is actually a variant of a gene that produces a protein involved in communication between brain cells. Hamer found a correlation, not a causal connection, between the presence of this gene variant,

called VMAT2, and a paper-and-pencil scale designed to measure a character trait called self-transcendence. This measure includes subscales for self-forgetfulness, transpersonal identification, and mysticism, each thought to be an aspect of spirituality by the person who constructed the scale. VMAT2 was most strongly associated with the self-forgetfulness subscale, more weakly with the other two. While the title of Hamer’s book certainly grabs one’s attention in a bookstore, the nature of the research described within the book is less extraordinary than the title suggests. (Carl Zimmer, a well-known science writer in his own right, famously suggested in his October 2004 *Scientific American* review of Hamer’s book that a better, more accurate title would be, *A Gene That Accounts for Less Than One Percent of the Variance Found in Scores on Psychological Questionnaires Designed to Measure a Factor Called Self-Transcendence, Which Can Signify Everything from Belonging to the Green Party to Believing in ESP, According to One Unpublished, Unreplicated Study.*)

The empirical evidence cited above is suggestive of a biological foundation for spirituality as it is defined in this article, namely, the capacity to relate to and have a cognitive representation of the self, to have relatedness with others, and to have relatedness to God. None of the evidence is intended to demonstrate beyond doubt that spirituality is an innate and emerging process of the human brain. Even less is it intended to try to prove the existence of God. Science is necessarily naturalistic in its methods; it cannot address issues dealing with the nonmaterial or supernatural. Thus, no empirical data can answer ultimate questions raised by religion.

Despite this limitation, some researchers in this area are nevertheless reductionistic in their understanding of the data.³³ Persinger, for example, interprets spiritual and religious experiences as merely temporal lobe microseizures or transients. While these experiences might have had evolutionary significance, the continuation of spiritual and religious experiences “within contemporary human behavior is ominous,”³⁴ and he worries about the correlations between these experiences and aggression, helplessness and complacency. He also expresses concern about how “the decision-making patterns of people who occupy powerful political positions” might be influenced by these spiritual/religious experiences.³⁵

Joseph also links spiritual experiences to temporal lobe and limbic structures, suggesting that these brain areas serve as a “transmitter to God” as well as accounting for “sexual and violent aspects of religious behavior.”³⁶ In a less reductionistic manner, however, Joseph does acknowledge that a true scientist cannot rule out the possibility that these brain structures evolved as they did because there are spiritual data to which humans can respond, and doing so increases the likelihood of survival.³⁷

Notwithstanding the negative arguments presented by researchers such as Persinger and Joseph, the data cited above can provide support for the truth of theological beliefs that are initially taken on other than empirical bases. If one believes, on theological grounds, that God is at least partially understood as Father, Son, and Holy Spirit in relationship, and that this God created humans to be in a relationship with him (“Let us make man in our image, after our likeness ...” Gen. 1:26, RSV), then one might expect God to make the capacity to have this relationship embodied in our physical being. One might expect this capacity for spirituality to be innate, and therefore universal, and the evidence cited above can be interpreted as supporting, not proving, that expectation. Given this assumption, how might this innate and universal capacity for relatedness have developed? By what naturalistic mechanism, the only kind of mechanism revealed by science, might a biology of spirituality have emerged?

The Development of a Biology of Spirituality

John Teske, in arguing for the embodiment of spirituality, suggests that human spirituality is a product of the same processes of evolution that make social life possible.³⁸ Others have also suggested that spirituality (or religion) is the product of natural selection. What are some of the possible ways that evolutionary theory might be applied to an understanding of spirituality’s apparent universality? David Sloan Wilson presents five evolutionary hypotheses that can be used to try to understand the presence of spirituality.³⁹ One perspective is to view spirituality as an adaptation, built into humans as a result of natural selection, with the outcome that spirituality serves for the benefit of religious groups. In other words, spirituality is selected at the level of the group via genetic as well as cultural processes. A second view

is that spirituality is an adaptation, but that selection is at the level of the individual; it is the individual, not the group as a whole, which benefits from spirituality, so some members of a group will reap the advantages of spirituality while other members of the group will not. A third option utilizes the concept of memes to try to explain spirituality by suggesting that the cultural characteristics of spirituality (and religion) act like parasites and infect the minds of the “spiritual,” much like viruses infect their unfortunate hosts.

In addition to these adaptation approaches, there are those arguments that see spirituality (or religion) as nonadaptive. The first of these nonadaptive approaches suggests that characteristics of spirituality were possibly adaptive in the past when groups were small and the individuals in the groups tended to be genetically related to each other, but that these traits are not adaptive in large groups of unrelated individuals. Another nonadaptive approach argues that spirituality is a functionless by-product of cognitive processes that are themselves adaptive in nonspiritual contexts. In other words, relatedness to God, a characteristic of spirituality as defined in this article, is a nonadaptive by-product of adaptive cognitive processes involved in relatedness to other humans. The cognitive processes involved in developing relationships to others evolved because this type of relatedness was important in human ancestral history. Relatedness to God is a by-product of these adaptive cognitive processes, but has no adaptive survival function in and of itself.⁴⁰

For spirituality or any other characteristic to be adaptive, it is necessary to show that it increases the survivability of the individual (or group). Support for the view that spirituality is an adaptation is seen, some argue, in the positive relationship between spirituality and health.⁴¹ Individuals scoring high on measures of spirituality also tend to score positively on various measures of physical as well as mental health, including lower levels of disease risk and lower mortality rates. In analyzing the adaptive nature of religion, Joseph Bulbulia maintains that such evidence can be interpreted as suggesting that natural selection “endorsed religious cognition because religion assists in restoring and maintaining individual well-being.”⁴² Given the overlap in research findings on the effect of spirituality and religion on health, and the close connection between spirituality

Article

Biology of Spirituality

and cognition maintained in this article, a similar statement might be proposed to argue for the adaptive nature of spirituality as well. To show that a characteristic or capacity is an adaptation, it is also important to link that capacity to particular brain regions or structures that have been selected for in evolution. Some of the literature discussed above speaks to this requirement. It can be argued, however, that while the cognitive (and brain) structures necessary for developing self-relatedness and relationships with others was selected by evolution because of their survival value, the third part of relatedness, to God, is still a by-product, not a specific adaptation.

McNamara suggests that the influential role the prefrontal cortex has on social cognition (see discussion above) supports viewing spirituality as an adaptation.⁴³ The way that spirituality performs this adaptive function is by “tapping the neurochemistry of the prefrontal lobes to support moral, filiative, and prosocial behaviors,”⁴⁴ all of which encourage cooperation and relatedness. The ability to inhibit selfish behavior, cheating, and short-term gratification are necessary to establish trusting, long-term, cooperative relationships with others. These relationships, in turn, are required for human survival. Cognitive mechanisms that mediate these prosocial behaviors would be selected, leading to adaptation and reproductive success.

The nonadaptive by-product view is the perspective presented by psychologist Lee Kirkpatrick and anthropologist Pascal Boyer. For Kirkpatrick, spirituality is considered a by-product of a system that is meant to do something else, in this case, provide the necessary cognitive processes to enable social cognition and the development of relationships with other humans. There are different kinds of evolutionary by-products. One type is known as a spandrel, which “refers to incidental, nonfunctional (or sometimes dysfunctional) effects of adaptations that result more or less inevitably but ‘unintentionally’ from the design of an adaptation ...”⁴⁵ Another kind of by-product is an exaptation which “refers to the use of an adaptation for a purpose other than its original function.”⁴⁶ In either case, natural selection produced the cognitive processes necessary for social relatedness, and at least some of these processes were used for the purpose of developing a relationship with the transcendent or God. For many of the

writers in this area of scholarship, the fact that God, or the transcendent, does not exist in reality would no doubt suggest that the by-product is not only incidental, but also dysfunctional. Kirkpatrick also argues that, while there might be psychological benefits to spirituality, that is not the same as demonstrating reproductive success to spirituality, and it is reproductive success that is ultimately, from a gene-selection perspective, what counts. Pascal Boyer, perhaps the best-known theorist on the evolution of religion and spirituality, affirms the important role of cognition in spirituality, but ultimately ascribes spirituality as a by-product, not a capacity that was directly selected for by natural selection.⁴⁷

One might say at this point that from a Darwinian perspective, it is unreasonable to suggest that there is any purpose to the selection of particular cognitive processes beyond genetic reproductive success, and that the mechanisms of mutation and selection do not, therefore, allow for any evolutionary or physical account of the development of spirituality. Simon Conway Morris, evolutionary paleobiologist at the University of Cambridge, argues convincingly that there is a kind of direction to evolution in that it has an ability to repeatedly “navigate” to the correct solution to various life problems.⁴⁸ For example, he maintains that the eye has evolved independently multiple times, because the camera-like eye is the “solution” to the problem of seeing. Regardless of variations in environments, all solutions are not possible. There are a limited number of workable solutions, and through the process Conway Morris calls “convergence,” the correct solution is repeatedly found. Convergence to Conway Morris suggests that evolutionary trends are real, not just apparent.

Another example of convergence within nature is the emergence of sentience. Conway Morris suggests that sentience is inevitable, that the evolution of life seems to necessarily lead to intelligent life. Conway Morris is well known for his rebuttal of Stephen Jay Gould’s statement that if you play the tape of evolution over, there will be an entirely different outcome. Not so, says Conway Morris. If you play the tape of evolution over, you will get pretty much the same outcome we have now (namely, intelligent life more or less in the current human form). The reason for this is evolutionary convergence which leads to sentience. Intelligent life, human life, is an evolutionary inevitability. The ideas of convergence and the inevi-

tability of intelligent life provide scientific support for the theological position that God created humans for the purpose of having a relationship with him. If Simon Conway Morris is correct about convergence and the inevitability of intelligent human life, then the natural mechanisms of mutation and selection could be the means whereby God created the embodied spiritual nature of humans, that part of our human capacity that enables us to establish personal relatedness.

Why a Biology of Spirituality Might Be Expected

We have seen that there is empirical evidence for a biological basis of spirituality when spirituality is understood as personal relatedness, i.e., relatedness to one's self, to others, and to God. What grounds are there, from a Christian theological perspective, for expecting an innate, biologically based spirituality in humans? Why should we not be surprised at the findings presented by the Commission on Children at Risk, that we are hardwired to connect, not only with other members of our species, but also to the transcendent?

Aquinas believed that because humans share in the *imago Dei*, we have a passion for communion with God; we are driven toward a relationship with him and are attracted to God who is the object of this passion.⁴⁹ Trinitarian theology provides a rationale for why humans should experience this lure of the Divine. Miner argues that a Trinitarian perspective is necessary because it focuses on all members of the Godhead (rather than viewing God as simply Creator/Father) and how the relationships within the Godhead can be seen as a model for human relationships, both with God and with other humans.⁵⁰ God as relational has implications for our being made in the likeness of God, the *imago Dei*,⁵¹ and this central Christian doctrine suggests that our destiny is to enter into fellowship with God, a destiny manifested on Earth as a drive to relate to something beyond ourselves.⁵² It is in relationship with others that we reflect the image of God and reach our full potential as humans.⁵³ According to Miner, and consistent with Aquinas, "God is attuned to and desires relationship with humans. Human longing for God is a result of an innate, God-given capacity to pursue relationships."⁵⁴ Our spirituality is the capacity to engage in these relationships, and it should not be

surprising that this God-given capacity has a biological basis or that it emerges out of brain functioning. We are embodied beings whose physical natures are affected by, and are involved in creating, all of our experiences, including our relationships. To the extent that our spirituality involves relatedness, our physical nature, our biology, will be involved and will mediate these relationships, even our most important relationship to God. □

Notes

- ¹ David Hay and Pawel M. Socha, "Spirituality as a Natural Phenomenon: Bringing Biological and Psychological Perspectives Together," *Zygon* 40 (2005): 589–612.
- ² Alister Hardy, *The Divine Flame: An Essay towards a Natural History of Religion* (Oxford, UK: The Religious Experience Research Unit, 1966), 30.
- ³ Warren S. Brown, "Nonreductive Physicalism and Soul," *American Behavioral Scientist* 45 (2002): 1817.
- ⁴ Warren S. Brown, "Cognitive Contributions to the Soul," in *Whatever Happened to the Soul? Scientific and Theological Portraits of Human Nature*, ed. Warren S. Brown, Nancey Murphy, and H. Newton Malony (Minneapolis, MN: Fortress Press, 1998), 99–125.
- ⁵ Paul N. Markham, *Rewired: Exploring Religious Conversion* (Eugene, OR: Pickwick, 2007), 4.
- ⁶ G. Simon Harak, *Virtuous Passions: The Formation of Christian Character* (Eugene, OR: Wipf and Stock, 1993), 60.
- ⁷ Heather Looy, Kevin Reimer, and Kevin Seybold, "Reductive No More: Explaining Religion without Explaining It Away," *Journal of Psychology and Christianity* 24 (2005): 101–4.
- ⁸ David Hay, *Something There: The Biology of the Human Spirit* (West Conshohocken, PA: The Templeton Foundation Press, 2007); David Hay and Pawel M. Socha, "Spirituality as a Natural Phenomenon: Bringing Biological and Psychological Perspectives Together," *Zygon* 40 (2005): 589–612.
- ⁹ David Hay and Rebecca Nye, *The Spirit of the Child* (London: Fount, 1998).
- ¹⁰ Nina P. Azari, John Missimer, and Rüdiger J. Seitz, "Religious Experience and Emotion: Evidence for Distinctive Cognitive Neural Patterns," *The International Journal for the Psychology of Religion* 15 (2005): 263–81.
- ¹¹ Commission on Children at Risk, *Hardwired to Connect: The New Scientific Case for Authoritative Communities* (New York: The Institute for American Values, 2003), 5–6.
- ¹² Robert Putnam, *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon and Schuster, 2000).
- ¹³ Shelley E. Taylor, "Tend and Befriend: Biobehavioral Bases of Affiliation Under Stress," *Current Directions in Psychological Science* 15 (2006): 273–7; Mattie Tops, Jacobien M. Van Peer, Jakob Korf, Albertus A. Wijers, and Don M. Tucker, "Anxiety, Cortisol, and Attachment Predict Plasma Oxytocin," *Psychophysiology* 44 (2007): 444–9.
- ¹⁴ Jaak Panksepp, "Neurologizing the Psychology of Affects: How Appraisal-Based Constructivism and Basic Emotion Theory Can Coexist," *Perspectives on Psychological Science* 2 (2007): 281–96.

Article

Biology of Spirituality

- ¹⁵Bert N. Uchino, "Social Support and Health: A Review of Physiological Processes Potentially Underlying Links to Disease Outcomes," *Journal of Behavioral Medicine* 29 (2006): 377-87.
- ¹⁶Kevin S. Seybold, "Physiological Mechanisms Involved in Religiosity/Spirituality and Health," *Journal of Behavioral Medicine* 30 (2007): 303-9.
- ¹⁷Hay, *Something There: The Biology of the Human Spirit*.
- ¹⁸Kevin S. Seybold, *Explorations in Neuroscience, Psychology and Religion* (Aldershot, UK: Ashgate, 2007).
- ¹⁹Giacomo Rizzolatti and Laila Craighero, "The Mirror-Neuron System," *Annual Review of Neuroscience* 27 (2004): 169-92.
- ²⁰Chadi Calarge, Nancy C. Andreasen, and Daniel S. O'Leary, "Visualizing How One Brain Understands Another: A PET Study of Theory of Mind," *American Journal of Psychiatry* 160 (2003): 1954-64.
- ²¹Ralph Adolphs, "Cognitive Neuroscience of Human Social Behavior," *Nature Reviews: Neuroscience* 4 (2003): 165-78.
- ²²*Ibid.*, 172.
- ²³Glenn Weaver, "Embodied Spirituality: Experiences of Identity and Spiritual Suffering among Persons with Alzheimer's Dementia," in *From Cells to Souls – and Beyond: Changing Portraits of Human Nature*, ed. Malcolm Jeeves (Grand Rapids, MI: Eerdmans, 2004), 77-101.
- ²⁴Kevin S. Seybold, "God and the Brain: Neuroscience Looks at Religion," *Journal of Psychology and Christianity* 24 (2005): 122-9.
- ²⁵Mario Beauregard and Denyse O'Leary, *The Spiritual Brain: A Neuroscientist's Case for the Existence of the Soul* (New York: Harper One, 2007).
- ²⁶Mario Beauregard and Vincent Paquette, "Neural Correlates of a Mystical Experience in Carmelite Nuns," *Neuroscience Letters* 405 (2006): 186-90.
- ²⁷Andrew Newberg, Eugene D'Aquili, and Vince Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine Books, 2001).
- ²⁸Andrew Newberg, Abass Alavi, Michael Baime, Michael Pourdehnad, Jill Santanna, and Eugene d'Aquili, "The Measurement of Regional Cerebral Blood Flow during the Complex Cognitive Task of Meditation: A Preliminary SPECT Study," *Psychiatry Research: Neuroimaging Section* 106 (2001): 113-22; Andrew Newberg, Michael Pourdehnad, Abass Alavi, and Eugene G. d'Aquili, "Cerebral Blood Flow during Meditative Prayer: Preliminary Findings and Methodological Issues," *Perceptual and Motor Skills* 97 (2003): 625-30.
- ²⁹Andrew B. Newberg, Nancy A. Wintering, Donna Morgan, and Mark R. Waldman, "The Measurement of Regional Cerebral Blood Flow during Glossolalia: A Preliminary SPECT Study," *Psychiatry Research: Neuroimaging* 148 (2006): 67-71.
- ³⁰Nina P. Azari and Marc Slors, "From Brain Imaging Religious Experience to Explaining Religion: A Critique," *Archive for the Psychology of Religion* 29 (2007): 67-85.
- ³¹Niels G. Waller, Brian A. Kojetin, Thomas J. Bouchard, David T. Lykken, and Auke Tellegen, "Genetic and Environmental Influences on Religious Interests, Attitudes, and Values: A Study of Twins Reared Apart and Together," *Psychological Science* 1 (1990): 138-42.
- ³²Dean Hamer, *The God Gene: How Faith Is Hardwired into Our Genes* (New York: Doubleday, 2004), 6.
- ³³Rhawn Joseph, "The Limbic System and the Soul: Evolution and the Neuroanatomy of Religious Experience," *Zygon* 36 (2001): 105-36; Michael A. Persinger, "Religious and Mystical Experiences as Artifacts of Temporal Lobe Function: A General Hypothesis," *Perceptual and Motor Skills* 57 (1983): 1255-62; Michael A. Persinger, *Neuropsychological Bases of God Beliefs* (New York: Praeger, 1987).
- ³⁴Persinger, "Religious and Mystical Experiences as Artifacts of Temporal Lobe Function: A General Hypothesis," 1260.
- ³⁵*Ibid.*, 1261.
- ³⁶Rhawn Joseph, "The Limbic System and the Soul: Evolution and the Neuroanatomy of Religious Experience," *Zygon* 36 (2001): 105.
- ³⁷*Ibid.*, 132.
- ³⁸John A. Teske, "Neuroscience and Spirit: The Genesis of Mind and Spirit," *Zygon* 36 (2001): 93-104.
- ³⁹David Sloan Wilson, "Testing Major Evolutionary Hypotheses about Religion with a Random Sample," *Human Nature* 16 (2005): 419-46.
- ⁴⁰*Ibid.*
- ⁴¹See Kevin S. Seybold and Peter C. Hill, "The Role of Religion and Spirituality in Mental and Physical Health," *Current Directions in Psychological Science* 10 (2001): 21-4.
- ⁴²Joseph Bulbulia, "Nature's Medicine: Religiosity as an Adaptation for Health and Cooperation," in *Where God and Science Meet: How Brain and Evolutionary Studies Alter Our Understanding of Religion*, vol. 1, ed. Patrick McNamara (Westport, CT: Praeger, 2006), 113.
- ⁴³Patrick McNamara, "The Frontal Lobes and the Evolution of Cooperation and Religion," in *Where God and Science Meet: How Brain and Evolutionary Studies Alter Our Understanding of Religion*, vol. 2, ed. Patrick McNamara (Westport, CT: Praeger, 2006), 189-204.
- ⁴⁴*Ibid.*, 193.
- ⁴⁵Lee A. Kirkpatrick, "Religion Is Not an Adaptation," in *Where God and Science Meet*, vol. 1, 161-2.
- ⁴⁶*Ibid.*, 162.
- ⁴⁷Pascal Boyer, *Religion Explained: The Evolutionary Origins of Religious Thought* (New York: Basic Books, 2001).
- ⁴⁸Simon Conway Morris, *Life's Solution: Inevitable Humans in a Lonely Universe* (Cambridge: Cambridge University Press, 2003).
- ⁴⁹G. Simon Harak, *Virtuous Passions: The Formation of Christian Character* (Eugene, OR: Wipf and Stock, 1993).
- ⁵⁰Maureen H. Miner, "Back to the Basics in Attachment to God: Revisiting Theory in Light of Theology," *Journal of Psychology and Theology* 35 (2007): 112-22.
- ⁵¹Jürgen Moltmann, *God in Creation* (Minneapolis, MN: Fortress Press, 1993), 219-23.
- ⁵²F. LeRon Shults, *The Postfoundationalist Task of Theology: Wolfhart Pannenberg and the New Theological Rationality* (Grand Rapids, MI: Eerdmans, 1999).
- ⁵³Paul N. Markham, *Rewired: Exploring Religious Conversion* (Eugene, OR: Pickwick, 2007).
- ⁵⁴Maureen H. Miner, "Back to the Basics in Attachment to God: Revisiting Theory in Light of Theology," *Journal of Psychology and Theology* 35 (2007): 119.

Spirituality Research: Measuring the Immeasurable?

David O. Moberg



David O. Moberg

The rising popularity of spirituality is accompanied by a flood of research in numerous disciplines to probe its relationships with health, wellness, and countless other topics. Initially subsumed under religion, especially Christianity, and still overlapping with it, spirituality is increasingly treated as a distinct topic that applies to all religions and to persons who have none with their diverse assumptions, variables, and terminology. Besides issues common to all social and behavioral sciences, spirituality research faces special challenges because of its subject matter. In the context of Christian values, it is immeasurable, yet numerous scales serve the measurement need as its indicators or reflectors. Much more research is needed, ideally with methodological and philosophical precautions to avoid reification, reductionism, and other traps. Because spirituality pervades everything that is human, its study is central to investigations of the essence of human nature.

A 1986 article on spirituality and science began with the words, “Most social and behavioral scientists avoid attention to the spiritual nature of humanity.”¹ That still is true in some specialties, but spirituality has become a prominent subject of research in those most closely related to religion, health, and well-being. This article summarizes and critiques significant developments in psychological and other research on spirituality. It provides an introductory foundation for beginning research on the subject and critically analytic suggestions for persons already grounded in it. Endnote references can guide readers deeper into aspects of spirituality that intrigue them.

The Popularization of Spirituality

Popular magazines that once aimed at political correctness by shunning discussions of religion have resumed publishing front cover stories about it. News reports no longer avoid mentioning the

religious orientations and spiritual experiences of newsworthy persons for whom they are a concern, although most use only “God talk” substitutes about personal faith in Jesus Christ. Since the late 1980s, there has been a rising crescendo of popular interest in spirituality and its marketplace² of religious and pseudo-religious phenomena, including meditation, mysticism, psychic healing, yoga, spirit guides, witchcraft, New Age cults, and alternate religions, some of which openly or covertly incorporate themes and techniques from ancient Greek, Gnostic, or Eastern religions.

David O. Moberg (ASA Fellow) is Professor of Sociology Emeritus at Marquette University where he taught for twenty-three years after nineteen years at Bethel College (Minnesota). He is the author of numerous articles and books, two still in print, *The Great Reversal* (3d ed., Wipf and Stock, 2007); *Aging and Spirituality* (Taylor and Francis, 2001). He has served as editor of the *Journal of the American Scientific Affiliation* (1962–1964) and *Review of Religious Research* (1968–1972), co-edited *Research in the Social Scientific Study of Religion* (1989–2004), held offices in several professional associations, and twice was a Fulbright professor (Netherlands and West Germany). His AB is from Seattle Pacific University, MA from the University of Washington, and PhD from the University of Minnesota. Now during retirement, he sometimes says, “I’m still working full-time, just without a salary.”

Article

Spirituality Research: Measuring the Immeasurable?

The popularization of spirituality is accompanied by expanded recognition of the centrality of religion in human societies and a surge of interest in studying spiritual phenomena.³ Annual meetings of many professional societies include sections on religion-related topics that once were shunned, if not banned. Entire conferences gather around spiritual themes.⁴

Empirical research on and related to spirituality has rapidly expanded since the late 1980s in the social and behavioral sciences, social work, nursing, medicine, neurobiology, and other academic specialties and applied professions. It matters not whether popularization stimulated scholarly investigations or reflected the growing recognition that spirituality is important, for they are closely interrelated. These interests also reflect major trends in the politics of global society, culture wars, international warfare, and significant migration patterns. Spirituality is increasingly recognized as a concern that penetrates to the core or essence of both human nature and society.

This article focuses upon one significant facet of those developments, the multidisciplinary research on spirituality. By answering key questions, it sketches some highlights of the research, methods, and tools used to investigate spirituality; samples of findings; research problems and limitations; and relevant Christian values. It mentions some of the challenges for future research and provides references to help interested scholars and researchers quickly locate helpful resources for their investigations, whether they are at beginning or advanced stages of study.

How Did Spirituality Research Begin?

The American Scientific Affiliation was far ahead of its time when the question of the amenability of spirituality to scientific study was included in its joint conference on “Science and Christian Faith” with the Research Scientists’ Christian Fellowship at Oxford University in July 1965.⁵ Interest in spirituality was stimulated in part by a nagging feeling that the central core of religion may have been cut away from the sociology of religion. The claim of Charles Glock, a prominent sociologist of religion, that all of the manifestations of religious commitment in all religions of the world can be subsumed under five interactive and researchable dimensions (ritualistic,

ideological, intellectual, experiential, and consequential) also motivated that work.⁶

Probing this issue led to the conclusion that, at least within Christianity, there is a sixth component of personal religiousness that can be labeled as the “spiritual” or “supernatural.” It is the very essence or core of religious commitment, labeled by Italian sociologist Sturzo as “the true life.”⁷ He convincingly argued that the supernatural is not a separate segment of social life juxtaposed to the natural, but rather, that the natural order exists within the atmosphere of the supernatural. Therefore, even those who search for purely natural explanations of religion, while denying the supernatural root and branch of life, are involved in “a sociology of the supernatural” in a negative sense.

This is fully consistent with 378 references in the Hebrew Bible to the word *ruah* and 146 in the Greek New Testament to *pneuma*, each referring to human beings as *spirit*. The Creator breathed life into Adam, and he became a living soul (Gen. 2:7).⁸

Indeed, the word “breath” comes from the Latin *spiritus*, which means “that which gives life or vitality.” When we breathe in, that invisible breath gives life to our visible bodies: so it is with our spirit, also unseen. Spirit, like the breath, transcends a person but is part of the person. All of our relationships with others can be perceived as spiritual, especially when we understand that they have in common the life-giving gift of breath.⁹

Rich and relevant reports on evidences for the spiritual nature of humanity, the importance of bringing ontological supernatural elements of religion back into the sociology of religion (and by implication all disciplines dealing with religion), and tentative methods by which spirituality can be explored through philosophical questions, theory development, and scientific methodologies comprise major foundation stones for subsequent developments in research on spirituality.¹⁰

Even more important from the perspective of its discernible historical impact was the 1971 White House Conference on Aging (WHCA), which replaced a section on religion with one on Spiritual Well-Being (SWB). Its 63-page background paper began by differentiating spirituality from religion

and identifying six categories of spiritual needs among aging people. Its working definition stated,

... we shall consider "the spiritual" as pertaining to man's inner resources, especially his ultimate concern, the basic value around which all other values are focused, the central philosophy of life—whether religious, anti-religious, or non-religious—which guides a person's conduct, the supernatural and nonmaterial dimensions of human nature. We shall assume, therefore, that all men [i.e., people] are "spiritual," even if they have no use for religious institutions and practice no personal pieties.¹¹

In order to implement recommendations of the SWB Section of the 1971 WHCA, the National Interfaith Coalition on Aging (NICA) was founded in 1972. As it began cooperative work, its leaders quickly recognized dissimilar interpretations of SWB that had divergent referents, denotations, and connotations, sometimes clashing with each other. To assure reasonable agreement that all were discussing the same or closely related phenomena when they used the word "spiritual," a nonsectarian definition was needed to guide NICA's deliberations and data collection. A two-day workshop in 1975 discussed the diverse viewpoints of representatives from numerous religious backgrounds and academic disciplines. It resulted in a "working definition" that still remains in use:

Spiritual well-being is the affirmation of life in a relationship with God, self, community and environment that nurtures and celebrates wholeness.¹²

That NICA definition has been used for ecumenical discussions and pragmatic applications, but it clearly is not an operational definition for scientific research. Nevertheless, it has stimulated cooperation and prevented many human service professionals from continuing to ignore the spiritual nature and needs of clients. It sensitized academicians from many disciplines to spirituality, encouraged spiritual intervention experiments and interdisciplinary studies, and prodded support for spiritual care in hospitals, retirement facilities, and other service agencies. In 1992, it was among the stimuli for changing the name of the Forum on Religion and Aging to FORSA, Forum on Religion, Spirituality and Aging.¹³

What Are the Foundations for Spirituality Research?

Spirituality was long excluded from scientific investigations as too ephemeral, mystical, theological, ineffable, or transcendent to be a researchable subject. Christians were especially resistant to its scientific study. Many of them, with others, believed it was too sacred for study by the mundane, cold, worldly methods of science. Others thought it was so inscrutable that it was far beyond the range of sensory observations. Logical positivists claimed spirituality was nothing more than a verbalized reification or product of the human imagination. Reductionists subsumed its manifestations under psychological, neurological, medical, or other concepts.

Gradually, however, the recognition grew that spirituality was no more intangible and immeasurable than numerous other internalized phenomena that already were investigated through the scientific lenses of disciplines such as psychology, epidemiology, and sociology. Already researchable were subjective nonmaterial subjects, e.g., anomie, attitudes, beliefs, opinions, prejudice, self-concepts, and marital happiness, that were accessible only through self-reports.

Narrative accounts of spiritually sensitive nurses, physicians, therapists, chaplains, pastors, and priests complemented the stories and legends spread by the testimonials of Christians and others in religious circles and popular culture. Anecdotal and observational data in literature and scholarly essays (analogous to early forms of qualitative research) stimulated further studies of spirituality through quantitative methods, especially survey research.

Today the question of whether spirituality, or at least aspects of it, can be subjected to scientific research methodologies is seldom raised, although subsidiary questions, such as differentiating spirituality from religion and the appropriateness and scope of quantitative studies, remain.

Is Spirituality a Synonym for Religion?

Initially, everything now considered to be spiritual phenomena was subsumed under the concept of religion. Reinterpreting details of religion research reveals inclusion of numerous variables and concepts that now would be classified as "more spiritual than

Article

Spirituality Research: Measuring the Immeasurable?

religious." Moberg's 1951 dissertation, e.g., included multidimensional measures of religious faith and beliefs alongside church membership and religious activities. It found that beliefs (now categorized as spirituality) were more likely than other measures to be correlated with good personal adjustment in old age.¹⁴ Similarly, the 1967 Religious Orientation Scale that differentiated intrinsic from extrinsic religiousness was an early attempt to separately measure two types of personal religion.¹⁵

Religion and spirituality are very complex multidimensional phenomena. They overlap so much that two leading research questions are whether "spirituality" is just another word for "religion," and if not, whether it is possible to separate the two for research purposes. Allie Scott's content analysis of thirty-one definitions of religiousness and forty of spirituality that were used in social science publications over the previous century found three differentiating polarizations that became increasingly acceptable among behavioral scientists. They are organizational religion vs. personal spirituality, substantive religion vs. functional spirituality (centering upon sacred contents or their effects), and negative religiosity vs. positive spirituality. Nevertheless, one qualifying conclusion [especially relevant to Christians] was that there is little difference between the processes of religion and of spirituality for those who consider all of life to be sacred.¹⁶

For at least a decade, many have treated the concepts as so interrelated that they can be studied together as "Religion/Spirituality."¹⁷ Among recent demonstrations of their overlap in people's minds are face-to-face interviews with 6,082 USA adults from three ethnic and racial sub-groups. Their self-ratings of religiousness and spirituality clearly suggest that most Americans do see differences between the two concepts, although the majority closely link them together.¹⁸ Therefore the dominant trend in research is to deal with them as discrete although interrelated and overlapping variables. Thus, in her introduction to three special issues on spirituality and adult development in the *Journal of Adult Development*, Sinnott explained,

Spirituality is one's personal relation to the sacred or transcendent, a relation that then informs other relationships and the meaning of one's own life ... Religion ... refers to practices and beliefs related to a particular dogma system.¹⁹

From my perspective, spirituality is the broader concept. Out of it emerged the countless religions and pseudo-religions of the world. Their rituals, belief systems, ideologies, and institutions developed out of the original incentive to awaken, stimulate, nourish, and satisfy desires and drives that originate in the spiritual essence of every person.

How Is Spirituality Measured?

Especially since the 1960s, numerous indexes, scales, and rating instruments have been constructed to "measure" personal religiousness. The components of each, typically including many now classified as facets of spirituality, define whatever the scale is named. By 1984, Gorsuch argued that there already were a sufficient number and variety of reasonably effective instruments to meet almost any task related to the psychology of religion. He pleaded that, instead of creating ever more new measures, psychologists should work on testing, improving, and linking with theory those already in existence.²⁰

Soon thereafter, in-depth analyses compared twenty measures of spiritual and transpersonal constructs uncovered in a nonexhaustive survey and mentioned fifty-four more they did not discuss.²¹ (Transpersonal constructs include spirituality as a major topic among phenomena that extend beyond direct empirical observation, such as experiences of awe, ecstasy, inner states of consciousness, creativity, love, meaning, mystical experiences, and purpose in life. They attract the attention of New Age sects, but Christian scholars recognize that they are closely related to biblical perspectives on spirituality.)²² Extension of those descriptive and analytical studies at the end of the twentieth century revealed ten more research tools plus another twenty-eight not included in earlier studies.²³ Hill and Hood also provided descriptions and evaluations of 126 measurement scales. Eight included "Spiritual" in their titles; numerous others would now be considered primarily spiritual, and most of the rest included spiritual components.²⁴

Dozens of scales with varying degrees of methodological sophistication relative to spirituality have been developed subsequently, so at least two hundred are now available. Many relate to the spiritual assessment of individual persons. Others aim to evaluate holistic well-being in a framework of physical or mental health, and still others aid nonsectarian

chaplains and counselors who work in settings like hospitals, colleges, businesses and industries, retirement facilities, and the armed forces. Still more are oriented mainly to the needs of nurses, physicians, or other health professionals. Some are tools for use in research, including several created to measure different kinds of praying and prayer.²⁵ Despite their variety and abundance, most are relatively unknown except among a small minority of professional practitioners within each research and service domain.

Most measures of religion and spirituality can be classified for research and other purposes under twelve domains. Hill refers to four as measures of dispositional religiousness or spirituality: general religiousness or spirituality, religious or spiritual commitment, religious or spiritual development, and religious or spiritual history. The other eight are functional assessments of religious or spiritual social participation, private practices, support, coping, beliefs and values, motivations, experiences, and techniques for regulating and reconciling relationships.²⁶

The most widely used instrument designed for measuring general spirituality is the Spiritual Well-Being Scale (SWBS) developed by psychologists Paloutzian and Ellison.²⁷ Its uses in hundreds of studies in very diverse populations are reported in nearly four hundred articles and books. Its twenty simple questions produce a SWBS score. Ten comprise the Existential Well-Being subscale, a "horizontal dimension" of adjustment to self, community, and surroundings with items probing the respondent's sense of purpose, direction, satisfaction in life, and adjustments to self and community. The other ten are on the "vertical dimension" of Religious Well-Being, one's perception of the wellness of his or her spiritual life in relation to God. Although originated in a Christian frame of reference, it is used in non-Christian cultures for evaluating spirituality levels of general populations. Researchers constructing new religion and spirituality scales use it to test concurrent criterion validity. It is a tool for clinical counseling, for assessing the effectiveness of patient care programs, for helping individuals "assess your perceived relationship with God, sense of life purpose and life satisfaction," and for evaluations in religious congregations, although it is less helpful for distinguishing between people with high levels of spirituality than those with low or average levels

of spirituality. With rare exceptions, its scores have been positively correlated with a wide range of measures of health and well-being.²⁸

What Has the Research Revealed?

The results of studies relating spirituality to measures of health, well-being, personality, and other concerns are so exceptionally consistent in one direction that many researchers are surprised by their discoveries.

The growing body of evidence that there is a strong positive relationship between spiritual health and other forms of physical, psychological, and social health would seem to suggest that therapeutic interventions with clients might be enhanced by addressing spiritual dimensions of the client's life experiences.²⁹

Many of these findings have been clearly, comprehensively, concisely, and critically summarized in numerous books, especially those by Harold G. Koenig.³⁰

This, however, must not lead to the presumption that every activity and practice labeled as "spiritual" has only wholesome effects for every person and group. Outliers with negative results instead of the usually constructive and wholesome correlates and effects of spirituality are found in most, if not all, empirical studies. Exploring those cases and the reasons for their deviations deserves more attention than it has received to date.

Questions can also be raised about the evaluative criteria that describe events and experiences as good or bad, well or ill, and so forth. What are the values behind each label? Are they superficially time- and culture-bound or linked to only superficial feelings, hence of no enduring worth? Peterson, e.g., has reminded us that even the increasing use of the word "spirituality" in Christian circles might reflect more pathology than health.³¹

Does the Research Reflect a Christian Bias?

One criticism of most spirituality research is that it strongly reflects Christian definitions and interpretations of spirituality. Whether by Christian researchers or others, it allegedly applies explicit or implicit

Article

Spirituality Research: Measuring the Immeasurable?

Christian values that then are presumed to provide universally valid criteria for evaluating the positive or negative spiritual well-being and functional health of all people everywhere. Thus Glicksman claims that Protestant theological themes that shaped American civilization are so central to the research that its tools are inappropriate for use in non-Christian populations.³² He thinks “evangelical Protestant” themes and assumptions pervade seven prominent scales that he analyzed and then contrasted with perspectives of contemporary Judaism. Those scales are weak, he claims, both from the viewpoint of excluding “right action” such as charitable acts and from the viewpoint of ignoring “the core of the Christian message—the message of sin and redemption” from their components. Therefore they neither use measures independent of a particular religious tradition nor properly reveal how faith shapes the lives of respondents.

Among several respondents to Glicksman’s stimulating critique, Oman studied details of the same scales and concluded that “the problem appears substantially smaller than the impression conveyed by Glicksman, but still merits further attention and correction.”³³ Moberg called attention to the ongoing need to clarify the concept of “spirituality” and associated methodological issues, while also summarizing some Jewish roots of evangelicalism that support several of the evaluative criteria.³⁴

Nearly all prominent spirituality scales, indeed, were developed inside a cultural context of implicit Christian values, even if most constructors fail to acknowledge any source other than universal humanistic ideals. The main reason is that most of the research has been done in the USA and other countries with populations of mostly Christian backgrounds and identities. Under the European heritage of ethical and legal values grounded in Christianity, most popular evaluations use labels that simply assume what is good and bad, well and ill, upright and immoral, and the like. Besides, spirituality is a special concern of Christian theology, so some of the research was undertaken for specific Christian purposes.

A significant question is whether spirituality itself is so strictly a Christian concept that it is inappropriate for study among people with other religions. Christian terminology does slip into items included

in some “nonreligious” measurement scales. There also is such a wide variety of people’s concepts or images of God that any item referring to the deity is likely to reflect meanings so diverse that findings are not genuinely equivalent from one religious group to another, and possibly not even from one person to another. (Members of the same Christian parish reciting a liturgical creed together may have widely divergent mental images of God, Jesus, sin, forgiveness, and other religious concepts.)

Studies of the spirituality of people with non-Christian religions usually use case studies, simple survey questions, or general scales because none have been specifically developed for use in the context of their own faith. Few professional reports cover Buddhist spirituality and aging, possibly due less to disinterest in the subject than to tenets of the faith and its spiritual culture,³⁵ although an eleven-item Buddhist Beliefs and Practices Scale was developed to assess agreement with Buddhist teachings and practices.³⁶ The faith traditions and religious experience of Judaism, Islam, Buddhism, and Hinduism are described alongside those of Catholicism and Protestantism in chapters of Hood’s *Handbook*.³⁷ People in Japan, however, lack a clear equivalent for the word “spirituality,”³⁸ and Shinto is so indigenous that Isomae believes it ought not be treated as the hybrid implied by the term “Japanese religion.”³⁹

Is There Research on Nonreligious Spirituality?

Currently, some interpret spirituality as if it were completely separate from religion. This usually takes the form of “nontheistic” (atheistic) attempts to exclude every reference to God, worship, supernaturalism, and institutional religion. Not only are there scales to deal with spirituality apart from religion, but there also are academic, analytical, and interpretive studies that present spirituality as a “natural” phenomenon, conflating it to one or another “nonreligious” essence, such as meditation or self-realization. Ellis, e.g., argues that spirituality is misrecognized existential self-esteem.⁴⁰

The most prominent analytic example is Atchley’s textbook on spirituality and aging with its wealth of perspectives on and interpretations of spiritual self-identity, journeying toward wisdom, coping

with aging and dying, a spirituality inventory, and similar topics. It defines spirituality as

... a subjective, existential region of experience. Spiritual experience begins with basic spirituality, an unadorned sense of being. To this is added a sense of 'I' as perceiver and actor, having the capacity to experience spiritual qualities through various human avenues of experience.⁴¹

Atchley believes that each person's spiritual journey is one of seeking and negotiating a landscape for which we never have perfect maps to help us discover the ground of being. Drawing mainly upon developmental experiences and qualitative resources, he emphasizes the importance of an intentional inner journey and shows how Quaker, Buddhist, and other types of reflection and contemplation can aid spiritual growth. Because his book focuses on spirituality as a topic separate from religion, it omits attention to nearly all of the huge and rapidly growing body of empirical research findings.

Both religious and antireligious biases create problems for any researcher, therapist, or educator who desires to use a single spirituality instrument in heterogeneous groups that include members outside of Christianity or any other cultural context that is the scale's origin. When no religiously neutral instruments appropriately measure spirituality with only nonreligious variables, researchers covering nonreligious or other ideological groups need to create their own.

One scale designed to measure the effect of spirituality on subjective well-being outside of a religious framework is the *Spirituality Index of Well-Being*. It aims to be a parsimonious, yet global, instrument to capture the complexity and depth of spirituality in any healthcare or other context without being "hampered" by items that gauge religiosity. Assuming spirituality is a health-related quality-of-life concept within a psychological domain, its twelve items ask (with five "strongly disagree" to "strongly agree" responses) if the respondent is unable to do much to help himself or herself, fails to understand his or her problems, knows how to begin to solve them, feels overwhelmed, has not found life's purpose, often has no way to complete whatever was started, has a great void in life, and the like. Most of the variance among its scores is accounted for by two factors,

life scheme and self-efficacy. Its scores correlate positively with those of the SWBS, especially its Existential Well-Being subscale, presumably because both include life purpose and satisfaction in addition to life experiences.⁴²

Because of the consistently observed importance of religion and spirituality to health and the need for a holistic model to deal with health problems in their existential as well as other dimensions, Katerndahl developed a *Spiritual Symptom Scale* to complement the other components of the BioPsychoSocioSpiritual Inventory. Its seven items (none mentioning religion) summarize a medical client's sense of peace, harmony, and purpose. Among patients in two primary care clinics, spiritual symptom scores alone or in conjunction with other symptom categories were associated with higher health services utilization rates for seven of ten outcomes.⁴³

Whether these and other nonreligious scales validly focus upon spirituality, comprise only socio-psychological measures of subjective feelings of mental health or well-being, are reductionistic perversions of spirituality measurement, or reflect some other underlying concept remains an open question.

Is Spirituality Relevant to Other Sciences?

As ever more linkages of spirituality with other domains of personal and scholarly interest are recognized, investigating it has spread far beyond its primary homes in the psychological, social science, epidemiological, medical, and religious disciplines. For example, biological factors help to explain differences in the religious and spiritual orientations of paired twins, although environmental influences are more important.⁴⁴ Mystical, religious, and spiritual experiences have been linked to neuroscientific findings,⁴⁵ the innate genetic brain structure of humans,⁴⁶ consciousness rooted in the brain,⁴⁷ quantum physics,⁴⁸ mystical experiences,⁴⁹ and other scientific research.⁵⁰

As additional associations of spirituality with other variables are revealed, novices will be tempted to believe that it is fully explained by whatever is the focus of their research. Spirituality, however, is much too huge and complex to be treated fairly by any ontological reductionisms of scientific work.

Article

Spirituality Research: Measuring the Immeasurable?

Even on the basis of the best research revealing contributions of religion and spirituality to resolving human problems and meeting people's needs, the findings

... cannot be explained away simply as attempts to counter the fear of death, as the expression of a need to find in God or the gods fantasy substitutes for earthly parents, as a neurotic escape from the realities of life, or as symptoms of incipient or real psychosis.⁵¹

Furthermore, just because many scientists' opinions overstep the limitations of science by rejecting spirituality and the Bible as possible aspects of reality, is no reason for denying them. The fact of the existence of a spiritual dimension or of an intelligent Creator is outside the sphere of scientific examination per se. What is obvious in everyday experience need not be overlooked just because it cannot be measured.⁵²

Without appropriate qualifications, it is easy to conclude that a research scale actually measures spirituality as a whole or that its scores are equivalent to spirituality itself. Doing either is a serious ontological reductionism, for no measurement constitutes the phenomenon it measures. Thus, a serious error to avoid is making statements that declare spirituality is nothing except whatever is named.⁵³

In reducing everything to the laws of nature we risk denying that there is any rationality or truth behind nature's laws ... [Just because] human beings [are] made up of atoms and molecules ... that does not even begin to describe the unity we experience in our everyday lives.⁵⁴

Does Spirituality Research Confront Special Problems?

All of the methodological issues ordinarily involved in social and psychological research apply to studying spirituality, but it poses additional complications, some of which may be unique. Because spirituality is becoming a significant aspect of professional interventions and therapies, there also is a danger of interpreting it as nothing more than an additional means to an end, a tool to use for healing, coping with problems, or attaining other goals. Human beings and their conceptualizations can be observed and understood only in part, while their Creator immeasurably transcends all limits.

Conceptual Issues

Not the least of the complications of researching spirituality are questions about the concept itself. Hundreds of definitions are available. How a researcher interprets it must interact with the definitions held by research subjects. This reflects the questions of whether spirituality is subsumed under or is a partner of religion, whether supernatural references are needed, and whether it is, at base, supernatural or nonreligious.

Using subjective data, e.g., feeling states, a sense of meaning or purpose in life, self-rated well-being, or other subjective self-evaluations, to measure spirituality can imply that it is no more than a reification of interiorized impressions that differ from one person to another and lack any objective foundation. It also opens the question of whether it is genuinely reflected by verbalized self-appraisals offered in interviews, questionnaires, narratives, and the like.⁵⁵ To use an analogy, thousands of people every year look good and feel well with no medical tests uncovering ailments, yet later a slow-growing cancer at or near the stage of metastasis that must have been present much earlier is discovered. Similarly, many devout saints of God experience "the dark night of the soul."⁵⁶ Subjective feelings can twist facts into perceptions contrary to reality.

Linguistic Issues

Language differences easily become a source of incomparable meanings even among the members of relatively small groups. Regional and global nuances in the meanings of words, the breadth of the vocabularies of research subjects, reading- and writing-skill levels, being test-wise or not, dialects that interfere with oral communication, previous religious knowledge and spiritual experiences, and much more, influence data collection related to spirituality. The complications are accentuated whenever a research sample includes persons of different cultural backgrounds, religious traditions, educational levels, and lifestyle patterns.

Translation of scales from one language to another imposes additional complications, as is especially evident to Christians who have studied diverse religious interpretations originating in alternative meanings of the original Hebrew and Greek words in the Bible. When, e.g., my *Spiritual Well-Being Questionnaire*⁵⁷ was translated into Swedish, we

wondered how to word the Jewish “theological position” (faith) in a society with very few Jews. I preferred simply *Jude* or *Judaisk*, but my Swedish consultants insisted upon *Judaiska trosbekännelse* (Jewish confession of faith). Several Christians checked it, apparently realizing that their faith in Jesus Christ echoed Abraham’s faith in Yahweh (Gen. 15:6).

Research Design

There are important questions about the appropriateness of various designs for spirituality research. Most quantitative studies use cross-sectional data gathered at only one moment of their subjects’ lifespan, but people change spiritually over time, some by life-changing conversions and others by gradual developmental modifications. Even if all research subjects are within a narrow age range, they may differ greatly in spiritual alertness and maturity. In terms of biblical evaluations, some are spiritually dead, while those “born anew” may remain spiritual infants (1 Cor. 3:1–4; Heb. 5:11–14).

Many studies use data from convenience samples, especially college students, most of whom have had limited personal experiences, are relatively immature spiritually, and represent a far narrower scope of spiritual experiences than most middle-aged and older adults. This is an important limitation of spirituality scales developed by studying only youths.

Assessments to discover and measure changes in spirituality that occur from a ministry or program intended to produce spiritual growth can be biased. By using the same instrument for before and after evaluations, results in the repeated “test” may be modified by the habituation of recalling details.

Longitudinal studies of spirituality at different stages of the same persons’ lives are very desirable to assess either developmental growth or the effects of influences such as family, education, or participation in church ministries. However, they are contaminated by intervening events and experiences of their subjects, some of which reinforce and some counteract the variables under investigation. The inevitable dropouts during research can also bias results. Thus, since people with the lowest levels of religiousness usually die earliest,⁵⁸ the average spirituality level of a typical large group can increase with age even without any changes among the survivors.

Experimental interventions aimed at modifying personal spirituality are confronted with major complications, whether the change agent is education, evangelism, counseling, Bible study groups, or other influences. Sometimes one can coerce members of a “captive audience” to participate behaviorally, but even then no spiritual change is certain. If spirituality is basically an inner orientation “of the heart,” it cannot be imposed upon people from the outside. Besides, questions about feasibility include important theological issues regarding “free will” and the ethics of research.

Statistical Analyses

As already suggested, most spirituality research has used quantitative methods, gathering data from questionnaires and interviewing schedules. The simplified answers to response categories of questions can be analyzed with rigorous statistical sophistication, but their simplicity is itself a source of difficulty because it waters down complex feelings, commitments, beliefs, behaviors, qualifications, and relationships with God and people.

In addition, many studies, including some used for scale construction, are based upon small samples that lack statistical significance even when observed differences are large, while others with big national samples produce statistically significant differences with a narrow range of variations. The nature of statistical measurement in and of itself thereby raises questions about the certainty of generalizations, especially when few people have a reported characteristic. In my opinion, the social significance represented by large and consistent but statistically insignificant results from numerous small samples is more important than small but statistically significant differences from a large sample.

Qualitative Studies

Because spiritual phenomena have a richness that is difficult to capture by statistically manipulable answers, qualitative methods are exceptionally suitable for studying them. Besides their typical uses during the exploratory stages of research, qualitative methods can lead to improved understanding of relationships between the subjects’ interpretations of their own and others’ spirituality, its connections with their own sense of meaning in life and purpose

Article

Spirituality Research: Measuring the Immeasurable?

for living, its impact upon their perceived well-being, the influence of past experience, its connections with religion, and much more.

Despite that rich potential, an analysis of 2,726 articles published from 1978 to 2003 in seven journals that include articles relevant to psychology and spirituality found only twenty-two based upon qualitative methods.⁵⁹ Of them, eighteen used face-to-face interviews, three of which were in focus groups. Seven used a phenomenological design that was also referred to as a narrative approach or clinical interviewing, four applied grounded theory, and two used research software.

Researcher Bias

Because spirituality is a nebulous concept, a shrewd scholar using any method can subtly or unconsciously shape its representations to fit the postulates and presuppositions of his or her frame of reference, whether it is an academic discipline, theory, religion, or philosophical ideology. More often than not, the narrower and more precise the targeted scope and definition of spirituality, the less likely will a definitionally limited instrument meet the interests and needs of those who identify themselves with divergent disciplines, religions, or belief systems. On the other hand, the more generalized and universalized the instrument, the less the likelihood that it will satisfy the precise interests and needs of persons within any particular spiritual frame of reference.

Ethical Issues

Social and professional pressures drive researchers toward conformity to whatever values and practices seem most acceptable or politically correct in their society or subculture and subtly push them toward minimizing attention to whatever is unique in their own ideology and faith.⁶⁰ Christians, like others, must carefully weigh those issues to find the best professional and personal resolution for each situation. They also must face the issue of whether it is ethical to use political, institutional, or other influences to force Christian behavioral norms, including those of research instruments that allow only responses based upon unique Christian values, upon people of other faiths, no religion, or NUNYAs (none of your business).⁶¹

Do Spirituality Scales Really Measure Spirituality?

Every attempt to measure spirituality is based upon one or more observable reflectors that score each individual. Typically these are components, concomitants, correlations, or consequences that allegedly reflect a person's spirituality or a subsidiary such as spiritual intelligence, orientation, maturity, gifts, self-assessment, and so forth. Because each item included is chosen as a possible sign or symbol of the aspect of spirituality under investigation, every measuring instrument is a product of postulates and assumptions that are more often implicit than overtly expressed. Whatever the researcher believes to be outside of possible relevance is not even considered for inclusion. The validity of the instrument (whether it genuinely measures spirituality or a subcategory) thus depends upon presuppositions that preselect and omit variables before empirical data gathering. If truly important variables are omitted from the initial selection, they are never tested. (Ideally, prior knowledge and qualitative explorations help to overcome that limitation.)

Central to questions about the validity of instruments for evaluating and measuring spiritual wellness and illness is the issue of widely diverse standards for judging elements such as commitment, devoutness, ritual faithfulness, and other criteria used in various world religions, their subsidiary denominations and sects, and the functionally equivalent philosophies, therapies, and practices that serve as parts of spirituality or as its synonyms, analogies, or substitutes. Do those evaluation systems and the research instruments built upon them genuinely measure spirituality or only something else connected with or related to one of its disparate interpretations? What does any given scale really measure? To date we have, for the most part, simply accepted at face value the claims of psychologists and others who create spirituality scales, affirming that they indeed measure spirituality.

Since the indicators included in a scale are only *components* of spirituality, those parts obviously do not comprise its whole. If they are *concomitants*, any relationships found could be little more than the *coincidence* of disparate events that happen together at the same time. If they are *correlations*, both variables may be common causes or effects of

the same chains of events. If they are *consequences* of spirituality, its products cannot be spirituality itself. The same holds true if they are verbal or other *symbols* of spirituality, for words, pictures, music, sculpture, or whatever else depicts spirituality is not spirituality. In the final analysis, therefore, the validity of any index or scale cannot be established by scientific investigations alone. It depends upon theological and philosophical criteria that ultimately extend beyond the limits of empirical observation.

The complexity of these epistemic relationships means that the measurement process itself has impenetrable limitations. Even if there is agreement on a conceptual definition of spirituality, its operational definition for empirical applications is fraught with difficulties. Unless there is agreement about an outside basis for evaluation, the ultimate conclusion must necessarily be that *spirituality in each case is only whatever is measured by the spirituality scale under consideration*. Each scale is its own operational definition. Although many scales are closely related to others that have overlapping components, some are completely different from all the rest. Do all genuinely measure spirituality?

Allegations about hidden “Christian values” in the research reflect those complications. Christian values necessarily must be the foundation for explicitly Christian scales, but whose values should govern those intended to be generic or universal? The analysis of these complex interrelationships is a continual challenge for religion scholars and philosophers of religion as well as for social and behavioral scientists.

How Do Christians Interpret Spirituality?

The Bible clearly teaches that humanity originated in creation by God as males and females made in “his” image (Gen. 1:27). Obviously, that image is not physical, for every human body is unique. However we interpret and fine tune that *imago Dei*, it is explained by Jesus who taught that “God is spirit” (John 4:24). Therefore our essence, too, must be *spirit* (a concept often interchangeable with *soul* in the Bible). As spirit, we possess bodies and minds; we are not bodies that possess spirits and minds. Yet, as Hall explained, we are spirits embodied in the material and physical world God created, and our bodies

have the purpose of functioning within facilitating relationships of service that show God to others.⁶²

In the process of creating humans as trinitarian spirits (with body, soul, and mind), God “set eternity in the hearts of men” (Eccles. 3:11, NIV). The inner nature of humanity innately seeks God and wants to please him, however nebulous and distorted their images of him may have become through millennia of social and cultural modifications that have produced diverse religions and far-fetched philosophical speculations. To use psychologist Helminiak’s words, “... simply to be human is already to be spiritual. So underlying all expressions of spirituality is a core that is universal, a core that is simply human.”⁶³

Barrett’s cognitive science of religion accordingly concludes that belief in divinity is so inevitable a consequence of the kind of minds we have that theism is our natural condition.⁶⁴ People everywhere try to transcend the natural world and thereby confirm that the ultimate referent for spirituality is the Almighty Creator in whose image all were created. He is revealed most clearly of all by his incarnation in the person of Jesus Christ (Heb. 1:1–4) but also through all of his created universe and the gentle inner whispers of the Holy Spirit calling attention to things we observe, experience, and do. Those revelations help us make sense of scientific (and other) discoveries, interpretations, and contemplations in the context of biblical truths.

Biological research provides supportive evidence that spirituality is a built-in biological component of human nature.⁶⁵ God did “set eternity in human hearts,” so *all of life is spiritual* or sacred and everything human relates to or mirrors spirituality. Therefore every thought, feeling, and action reflects spirituality in some way, and almost all of them could be used in research, along with other variables, as indicators or reflectors of spirituality.

No wonder every known group of people has, or at least has had, a religion of some kind! Most have included sacrifices and offerings to win the favor or deflect the anger of one or more demons or deities. The preliterate and ancient religions originated, in my opinion, in the undescribed and unexplained relationships with the Creator that led Cain and Abel to offer up sacrifices to him (Gen. 4:3–4). Later, when their descendants were scattered across the earth after their sin at the Tower of Babel (Gen. 11:1–9),

Article

Spirituality Research: Measuring the Immeasurable?

they brought atoning sacraments along. Over centuries of separation from each other in diverse environmental and cultural settings, the details of their rituals and accompanying meanings of sacrifices were gradually modified into today's global variations of spiritual worship and religious systems. (I hope archeological and other researchers will some day discover the resources necessary to test that hypothesis.)

The Bible teaches that all humanity are spiritual beings who stem from a common ancestry (Acts 17:26–29). It reminds us that Christian spiritual worship requires the living sacrifice of offering one's entire being to God (Rom. 12:1–2). That means praying without ceasing (1 Thess. 5:17), not only during worship services, prayer gatherings, and personal devotions. Loving God with all of one's heart, soul, mind, and strength (Luke 10:27; Matt. 22:37–40) is a 24/7 spiritual activity, not an occasional part-time experience separate from the rest of life.⁶⁶ Believers who are spiritually alive through faith in the Lord are "God's workmanship, created in Christ Jesus to do good works" (Eph. 2:10). On average they are more sensitive to the issues, values, biases, assumptions, limitations, and applications related to spirituality than are people who remain spiritually "dead in transgressions and sins."

Human Finitude

Since spirituality is the essence of human nature, everything in which people are engaged is related to it. Nevertheless, because it is the core or ground of being, it is easy either to ignore it or to slip into thinking that one's own dominant interest is its center and consequently to view all human experience from only that limited perspective. Reaching simplified conclusions about spirituality is one of the most subtle forms of ontological reductionism, especially if that focus obscures manifestations, however faint, of the mystical work of the Almighty Creator.

Many problems of spirituality research stem from failure to recognize the limitations of science, on the one hand, and of Christian faith, on the other. The sciences are based upon observing only "natural" phenomena. God and much of his work are scientifically unobservable, so research is limited to "methodological naturalism"⁶⁷ or "methodological atheism."⁶⁸ Except for theoretical and speculative attempts to interpret that which cannot be observed,

science is limited to empirically discernible data. That, however, does not preclude the "philosophical theism" of Christian, Jewish, and Muslim scientists who believe that human beings, the universe, and everything it contains were made by the invisible Creator and therefore reflect his handiwork.

What Is the Future of Spirituality Research?

Spirituality research is flourishing. When I first contemplated writing this article, I thought it ideally ought to summarize all the definitions and scales that have been developed to measure and assess spirituality and its numerous subsidiaries. Analysis of those scales should list all the indicators (questions and topics) that comprise each operational definition, demonstrating side-by-side which indicators are shared and which are exclusive, so that it shows how a scale is distinctly different from all others. In addition, I wanted to summarize and compare details of the specific methodological procedures used for collecting and analyzing data, for they also help to explain similarities and differences of findings.

Alas, those tasks are undone! They would require an ever-expanding activity for a year or more of full-time work and result in an encyclopedic report. Also awaiting attention is the collection and analysis of voluminous interpretations of spirituality tucked away in literature, history, the arts, religious studies, and other humanities.

The Multiplication of Research Scales

The challenge to researchers who need spirituality instruments explicitly oriented to the beliefs, values, languages, and cultures of non-Christian faiths is slowly being resolved. However, there are few explicitly "Christian" instruments focused directly upon elements at the heart of the value systems of fundamentalist, Pentecostal, Catholic, Orthodox, or other branches of Christianity.⁶⁹ Because most scales attempt to be generic, unique elements, such as questions about an evangelical faith in Jesus Christ as the only way to eternal salvation and trusting his vicarious death and resurrection for forgiveness of sin, usually are omitted. Research on any Christian group that believes that the unique aspects of its own Reformed, Arminian, charismatic, denominational, or other distinctives are important may require its own

spirituality subscale. Because of the large variations within and between major religious groups, research reports always should designate clearly whichever definitions and measures of spirituality are used.

"Cafeteria Religiosity"

A challenge to Christian leaders is the tendency of many of their people and even some clergy⁷⁰ to create their own religion by patching together pieces of faith, worship, ethics, and practices that make them feel good, regardless of their source and whether their creation is or is not consistent with creeds they recite or the Bible they claim as their guide to faith and action.⁷¹

Currently the word *spirituality* glows with favor, so numerous New Age sects, alternative healing cults, and commercial hucksters use words such as "spiritual" to describe their rituals, attract members, and sell their services or wares. What they allege to be good spirituality may be as radically opposite to values of the Bible as the biblical words of Satan were when he tempted Jesus (Matt. 4:1-11; 2 Cor. 11:14-15). It is very easy to "let the world around you squeeze you into its own mould ... [instead of letting] God re-mould your minds from within" (Rom. 12:2, Phillips). Christians are squeezed by social, economic, political, and other pressures of society and its subcultures to rationalize worldly standards instead of conforming to whatever genuinely reflects the mind and example of Christ.

Three-fourths of the US population identify themselves as Christians, but many are becoming more like Hindus who believe there are many paths to God. With a strong propensity for a "divine-deli-cafeteria religion" that selects and combines its own pieces of different religions, thinking all seem the same and with 24% believing in reincarnation, a Hindu spirit seems to be replacing Christian orthodoxy.⁷²

The Next Great Discovery?

Richard Cox has boldly asserted, "The next great discovery will be in the realm of the Spirit. The ramifications of this discovery for the church will be beyond our current imagination."⁷³ On the growing edge of that prediction are research reports on the genome and countless other subjects in peer-reviewed journals, conferences on topics such as consciousness that

present massive evidence for the reality of the Soul and Spirit, and the coming together of the fields of psychology and religion. The Christian church, Cox believes, therefore needs to practice an "invasive theology" out of the conviction that its message is truly life changing. Centuries of its results are equivalent to empirical experiments that demonstrate the power of what it preaches and teaches.⁷⁴

Recent demonstrations of that power include the renunciation of atheism by Antony Flew, who in 2004 publicly announced that he now accepts the existence of God. Major influences on his shift were scientific findings of DNA investigations, data on the fine tuning of the universe, the inability of evolutionists to explain the first emergence of life, and fallacious circular reasoning of atheists unable to explain the origin of the universe. Reason and science, not faith, were progenitors of his radical turnaround.⁷⁵ Flew is not alone. "Since the 1980s and 1990s, there has been a renaissance of theism among analytic philosophers."⁷⁶

Conclusions

All research on spirituality is incomplete and imperfect. Despite significant progress, especially since the late 1980s, it still is in its infancy. Every research method and tool used to identify, describe, analyze, evaluate, and apply the findings about spirituality touches on only fragments of its totality. Spirituality is so comprehensive, universal, and all-inclusive that humans can apprehend only miniscule bits and pieces that are but tiny samples reflecting its amazing totality.

In the final analysis, spirituality is "the demonstration of the Spirit. It is an action of its originator, the soul, i.e., Spirit."⁷⁷ Because we *are* spirit, it is impossible to separate ourselves from spirituality to study it with unbridled objectivity, and many of its immaterial aspects are outside and beyond the bounds of scientific observation. As Fontana concludes,

... the urge to religious and spiritual experience and belief, and the consequences of this urge for human behavior, are among the greatest mysteries facing psychology. In spite of countless words written over the centuries, we are still a long way from finding answers to these mysteries.⁷⁸

Article

Spirituality Research: Measuring the Immeasurable?

The mysteries of spirituality are at the core of human existence, pervading everything that human beings are and do. It is impossible to fully understand it and all of its complex connections, even though every activity, belief, commitment, and motivation reflects it positively or negatively in some way.

This means that the large and expanding number of scales that allegedly measure the immeasurable spirituality are a benefit, not a problem. Whether they include religiosity or not, all provide strong or weak reflections of their subjects' spirituality, even when reversals of positive and negative scores may seem necessary to fit contrasting values of Christian and other ideologies. Ultimately, however, only God knows for sure whether a person is spiritually well, so it may forever be impossible for mere humans to discover and measure levels of spiritual well-being with absolute certainty despite the guidelines for righteous living in the Bible.

Scientific research on the material universe is rapidly expanding human knowledge of both its vastness and its intricately interacting minute parts, processes, and relationships. Similarly, research on spirituality is expanding our perceptions toward both an ever broader awareness of its vast domains and a deeper discernment of its largely impenetrable components, processes, and influences.

As we continue to study snippets of spirituality and its manifestations both within and outside of religion, we will generate increasing light on its complexities and expanding wisdom for its applications to social and individual behavior. Yet far beyond the scope of research methods related to spirituality and their findings, there forever is more and more and more.

Puzzles will always remain and will serve as a stimulus to further growth. Yet Christians who use the paradoxes and dilemmas of life constructively will win the satisfaction of bringing healing to both individuals and society in our troubled world. They will reap the immediate satisfactions of God's *shalom* ... [and] the ultimate reward of being a part of the great multitude "from every nation, tribe, people and language, standing before the throne and in front of the Lamb," their redeemer (Rev. 7:9, NIV).⁷⁹

□

Notes

- ¹David O. Moberg, "Spirituality and Science: The Progress, Problems, and Promise of Scientific Research on Spiritual Well-Being," *Journal of the American Scientific Affiliation* 38, no. 3 (1986): 186–94. (That article serves as an introduction to this one.)
- ²Wade C. Roof, *Spiritual Marketplace: Baby Boomers and the Remaking of American Religion* (Princeton, NJ: Princeton University Press, 1999).
- ³See, e.g., Eileen Barker, ed., *The Centrality of Religion in Social Life: Essays in Honour of James A. Beckford* (Oxon, UK: Ashgate Publishing, 2008); and Adrian Wooldridge, *God Is Back: How the Global Revival of Faith is Changing the World* (New York: The Penguin Press, 2009).
- ⁴Examples include the interdisciplinary conference on "Alternative Spiritualities, the New Age and New Religious Movements in Ireland" at the National University of Ireland, Oct. 30–31, 2009; the sixth international conference of the SIEF Working Group on Ethnology of Religion, devoted to "Experiencing Religion (illuminating spiritual experience)" in Warsaw, Poland, June 2–3, 2010; the theme of "Religion: A Human Phenomenon" chosen to encourage discussion of religions and religious phenomena across traditional geographical and temporal boundaries at the XXth Quinquennial World Congress of the International Association for the History of Religions, Toronto, Aug. 15–21, 2010; an international conference on "Politics, Poverty and Prayer" at the Africa International University in Nairobi, Kenya, July 22–25, 2010; and an international conference on "Changing Gods: Between Religion and Everyday Life" at the University of Torino, Italy, Sept. 9–11, 2010.
- ⁵This resulted in a paper by David O. Moberg at ASA's 1965 annual meeting, which was subsequently published in the *Journal of the American Scientific Affiliation* under the title, "Science and the Spiritual Nature of Man," 19, no. 1 (1967): 12–17.
- ⁶Charles Y. Glock, "On the Study of Religious Commitment," Research Supplement, *Religious Education* 59, no. 4 (1962): S-98–S-110.
- ⁷Luigi Sturzo, *The True Life: Sociology of the Supernatural*, trans. Barbara Barclay Carter (London: Geoffrey Bles, 1947).
- ⁸*Nephesh*, the Hebrew word for soul, is also variously translated as spirit, person, being, creature, and so forth.
- ⁹Hartzell Cobbs, "A Small Room in Kolkata: The Spiritual Gifts of Caregiving," *Aging Today* 30, no. 4 (2009): 10.
- ¹⁰Moberg, "Science and the Spiritual Nature of Man," and David O. Moberg, "The Encounter of Scientific and Religious Values Pertinent to Man's Spiritual Nature," *Sociological Analysis* 28, no. 1 (1967): 22–33.
- ¹¹David O. Moberg, *Spiritual Well-Being: Background and Issues* (Washington, DC: White House Conference on Aging, 1971), 3. As customary then, its references to "man" were to all humanity, not sexist allusions to one gender as if only males are important.
- ¹²James A. Thorson and Thomas C. Cook Jr., eds., *Spiritual Well-Being of the Elderly* (Springfield, IL: Charles C. Thomas Publisher, 1977), xiii.
- ¹³James Ellor, "FORSA Celebrates Traditions of Diversity, Fellowship and Service," *Aging Today* 30, no. 4 (July–August 2009): 7, 9.
- ¹⁴David O. Moberg, *Religion and Personal Adjustment in Old Age* (Ph.D. diss., University of Minnesota, 1951).

- ¹⁵G. W. Allport and J. M. Ross, "Personal Religious Orientation and Prejudice," *Journal of Personality and Social Psychology* 5 (1967): 432-43. The ROS is still in use; e.g., it is among the scales used by Mark Brennan and Thalia MacMillan, "Spirituality, Religiousness, and the Achievement of Vision Rehabilitation Goals among Middle-Age and Older Adults," *Journal of Religion, Spirituality and Aging* 20, no. 4 (2008): 267-87.
- ¹⁶B. J. Zinnbauer, K. I. Pargament, and A. B. Scott, "The Emerging Meanings of Religiousness and Spirituality: Problems and Prospects," *Journal of Personality* 67, no. 6 (1999): 889-919.
- ¹⁷B. J. Zinnbauer and K. I. Pargament, "Capturing the Meanings of Religiousness and Spirituality: One Way Down from a Definitional Tower of Babel," *Research in the Social Scientific Study of Religion* 13 (2002): 23-54.
- ¹⁸Linda M. Chatters, Robert Joseph Taylor, Kaim Bullard, and James S. Jackson, "Spirituality and Subjective Religiosity among African Americans, Caribbean Blacks, and Non-Hispanic Whites," *Journal for the Scientific Study of Religion* 47, no. 4 (2008): 725-37.
- ¹⁹Jan D. Sinnott, "Introduction: Special Issue on Spirituality and Adult Development, Part I," *Journal of Adult Development* 8, no. 4 (2001): 199-200.
- ²⁰Richard L. Gorsuch, "Measurement: The Boon and Bane of Investigating Religion," *American Psychologist* 39 (1984): 228-36.
- ²¹Douglas A. MacDonald, Laura LeClair, Cornelius J. Holland, Aaron Alter, and Harris L. Friedman, "A Survey of Measures of Transpersonal Constructs," *Journal of Transpersonal Psychology* 27, no. 2 (1995): 171-235.
- ²²David O. Moberg, "Christian Spirituality and Transpersonal Sociology," *Research in the Social Scientific Study of Religion* 12 (2001): 131-63.
- ²³Douglas A. MacDonald, Harris L. Friedman, and Jeffrey G. Kuentzel, "A Survey of Measures of Spiritual and Transpersonal Constructs: Part One—Research Update," *Journal of Transpersonal Psychology* 31, no. 2 (1999): 137-54.
- ²⁴Peter C. Hill and Ralph W. Hood Jr., eds., *Measures of Religiosity* (Birmingham, AL: Religious Education Press, 1999).
- ²⁵Bernard Spilka, "Religious Practice, Ritual, and Prayer," in *Handbook of the Psychology of Religion and Spirituality*, ed. R. F. Paloutzian and C. L. Park (New York: Guilford Press, 2005), 365-77.
- ²⁶Peter C. Hill, "Measurement in the Psychology of Religion and Spirituality: Current Status and Evaluation," in *Handbook*, ed. Paloutzian and Park, 43-61.
- ²⁷Raymond F. Paloutzian and Craig W. Ellison, "Loneliness, Spiritual Well-Being, and Quality of Life," in *Loneliness: A Sourcebook of Current Theory, Research, and Therapy*, ed. L. A. Peplau and D. Pearlman (New York: Wiley Interscience, 1982), 224-37; R. F. Paloutzian and C. W. Ellison, *Manual for the Spiritual Well-Being Scale* (Nyack, NY: Life Advance, Inc., 1991); R. K. Bufford, R. F. Paloutzian, and C. W. Ellison, "Norms for the Spiritual Well-Being Scale," *Journal of Psychology and Theology* 19 (1991): 56-70; for the 2010 version of its website, go to www.lifeadvance.com/spiritual-well-being-scale/8-research.html (Accessed February 10, 2010).
- ²⁸See M. F. Ledbetter, L. A. Smith, W. L. Vosler-Hunter, and J. D. Fischer, "An Evaluation of the Research and Clinical Usefulness of the Spiritual Well-Being Scale," *Journal of Psychology and Theology* 19 (1991): 49-55; R. F. Paloutzian, "A Time-tested Tool: The SWB Scale in Nursing Research," *Journal of Christian Nursing* 19, no. 3 (2003): 16-9.
- ²⁹David B. Simpson, Jody L. Newman, and Dale R. Fuqua, "Spirituality and Personality: Accumulating Evidence," *Journal of Psychology and Christianity* 26, no. 1 (2007): 33-44. See also P. S. Richards and A. E. Bergin, *A Spiritual Strategy for Counseling and Psychotherapy* (Washington, DC: American Psychological Association, 1997).
- ³⁰Among the most useful overviews of the research compiled by Harold G. Koenig are *Medicine, Religion, and Health: Where Science and Spirituality Meet* (Conshohocken, PA: Templeton Foundation Press, 2008) and his massive survey and critique co-authored by Michael E. McCullough and David B. Larson, *Handbook of Religion and Health* (New York: Oxford University Press, 2001). Brief summaries are in D. O. Moberg, ed., *Spirituality and Aging* (Binghamton, NY: Haworth Press, now Taylor and Francis, 2001).
- ³¹Eugene H. Peterson, *Subversive Spirituality* (Grand Rapids, MI: Eerdmans, 1997).
- ³²Allen Glicksman, "The Contemporary Study of Religion and Spirituality among the Elderly: A Critique," *Journal of Religion, Spirituality and Aging* 21, no. 4 (2009): 244-58.
- ³³Doug Oman, "Unique and Common Facets of Religion and Spirituality: Both Are Important," *Journal of Religion, Spirituality and Aging* 21, no. 4 (2009): 275-86.
- ³⁴David O. Moberg, "Predicaments in Researching Spirituality and Religion: A Response to Glicksman's Contemporary Study of Religion and Spirituality among the Elderly," *Journal of Religion, Spirituality and Aging* 21, no. 4 (2009): 297-309.
- ³⁵Ronald Y. Nakasone, "A Brief Review of Literature of Buddhist Writings on Spirituality and Aging," in *Methods in Religion, Spirituality and Aging*, ed. James W. Ellor (New York: Routledge, 2009), 211-7.
- ³⁶Tipawadee Emavardhana and Christopher D. Tori, "Changes in Self-Concept, Ego Defense Mechanisms, and Religiosity following Seven-Day Vipassana Meditation Retreats," *Journal for the Scientific Study of Religion* 36, no. 2 (1997): 194-206.
- ³⁷Ralph W. Hood Jr., ed., *Handbook of Religious Experience* (Birmingham, AL: Religious Education Press, 1995).
- ³⁸M. Takahashi and S. Ide, "Implicit Theories of Spirituality across Three Generations: A Cross-Cultural Comparison in the U. S. and Japan," *Journal of Religious Gerontology* 15, no. 4 (2003): 15-38.
- ³⁹J. Isomae, "Rethinking 'Japanese Religion': The Transcendental and the Indigenous." Paper presented at the 19th World Congress of the International Association for the History of Religions, Tokyo, March 28, 2005.
- ⁴⁰Thomas B. Ellis, "On Spirituality: Natural and Non-natural," *Religion Compass* 2, no. 6 (2008): 1117-38.
- ⁴¹Robert C. Atchley, *Spirituality and Aging* (Baltimore, MD: The Johns Hopkins University Press, 2009), 147.
- ⁴²Timothy P. Daaleman and Bruce B. Frey, "The Spirituality Index of Well-Being: A New Instrument for Health-Related Quality-of-Life Research," *Annals of Family Medicine* 2, no. 5 (2004): 499-503.
- ⁴³David A. Katerndahl, "Impact of Spiritual Symptoms and Their Interactions on Health Services and Life Satisfaction," *Annals of Family Medicine* 6, no. 5 (2008): 412-20.

Article

Spirituality Research: Measuring the Immeasurable?

- ⁴⁴Matt Bradshaw and Christopher G. Ellison, "Do Genetic Factors Influence Religious Life? Findings from a Behavior Genetic Analysis of Twin Siblings," *Journal for the Social Scientific Study of Religion* 47, no. 4 (2008): 529–44.
- ⁴⁵Kevin S. Seybold, "God and the Brain: Neuroscience Looks at Religion," *Journal of Psychology and Christianity* 24, no. 2 (2005): 122–9.
- ⁴⁶D. Hamer, *The God Gene: How Faith Is Hardwired into Our Genes* (New York: Doubleday, 2004).
- ⁴⁷A. B. Newberg, E. d'Aquili, and V. Rause, *Why God Won't Go Away: Brain Science and the Biology of Belief* (New York: Ballantine Books, 2001).
- ⁴⁸Fred Alan Wolf, *The Spiritual Universe: How Quantum Physics Proves the Existence of the Soul* (New York: Simon and Schuster, 1996); and P. Zoeller-Greer, "Genesis, Quantum Physics and Reality: How the Bible Agrees with Quantum Physics ...," *Perspectives on Science and Christian Faith* 52, no. 1 (2000): 8–17. See also Jeffrey Satinover, "Quantum Theory and the Boundary between Science and Spirit: Some Remarks from a Friend of Kabbalah," *World Futures: The Journal of General Evolution* 64, no. 4 (2006): 300–8.
- ⁴⁹Barbara Bradley Hagerty, *Fingerprints of God: The Search for the Science of Spirituality* (New York: Riverhead Books, 2009).
- ⁵⁰Francis Collins, *The Language of God: A Scientist Presents Evidence for Belief* (New York: Free Press, 2006).
- ⁵¹David Fontana, *Psychology, Religion, and Spirituality* (Oxford: British Psychological Society and Blackwell Publishing, 2003), 228.
- ⁵²Martinez J. Hewlett, "What Price Reductionism?" in *Science and the Spiritual Quest: New Essays by Leading Scientists*, ed. W. M. Richardson, R. J. Russell, P. Clayton, and K. Wegter-McNelly (London: Routledge, 2002), 82–9.
- ⁵³This "nothing buttery" fallacy is thoroughly exposed in Donald M. MacKay, *The Clockwork Image: A Christian Perspective on Science* (Downers Grove, IL: InterVarsity Press, 1974).
- ⁵⁴Dinesh D'Souza, *What's So Great about Christianity* (Washington, DC: Regnery Publishing, 2007), 247, 246.
- ⁵⁵David O. Moberg, "Epistemological Issues in Measuring Spirituality," *Annals of Family Medicine* (March 16, 2004): <http://annalsfm.highwire.org/cgi/eletters/2/1/49> (Accessed February 10, 2010).
- ⁵⁶Gerald G. May, *The Dark Night of the Soul* (San Francisco, CA: HarperSanFrancisco, 2004).
- ⁵⁷See Michael J. Boivin, reviewer, "Spiritual Well-Being Questionnaire (Moberg, 1984)," in *Measures of Religiosity*, ed. Hill and Hood, 375–81.
- ⁵⁸Koenig, McCullough, and Larson, *Handbook*, 385–6.
- ⁵⁹Jamie D. Aten and Barbara Couden Hernandez, "A 25-Year Review of Qualitative Research Published in Spiritually and Psychologically Oriented Journals," *Journal of Psychology and Christianity* 24, no. 3 (2005): 266–77.
- ⁶⁰For one introduction to these issues, see David O. Moberg, "Assessing and Measuring Spirituality: Confronting Dilemmas of Universal and Particular Evaluative Criteria," *Journal of Adult Development* 9, no. 1 (2002): 47–60.
- ⁶¹See Reeve Robert Brenner, "Nons, Nunyas, Appreciative Inquiry, and the Aged," *Journal of Religion, Spirituality and Aging* 21, no. 1–2 (2009): 119–30.
- ⁶²Elizabeth Lewis Hall, "What Are Bodies For? An Integrative Examination of Embodiment," *Christian Scholar's Review* 39, no. 2 (2010): 159–75.
- ⁶³Daniel Helminiak, *The Human Core of Spirituality: Mind as Psyche and Spirit* (Albany, NY: State University of New York Press, 1996), 272. For further discussion of the inner self as an aspect of the whole person, see Nancey Murphy, *Bodies and Souls, or Spirited Bodies?* (New York: Cambridge University Press, 2006).
- ⁶⁴Justin L. Barrett, *Why Would Anyone Believe in God?* (Walnut Creek, CA: AltaMira Press, 2004).
- ⁶⁵David Hay, *Something There: The Biology of the Human Spirit* (Philadelphia, PA: Templeton Foundation Press, 2007).
- ⁶⁶See D. O. Moberg, *Wholistic Christianity* (Elgin, IL: Brethren Press, 1985).
- ⁶⁷Patrick McDonald and Nivaldo J. Tro, "In Defense of Methodological Naturalism," *Christian Scholar's Review* 38, no. 2 (2009): 201–29.
- ⁶⁸For a popularized explanation of "methodological atheism," see D'Souza, *What's So Great*, 55–64.
- ⁶⁹One exception is the Mormon Scale reviewed by Susan Sheffer, "Attitudes toward the LDS Church Scale (Hardy, 1949)," in *Measures of Religiosity*, ed. Hill and Hood, 471–8.
- ⁷⁰Alexander D. Salvato, "A Buddhist Bishop in the UP," *Religion in the News* 12, no. 1 (Spring 2009): 14–6.
- ⁷¹See the Barna Research Group's interpretations of challenges and opportunities this offers Christian pastors: "Many Churchgoers and Faith Leaders Struggle to Define Spiritual Maturity," *Barna Update* (website), May 11, 2009, www.barna.org/barna-update/article/12-faithspirituality/264-many-churchgoers-and-faith-leaders-struggle-to-define-spiritual-maturity (Accessed March 9, 2010).
- ⁷²Lisa Miller, "We Are All Hindus Now," *Newsweek* (Aug. 24 and 31, 2009): 70. Her thesis is based upon results from public opinion polls.
- ⁷³Richard H. Cox, *The Sacrament of Psychology: Psychology and Religion in the Postmodern American Church* (Sanford, FL: InSync Press, 2002), 288.
- ⁷⁴*Ibid.*, 288–95.
- ⁷⁵Antony Flew with Roy Abraham Varghese, *There Is a God: How the World's Most Notorious Atheist Changed His Mind* (New York: HarperCollins Publishers, 2008).
- ⁷⁶*Ibid.*, 149.
- ⁷⁷Cox, *The Sacrament of Psychology*, 289.
- ⁷⁸Fontana, *Psychology, Religion, and Spirituality*, 228.
- ⁷⁹Moberg, *Wholistic Christianity*, 200.

66th Annual Meeting of the American Scientific Affiliation

July 29–August 1, 2011

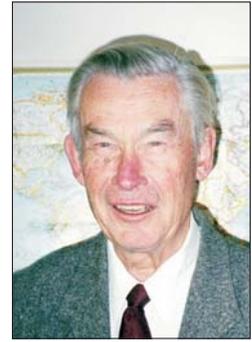
North Central College
Naperville, IL

Jointly hosted by
North Central and Wheaton Colleges

James Baird and Rodney Scott, co-chairs

Conscious Experience and Science: Signs of Transition

Thaddeus J. Trenn



Thaddeus J. Trenn

Available neurological correlates of personal conscious experience can often be detected, identified, and measured objectively. Substituting neurological correlates uncritically for personal conscious experience per se, if unintended, would constitute the error of reductionism. If intended, such substitution reflects decisions already taken on basic and highly contentious issues concerning the acceptable nature of the human person, offering no middle ground. Should personal aspects of individual conscious experience be disregarded out of hand simply for not being in conformity with available standards of objective scientific measurement? This logical quandary presents a serious bifurcating challenge bearing significant implications for current research in neuroscience cum neurophysiology, as discussed in the following article.

Preamble

Neuroscience cum neurophysiology stands at the cusp of a transition in thought regarding conscious experience. Whereas detectible correlates of conscious experience can be identified and measured scientifically, a relationship between objective measurements and individual consciousness experience remains open to further consideration. History of science is replete with fundamental transitions concerning scientific thought over time, a positive characteristic attesting to the dynamic emergence of many advances within science. Nevertheless, intradisciplinary transitions during such critical moments typically harbor considerable tension. Anomalies are often bracketed to “save the phenomena,” albeit only temporarily. Expected results may elude standardized methods, yet unwanted alternative approaches are resisted, even dismissed outright. Dominant metaphysical presuppositions become effectively impervious to modification. The dialogue of the deaf, resulting in such cases, bears classic features of denial, bipolarity, and rejection well identified by Thouless, Fleck, and Kuhn.

The following brief article features transitions regarding scientific thought in general; neurophysiology, in particular. The didactic approach taken is necessarily multifaceted in virtue of the considerable complexity characteristic of deep transitions, whatever the discipline. A more general background may also assist to identify and facilitate an appreciation regarding this nascent and perhaps professionally invisible transition presently in train within neurophysiology.

The primary focus of this article is the current state of affairs in neurophysiology, laden as it is with ingrained assumptions even about what constitutes conscious experience. Whether a personal dimension, even a spiritual

Thaddeus Trenn holds a PhD in history of science from the University of Wisconsin-Madison and degrees in physics and philosophy from Notre Dame. He has taught at various educational institutions in America and Europe while conducting research over a wide range of disciplines. During the 1990s, Thad continued to teach special courses concerning science and religion at the University of Toronto where he also acted in a leadership capacity for all of Canada on behalf of the international Templeton Program on Science and Religion. Thad is a Fellow of the ASA, currently serving as president of the CSCA. He can be contacted at t.trenn@utoronto.ca

Article

Conscious Experience and Science: Signs of Transition

one, is to be precluded may well remain beyond the range of science to properly adjudicate. As stressed below, the fractured professional response to the seminal work of Noë, for example, offers a wake-up signal as to the pervasive depth of this unfolding transition within neurophysiology. Gestalt-switch “seeing” typically requires looking at problems in a different way rather than merely looking harder in a standardized way. Although it may be methodologically expedient to exclude individual personal experience as not in conformity with objective criteria, uncritical adherence to this narrow approach may artificially truncate the domain of reality.¹ Rendering superfluous the critical personal aspect of conscious experience is at the core of a decades-old problem entailing considerable complexity.²

The Problem Identified

Key interlinked issues may be highlighted with the standard headache case. Jones claims to be experiencing a headache. Various ancillary cranial measurements could corroborate his claimed experience. Nevertheless Jones himself is certain about his own headache experience apart from these correlative measurements. Invasive chemical or other treatment blocking nerve signals might temporarily alleviate his personal painful experience. External cranial measurements, however, might continue to indicate that Jones still exhibits expressions associated with having a headache. Will the real headache experience now stand up? Over recent decades, considerable neurological research has been conducted along reductionist lines, following the working assumption that objective measurements constitute the essence of detected experience.³

Exposing Hidden Assumptions

Science extols objectivity in research, so it attempts to exclude subjective factors. While this well-known ideal may be appropriate for cases of “matter and motion,” as Sullivan avers, it is questionable whether this approach could adequately deal with conscious experience. Since the experiential aspect is inherently personal, then without some further assumptions, conscious experience could not even qualify for meeting criteria of significant objectivity and stipulated repeatability. Operational methodology for neurophysiology could circumvent this inconvenient dilemma by adopting, as surrogates, observations

and measurements carried out on the physiological expressions associated with the claimed experience. To confirm objectivity, similar measurable expressions should be artificially induced using various cortical stimuli, whether magnetic, electrical, physical, or chemical. Prima facie, then, any such *equivalency* maneuver would seem to close the measurable loop-of-experience without leaving any residue. Unfortunately, this approach bears a hidden assumption of serious methodological and logical import.

Consider the personal experience reported by Jones along with the detectible physiological expression of his reported experience, as duly measured and corroborated scientifically. The basic issue concerns what type of direct linkage is being assumed between his personal experience and the physiological expression of that experience. Direct linkage would not be inherently problematic since some degree of association would normally be expected physically between conscious experience and the physiological and externally detectible expression of that experience.

Indeed, in the first instance, it might even be useful to compare associative classification nomenclature regarding varieties of conscious experience, on the one hand, with correlative, externally detectible physiological expressions of such experience, on the other. In doing so, however, due diligence would be advisable to avoid directly conflating classification association with ontological association. Uncritically imputing ontological status to this association by default would transgress the boundary between classification and ontology by positing *identity* between the personal experience and the externally detectible physiological expression of said experience. Left unexposed, however, this logical faux pas paradoxically remains speciously beneficial insofar as it artificially provides, and appears to guarantee, for conscious experience the holy grail of objectivity deemed essential for conducting neurophysiological research on consciousness. Furthermore, reductive conflation of externally detectible physiological expressions of conscious experience with conscious experience per se can elude detection under protective assumptions inherent in scientific materialism. Conflating classification with ontology would thus indirectly appear to validate first-order physicalism replete with inherent constraints of space and time.

Reality Check

The working assumption for science guided by restrictive metaphysical principles, as noted by Sullivan, entails general acceptance that the reality being investigated should be accessible for general research. Yet when delving into personal conscious experience, this working assumption would require augmentation to maintain and foster a high degree of objectivity. So the association between conscious experience and the measurable expression of that experience is construed, without mention, as an ontological identity. Far more than providing merely reliable indicators of experience, following this dubious assumption to its logical conclusion, measurements of physiological expressions of personal, conscious experience could be alleged to constitute the very essence of such experience! Claims for distinctly personal experience, over and above measurements thereof, would be dismissed as peripheral, illusory, and, at best, of secondary interest. This result conforms to the general working assumption whereby any knowledge claim ought ideally to be depersonalized. Therefore, what counts as reality is deemed to be limited to those features of the world which can be addressed objectively by an exclusive scientific methodology. Above all, purported spiritual reality would have no status other than as representing neurological correlates when deemed useful for neurotheology.

A Change of Viewpoint

Recent literature provides reasons to believe that this low-order reductionist model of mind, brain, and consciousness may have reached a serious impasse.⁴ Early signals of transition have long been available. After all, how could a 2% difference in DNA alone ever suffice to account for a much higher order in human consciousness?⁵ On the standard model, as Noë avers, the brain is typically construed as the generative source of consciousness, a view consistent with the standard model of scientific methodology extolling unmitigated objectivity. If this were the case, individual conscious experience, once depersonalized, should be readily accessible and available for general cognitive research. Yet scientific research has gradually become stymied, primarily because other factors must be taken into consideration. In particular, Noë draws attention to the role of interaction between the individual experiential entity and its en-

vironment, with the brain being tasked with proper coordination. Put plainly, Noë is unconventionally claiming that “we are looking for consciousness in the wrong place if we look for it in the brain.”⁶

Once confirmed, this challenging claim may also herald the end of naive reductionism regarding brain, mind, and consciousness. As regards “questions of mind, self, consciousness, and their basis,” neurologist Oliver Sacks finds Noë’s concepts “both astounding and convincing.”⁷ Sensing here a fundamental revolution in “scientific thought about the nature of consciousness,” Hilary Putnam affirms that “most of what he says is true.”⁸ Even “those of us who disagree,” Daniel Dennett admits, “have our work cut out for us” in order to defend “current orthodoxy.”⁹ Comments this serious coming from the top echelon would seem to be signals of transitional distress.

An Integrative Approach

Noë identifies at least two interrelated problems: (1) conscious experience cannot be reduced to isolated, objectively measurable brain states; (2) environmental cum interpersonal factors are involved which require holistic coordination, since these factors are constitutive of the experience in some integral way. The significance of these fundamental issues extends far beyond possibly establishing some novel trend in neuroscience.

While openly affirming that excellent experimental and theoretical work continues in cognitive science, Noë claims that this entire research program is built upon misguided presuppositions.¹⁰

It is misguided to search for neural correlates of consciousness—at least if these are understood, as they sometimes are, to be neural structures or processes that are alone sufficient for consciousness ... More generally, it is untenable to suppose that the brain’s job is to do our thinking for us, and so it is untenable to think that the brain manages this task by performing complex computations.¹¹

Being quite beyond stand-alone computational capacity, seeking “to understand the brain basis of experience” requires appreciation of “our dynamic transactions with the world around us.”¹² Might the brain then be an instrument of interconnection,

Article

Conscious Experience and Science: Signs of Transition

inclusive also of spiritual reality? Because environmental factors would embrace “the cultural habitat of the organism,”¹³ this alternative approach manifests a wide-ranging viewpoint. Furthermore, Noë frankly acknowledges that his claim, that “the foundations of consciousness are not distinctively neural,”¹⁴ effectively constitutes a direct attack upon orthodoxy.

Holism Revisited

Emergent holism, as noted by Sullivan, may correct our fragmented views of reality.¹⁵ In this same vein, Noë is reintroducing holism to the attention of neuroscience.

The central claim of this book is that the brain is not, on its own, a source of experience or cognition. Experience and cognition are not bodily by-products. What gives the living animal’s states their significance is the animal’s dynamic engagement with the world around it.¹⁶

Noë clarifies this unorthodox alternative as follows:

The last twenty-five years have witnessed the gradual shaping of an embodied, situated approach to mind. This approach has flourished in certain regions of cognitive science ... but it has been all but ignored in neuroscience ... and, more generally, in the domain of consciousness studies ... It is now clear ... that consciousness, like a work of improvisational music, is achieved in action, by us, thanks to our situation in and access to a world we know around us.¹⁷

Limitations of Science

Many decades ago, Sullivan identified the poverty of science, if artificially restricted in its scope by a methodology appropriate for simple problems of “matter and motion.”¹⁸ Meantime, this limitation has become increasingly embedded within the culture of science leaving the illusion that, in the long run, no unreachable goals of any significance exist for science today. Unfortunately, personal experience does not fit this restrictive methodology. So to bring it within the range of scientific investigation, conscious experience is virtually depersonalized in order to meet acceptable methodological criteria.¹⁹ Summarily discounting personal conscious experience in this way could also be viewed as truncating reality at the altar of objectivity, attempting to gain access to this personal experiential domain for scientific research.

Signals of Transition

The findings identified by Noë arising internally from within the system of scientific investigation are unsettling. Lack of *specified* coupling between the measurement and some physiological entity is considered quite problematic.²⁰ The absence of direct and univocal correlation between detectable measurements makes it much more difficult to measure and control the specified reality purportedly being investigated. According to Noë, the brain is neither causative of the experience nor an adequate representation of it: something far grander is evidently involved. The brain seems to be functioning more like an integrating operator within a larger system involving multiple agencies. Perhaps the emergence of such unexpected indicators, in addition to other constraining factors, constitutes a signal heralding an impending shift in thought style or paradigm change.

Reactions to the work of Noë exhibit serious professional interest. Viewed classically, significant challenges to entrenched viewpoints signal incipient adjustments in thought style. Science history is replete with examples of worldviews and fundamental beliefs that underwent unanticipated change. Such shifts result largely as a function of new evidence and the reinterpretation of evidence. Examples of worldview change or paradigm shifts abound. The variable manner by which an entrenched worldview could be displaced or significantly modified is complex, usually involving cultural and sociological factors transcending what is usually deemed to constitute scientific evidence.²¹

Belief-Bifurcation and Worldview Shifts

The central parameters and features of typical transformations within scientific thought were well described in the classic 1935 work of Ludwik Fleck, who described how theories formulated within science, when entrenched, often exhibit extraordinary tenacity of conviction.²² In that same year, philosopher Robert Thouless published his insightful study on the tendency toward degrees of certainty assigned inversely as a function of available evidence.²³ He showed that lack of available supporting evidence for a particular belief position tended to correlate directly with a reinforced tenacity in belief conviction, often leading to increasing divergence, even utter belief-bifurcation. Both studies indicated that

claims for certitude tend to correlate with a high degree of rigidity and polarized conviction. This easily leads to discounting ostensibly unbiased evidence that ought to be deemed acceptable even by staunch opponents of a particular theory or another belief position, further polarizing the entrenched bifurcation. At the higher level, even the basic terms of legitimating and adjudication could become fixed. However, when the “rules” become dogmatically controlled by a particular belief system, transition or “conversion” can be extremely difficult to achieve.

Methodological Constraints Revisited

Viewed historically, acceptable feedback of scientific information from experimentation has traditionally resolved many cases of belief-bifurcation within science. Nature “communicates,” as it were, when we listen perceptively. Contending with polarized presuppositions within science has often been very challenging, especially when deeply embedded viewpoints are involved.²⁴

It is considerably more difficult to deal with embedded methodological constraints, setting preconditions for what is allowed to count as evidence. Accordingly, the findings recently identified by Noë, along with quoted peer commentaries, are particularly interesting since they seem to reveal internal signals of confusion and potential transition. Dennett expresses hope that these extraordinary findings can be treated as anomalies in need of special attention. On the other hand, perhaps these distress signals will expose grounds for really serious tension being exhibited within the system as currently understood. After all, it is imperative to recognize that a dominant working assumption is just that: an assumption. While not a religious type of belief, the allegedly “misguided” assumption identified by Noë, “to search for neural correlates of consciousness,”²⁵ nevertheless functions as a guideline demanding professional adherence in order to foster continued operation of normal science within this restrictive methodological paradigm. Clarifying this broadly held working assumption can facilitate proper understanding of the general operational role of beliefs within science. Far more problematic, however, are deeply embedded and tenaciously held methodological constraints controlling what counts as acceptable evidence.²⁶

Inner Experience

Inner conscious experience is well documented in the literature. In a rather prescient manner, Thomas Merton unpacks entry-level physiological experience often associated with spirituality, by identifying differences between conscious experience originating from beyond or from within the physiological system. Chemicals such as peyote can induce the kind of physiological ecstasy that Aldous Huxley felt was “truly spiritual.”²⁷ Although induced experience remains a poor reflection of spontaneous experience, at least some type of spiritual reality was hereby being associated with the physiological dimension of the human person. Thus some type of allegedly spiritual realm, whether internal or external, was unexpectedly discovered by artificially triggering physiological sensors.²⁸ However, this maneuver could not replicate spontaneous inner experience without leaving detectible differences. Peyote-induced experience, though superficially similar, was reportedly lacking meaningful depth and duration which contrasted with conscious spiritual experience arising spontaneously, presumably from outside the physiological system.²⁹

Conscious experience identified as arising from beyond is often associated with a permanent transformation best described as the most real thing in the world.³⁰ Using chemical shortcuts as the generative source of the conscious experience is patently not transcendent. Although the detectible difference in this instance is more subjective, it may nevertheless serve to expose difficulties regarding artificial replication or reconstruction of authentic conscious experience. Despite preemptive closure from neurotheology, only if conscious experience is truly genuine can said experience express an enduring sense of transcendence without involving Linus-blanket dependence upon conscious experience. This is the virtual litmus test. Neither peyote nor apparatuses like Persinger’s “God Helmet” can provide any enduring sense of transcendent reality. Trying to replicate, force, or mimic deep experiential reality remains a charade.

A person like Bucke, who consciously experienced such in-breaking “Presence,” may more easily recognize that the experience implicates a spiritual source beyond physiological expression of the experience. Though conscious experience may provide reassurance of meaningful spiritual reality beyond the here

Article

Conscious Experience and Science: Signs of Transition

and now, Merton wisely cautions against becoming dependent upon any repetition or artificial replication of such spontaneous experience, since dependence or control would inhibit authentic spiritual growth.³¹

Conclusion

Conscious experience characteristically involves an inherently personal aspect which will not be denied despite unacknowledged limitations within current scientific methodology. Conscious experience cannot be fully reduced to detectible physiological expressions associated with experience. If conscious experience is genuine, it may open the door to a deeper spiritual realm entirely beyond the restricted capacity of traditional science to recognize or adjudicate. □

Notes

¹Consider the convoluted case of the supposed coma victim, Rom Houben of Brussels, who internally yelled for twenty-three years, but no one heard him, as recently reported throughout the world's press, www.msnbc.msn.com/id/34132340/ns/health-health_care (accessed March 3, 2010).

²Over eighty years ago, Sullivan, the brilliant polymath, was able to observe how "metaphysical doctrines that accompanied science" influence and compromise methodology and content. "The philosophy based on science had made 'matter and motion' the sole reality. In doing so it had dismissed other elements of our experience ... as illusory." J. W. N. Sullivan, *The Limitations of Science* (New York: Viking Press, 1935): 148-9. Despite the prevailing mindset, Burt felt strongly that "mind ... must find its total explanation beyond the material world." E. A. Burt, *The Metaphysical Foundations of Modern Science*, rev. ed. (Garden City, NY: Doubleday, 1932), 324.

³Underlying reductionist presuppositions are often uncritically presumed to be integral to authentic science. For nearly a century, quantum mechanics has provided highly accurate measurements without clarifying the reality behind these measurements. In contrast, measurements made within neuroscience would not even recognize any deeper experiential reality.

⁴Alva Noë, *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness*, (New York: Hill and Wang, 2009).

⁵Sullivan, *The Limitations of Science*, 150. Sullivan anticipated infinite capacity for the growth of human consciousness, albeit not following simple materialist presuppositions in denial of the

belief that life has transcendental significance. [Yet] it is precisely this belief that the old philosophy of science made impossible. We conclude, therefore, that the truly significant change in modern science is ... to be found ... in the change in its metaphysical foundations.

This article heralds a possibly fundamental transformation currently in progress.

⁶Noë, *Out of Our Heads*, 65.

⁷*Ibid.*, dust jacket.

⁸*Ibid.*

⁹*Ibid.*

¹⁰*Ibid.*, 185.

¹¹*Ibid.* An international research team led by Randy McIntosh is reportedly constructing a virtual brain using a grid of powerful computers, www.theglobeandmail.com/news/technology/science/the-tough-task-of-building-a-virtual-brain/article1252523/ (accessed March 3, 2010).

¹²*Ibid.*

¹³*Ibid.*

¹⁴*Ibid.*

¹⁵Sullivan, *The Limitations of Science*, 125 ff. Early on, scientific method was guided by a tendency to select and abstract from the "total elements of our experience" those "elements that possess *quantitative* aspects" which allegedly made them more "suitable for scientific formulation" (p. 128). For Kepler and Galileo, the really "real world is the world of mathematical characteristics" (p. 129). Reality "identified with the quantitative" (p. 135) appeared to be fragmented. But the notion of isolated units was due to be "replaced by the notion of organism" compatible with the emergence of biology (pp. 188-9) followed by a "further synthesis [with] the science of mind" able to reach out toward ultimate unity. Potentially this could implicate a higher-order physicalism free of space-time constraints, compatible with nonlocality and entanglement, which conceivably might help to expose Chalmers' bifurcated "hard problem" analysis of experience as harboring a category error. Cf. www.sciencemag.org, vol. 323 (August 13, 2009): 1168.

¹⁶Noë, *Out of Our Heads*, 165.

¹⁷*Ibid.*, 186.

¹⁸Sullivan, *The Limitations of Science*, 148-9. What "seemed to many thoughtful men ... to have darkened life ... was the metaphysical doctrines that accompanied science." Statistical methods were being developed which could describe ensemble behavior with considerable accuracy without regard for individual instantiation. Quantum mechanics introduced refinements in measurement while holding accounts in abeyance concerning deeper reality beyond precise measurement. Einstein's allegedly "spooky" action at a distance remains an anomaly since nonlocality and entanglement appear to expose a degree of independence within the physical order surprisingly free of space-time constraints.

¹⁹The current approach to research operates efficiently by reframing the domain of reality to mate with scientific investigation. The metaphysical beliefs underlying this restrictive approach also buttress the secular philosophy of reductionist first-order materialism. Given the historical record identified by Burt and Sullivan, serious critical reflection would be required not to associate authentic science with nonscientific assumptions leading to scientism.

²⁰Statistical analysis of populations and aggregates might initially substitute for simple linkages.

²¹Classic exemplars within science include Galileo, wave-particle duality, relativity, and plate-tectonics.

²²Ludwik Fleck, *Genesis and Development of a Scientific Fact* (Chicago, IL: University of Chicago Press, 1979) is the edited translation of the German language version originally published in 1935. "Once a structurally complete and closed system ... has been formed, it offers enduring resistance to anything that contradicts it" (p. 27). Fleck focused primarily on how constraining beliefs, often held with utter tenacity, influenced medical history. The great relevance of Fleck for his own work was duly acknowledged by T. S. Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 1962).

²³Robert H. Thouless, "The Tendency to Certainty in Religious Belief," *British Journal of Psychology* 26, 1935: 16-31, www.social-sciences-and-humanities.com/PDF/certainty_in_religious_beliefs.pdf (accessed March 3, 2010).

²⁴Novalty may languish under extreme polarization. Wave-particle bifurcation eventually emerged as a case of inclusive "or." Einstein long had his detractors concerning relativity, yet even he bristled at what he believed to be "spooky" action-at-a-distance, bearing potential implications for regular space-time physicalism. Cf. Louisa Gilder, *The Age of Entanglement: When Quantum Physics Was Reborn* (New York: Knopf, 2008).

²⁵Noë, *Out of Our Heads*, 185.

²⁶Fleck cautioned that dogmatism remains an ever present danger. The mere recognition of contrary beliefs within science could be prejudged as somehow heretical. Similarly, examining foundational working assumptions seems threatening to science only if uncritical adherence to prevailing metaphysical presuppositions were presumed to be methodologically integral to doing science.

²⁷Thomas Merton, *The Inner Experience: Notes on Contemplation*, ed. William H. Shannon (San Francisco, CA: Harper, 2003): 107.

²⁸Ibid. Huxley's experiments, which included LSD and other drugs, "seemed to help open up undiscovered and unknown depths" without clarifying any possible ultimate significance.

²⁹Neurotheology would counter this claim by seeking some defect or other aberration in the brain, www.clinicallypsyched.com/neurotheologywithgodinmind.htm (accessed March 3, 2010).

³⁰Self-induced experience stands in sharp contrast with the type of transcendent experience identified by Bucke who described such genuine in-breaking experience from beyond that could in no way be artificially duplicated in terms of meaning. In particular, the "waking of God in the soul is what is called in the present volume 'Cosmic Consciousness.'" Richard M. Bucke, *Cosmic Consciousness: A Study in the Evolution of the Human Mind* (New York: Dutton, 1969): 147.

³¹Merton, *The Inner Experience*, 108. The experience "is only a sign and is, furthermore, capable of being dissociated from any reality and being a mere empty figure. The illuminist is one who attaches himself to the sign, the experience, without regard for the invisible substance of a contact which transcends experience." Cf. Thomas Keating and John Osborne, *The Heart of the World* (New York: Crossroads, 1981), 65. "Christ is ... in the heart of all creation, sustaining everything in being ... even material creation has become divine in him."

New Release

**The American Scientific Affiliation:
Its Growth and Early Development**
F. Alton Everest

F. Alton Everest, one of the five founders of the American Scientific Affiliation (ASA), documents the early growth and development of the ASA, from 1941 to 1985. This unique behind-the-scenes account of the early decades of an enduring faith-science evangelical institution details the founding meetings, the development of organizational policies and structure, and the struggles to survive during World War II. Descriptions of early conventions, publications, the role of the ASA in controversial questions, and the governance of a growing organization encompassing the full range of the sciences, philosophy, and theology provide insight into its current role in science-faith discussion.

186 pages + 41 illustrations + 33 appendices.
ASA Press. Hardcover. ISBN: 188147903X.

A **special introductory price** through **June 30, 2010. \$14.95**, plus shipping and handling (\$19.95 after June 30, 2010).

Available exclusively at the ASA store,
www.asa3online.org/estore.php



D. Gareth Jones

Article

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

D. Gareth Jones

"Peering into the brain" has a number of connotations: from directly examining aspects of the functioning of an individual's brain and hence what that individual may be thinking, to investigating the power of neuroscience to provide insights into characteristic features of our humanity. This article picks up on these different connotations and surveys several areas in neuroscience that raise issues of relevance for the Christian community. This is the domain of neuroethics, with particular reference to the prospects opened up by brain imaging and, in particular, functional magnetic resonance imaging (fMRI). Use of this and allied imaging procedures opens up the possibilities of locating brain regions involved in religious experiences, from glossolalia to meditation, suggesting that there are neural correlates of activities central to Christian communities. This raises the issue of causation that is discussed by reference to the brain regions involved in "disgust," altruistic acts, and religious visions.

Cognitive enhancement, sometimes referred to as cosmetic neurology, is discussed within the broader canvas of the use of neurocognitive enhancers for nonmedical reasons, and the theological issues raised by this and by the use of drugs to block the formation of traumatic memories. Neural vulnerability raises the specter of those with brain injuries that lead to aberrant behavior, sometimes at odds with these individuals' moral and spiritual values; an appreciation of the pathological element in these situations is stressed. While neuroethics is not as novel as often suggested, it brings home the importance of ongoing dialogue between science and theology in understanding the prospects and limitations of the technologies, their potential contribution to human well-being, and the ever-present threat posed by unwarranted mechanistic and deterministic thinking. A framework provided by a holistic view of humans within their environment and by the importance of relationships within the human community provides an essential element in Christian thinking.

A new term has appeared in the bioethics lexicon, namely neuroethics, a term that is beginning to appear regularly in the mainstream

neuroscience literature. The introduction of a new term like this conveys a couple of overriding messages. The first is that the ethical issues within neuroscience are distinct from those of all other areas within bioethics. The second is that neuroscience is replete with ethical challenges of momentous dimensions. While I doubt the accuracy of the first of these messages, the second encapsulates challenges we need to take very seriously.

Gareth Jones is director of the Bioethics Centre and professor of anatomy and structural biology at the University of Otago, New Zealand, where he served as Deputy Vice-Chancellor over the years 2005–2009. He is a neuroscientist and bioethicist. Recent books include *Speaking for the Dead: The Human Body in Biology and Medicine* (with Maja Whitaker; second edition, Ashgate Press, 2009), *A Tangled Web: Medicine and Theology in Dialogue* (co-edited with John Elford; Peter Lang, 2009), and *A Glass Darkly: Medicine and Theology in Further Dialogue* (co-edited with John Elford; Peter Lang, 2010). He is a Fellow of the ASA.

These challenges can be resolved into concerns over the degree of control it is now possible to exert over the brains of others, the prospects opened up by the biological enhancement of people's brains—our own as well as other people's—and the prospects of discovering what it is that other people are actually thinking, how they are responding to situations and even what preferences they have in racial, sexual, and political realms. While these concerns stem from a variety of technological developments, and while they overlap in some respects, they all touch a very sensitive nerve: they enable us to peer into what makes individuals what they are and what they stand for. Inevitably, such concerns have theological as well as ethical overtones.

Surprisingly, one of the most provocative techniques is that of functional magnetic resonance imaging (fMRI) which provides a means of mapping the brain by measuring regional blood flow. Even though it is a noninvasive procedure, and hence less intrusive and threatening than ones that actually change brain processes, the potential to use it to ascertain the parts of the brain associated with social, moral, and even religious attitudes is commonly viewed as opening up radically challenging prospects. Among these are the new domains of neuro-marketing, brain fingerprinting, and even "brainotyping," with its potential for assessing racial attitudes and mental health vulnerabilities.¹

Functional MRI studies demonstrate the possibility of delving into the biological correlates of complex human processes like existential thought and decision making, moral and nonmoral social judgment, love and altruism, aspects of personality, and competitiveness.² While such correlations do not point unequivocally to the neural bases of morality or consciousness, their overtones are mechanistic in nature. This ability is troubling to many, since it appears to represent an unduly powerful way of manipulating people's emotions and thought patterns, and even to question what it is that makes us the sort of people we are. These concerns are particularly pertinent for the Christian community, challenging cherished concepts of the soul, personal integrity, and faith. More prosaically, although more significant clinically, fMRI could open the way to predicting later-onset neurological and psychiatric disorders.³

The images projected by some writers are almost frightening, as the potential horrors of a brave new world of neuromanipulation and neurocontrol hang over us. It is in this spirit that William Safire has described neuroethics as the "examination of what is right and wrong, good and bad about the treatment of, perfection of, or unwelcome invasion of and worrisome manipulation of the human brain."⁴ So much in neuroethics is directed toward warnings of threats to personal identity and neural integrity, and its concerns extend well beyond issues raised by fMRI. I shall, therefore, paint on this broader canvas, using fMRI as a way into this broader debate.

From Neuroethics to Neurotheology

These challenges have all-too-obvious ramifications for theology as well as for neuroscience. The old distinctions between brain, mind, and soul appear, at best, quaint and, at worst, a hindrance to understanding the human condition. What, then, of traditional Christian conceptions? What has happened to the soul and the "heart," both of which still feature prominently in the language and thought forms of Christian theology? What is the relationship between the brain and the human person in Christian thinking?

Where do Christians think that human choices originate? While there are undoubtedly many answers to this question from a host of different Christian traditions, any answers that pay scant attention to the brain are about to come into major conflict with neuroscience. The same applies to those Christians who refuse to face up to the deeply physical nature of our behaviors and responses. It is this that provides the context within which Christians need to examine very closely the precise language they use when describing the manner in which God deals with individuals and those individuals' responses to God and, indeed, the whole repertoire of spiritual experiences. While it may be tempting for Christians to continue using traditional thought forms (the "language of Zion"), they are being increasingly forced into translating that language into expressions that are meaningful in neuroscientific terms. A failure to do this will see Christian thought forms estranged from the culture within which Christians are living.

Article

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

Bridge-building between neuroscience and religion typically centers around seeking to find a chemical or structural explanation for religious or spiritual experiences.⁵ These leanings are based on a biological reductionism not warranted by the scientific evidence, but which signals a considerable ideological impetus behind the work.⁶ It would be easy for theologians and Christians to overreact to such intrusions by rejecting all dialogue with neuroscience as detrimental to faith. Such a move would be a familiar reaction to the much-hyped ideological conflict between science and religion. However, this response would be both unmerited and perilous. People of faith encounter various neuroscientific technologies during their normal lives, and this will increase as these technologies become ever more sophisticated and accepted in the future. If Christians are to be in a position to face the ethical and theological conundrums posed by neuroscience, the Christian community must engage with neuroscience, actively exploring the issues it raises. Whether the findings of contemporary neuroscience pose a threat to Christian belief comes down to the role we do or do not give to the brain in helping form our view of the human person.

Even if the terms “neuroethics” and “neuro-theology” raise hackles, they encapsulate features of the debate on the role of the brain in ethical and theological thinking we dare not ignore.

Neural Correlates and Brain Imaging

To what extent is it possible to decode mental states from brain activity in humans? That was the task undertaken by John-Dylan Haynes and Geraint Rees in a 2006 review of human neuroimaging.⁷ They ask the question, “Is it possible to tell what someone is currently thinking based only on measurements of their brain activity?” Their review is a detailed analysis of methodological considerations, their conclusion being: “Decoding-based approaches show great promise in providing new empirical methods for predicting cognitive or perceptual states from brain activity.” Dry as that conclusion may seem, it points in the direction of being able to predict behavior from neuroimaging data, raising—as one might imagine—numerous ethical concerns.

The existing literature points toward the ability to detect the neural correlates of an increasingly wide

array of conditions and traits.⁸ These include conscious and unconscious racial attitudes, conscious self-regulation of emotion, a range of personality traits, personality disorders, and psychopathic conditions, serious criminal tendencies, drug abuse such as cocaine craving, preferences for products such as well-known drinks, and the decision-making process itself. All these, in their different ways, are illustrations of brain reading. While there is no doubt they raise issues of vast significance for society, since some of them are highly controversial, they must surely also force Christians to acknowledge the centrality of the brain in any model they construct of the human person.

One imagines it might, theoretically, be possible to pinpoint the parts of a person's brain that are active when that individual initially makes the crucial decision to become a follower of Jesus Christ, subsequently makes numerous moral and spiritual choices, forgives others rather than holds grudges against them, and decides to put others first by serving them. The same comments would probably apply to the act of praying, and it has even been suggested that different types of prayer would be associated with different brain regions. Changes in cerebral activity during glossolalia (“speaking in tongues”) have been assessed using SPECT, an imaging technique less disruptive to the subject than fMRI.⁹ When compared to a religious state involving singing in English, subjects exhibited decreased activation in the prefrontal cortices, consistent with their description of glossolalia as nonvoluntary. The scans also indicated decreased activation of the left caudate nucleus and a change in thalamic lateralization, which could be associated with the subject's altered emotional state.

At this early stage, it is worth reflecting on what information like this is actually telling us that we did not know in the absence of any understanding of brain states. First, religious experiences are accompanied by changes in neural states. This, in my estimation, is an obvious and relatively uninteresting observation, although it does underline a reality the Christian community should not ignore. Second, one would like to know whether some individuals are more amenable than others to these brain changes, and hence, whether it is easier for some to experience this particular religious phenomenon than others. Were this to be the case, it would have

theological overtones. Third, if it is possible to induce these brain changes by psychological or pharmacological means, enormous caution would be required in interpreting the resulting phenomenon as having any religious significance under those circumstances.

In the light of these comments, it is to be expected that there has been considerable interest in locating the brain regions involved in religious or spiritual experiences. Newberg and colleagues have studied changes in cerebral blood flow using SPECT during various types of meditation. Both Franciscan nuns engaging in meditative prayer and Tibetan Buddhists performing visualization meditation showed increased activity in the prefrontal cortex.¹⁰ In many regards, this is to be anticipated in terms of what is known about the functions of this part of the brain. One would like to know whether this, in itself, helps us understand more about the practice of meditation, and even whether it is to be encouraged as a religious ritual. Or is such neuroscientific knowledge irrelevant in religious terms? An attempt to address these queries has been made by McNamara, with the proposal that activation of the frontal lobes can help explain the intrinsically rewarding nature of spiritual experiences as well as assist in the attainment of positive behaviors such as moral insight and empathy, alongside negative outcomes often associated with religion such as intolerance and fanaticism.¹¹

These neuroimaging studies raise questions about the biological basis, function, and evolutionary history of religion. However, evidence for the occurrence of particular cognitive processes during religious experiences cannot address the authenticity of such experiences.¹² This is because one comes up against the ever-present question of which comes first: is it the brain state or the religious experience? A related consideration is that the same brain state may be associated with different positions on fundamental religious worldviews. For instance, one would like to know whether one could distinguish between different views on the divinity of Christ from examining people's brains. The precision required here may be forbidding, and yet it may be of far greater relevance than knowing whether someone is "religious" or "nonreligious," or even has a tendency toward fundamentalist or liberal perspectives on religious matters.

Much of this is speculation, and one may well ask whether it is profitable speculation. How much can neuroscience ever tell us about religion, and what will be the nature—let alone value—of that information? Currently investigators are attempting to assess the subjective religious experiences of individuals rather than the shared belief system that is religion embedded in its cultural-historical framework.¹³ They are certainly not determining the existence or nonexistence of a divine being. But my point remains. We should not be surprised to find neural correlates with what we consider are fundamental activities within the Christian community.

Neuroimaging and Causation

The simple act of finding neural correlates for certain behaviors or attitudes provides few, if any, insights into *causative factors*. Even if a certain brain structure were strongly associated with religious experience, this says nothing about whether the structure generates that experience. Simply because brain region "R" is active when behavior "B" is undertaken does not mean that changes in "R" cause "B" to take place. The opposite, in fact, could be the case, in that when an individual displays behavior "B," brain region "R" is modified, and if this occurs sufficiently often, there are significant changes to "R." Yet again, the interplay between "R" and "B" may be so close that the only tenable conclusion is that there is no definitive causative factor—the one feeds upon the other. But we have to dig deeper than this, since the neural correlates detectable by brain imaging may question some aspects of our moral geography.

Take the case of the commonly drawn distinction between two forms of disgust—visceral and moral. On the surface these appear to be quite different, and yet visceral disgust, which is common to human cultures worldwide, may have formed the neural basis for the evolutionary development of moral repugnance.¹⁴ Visceral disgust functions to protect bodily purity and integrity, for example, by preventing us from eating contaminated food. This core disgust is supposedly associated with socio-moral disgust concerning more abstract issues, such as our reactions to late-term abortion, homosexuality, embryo research, or murder. One fMRI study showed that overlapping brain areas are activated whether individuals experience visceral or moral disgust, the implication being that these emotions are related.¹⁵

Article

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

Does this mean that there is no category difference between our responses to contaminated food and late-term abortion? Are our often firmly held moral intuitions thus little more than impulsive gut reactions rather than considered moral and/or theological positions? To argue that there are no category differences is a misinterpretation of the fMRI data. The common element is provided by "disgust," but this tells us nothing about why some people find embryo research, say, disgusting, but others do not. Moral judgments are not implicitly tied in to feelings of disgust, since levels of moral disgust can decrease (or increase) as we ponder the issues at stake.

Along similar lines, the case has been made that donations made to charitable causes activate the "reward system" in the brain, in a fashion similar to its activation by food, drugs, and sex.¹⁶ In this fMRI study, it was found that altruistic acts, such as giving away money, lit up the primitive mesolimbic reward system in the brain. From this, the authors concluded that performing charitable acts may be hard-wired into the brain; they are not a product of culture or, one assumes, of moral reflection. In the light of this provocative conclusion, it is important to remember that fMRI images are based on nothing more than changes in blood flow in the brain regions concerned. While these changes are not to be idly dismissed, the conceptual gap between them and conclusions regarding the nature of altruism is vast and debatable.

Similar comments can be made about yet another study in the same genre. In this instance, fMRI was employed to examine the brains of subjects who were set the task of choosing whether to voluntarily give money to a food bank, or "to give" through mandatory taxation.¹⁷ Surprisingly, perhaps, even when the money went to the food bank via taxation, the reward center in their brains lit up. The authors concluded that pure altruism does exist, since satisfaction was derived from an increase in the public good in the absence of any reciprocal benefit. However, activation of the brain region was greater when the money was voluntarily given. While these results can be interpreted in different ways, it is worth noting that two of the three authors were economists, whose interest was in determining taxation policy rather than in discovering how the brain works. It may be that the results are more enlightening to

neuroeconomists than to neuroscientists, let alone theologians.

Regardless of the evidential basis for the conclusions reached, they present a renewed challenge to our moral and theological decision making to demonstrate that acts of kindness and altruism are indeed motivated by compassion and moral feeling rather than by a primitive urge for the good feeling produced by neural events. Renewed efforts are needed to provide a thoroughly grounded conceptual basis for the validity of altruism; otherwise, it becomes all too easy to assert that it amounts to little more than a drive for food or sex. The relationship between the rationale underlying altruistic acts and their neural basis is in urgent need of clarification. While I have no problem in contending that a neural basis for such drives does not in itself undermine our moral faculty, since the neural events are in no way causative, the task of substantiating this will be ongoing. From my perspective, this is a task that should be welcomed by theologians as a means of widening our horizons on the contribution that neuroscience can make to theology.

Regardless of such provisos, neuroimaging is being increasingly presented as evidence in courts of law to help determine culpability. In a number of high-profile cases, the defense has sought to admit brain images as evidence of mitigated responsibility for criminal actions.¹⁸ While this has immediate consequences for the legal profession, it also has implications for Christian thinking around the notion of moral responsibility.

One of the great problems is that brain images are visually arresting, and hence, may prove dangerously persuasive, giving the impression of greater certainty than is scientifically justifiable.¹⁹ Nevertheless, this apparent certainty is misleading, masking as it does the social and family context within which the individual concerned was raised, educated, and later lived. It also pays little, if any, attention to the belief system of the individual, and the role this may have played in his or her actions. Consequently, brain images should only be used in a court of law to establish a correlation between a structural abnormality and a specific deficit, not to demonstrate motivation, responsibility, or a predisposition toward a particular behavior.²⁰ Conclusions any firmer than this are premature, considering our relatively poor

understanding of the brain and its complex interactions. Nevertheless, even a moral evil, such as violence, or a moral good, such as altruism, has a neural substrate.

It is unfortunate that some researchers use this realization to dismiss moral and religious aspirations as nothing more than the outpouring of one neurotransmitter or another. In fact, one research group is experimenting with subjecting the human brain to patterns of electromagnetic bursts that, in some subjects, stimulate out-of-body or other spiritual experiences.²¹ This apparatus, dubbed the “God machine” by some, attempts to mimic the cerebral “short circuiting” which, in some epileptics, produces religious visions.

In one study, the application of specific patterns of complex magnetic fields over the right temporoparietal regions induced fears, odd smells, or feelings of another presence, in the majority of subjects.²² While some subjects believed one of the researchers had entered the room, others attributed the feeling of a proximal sentient being to “God” or “Allah” or some other spiritual being. Persinger has hypothesized that the sensed presence is produced by a transient awareness of the right hemisphere’s equivalent of the left hemisphere’s sense of self.²³ The machine’s effects vary in intensity among subjects, depending upon how open they are to religious experiences. Increased global geomagnetic activity at the time of the experiment was correlated with increased feelings of a sensed presence, suggesting a mechanism for increased reports of apparitions and epileptic seizures at such times.²⁴ Sensory experiences such as these point clearly to the need to recognize them for what they are—neurally derived sensory experiences that may or may not have any connection with the beliefs and aspirations central to Christianity (or any other religion). Christianity does not necessitate these experiences. They are sometimes found in certain Christian groups, but never in others.

All too readily, writers can fall into the trap of claiming that religious sentiments are “nothing but” a matter of neural organization, or “nothing but” the outpouring of certain neurotransmitters. They conclude that what are needed are neurotransmitters, not prayer! This will seem like a rerun of the old neural determinism argument in modern guise; however, it should now be far more obvious than

was once the case, that correlations do not provide immediate answers regarding causation. In addition, it always has to be asked whether the behavior or religious experience stems from a pathological occurrence of some description. After all, neural pathologies give rise to experiences that for some have religious overtones, just as other pathologies appear to wipe out previous religious commitments. In these instances, the task is to elucidate how the behavior and belief patterns of the individual before the illness, have been modified by the pathological phenomenon. To overlook the role of the abnormality is to fall into the trap of equating pathology with normality; even though we shall see in the next section that the border between the two can be murky, this is not the same as arguing that no distinction can ever be made.

Enhancing Our Brains

We are coming close to being able to use the growing armamentarium of neurotechnologies to do a variety of things. If we can *predict* how people will act under certain circumstances, we have the ability to intrude upon their privacy as well as to use the data to scope out sophisticated marketing campaigns. The next step would be to *modify* people’s brains by using drugs that would increase or decrease the levels of neurotransmitters in targeted brain regions. Intrusions of this order could be used for therapeutic or enhancement purposes, or to modify decision-making abilities. As with all technologies, there is ample room for every kind of good and evil use. But my concern is not with the ethical issues, as much as with the underlying concepts. To what extent have Christians begun to come to grips with these developments, since they have major pastoral implications as well as fundamental conceptual ones? A useful illustration is provided by efforts at enhancing performance, including cognitive enhancement.

In the neuroscience realm, one encounters papers with titles such as “The Promise and Predicament of Cosmetic Neurology,” the accompanying description to which assures us that “advances in cognitive neuroscience make cosmetic neurology in some form inevitable.”²⁵ In another place, we encounter the promise, “Artificial Brain Parts on the Horizon” which, it is claimed, will help people with Alzheimer’s disease form new memories.²⁶ Is thinking like this scientific hyperbole, or are we obligated to over-

Article

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

come limitations imposed upon us by our genes and our environment? However we react to possibilities like these, or to less expansive ones such as university students taking cognitive enhancing drugs to improve memory and retention when studying for exams, we are immediately confronted by profound philosophical, theological, and ethical conundrums.

Cognitive enhancement refers to the enhancement of cognitive aspects of the brain, including reasoning, perception, memory, and judgment. It is the augmenting of some aspect of the human intellect, providing people with a better comprehension of complex situations, or enabling them to devise speedier and better solutions to problems. This is the realm of psychoactive drugs, the debate about which touches on their use in therapy and also, in the words of the President's Council on Bioethics, "beyond therapy."²⁷

Clinical depression is a recognized clinical entity, but what of low-grade depression, an everyday reality for countless people? If this condition is not an illness, are some of the treatments illustrations of enhancement? If this concerns us, it follows that if some forms of depression are "normal," then we should refrain from treating them. However, is there any virtue in living with sub-clinical depression if it can be treated? What we are beginning to encounter here is the very fine line between the normal and the pathological.²⁸

Take another illustration, this time concerning hyperactive children who push the limits of normal behavior to its utmost. What was once considered normal, even if disruptive, is now frequently regarded as pathological. Drugs like Ritalin (methylphenidate) appear to have converted taxing behavior into a syndrome that calls out for treatment. The dividing line between normality and abnormality, between therapy and enhancement, is very fragile. It has become difficult to decide whether what we have in this instance is an example of genuine medical treatment or social manipulation.

Even more problematic is the use of neurocognitive enhancers for nonmedical reasons. For instance, drugs such as Ritalin or Adderall (dextroamphetamine), originally aimed at people with attention-deficit disorder, and Provigil (modafinil), developed to treat narcolepsy, are widely used by healthy individuals. There is good evidence that they aid

concentration, alertness, focus, short-term memory, and wakefulness.²⁹ Another drug, Donepezil (Ari-cept), originally developed as a treatment for Alzheimer's disease, improves recall of training when taken by healthy, but older, pilots in a flight simulator.³⁰

The move from modifying the brain to correct a perceived defect, to modifying it as an enhancement, is a defining feature of the neurotechnology landscape.³¹ Psychopharmaceuticals are increasing in popularity among the healthy who seek a competitive edge. An online poll conducted by the journal *Nature* found that one in five of the scientists and researchers who responded had used methylphenidate, modafinil, or beta blockers for nonmedical purposes to stimulate concentration, focus, or memory.³² These drugs may prove especially beneficial in a competitive environment in which some people are already taking them, thereby encouraging or even coercing others into doing so.³³ Some refer to this as cosmetic neurology, and see its development as little short of inevitable.³⁴ Banning the use of psychopharmaceuticals to augment cognitive abilities raises philosophical objections from libertarians, alongside practical issues regarding enforcement.³⁵ This social (or quasi-educational) use brings us face-to-face with the aspirations of the affluent sections of society, aided and abetted by commercial pressures within the pharmaceutical industry. It also highlights the dramatic manner in which society's values and desires can shape the direction of scientific advances.

How are Christians to respond to examples of cognitive enhancement such as these? Their mundane nature is their allure, but also their deceptiveness. Some argue that all enhancement is to be eschewed in favor of acceptance of the "given."³⁶ However, considering Christianity's characteristic embrace of the healing ministries and the blurred distinction between therapy and enhancement, this stance is difficult to defend on theological grounds. For instance, Peters questions whether a Christian faith that emphasizes redemption should not also embrace "all forms of human betterment, even enhancement."³⁷ For him, a holistic view of health, as frequently championed by Christian anthropology, may even have space for the enhancement of the social and relational aspects of our humanity.³⁸ These pointers are at odds with the precautionary stance often encountered in Christian thinking, a stance that tends toward acceptance of the status quo

and rejection of technological interference—in this instance, with the brain.

Quite a different scenario is opened up by drugs that block the formation of traumatic memories, or erase them once established.³⁹ Nonconscious pathological memories can arise from trauma, such as in combat, rape, and horrific natural disasters, and may result in posttraumatic stress disorder (PTSD). By administering beta-blockers such as propranolol, it is possible to prevent the embedding of pathological memories of fearful events, just before or after the traumatic event.⁴⁰ Alternatively, if administered during flashbacks some time after the event, it is possible to erase the pathological memories.⁴¹ However, these drugs can also be taken to erase unpleasant memories generally considered integral to normal human life. A speculative extension of this sees the development of drugs to remove all traces of guilt, shame, or grief in healthy individuals. This is speculative, and such far-reaching effects may never eventuate. Were they to do so, the theological ramifications would be major, since they would intrude into the inner sanctum of human existence, shattering the essence of what it means to be responsible human beings.

Of course, life is never this simple, and these drugs have side effects of varying severity and concern. For instance, long-term use of psychopharmaceuticals could permanently alter the brain by inhibiting the role of normal sleep to maintain neural plasticity and consolidate new memories. Scientific and clinical caution is, therefore, the order of the day in addition to the theological caution just outlined. However, excessive speculation should not be used as a way of constraining productive theological and ethical debate on the uses of beta-blockers in memory formation.

Savulescu and Sandberg have taken the neuro-enhancement debate further by proposing the use of psychopharmaceuticals to enhance romantic love and marriage.⁴² They suggest that artificially manipulating levels of testosterone, oxytocin, and other hormones may help decrease the rate of divorce by enhancing pair-bonding and attachment. We may or may not take this suggestion seriously, but it does force us to ask whether there are morally relevant differences between counseling and neurostimulation. In my view there are, since the former taps into

human responsibility whereas the latter completely bypasses it. Ready acceptance of neurostimulation appears to reduce human beings to nothing more than psychological machines, controlled by hormonal and neurotransmitter levels. It is the “nothing more” that is the crucial marker of a deterministic world of psychological impulses and responses.

Herein lies the key to our approach to all of the therapeutic and enhancement possibilities just discussed. As in so many areas within biomedicine, their newness betrays their sameness. Few truly original considerations are raised by neuroethics, even though it is the center of our persons that is the object of attention—be it therapy or potential “improvement.” From a Christian perspective, it is what we do with the knowledge and abilities at our disposal that is crucial. Why are we moving in a particular direction and making use of certain procedures? What are our goals and what do these tell us about our dependence upon God and our relationship to him through Christ?

Neural Vulnerability

The extent of the interdependence between the brain and person is demonstrated by the way in which pathologies of the brain can have devastating consequences for the integrity and wholeness of a person. For instance, some patients with Parkinson’s disease have been transformed from law-abiding citizens into compulsive gamblers and obsessive pleasure seekers as a result, it would appear, of the dopamine enhancers they are receiving as treatment for the disease.⁴³ Another example is provided by patients with damage to their ventromedial prefrontal cortex, who have impaired emotional responses and make aberrant, unusually utilitarian decisions when faced with a moral dilemma.⁴⁴ The significance of this is that it applies regardless of their moral or religious commitments prior to the injury.

Recent case studies on a unique individual with bilateral amygdala damage have revealed the role of the amygdala in mediating explicit responses to social and emotional events, in contrast to the prevailing conception of the amygdala as a primitive threat detector.⁴⁵ In particular, this patient is heedless of the appropriate interpersonal distance normally maintained by a sense of social comfort between individuals. While he or she can rationally comprehend others’ sense of interpersonal space,

Article

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

he or she simply does not feel the discomfort that too close proximity usually brings.⁴⁶

There is clearly a causal relationship between injury to certain brain regions and aberrant behavior. As we consider each of these (pathological) examples, we are reminded that there is an intimate link between our physical brains and our standing as human persons. We are reminded of our vulnerability, in that any intrusion into the brain is an intrusion into the center of what we are as physical beings.

Similarly, a considerable amount of attention is being devoted to exploring a genetic basis for anti-social behavior. Particular attention has focused on a gene responsible for producing a protein, monoamine oxidase A (MAOA), involved in regulating a neurotransmitter, serotonin, in the brain. An association between this gene and aggressive behavior has been found in one particular family with a high incidence of violence.⁴⁷ A subsequent study by other researchers also showed a link between the MAOA gene and antisocial behavior if the individuals concerned had also been mistreated and abused as children.⁴⁸ An Italian court has recently reduced the sentence for a convicted murderer on the grounds that his genetic predisposition to low MAOA expression (in addition to abnormal brain scans) made him more prone to violence when provoked.⁴⁹ This may well be true, but there is a major conceptual leap from here to the conclusion that this amounts to a total lack of moral responsibility. A perspective more amenable to Christian premises will assert that the ethical road is to ascertain the degree of moral responsibility within a framework of low MAOA expression. Neurogenetics may have a role in determining culpability and its admissibility as evidence in a court of law, but this does not dispense with the necessity of a moral framework.

Seeking to refute deterministic neurobiology, Murphy points out that "interactions with the environment and higher-level evaluative processes alter neural structure. Thus, behavior is seldom controlled exclusively by neurobiology."⁵⁰ In addition, "our complex neurobiology enables us to conceive of abstract goals that become causal factors in their own right."⁵¹ The neural basis of thought and behavior in no way threatens the conception of a person as a rational being, capable of taking personal responsi-

bility as a free agent. Neither does it even hint that we cannot act as God's agents and stewards in his created order.

It is up to us as persons to determine what we do with both our abilities and restrictions (no matter how obviously neurally based some of these may be). We are to use the resources at our disposal, rather than view ourselves as prisoners of our inheritance. The information provided by neural studies and behavioral genetics should be used to increase our repertoire of understanding, so that we can come to terms with the behavioral conundrums with which we are all confronted. In the final analysis, it is we who decide how we live and act, and what we believe. For some, this freedom is severely restricted, due to developmental restrictions or later brain injury. However, most of us are in a position to play a causal role in how we live and what we do.

Science as a Basis for Neuroethics and Neurotheology

It should have emerged that a great deal of care is required in handling the issues at stake, especially if we wish to bring a Christian mind to bear on the issues of neuroimaging and even neuromanipulation. It is unfortunate that in the domain of neuroimaging, hyperbole has outstripped scientific reality. Joseph Fins writes,

Despite all the futuristic warnings, imaging studies can tell us very little about disorders of consciousness ... Finding the balance will be the crux of responsible neuroethics but it may be difficult because neuroethics has developed as a speculative philosophy, rather than one grounded in clinical reality. It is neither therapeutically engaged, nor directed toward the needs of patients afflicted by neuropsychiatric disorders.⁵²

Neuroethical discussion should begin with a clear understanding of the capabilities as well as the limitations of the technologies,⁵³ which should be approached within the context of clinical medicine, something theologians have to learn as well as others. Many members of Christian communities have to grapple with the clinical realities of their vulnerable brains, whether in the form of brain injuries or neurodegenerative diseases in themselves

or in their loved ones. It is these people whom we must be mindful of in our neuroethical reflections. Unfortunately, so much of the controversy around neuroscientific technologies is with their nonmedical uses, some would say with their speculative and ephemeral uses. We need to return to how these technologies might assist in understanding the human condition, both in sickness and in health.

The role of science in this debate is central, both ethically and theologically. It is a pity that theologians sometimes pay scant attention to the contours mapped out by practicing scientists and clinicians, looking instead to ideologically driven speculation that is, rightly, opposed. Unfortunately, in doing this, they tend to ignore the legitimate contributions of scientific understanding that serve to limit both humanistic and theological hypothesizing.

As suggested previously, neuroethics is not as novel as some have indicated. Nevertheless, the challenges posed by contemporary neuroscience are of an order of magnitude greater than anything else encountered in the biomedical realm, genetics included. As embodied individuals, all aspects of our mental functioning, including belief systems, attitudes, prejudices, and predilections, have neural substrates. This is not unique to the brain, since the functioning of other bodily systems also has physical and chemical substrates. Indeed, this constitutes the basis of traditional medical diagnosis. While the degree of sophistication is undoubtedly different, there is no difference in principle.

Dialogue between science and theology is central to the neuroethical debate, as it is to all other bioethical debates. Insight into the brain, its functioning and its malfunctioning, and the manner in which we respond to each aspect, is a theological imperative. Peering into people's brains takes many forms—insight into what individuals are, insight into their motives and aspirations, insight into what they are as beings before God and made in his image. These all have theological overtones that should be of profound interest to theologians and those with pastoral responsibilities. This is our inner sanctum and neuroscience is increasingly intruding into it. The ethical demands presented by neuroscience are daunting, paralleled only by the theological implications of an increasingly detailed understanding of higher neural processes. □

Acknowledgments

I would like to thank Maja Whitaker for her superb assistance at every stage in the preparation of this article.

Notes

- ¹M. J. Farah, "Neuroethics: The Practical and the Philosophical," *Trends in Cognitive Sciences* 9, no. 1 (2005): 34–40.
- ²See J. Illes and S. J. Bird, "Neuroethics: A Modern Context for Ethics in Neuroscience," *Trends in Neurosciences* 29, no. 9 (2006): 511–7.
- ³W. Glannon, "Neuroethics," *Bioethics* 20, no. 1 (2006): 37–52.
- ⁴W. Safire, "Introduction: Visions for a New Field of 'Neuroethics,'" in *Neuroethics: Mapping the Field*, ed. S. J. Marcus (San Francisco, CA: Dana Press, 2002).
- ⁵M. Ratcliffe, "Neurotheology: A Science of What?" in *Where God and Science Meet: How Brain and Evolutionary Studies Alter Our Understanding of Religion*, ed. Patrick McNamara (Westport, CT: Praeger Publishers, 2006), 81–104.
- ⁶T. Peters, "The Soul of Trans-Humanism," *Dialog: A Journal of Theology* 44, no. 4 (2005): 381–95.
- ⁷J. D. Haynes and G. Rees, "Decoding Mental States from Brain Activity in Humans," *Nature Reviews: Neuroscience* 7, no. 7 (2006): 523–34.
- ⁸D. G. Jones and M. I. Whitaker, *Speaking for the Dead: The Human Body in Biology and Medicine*, 2d ed. (Farnham, UK: Ashgate, 2009).
- ⁹A. B. Newberg et al., "The Measurement of Regional Cerebral Blood Flow during Glossolalia: A Preliminary SPECT Study," *Psychiatry Research: Neuroimaging* 148, no. 1 (2006): 67–71.
- ¹⁰A. Newberg et al., "Cerebral Blood Flow During Meditative Prayer: Preliminary Findings and Methodological Issues," *Perceptual and Motor Skills* 97, no. 2 (2003): 625–30; —, "The Measurement of Regional Cerebral Blood Flow During the Complex Cognitive Task of Meditation: A Preliminary SPECT Study," *Psychiatry Research: Neuroimaging* 106, no. 2 (2001): 113–22.
- ¹¹P. McNamara, "The Motivational Origins of Religious Practices," *Zygon* 37 (2002): 143–60.
- ¹²N. P. Azari, "Neuroimaging Studies of Religious Experience: A Critical Review," in *Where God and Science Meet*, ed. McNamara, 33–54.
- ¹³Ratcliffe, "Neurotheology: A Science of What?"
- ¹⁴D. Jones, "Moral Psychology: The Depths of Disgust," *Nature* 447, no. 7146 (2007): 768–71.
- ¹⁵J. Moll et al., "The Moral Affiliations of Disgust: A Functional MRI Study," *Cognitive and Behavioral Neurology* 18, no. 1 (2005): 68–78.
- ¹⁶—, "Human Fronto-Mesolimbic Networks Guide Decisions about Charitable Donation," *Proceedings of the National Academy of Sciences of the United States of America* 103, no. 42 (2006): 15623–8.
- ¹⁷W. T. Harbaugh, U. Mayr, and D. R. Burghart, "Neural Responses to Taxation and Voluntary Giving Reveal Motives for Charitable Donations," *Science* 316, no. 5831 (2007): 1622–5.
- ¹⁸For example, see J. H. Baskin, J. G. Edersheim, and B. H. Price, "Is a Picture Worth a Thousand Words? Neuroimaging in the Courtroom," *American Journal of Law and*

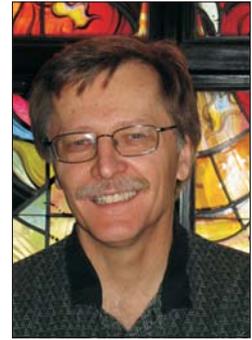
Article

Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum

Medicine 33, no. 2-3 (2007): 239-69; L. S. Khoshbin and S. Khoshbin, "Imaging the Mind, Minding the Image: A Historical Introduction to Brain Imaging and the Law," *American Journal of Law and Medicine* 33, no. 2-3 (2007): 171-92.

- ¹⁹D. Mobbs et al., "Law, Responsibility, and the Brain," *PLoS Biology* 5, no. 4 (2007): e103; L. R. Tancredi and J. D. Brodie, "The Brain and Behavior: Limitations in the Legal Use of Functional Magnetic Resonance Imaging," *American Journal of Law and Medicine* 33, no. 2-3 (2007): 271-94.
- ²⁰Khoshbin and Khoshbin, "Imaging the Mind, Minding the Image."
- ²¹J. Hitt, "This Is Your Brain on God," *Wired* 1999. Retrieved from www.wired.com/wired/archive/7.11/persinger_pr.html (Last accessed 24 August 2009).
- ²²M. A. Persinger and F. Healey, "Experimental Facilitation of the Sensed Presence: Possible Intercalation between the Hemispheres Induced by Complex Magnetic Fields," *Journal of Nervous and Mental Disease* 190, no. 8 (2002): 533-41.
- ²³M. A. Persinger, *Neuropsychological Bases of God Beliefs* (New York: Praeger, 1987).
- ²⁴J. N. Booth, S. A. Koren, and M. A. Persinger, "Increased Feelings of the Sensed Presence and Increased Geomagnetic Activity at the Time of the Experience during Exposures to Transcerebral Weak Complex Magnetic Fields," *International Journal of Neuroscience* 115, no. 7 (2005): 1053-79.
- ²⁵A. Chatterjee, "The Promise and Predicament of Cosmetic Neurology," *Journal of Medical Ethics* 32, no. 2 (2006): 110-3.
- ²⁶_____, "Artificial Brain Parts on the Horizon," *Ivanhoe Newswire*, 30 May 2006.
- ²⁷President's Council on Bioethics, *Beyond Therapy: Biotechnology and the Pursuit of Happiness* (Washington, DC: Dana Press, 2003).
- ²⁸Jones and Whitaker, *Speaking for the Dead: The Human Body in Biology and Medicine*.
- ²⁹D. C. Turner et al., "Cognitive Enhancing Effects of Modafinil in Healthy Volunteers," *Psychopharmacology* 165, no. 3 (2003): 260-9; M. A. Mehta et al., "Methylphenidate Enhances Working Memory by Modulating Discrete Frontal and Parietal Lobe Regions in the Human Brain," *Journal of Neuroscience* 20, no. 6 (2000): RC65.
- ³⁰J. A. Yesavage et al., "Donepezil and Flight Simulator Performance: Effects on Retention of Complex Skills," *Neurology* 59, no. 1 (2002): 123-5.
- ³¹Jones and Whitaker, *Speaking for the Dead: The Human Body in Biology and Medicine*.
- ³²B. Maher, "Poll Results: Look Who's Doping," *Nature* 452 (2008): 674-5.
- ³³B. Sahakian and S. Morein-Zamir, "Professor's Little Helper," *Nature* 450 (2007): 1157-9.
- ³⁴A. Chatterjee, "Cosmetic Neurology and Cosmetic Surgery: Parallels, Predictions, and Challenges," *Cambridge Quarterly of Healthcare Ethics* 16 (2007): 129-37.
- ³⁵V. Cacic, "Smart Drugs for Cognitive Enhancement: Ethical and Pragmatic Considerations in the Era of Cosmetic Neurology," *Journal of Medical Ethics* 35, no. 10 (2009): 611-5.
- ³⁶M. J. Sandel, *The Case against Perfection: Ethics in the Age of Genetic Engineering* (Cambridge, MA: Belknap Press of Harvard University Press, 2007).
- ³⁷Peters, "The Soul of Trans-Humanism," 384.
- ³⁸Ibid.
- ³⁹W. Glannon, "Psychopharmacology and Memory," *Journal of Medical Ethics* 32 (2006): 74-8.
- ⁴⁰G. Vaiva et al., "Immediate Treatment with Propranolol Decreases Posttraumatic Stress Disorder Two Months after Trauma," *Biological Psychiatry* 54, no. 9 (2003): 947-9; R. K. Pitman et al., "Pilot Study of Secondary Prevention of Post-traumatic Stress Disorder with Propranolol," *Biological Psychiatry* 51, no. 2 (2002): 189-92.
- ⁴¹A. Brunet et al., "Effect of Post-Retrieval Propranolol on Psychophysiologic Responding during Subsequent Script-Driven Traumatic Imagery in Post-Traumatic Stress Disorder," *Journal of Psychiatric Research* 42, no. 6 (2007): 503-6.
- ⁴²J. Savulescu and A. Sandberg, "Neuroenhancement of Love and Marriage: The Chemicals between Us," *Neuroethics* 1 (2008): 31-44.
- ⁴³M. L. Dodd et al., "Pathological Gambling Caused by Drugs Used to Treat Parkinson Disease," *Archives of Neurology* 62, no. 9 (2005): 1377-81.
- ⁴⁴M. Koenigs et al., "Damage to the Prefrontal Cortex Increases Utilitarian Moral Judgements," *Nature* 446, no. 7138 (2007): 908-11.
- ⁴⁵R. M. Todd and A. K. Anderson, "Six Degrees of Separation: The Amygdala Regulates Social Behavior and Perception," *Nature Neuroscience* 12, no. 10 (2009): 1217-8.
- ⁴⁶D. P. Kennedy et al., "Personal Space Regulation by the Human Amygdala," *Nature Neuroscience* 12, no. 10 (2009): 1226-7.
- ⁴⁷H. G. Brunner et al., "X-Linked Borderline Mental Retardation with Prominent Behavioral Disturbance: Phenotype, Genetic Localization, and Evidence for Disturbed Monoamine Metabolism," *American Journal of Human Genetics* 52, no. 6 (1993): 1032-9.
- ⁴⁸A. Caspi et al., "Role of Genotype in the Cycle of Violence in Maltreated Children," *Science* 297, no. 5582 (2002): 851-4.
- ⁴⁹E. Feresin, "Lighter Sentence for Murderer with 'Bad Genes,'" *Nature News*, 30 October 2009.
- ⁵⁰N. Murphy, *Bodies and Souls, or Spirited Bodies?* (Cambridge: Cambridge University Press, 2006), 103.
- ⁵¹Ibid.
- ⁵²J. J. Fins, "A Leg to Stand On: Sir William Osler and Wilder Penfield's 'Neuroethics,'" *American Journal of Bioethics* 8, no. 1 (2008): 37-46.
- ⁵³R. L. Fischbach and G. D. Fischbach, "Neuroethicists Needed Now More Than Ever," *American Journal of Bioethics* 8, no. 1 (2008): 47-8.

Visit the New ASA Store
www.asa3online.org/estore.php



Denis O. Lamoureux

The Erosion of Biblical Inerrancy, or Toward a More Biblical View of the Inerrant Word of God?

Denis O. Lamoureux

THE EROSION OF INERRANCY IN EVANGELICALISM: Responding to New Challenges to Biblical Authority by G. K. Beale. Wheaton, IL: Crossway, 2008. 304 pages. Paperback; \$20.00. ISBN: 9781433502033.

In his latest book, *The Erosion of Inerrancy in Evangelicalism: Responding to New Challenges to Biblical Authority* (2008), G. K. Beale contends that the doctrine of inerrancy is under attack in the most surprising place—the evangelical world itself. He argues that there is an emerging generation of scholars, whom he terms “so-called evangelicals,” and their work is a threat to the 1978 Chicago Statement on Biblical Inerrancy, which he views as “the benchmark for an evangelical view of the inspiration of Scripture.”¹

Beale is well positioned to enter this discussion. He is a leading professor of New Testament at Wheaton College, one of America’s most important evangelical schools; and he is a past president of the Evangelical Theological Society (2004). During the academic years 2009–2012, he will be a visiting professor at Westminster Theological Seminary, “long considered to be a bastion of evangelical orthodoxy.”²

The first part of Beale’s book is a blunt critique of Peter Enns’ *Inspiration and Incarnation: Evangelicals and the Problem of the Old Testament*.³ Notably, in 2008 Enns “resigned” from Westminster Theological Seminary, despite fourteen years

of stellar teaching and the fact that the majority of his colleagues deem his views on biblical inspiration to be within the contours of evangelicalism.⁴ Beale’s attack is aimed primarily at Enns’ belief that the Holy Spirit employed myth in the revelatory process, particularly throughout the opening chapters of the Bible. Of course, the term “myth” is volatile in evangelical circles, and Beale exploits this word and the associated emotion to pit his readers against Enns (e.g., his recurrent use of the phrase that Scripture is “shot through with myth”).⁵ This polemical strategy might work with those outside the literary and theological academies, but it only irritates those of us within, because myth is a well-known genre of literature.⁶ According to Beale, the use of myth in Scripture “give[s] way too much ground to pagan myth.”⁷

Denis O. Lamoureux is an associate professor of science and religion at St. Joseph’s College in the University of Alberta. His academic specialty is the modern origins debate. He has debated leading anti-evolutionists, including Phillip Johnson and Michael Behe. With Johnson, he co-authored *Darwinism Defeated? The Johnson-Lamoureux Debate on Biological Origins* (1999). Lamoureux is author of *Evolutionary Creation: A Christian Approach to Evolution* (2008) and *I Love Jesus and I Accept Evolution* (2009). He holds three earned doctoral degrees—dentistry, theology, and biology. He is a Fellow of the American Scientific Affiliation and a member of the Evangelical Theological Society. Lamoureux fellowships at McKernan Baptist Church in Edmonton, Alberta, Canada.

Essay Review

The Erosion of Biblical Inerrancy, or Toward a More Biblical View of the Inerrant Word of God?

Unsurprisingly, a concordist assumption applied to the early chapters of the Bible is the driving force behind the arguments. Beale repeatedly appeals to the category of “essential history/historicity,” which he defines as the notion “that [biblical] writers record events that correspond with real past events.”⁸ He recognizes that Enns affirms the development of a “historical consciousness” during Israel’s monarchic period (about 1000 BC), and that Enns extends some essential historicity to “the core of the patriarchal narratives.”⁹ But the perennial evangelical battlefield is the historicity of the creation accounts. In an attempt to establish a historical element, Beale offers “several *possible* well-known interpretations of Genesis 1 that can be quite consistent with the notion of ‘essential historicity.’”¹⁰ These include (1) “a literal creation” in six days, (2) “a literal creation” with the days representing extensive periods of time, and (3) Wheaton College professor John Walton’s view that Genesis 1 reflects temple imagery and does not deal with material origins.¹¹ It is here that my confidence in Beale was irreparably fractured. Is young earth creation a “possible” interpretation in the twenty-first century? So too the day-age hermeneutic of progressive creation. Does Beale not realize that the creative events in Genesis 1 do not align with the cosmological and geological records?¹²

The second part of Beale’s book focuses on Genesis 1 and the cosmology in Scripture. His position is clearly stated: “[T]he Old Testament’s view of the cosmos does not pose problems for the modern-day Christian’s trust in the divine authority of the Old Testament.”¹³ Beale’s agenda is to avoid any conflict or contradiction between the Bible and science, thus protecting his mechanical understanding of biblical inerrancy. In this way, he claims that Genesis 1 does not have any “essential history,” and consequently it can never clash with the discoveries of modern science. This nonconcordist hermeneutic may seem surprising for one who argues throughout his book for the necessity of “real past events” in Scripture. Of course, essential historicity, for Beale, must begin in Genesis 2, as reflected in the Wheaton College Statement of Faith (“WE BELIEVE that God directly created Adam and Eve, the historical parents of the entire human race”).¹⁴ That is, instead of demarcating the beginning of actual history roughly around Genesis 12, as many conservative scholars do, Beale needs to draw the line between Genesis 1 and 2.¹⁵

Beale’s central argument is that Genesis 1 does not deal with origins *per se*, but rather, it is a symbolic representation of a gigantic cosmic temple. He contends,

Since Israel’s temple was viewed as a small model of the cosmos, then the cosmos itself was likely seen as a massive temple ... [Consequently,] the architectural depictions of a massive temple-house [in Genesis 1] are to be taken *figuratively*.¹⁶

To defend his position, Beale aligns the three main parts of the temple with the physical world: (1) the outer court represents the habitable world, (2) the Holy Place corresponds with the visible heavens and celestial lights, and (3) the Holy of Holies depicts “the invisible dimension of the cosmos, where God and his heavenly hosts dwell.”¹⁷ However, many problems arise with this interpretive approach. Let me mention a few.

First, Beale presents a temple that reflects a two-tier universe when, in fact, ancient Near Eastern peoples and the Bible embraced a three-tier cosmos—the heavens, the earth, and the underworld.¹⁸ Beale is actually aware of the existence of the “netherworld,”¹⁹ and Scripture often refers to this region using the Hebrew *she’ol* (sixty-five times) and the Greek *hādes* (twenty times) and *katachthoniōn* (once as the chthonic realm). In particular, the New Testament refers to this place as “under the earth” (Phil. 2:10; Rev. 5:3, 13; see also Eph. 4:9–10). If Israel’s temple is supposed to be a model of the cosmos, then where is the underworld depicted?

Second, Beale argues that the seven lamps on the lampstands in the Holy Place represent seven heavenly light sources—the sun, moon, and the five planets visible to the naked eye. However, Genesis 1 does not differentiate the five “wandering stars,” and the seven lamps of equal size do not distinguish the “two great lights” from the stars (Gen. 1:16). Moreover, there were ten lampstands in the Holy Place. Does this mean that there were ten suns, ten moons, and so forth?

Third, the walls in both the Holy Place and the Holy of Holies featured garden imagery with “palm trees and open flowers” (1 Kings 6:29). This is not expected if the Holy Place is supposed to represent the visible heavens. In attempting to resolve this problem, Beale claims that the Holy Place “was also

intended to mimic the garden of Eden.”²⁰ Yet there is garden imagery in the Holy of Holies as well. Is God’s dwelling place “also intended to mimic the garden of Eden”? I am not convinced by this ad hoc line of argumentation.

The sandy foundation upon which Beale’s cosmic temple rests is further seen with his biblical justification for his thesis. He claims,

One of the most explicit texts affirming the design of Israel’s temple as a small model of the cosmos is Psalm 78:69: “He built his sanctuary like the heights, like the earth which he founded *forever* [or from eternity].” The psalmist is saying that, in some way, God designed Israel’s earthly temple to be comparable to the heavens and to the earth.²¹

Beale later states that Ps. 78:69 is “the *most explicit* Old Testament” passage.²² However, if this is the best biblical support for his thesis, most will agree that it is, indeed, sparse. Moreover, the context of this verse is not about the architecture of the temple. In a cursory review of a dozen commentaries on the Psalms, I did not find a scholar who uses this verse to argue for a cosmic temple. Rather, the comparison in Ps. 78:69 is qualitative. Israel’s temple is glorious like the heights of heaven, and stable like the immovable earth (note the ancient astronomy). And Beale knows he lacks biblical support for his thesis. He even confesses, “[W]hy there are not more Old Testament descriptions of the cosmos as a temple is not so clear.”²³ It seems clear to me that the Genesis 1 cosmic temple thesis is unbiblical and an alien intrusion upon Holy Scripture.

In a second strategic move to alleviate tension between the Bible and modern science, Beale recycles the phenomenological language argument, a popular approach often heard in evangelical circles. He contends,

[A]ncient and modern peoples share strikingly similar phenomenological portrayals of the cosmos. Our common reference to the sun rising or setting is one that was also common in the ancient world of the Old Testament ... [These] are descriptions of the way things appeared to the unaided eye.²⁴

There is, however, a fundamental error in this argument. It fails to distinguish the *ancient* phenomeno-

logical perspective embraced by ancient peoples from our *modern* phenomenological perspective. What the biblical writers saw with their eyes, they believed to be real, like the literal rising and setting of the sun. In fact, the belief that the sun actually crossed the sky every day was held by nearly everyone right up until the seventeenth century. Historical proof for this comes from the Galileo affair – the central issue was whether or not the sun moved.²⁵ Today scientific instruments, like telescopes, have broadened our view of the universe. As a result, when we see the sun “rising” and “setting,” we know that it is only an appearance or visual effect caused by the rotation of the earth. Thus it is crucial that the ancient and modern phenomenological viewpoints of nature not be confused and conflated as Beale presents them.²⁶

Yet, despite his arguments for interpreting Genesis 1 figuratively as a giant temple and for viewing statements about nature in Scripture phenomenologically, Beale slips back to a concordist hermeneutic in his understanding of the firmament (Hebrew *rāqîa’*) and waters above in Gen. 1:6–8. He writes,

I have no problem in viewing the waters “above the expanse [firmament]” to be literal atmospheric waters from which rain comes. Part of this “expanse” was certainly understood even by the ancients to contain water that was separated from the waters “below” on earth, as, for example, the hydraulic cycle described in Job 36:27–39 makes clear (evaporation of water from earth forms clouds from which rains upon the earth come). Thus, many would have viewed the *rāqîa’* to have various layers (first air, then multiple levels of clouds filled with water with a further uppermost air space above). This multiple-level view of the “expanse” is still consistent with the notion of Gen. 1:7, that the “expanse” separated earthly waters from heavenly waters, though technically the upper atmosphere waters *were really a part* of the “expanse” itself.²⁷

Beale’s interpretation is another example of the failure of concordism.²⁸ First, Scripture clearly states that the firmament (expanse) was *under* the waters above, not *in* them or *part* of them. Second, if the writer of Genesis 1 had intended the waters above to mean clouds, vapor, or mist “from which rain comes,” then there were three well-known Hebrew words (*’ānān*, *’ēd*, *nāsî’*; Gen. 9:13, Jer. 10:13, Gen. 2:6, respectively)

Essay Review

The Erosion of Biblical Inerrancy, or Toward a More Biblical View of the Inerrant Word of God?

that he could have used. But the inspired author never did. Instead, he employed the common term for water (*mayim*) five times in Gen. 1:6–8. Third, Beale seems to forget that the sun, moon, and stars are placed *in* (Hebrew *b*) the firmament on the fourth day of creation. Following his model of the universe's structure, these astronomical bodies should be in the earth's atmosphere! Finally, Beale disregards (1) the biblical contexts in which *rāqîa'* and its cognates appear (e.g., "Can you join God in spreading out [*rāqîa'*] the skies, *hard* as a mirror of *cast bronze*?" Job 37:18; my italics),²⁹ (2) the translation of this word in Bibles over time (Greek Septuagint: *stereōma* based on *stereos* which means "firm/hard"; Latin Vulgate: *firmamentum* based on *firmus* which means "firm/hard"; King James Version: firmament), and (3) the traditional interpretation of this word for 1,500 years of church history, meaning a hard and solid structure above the earth.³⁰ In this light, it is evident (and ironic) that Beale does not embrace the traditional, conservative, and biblical understanding of the meaning of the firmament and the waters above in Genesis 1.³¹

Beale's hermeneutic is a unique (and conflicting) blend of concordism, symbolism, and phenomenological language. This brings us back to his perceived problem with myth. Ancient Near Eastern creation myths outside Israel feature a pagan theology cast within an ancient origins account. The account of origins can judiciously be seen as an ancient view of science and an ancient understanding of the beginning of human history. Beale conflates the ancient account of creation with the paganism. Consequently, he assumes that the pagan ideology corrupts the ancient ideas about origins. This is fallacious, however, in the same way that it would be for anyone to presume that a pagan physician corrupts standard medical protocols.

A more parsimonious approach to the biblical creation accounts is to suggest, with Enns, that under the inspiring guidance of the Holy Spirit, the science and history of the day were employed as incidental vessels to reveal inerrant messages of faith regarding origins. Of course, such an approach would indicate that God accommodated to the level of ancient humans in the revelatory process. Yet, according to Beale, the hermeneutical principle of accommodation undermines biblical revelation and inerrancy.³² However, a corollary of divine revelation is that God *has* to accommodate. He is the holy, infinite Creator,

and we are the sinful, finite creatures. It is by necessity (and grace) that he descends to our level in the revelatory process. In fact, the greatest act of revelation is Jesus Christ—God in human flesh. As Phil. 2:7–8 states, God "humbled himself" and "made himself nothing" in order to reveal himself to us.³³

Finally, a few comments are in order regarding the 1978 Chicago Statement on Biblical Inerrancy, which Beale places as an appendix in his book. It is a balanced and reasonable document for its time. The formulators wisely cautioned that they "do not propose that this Statement be given creedal weight."³⁴ With humility and openness, they also recognized the tentative nature of their work and saw the prospect of further development on the issue of inerrancy: "We invite response to this Statement from any who see reason to amend its affirmations about Scripture by the light of Scripture itself, under whose infallible authority we stand as we speak."³⁵ Three passages are relevant to our discussion:

Article VIII

We affirm that God in His work of inspiration utilized the distinctive personalities and *literary styles* of the writers whom He had chosen and prepared.

Article XVIII

We affirm that the text of Scripture is to be interpreted by grammatico-historical exegesis, taking into account its *literary forms* and devices, and that Scripture is to interpret Scripture.

So history must be treated as history, poetry as poetry, hyperbole and metaphor as hyperbole and metaphor, generalization and approximation as what they are, and so forth. Differences between *literary conventions* in Bible times and in ours must also be observed: since, for instance, nonchronological narration and imprecise citation were conventional and acceptable and violated no expectation in those days, we must not regard these things as faults when we find them in Bible writers. When total precision of a particular kind was not expected nor aimed at, it is no error not to have achieved it. Scripture is inerrant, not in the sense of being absolutely precise by modern standards, but in the sense of making good its claims and achieving that measure of focused truth at which its authors aimed.³⁶

The category that connects these three passages is the notion of literary genre. The 1978 Chicago Statement of Biblical Inerrancy underlines that we must respect the genre of biblical passages, and have it direct our interpretations. Stated more incisively, literary genre *dictates* biblical interpretation.³⁷ This is exactly the foundational principle in the work of Enns. He respects Holy Scripture and submits his scholarship to “the light of Scripture itself.” He treats the ancient science as ancient science, and the ancient understanding of human history as an ancient understanding of human history. It is Enns who embraces the spirit and central tenet of the 1978 Chicago Statement on Biblical Inerrancy, not Beale. It is Enns who defends a more biblical view of the inerrant Word of God.

In sum, though I am quite critical of *The Erosion of Inerrancy*, I highly recommend that this book be read. Beale is a leading theologian within the evangelical community and his contribution is an important one. However, his book must be read alongside Enns’ *Inspiration and Incarnation*. Look past Beale’s polemic, and you will be able to appreciate a shift that is indeed happening within evangelical scholarly circles toward a more scriptural understanding of God’s Word. □

Acknowledgment

I thank Lyn Berg for her always insightful assistance.

Notes

- ¹G. K. Beale, *The Erosion of Inerrancy in Evangelicalism: Responding to New Challenges to Biblical Authority* (Wheaton, IL: Crossway, 2008), 23. Hereafter cited as *Erosion*.
²Ibid.
³Peter Enns, *Inspiration and Incarnation: Evangelicals and the Problem of the Old Testament* (Grand Rapids, MI: Baker Academic, 2005).
⁴See public statements by Westminster Theological Seminary: www.wts.edu/stayinformed/view.html?id=104 and www.wts.edu/stayinformed/view.html?id+187.
⁵Beale, *Erosion*, 53, 64, 75. In a personal communication 16 August 2009, Enns informs me that he never said this. Ironically, Beale accuses Enns of using “emotive language” and righteously calls him to employ “more diplomatic terms in order to allow for more dialogue.” Ibid., 49–50.
⁶For an excellent summary of ancient Near Eastern myths, see Kenton L. Sparks, *Ancient Texts for the Study of the Hebrew Bible* (Peabody, MA: Hendrickson, 2005), 305–43. For my approach, see “Is Genesis 1–11 Myth?” in Denis O. Lamoureux, *Evolutionary Creation: A Christian Approach to Evolution* (Eugene, OR: Wipf and Stock, 2008), 259–61. Hereafter cited as *Evolutionary Creation*.

- ⁷Beale, *Erosion*, 33.
⁸Ibid., 70. See also pp. 29, 31, 36, 38, 71, 74, 75.
⁹Ibid., 72.
¹⁰Ibid., 74. My italics.
¹¹Actually, Walton’s approach to Genesis 1 is a nonconcordist hermeneutic and, consequently, cannot include essential history. See John Walton, *The Lost World of Genesis 1* (Downers Grove, IL: InterVarsity Press, 2009).
¹²See the appendix “Fossil Pattern Predictions of the Christian Origins Position” in Lamoureux, *Evolutionary Creation*, 418–21.
¹³Beale, *Erosion*, 218.
¹⁴See www.wheaton.edu/welcome/aboutus_mission.html. Capitalization in the original. Also see the dismissal of anthropology professor Alex Bolyanatz in 2000 from Wheaton College as presented by Beth McMurtie, “Do Professors Lose Academic Freedom by Signing Statements of Faith?” *The Chronicle of Higher Education* (24 May 2002): 12–5.
¹⁵For example, Iain W. Provan, V. Philips Long, and Tremper Longman III, *A Biblical History of Israel* (Louisville, KY: Westminster John Knox Press, 2003).
¹⁶Beale, *Erosion*, 163–4. My italics.
¹⁷Ibid., 165. See endnote 27 below regarding Beale’s “invisible dimension of the cosmos.”
¹⁸See standard works: Luis I. J. Stadelmann, *The Hebrew Conception of the World* (Rome: Biblical Institute Press, 1970); Paul H. Seely, *Inerrant Wisdom: Science and Inerrancy in Biblical Perspective* (Portland, OR: Evangelical Reformed, 1989), 28–37; Stanley Jaki, *Genesis 1 through the Ages* (New York: Thomas More Press, 1992), 1, 275–9; Lloyd R. Bailey, “The Cosmology of the Ancient Semites,” in his *Genesis, Creation and Creationism* (New York: Paulist Press, 1993), 172–85; John H. Walton, *Ancient Near Eastern Thought and the Old Testament: Introducing the Conceptual World of the Hebrew Bible* (Grand Rapids, MI: Baker Academic, 2006), 165–78; Denis O. Lamoureux, *I Love Jesus and I Accept Evolution* (Eugene, OR: Wipf and Stock, 2009), 43–70; Lamoureux, *Evolutionary Creation*, 105–76.
¹⁹In fact, Beale states, “The universe was commonly understood as a composition of three tiers: the heavens, the earth, and the netherworld” (*Erosion*, 162).
²⁰Ibid., 180.
²¹Ibid., 164. Beale’s italics and bracket inclusion.
²²Ibid., 176. My italics.
²³Ibid., 215.
²⁴Ibid., 76, 213.
²⁵For an introduction, see Charles Hummel, *The Galileo Connection: Resolving Conflicts between Science and the Bible* (Downers Grove, IL: InterVarsity Press, 1986).
²⁶Regarding this popular categorical error, see Lamoureux, *Evolutionary Creation*, 108–10.
²⁷Beale, *Erosion*, 204. My italics. There is more to Beale’s model. He connects the firmament “sparkling like crystal” in Ezek. 1:22 to the “sea of glass like crystal” in Rev. 4:6. Accordingly, the firmament is fluid and it “separates the visible creation of the sky and starry heavens from the invisible dimension of God’s heavenly temple dwelling.” Ibid., 197. My italics. Also pp. 202–3. My 11-year-old niece informs me that the separation of different dimensions by a fluid crystal barrier appears in the science-fiction series *Star Gate*.

Essay Review

The Erosion of Biblical Inerrancy, or Toward a More Biblical View of the Inerrant Word of God?

²⁸For a list of biblical features that reveal the failure of concordism, see Lamoureux, *Evolutionary Creation*, 150.

²⁹The root of the noun *rāqia'* is the verb *rāqa'* which means "to flatten," "spread out," and "hammer out." Exodus 39:3 and Isa. 40:19 use *rāqa'* for pounding metals into thin plates, and Num. 16:38 employs *riqqūa'* (broad plate) in a similar context. Notably, Beale fails to deal directly with these biblical cognates.

³⁰For example, Augustine in *The Literal Meaning of Genesis*, trans. John Hammond Taylor (New York: Newman Press, 1982 [415]) argued,

Bear in mind that the term "firmament" does not compel us to imagine a stationary heaven: we may understand this name as given to indicate not that it is motionless but that it is solid and that it constitutes an impassable boundary between the waters above and the waters below. (P. I:61)

Similarly, in *Luther's Works: Lectures on Genesis, Chapters 1-5*, ed. J. Pelikan (St. Louis, MO: Concordia, 1958), Protestant reformer Martin Luther stated,

Scripture ... simply says that the moon, the sun, and the stars were placed in the firmament of the heaven (below and above which are the waters) ... The bodies of the stars, like that of the sun, are round, and they are fastened to the firmament like globes of fire ... (Pp. 42-3)

We Christians must be different from the philosophers in the way we think about the causes of things. And if some are beyond our comprehension like those before us concerning the waters above the heavens, we must believe them rather than wickedly deny them or presumptuously interpret them in conformity with our understanding. (P. 30)

³¹One last comment is in order regarding the structure of the universe according to Beale. He takes Paul Seely and me to task with regard to the firmament. After reading Beale's critique a number of times, I am sorry to say that he selectively misrepresents my views and sets up a strawman that he then attempts to destroy with his tortuous line of argumentation. Similarly, in a personal communication 27 October 2009, Seely states, "Beale misrepresented my arguments several times, apparently so he could have a strawman he could more easily refute. At one point, he even put quotation marks around words I have not said." I will let the readers make their own decision regarding Beale's logic and methodology. See Beale, *Erosion*, 197-205; Paul H. Seely, "The Firmament and the Water Above. Part I: The Meaning of *rāqia'* in Gen. 1:6-8," *Westminster Theological Journal* 53 (1991): 227-40; Denis O. Lamoureux, "Lessons from the Heavens: On Scripture, Science, and Inerrancy," *Perspectives on Science and Christian Faith* 60 (2008): 4-15.

³²Beale, *Erosion*, 17, 27-8, 125, 143-5.

³³For an excellent examination of the notion of accommodation, see Kenton L. Sparks, *God's Word in Human Words: An Evangelical Appropriation of Critical Biblical Scholarship* (Grand Rapids, MI: Baker Academic, 2005). See also Lamoureux, *Evolutionary Creation*, 166-7, 172-3.

³⁴Norman L. Geisler, ed., *Inerrancy* (Grand Rapids, MI: Zondervan, 1980), 493.

³⁵Ibid.

³⁶Ibid., 495, 497, 500-1. Italics added.

³⁷Regarding creation myths (accounts), Sparks concludes, "[F]or the ancients, their cosmological myths also reflected their scientific ideas about the cosmos ... Often, they viewed their myths as history" (*Ancient Texts for the Study of the Hebrew Bible*, 337).

65th ASA Annual Meeting

Science, Faith, and Public Policy

The Catholic University of America
Washington, DC

July 30-August 2, 2010

"And who knows but that you have come to royal position for such a time as this?" Esther 4:14b, NIV

Program Highlights

Plenary Speakers:

- Stanley Bull, *Associate Director National Renewable Energy Laboratory*
- Francis Collins, *Geneticist and Author of Language of God*
- Richard Cizik, *Senior Fellow United Nations Foundation*
- Vernon Ehlers, *Congressman (R-MI) House Science Committee*
- Sara Joan Miles, *Founding Dean Emerita Esperanza College, Eastern University*
- Jennifer Wiseman, *Astronomer and ASA President, 2010*

Plus:

- Special Guest Lecture
- Symposia
- Contributed Papers and Posters
- Women in Science, Fellows, and Student and Early Career Network Luncheons
- Student and Early Career Network Events
- Business Meeting of the ASA
- Reception for InterVarsity Graduate Faculty

Pre-Meeting Activities

Field Trips:

- Private tour of the new Smithsonian Hall of Human Origins
- NASA Goddard Space Flight Center
- C & O Canal Boat Ride
- National Arboretum
- Smithsonian Museum of Natural History
- Basilica of the National Shrine
- Tour of the CUA Vitreous State Laboratory

Workshops:

- A Short History of American Religion and Science – Ted Davis
- Scripture, Science, and Origins: An Overview – Denis Lamoureux

Register at

www.asa3.org



HEALTH & MEDICINE

GRACE FOR THE AFFLICTED: A Clinical and Biblical Perspective on Mental Illness by Matthew S. Stanford. Colorado Springs, CO: Paternoster, 2008. 261 pages. Paperback; \$19.99. ISBN: 9781934068441.

This volume relates a biblical view of personhood to a survey of the most prevalent forms of mental disorders. The intended audience is the average Christian who may have experienced or known mental disturbance personally. The goal of the book is to better equip Christians to utilize their faith in understanding, supporting, and resolving these disruptions of human functioning.

The author is well suited for this task. Stanford, an ASA member, is a clinical neuropsychologist who directs Baylor University's PhD program in psychology—one of several doctoral programs that attempt to integrate professional psychology and the Christian faith. His background includes numerous research studies of mentally ill persons who suffered from a number of the maladies he discusses in the book. His writing style reveals an acquaintance with the questions asked by the average church member.

Stanford spends the first three chapters reviewing the Christian understanding of personhood. The reader will be reminded at every turn of the biblical foundation of every assertion. This presentation is followed by a discussion of seven of the most common types of mental disorder. These include mood, anxiety, dissociative, eating, attention deficit, substance abuse, and borderline personality disorders as well as schizophrenia. In each chapter devoted to one of the maladies, Stanford describes the disorder as detailed in the *Diagnostic Manual of Mental Disorders* published by the American Psychiatric Association. He details the circumstantial (environmental) and genetic (biological) determinants as well as the spiritual (biblical) dimensions of each malady. Each chapter ends with suggestions on how the Christian faith might be utilized in understanding and dealing with that illness.

The final two chapters of the book are concerned with "How can we help those who struggle?" The first of these is based on Matt. 11:28, Jesus' invitation to "Come unto me all you who are weary and heavy laden, and I will give you rest." This chapter is replete with personal incidents out of Stanford's experience and is focused on how Christians can support one another during these emotional trials. The final chapter, entitled "Little Things Matter," includes very practical suggestions of how church people can take a holistic approach in dealing with individuals and families as they go through these difficulties. Although he deals with the spiritual dimensions of these disorders, Stanford avoids relying too heavily on using the strength of one's faith as a cure-all for these disorders.

As an excellent introduction to mental illness, this volume will expose many of *PSCF's* readers to an aspect of life-experience they may not have studied as physical scientists. The book is a careful description of these issues; it will be appreciated both for its being grounded in the latest social/behavioral science and also for its very prag-

matic insights as to how the biblical understanding of persons and of sin relate to the topic. The final indices of the book list a number of resources for those who want to explore these issues more fully or want to learn of groups that can be of help.

Reviewed by H. Newton Malony, Graduate School of Psychology, Fuller Theological Seminary, Pasadena, CA 91182.



SOCIAL SCIENCE

NEUROSCIENCE, PSYCHOLOGY, AND RELIGION: Illusions, Delusions, and Realities about Human Nature by Malcolm Jeeves and Warren S. Brown. West Conshohocken, PA: Templeton Foundation Press, 2009. 168 pages, index. Paperback, \$17.95. ISBN: 1599471477.

Malcolm Jeeves and Warren Brown are no strangers to those who are interested in psychology and human nature. These two psychologists are internationally known for their research expertise as well as for their grasp of the knotty theoretical issues that have proven to be points of contention between those in the scientific and religious communities. This particular text is part of a science and religion series. It addresses the current state of the conversation (although some might refer to it as a conflict) between those in the sciences (i.e., psychology, neuroscience, and anthropology) and theologians, about the mind and human nature.

There are several areas that will be familiar to those who have read previous offerings from either author. The recurring themes of partnership rather than warfare between science and religion, the tightening of the mind/brain link, cognitive emergence, top-down causation, and the importance of the relational *imago dei* are found again throughout the book. This book, however, is different in scope and in length when compared to earlier offerings.

As the title of the book indicates, the text covers an incredible amount of intellectual geography, which may seem to be more than a tad ambitious. Jeeves and Brown are up to the task, though. Classic thinkers such as Galen, Augustine, René Descartes, and William James are dutifully accounted for, but the inclusion of names ranging from William Inge, Gordon Allport, and George Combe to Donald MacKay, David Premack, and novelist Mark Salzman displays the authors' substantial historical knowledge base as well as a contemporary sensibility.

What is most impressive about this text is the historical ground that it covers in such little space. Early chapters seem to be written more for those who are new to the conversation, but they have nuggets of information that even those familiar with the area will find beneficial and worth mining. These chapters include an introductory chapter, a historical review of the relationship between science and theology, and another historical chapter on the soul and mind. A primer chapter on brain functioning lays the groundwork for reinterpreting the notion of mind and links it to the brain. It is then followed by a chapter on evolutionary psychology that deals with cognition and origins issues. The later chapters hit upon significant

Book Reviews

findings from the past several years (i.e., mirror neurons and the neurology of moral decision making and mystical experiences). A chapter on the neuroscience of religiousness is followed by another that attempts to develop a metanarrative on human nature, which includes the voices of both science and religion.

The writing is concise, crisp, and easy to follow. Some of the sections within the chapters are shorter than hoped for if you are looking for a thorough treatment of a particular topic. For example, there are a total of three pages on consciousness—an area that would seem to warrant significantly more comment. There should be little doubt that the authors could have said more, but the constraints of the book's text seem to have forced them to make it brief and to the point. Given the density of information that is covered in the text and the manner in which it presents it, this text would be a valuable starting point for those looking to enter a conversation with an opposing viewpoint. The book ends with an upbeat look at future possibilities of dialogue and a challenge to entertain ways in which we can appreciate humanity's place in creation.

This text would be an excellent accompaniment either to an upper-division undergraduate course or to an entry-level graduate survey course. It contains a list of recommended readings and an index of names and subjects.

Reviewed by William M. Struthers, Psychology Department, Wheaton College, Wheaton, IL 60187.

SACRED DESIRE: Growing in Compassionate Living by Nancy K. Morrison and Sally K. Severino. West Conshohocken, PA: Templeton Foundation Press, 2009. xv + 179 pages. Hardcover; \$21.95. ISBN: 9781599471501.

Psychiatry at times gets a bad rap, sometimes deservedly so, sometimes not. With a history of occasional erroneous and damaging theorizing, psychiatry has had a tendency to theorize on a given subject before the science has been present to support the claim. For instance, autism once was believed to be caused by "refrigerator mothers,"¹ and the concept of the "schizophrenogenic" parent was used for schizophrenia.² Over time these harmful theories, as well as others, had to be retracted. Yet theory has played a powerful role in the development of psychiatric care. Even when certain aspects of a theory have been refuted, it continues to guide therapy work. What we do not know about the human brain, especially in regard to psychiatric illness, outweighs what we do know. Until now, there are still no definitive biological markers for any psychiatric diseases.

The human brain is by far the most complex organ in the body, comprising over one hundred billion nerve cells. As a vital organ, it is not amenable to direct observation. Mainly indirect, but still intriguing, is the secondary information that is obtained from neurophysiologic studies, since they provide researchers with clues to what is actually occurring *in vivo*. Psychiatry and the neurosciences thus must rely on animal studies, often with rat and monkey brains, as well as on human autopsy studies, cerebrospinal fluid collections, and more recently neuroimaging studies. These latter research tools include func-

tional magnetic resonance imaging, positron emission tomography, and diffusion tensor imaging, all of which provide exciting and compelling information about normal developing brains and pathological conditions.

In the opinion of this reviewer, to practice psychiatry one must, first of all, feel comfortable dealing with a lot of uncertainty. Secondly, one must remember the theoretical constructs that are important as a framework for treatment. Nonetheless, these theories must be open to modification based on the evolving research in the field. Our diagnoses have been developed and defined based on the consensus of experts in the field, rather than on pure biological data. In addition to not knowing the cause of psychiatric illnesses, we have only limited information about how our psychiatric medicines treat the illnesses. We know, for instance, the immediate effects of antidepressant medications on certain neurotransmitters, which usually cause reuptake inhibition within the synapses. However, this does not explain why the true therapeutic effects of antidepressants usually require two or more weeks of treatment; this is much later than the immediate neurotransmitter reuptake inhibition effects. This has led to speculation that true therapeutic effects may be "further downstream" from the synapse and may be due more to second messenger systems. Nonetheless, this is still a conjecture. We are left with our simplistic explanations, for instance, depression as a "chemical imbalance" and antidepressant medications helping to restore the balance. It is an oversimplification, but easier to digest for the patient (and sometimes the psychiatrist), than both having to experience the "indigestion" of ignorance.

The title of the book under review, *Sacred Desires: Growing in Compassionate Living* by two clinical psychiatrists, Nancy K. Morrison and Sally K. Severino, suggests that this could be a manual to foster the personal development of empathy toward others. This seems a noble endeavor in our modern age of isolation, conflict, and terrorism. However, the publishers use the dust cover to emphasize a different aspect of the book, introduced by the query,

Is the call to spirituality embedded in human biology? Drawing on cutting-edge research and recent discoveries on the neurophysiological functions of the brain, [the] authors ... boldly argue that the same neurons that lead us to connect with each other also lead us to seek a connection with the divine. We are, in fact according to the authors, biologically wired to seek oneness with the divine.

In this reviewer's opinion, this is quite a strong claim for the authors and publisher to make. One might imagine that Morrison and Severino would demonstrate the existence of a brain circuit for religious belief or a brain chemical that would make humans contemplate the divine. In fact, this is what the authors try to do, but unfortunately in a way that overstretches the available scientific data. For neurocircuitry, they theorize that the ventral aspect of the vagus nerve serves as the link to the divine. The ventral vagus nerve is, in phylogenetic terms, a newer part of the parasympathetic nervous system, which not only aids to counterbalance our sympathetic nervous system's response to stress and helps the body regulate cardiac physiology, but it also innervates facial muscles and the vocal cords.

The authors cite Stephen Porges' theory³ of this aspect of our nervous system as playing a role in social communication and connection. They then tack on the implication that this social connection is really evidence for the spiritual. As far as a "God chemical" (this reviewer's term, not the authors'), Morrison and Severino turn to the neuropeptide oxytocin and its potential role in attachment, especially between newborns and their mothers. They take the liberty of modifying the reference that Kerstin Moberg makes to oxytocin in her book as "personal healing nectar" and renaming it as "holy nectar."⁴ Here again the spiritual is tacked on.

The authors also draw on research regarding the existence of a mirror neuron system in the brain, as being responsible for the human capacity to empathize with others, which the authors label as "redemptive attuning." The theory of a mirror neuron system is still somewhat of a controversial entity. It draws on research originally involving macaque monkeys: the activation that occurs in the monkey's preemtor cortex when watching someone else engaging in a certain activity. This action might be as simple as the researcher reaching for a cup, the original observation that initiated this scientific work. This research has been expanded to human studies, using functional magnetic resonance imaging (fMRI) showing some similarities to the macaque data, specifically neurocircuits for action intention based on the context of the action. Thus a mirror neuron system is believed to be activated, not just from an action, but from witnessing someone else engage in the action. These monkey findings have led researchers to theorize about the role of imitation in language acquisition and the aberration of this system as a potential explanation for childhood autism. In addition, some research involving human subjects has provided support for the animal data regarding mirror neurons. Functional MRI studies of healthy volunteers have demonstrated that subjects viewing photographs of various facial expressions, such as disgust, will activate regions of the subject's brain linked directly to these strong emotions. In short, researchers in this field postulate that the mirror neuron system is essential for social interactions and learning through imitation.⁵

Morrison and Severino go on to propose that this same mirror neuron system forms part of the basis, not only for our connections with others, but also for our connection with the sacred, which they refer to as "sacred desire." This could be God or any other universal life force. For the authors, it appears that their connection to the sacred is influenced significantly by Roman Catholic contemplative prayer, yet they allow for a full gamut of religious and spiritual perspectives on a higher power.

All this leads me to a discussion of the central assumption of *Sacred Desire*. The authors make a case for a link from exceptionally broad biological theories to the authors' spiritual musings. They take the bonding experience of a child with its parent (mother) as the foundation for their theory regarding the biological-spiritual link, equating this attachment experience to the relationship between God (or the sacred) and humanity. They name this relationship "first nature" and refer to it in other places as "redemptive attuning." Although compelling, and perhaps even pleasing to contemplate, this is undoubtedly

speculation, outside the realm of science and more properly in the realm of metaphysics. This assumption regarding the fundamental significance of the parent-child bonding experience has its origin in psychology, most significantly in attachment and object relations theory. The authors discuss these theories, which are psychological models that postulate a link between the primary bonding experience between a child and its caregiver (specifically the interaction of the child's temperament style and the availability of the caretaker) as a predictor for future social relationships.

The authors then tackle disordered relationships, referring to them as "second nature" or "dissonant tuning." They view compassionate relationships within or outside therapy as able to keep one in first nature or to be the impetus for a move from second to first nature. This latter dynamic seems similar to the psychoanalyst Franz Alexander's concept of a "corrective emotional experience."⁶ Morrison and Severino then expand their theory of interpersonal interactions to the broader context of communities, including the global community.

In my judgment, this book is far better suited as a resource for weekend workshops for spiritually minded psychotherapists or as part of a retreat for pastoral counselors, rather than as a resource book for the serious scientist. *Sacred Desire*, like many of the sources that it draws upon, is fraught with what seems to me to be an oversimplification of brain science, and it jumps to conclusions that extend far beyond the available evidence.

Unfortunately, the writing is not that engaging and seems to be uneven in style. The book suffers from a mish-mash of quick summaries of simplified science, quotations from sources, case studies from the authors' practice, summaries of spiritual figures, and a fair bit of hyperbole. The gray boxes of scientific evidence seem to be too large and detract from the main text. On the positive side, the glossary was helpful since it provides the reader with definitions of the unique terminology developed by the authors.

Does this book reach its goals? From my perspective, the answer is in part "yes" and in part "no." As far as creating a framework for relationship and compassion building, the book is on target. Some of the examples of the remarkable spiritual transformation made by specific individuals are quite inspiring. It might sit comfortably alongside other books dealing with the "science" of compassion, such as those by the Dalai Lama, leader of Tibetan Buddhism.⁷ In the authors' attempt to connect basic science research to the human quest for the divine, the book falls far short of the mark. It takes its place alongside other books in psychiatry that could be categorized as "soft science," containing more conjecture than scientific data. Fortunately, there are still many examples of top-notch research. These include, *inter alia*, basic science studies of brain functioning research on psychopathology and evidence-based treatment studies for various psychiatric disorders, published in textbooks or fine journals such as the *Archives of General Psychiatry*, the *American Journal of Psychiatry*, or my journal of choice, the *Journal of the American Academy of Child and Adolescent Psychiatry*.

Book Reviews

Notes

- ¹L. Kanner, "Autistic Disturbances of Affective Contact," *Nerv Child* 2 (1943): 217–50. Reprinted in *Acta Paedopsychiatri* 35, no. 4 (1968): 100–36.
- ²R. W. Lidz and T. Lidz, "The Family Environment of Schizophrenic Patients," *American Journal of Psychiatry* 106 (1949): 332–45.
- ³S. W. Porges, "The Polyvagal Theory: Phylogenetic Substrates of a Social Nervous System," *International Journal of Psychophysiology* 42 (2001): 123–46.
- ⁴K. Moberg and R. Francis, *The Oxytocin Factor: Tapping the Hormone of Calm, Love, and Healing* (Cambridge, MA: Perseus Press, 2003), 129.
- ⁵M. Iacoboni, *Mirroring People: The New Science of How We Connect with Others* (New York: Farrar, Straus, & Giroux, 2008).
- ⁶F. Alexander, T. French et al., "The Principle of Corrective Emotional Experience," in *Psychoanalytic Therapy: Principles and Application* (New York: Ronald Press, 1946), 66–70.
- ⁷D. Goleman, *Destructive Emotions: How Can We Overcome Them? A Scientific Dialogue with the Dalai Lama* (New York: Bantam Dell, 2003); Dalai Lama and P. Eckman, *Emotional Awareness: Overcoming the Obstacles to Psychological Balance and Compassion: A Conversation between the Dalai Lama and Paul Eckman* (New York: Times Books, 2008).

Reviewed by Kenneth J. Zwier, MD, Family Mental Health Associates, Scottsdale, AZ 85251-4502.

HOW GOD CHANGES YOUR BRAIN: Breakthrough Findings from a Leading Neuroscientist by Andrew Newberg and Mark R. Waldman. New York: Ballantine Books, 2009. xi + 348 pages. Hardcover; \$27.00. ISBN: 9780345503411.

For most of the twentieth century, with a few notable exceptions, the study of the biological underpinnings of religious beliefs was off limits to members of most professional guilds. Those who were aligned as behavioral or natural scientists were actively discouraged from investing any intellectual stock in this elusive endeavor, which is now known as the discipline of neurotheology. Fortunately, a subtle paradigm shift opened the door for scholars from a variety of disciplines—including neuroscience—to weigh in on this fascinating subject. Within the past ten years, there has been a plethora of scholarship involving hundreds of published articles in referred journals and dozens of books. Andrew Newberg's latest book, *How God Changes Your Brain*, is another addition to the recent collection. Newberg, currently the director of the Center for Spirituality and the Mind at the University of Pennsylvania, is regarded by many as one of the founders of neurotheology. His co-author, Mark Waldman, a therapist, is an associate fellow at the above-mentioned Center for Spirituality.

This book attempts to accomplish several goals. One goal is to elucidate how belief in God is good for mental, physical, and spiritual health (chapters 1–3). A central thesis of the book is to proclaim that once a person begins to contemplate God—particularly for extended periods of time—neural functioning becomes altered; real physical changes occur to the dendrites, synapses, and neurochemistry. These changes, for the most part, bring about several positive outcomes.

In contrast to Newberg's previous books, *How God Changes the Brain* reads much like a self-help text with

a substantial emphasis on practical steps one can take to improve areas as diverse as memory, communication skills, meditation, and finding serenity. In fact, chapters 8–10 are devoted to practical applications that comprise nearly half of the text. It is clear that this is not an academic book; to the contrary, it is written to an educated, general audience: those who preferably respond well to concise and formulaic prescriptions about how to bring about changes in their lives. The most solid of the applied chapters is the one called "compassionate communication" that teaches individuals how to communicate more effectively with their spouses, colleagues at work, or strangers.

There are several strengths to this book. The authors write in a clear and crisp style that avoids the technical language that can frequently confound nonscientists, particularly on subjects that integrate brain science with theology. For example, when neuroanatomy is discussed, the authors strategically limit the discussion to no more than six brain regions. In addition, case studies and personal stories are interspersed that contribute to an engaging, provocative, and honest presentation of the material. The book also avoids a technical discussion of some of the brain imaging technologies that provide data for several of the studies that are referenced. This could be viewed as a weakness, since some would prefer any "light-bright" interpretations of PET data to include a more thorough explanation. Lastly, the book capitalizes on new research into neuroplasticity that has captured the attention of neuroscientists.

Unfortunately, this book possesses several weaknesses. Some of the difficulties arise from the self-help genre to which this book belongs. It is always difficult to unpack basic research findings and then extrapolate practical applications to everyday life. Many *PSCF* readers will not feel comfortable with the liberties that the authors have taken in generalizing research. The authors' use of inflated language does not help their cause. Words like "breakthrough discoveries" sprinkled within the text reduce the authors' credibility; in addition, they draw sweeping conclusions from single studies—in some cases, with modest sample sizes—without the normal cautious language that would be present in the scientific literature. Some *PSCF* readers will be frustrated that factual information is embedded right alongside material that is conjecture and not supported by credible research. Discerning the fact from the fiction, for the nonscientist, might be rather challenging. In addition, the title is a bit misleading. It turns out that according to Newberg, God is not necessary to bring about the beneficial changes; the practice of religious behaviors, with God left out, works just fine.

Some readers will be disappointed by the negative presentation given to those who come from a fundamental religious tradition. The authors—one an agnostic and the other an atheist—clearly favor Unitarian religious expressions that are completely open to all religious conceptions, and frown upon those who believe in an "authoritarian" God. If readers are interested in neurotheology, start by reading one of Newberg's earlier books such as *Why God Won't Go Away*.

Reviewed by Bryan C. Auday, Professor of Psychology, Gordon College, Wenham, MA 01984. □

Letters

A Tale of Two Randomnesses

Craig Story's "The God of Christianity and the G.O.D. of Immunology" (*PSCF* 61, no. 4 [2009]: 221–32) states that ID proponents such as Lee Strobel and William Dembski categorically reject the possibility of randomness being involved in the ordering of the universe (producing "fine tuning" and "information"), while Story demonstrates "randomness with a purpose" in the human immune system. Story asserts that, "People whose conception of God allows for *no such randomness*" are forced into the horns of a dilemma where ID proponents must "either reject their God or ... ignore these observations of the natural world."

Story's point is a valid one if, first, the construction of his argument is sound and, second, his use of terms is unequivocal—but, in my opinion, he fails to meet the second criterion, particularly with his use of "randomness." Consider how he uses this term in the following segments from the article (*italics are mine*).

Story asserts that his goal is "to clearly demonstrate that a specific type of randomness *is an essential component* of some biological systems." At the conclusion of his article he adds, "... that from randomness in the world of biology *arise* the many good things we enjoy."

Closely scrutinizing the use of the term "randomness" in these two sentences above reveal a clear equivocation in the consequent meaning that is not made explicit by Story. These two uses can be understood thusly:

1. Randomness that *is generated within* an organized system that serves a purpose for that system (randomness as an *effect*).
2. Randomness that *gives rise to* purposeful systems (randomness as a *cause*).

In his explication of the G.O.D.'s function within the immune system, Story rightfully utilizes the first definition—randomness as an important component of a biological system that is an *effect* of a random generating machine within the immune factory for an ultimate purpose. Where he makes his error is in making the non sequitur that since randomness can be utilized as an *effect* to meet a goal, that randomness, *per se*, can therefore act as a *cause* and give rise to purposeful systems independent of any causal entity (i.e., standard evolutionary origins theory). Nowhere in his article does Story build a case for unguided randomness (randomness outside the governance of a demonstrable controlling entity) giving rise to anything purposeful—this is simply assumed.

It is my guess that most ID proponents would have no problem conceding Story's assertion that "specific types of randomness" are "essential components of some biological systems," in line with the first meaning of randomness, but would, correctly in my view, object to Story's imputation of causal ability to randomness, the second meaning used.

Story creates a false dilemma as his argument contains equivocal terms, and hence ID proponents can both keep

their God and their affirmation of reality—intelligent agents can utilize randomness to serve a purpose, but randomness itself has never been seen to give rise to intelligent agency nor is there any good *nonmetaphysical* reason to think that it can.

Larry Parsons
Missionary Member
Science Department
Black Forest Academy
Kandern, Germany

How Far Can Science Take Us?

I found Craig M. Story's article on "The God of Christianity and the G.O.D. of Immunology: Chance, Complexity, and God's Action in Nature" (*PSCF* 61, no. 4 [2009]: 221–32) to be very controversial. I will briefly focus on only three points of philosophical interest.

Central to Story's article is the notion of randomness. He lists various distinct senses by which the notion of randomness is understood. But he defines his version of randomness as "biological randomness," that is to say, "extreme unpredictability." Story then attempts to show how an instance of biological randomness can be justified in immunology, which also underlies the very process of the rearrangement of antibody gene segments which form functional genes. In light of this, once the existence of randomness is accepted, Story thinks that we can show how the sovereign, all-knowing, and all-powerful God can exercise control over pure randomness. In fact, solving the problem of how God exercises complete sovereignty over pure randomness is what Story hopes his article succeeds in showing. Throughout his article, Story appeals to science to make his case. Here follow my objections.

First, Story conflated first-order discipline with second-order discipline. For instance, biology is a first-order discipline that studies living organisms. Put another way, biology does not take itself as an object of its own study. Such is the task of a second-order discipline, that is, philosophy. Taken in this sense, it is philosophy that studies biology, and the converse is not true. Thus, contrary to Story's claim, to say that God exercises control over randomness is not an empirical claim at all, and thus it can hardly be established on the basis of science. Rather, such a claim is strictly a philosophical thesis that requires a philosophical justification as opposed to a scientific one. If I am right here, then Story's attempt to resolve the problem of how God maintains sovereignty over randomness on a scientific basis remains a non sequitur. In my view, science is inherently unable to resolve such issues. We will do fine in leaving such issues to philosophy/theology. Yet I am not denying here that some sort of integrative approach can be taken between science and philosophy/theology. But that is another matter.

Second, Story mistakenly assumes that because *x* is random from the point of view of humans, therefore *x* is equally random from God's perspective. But such is unwarranted extrapolation which amounts to a fallacious argument: because I cannot see it, therefore it must be the case that God also cannot see it. Even if it may be true that for all that scientists know, that there is such a thing called biological randomness, such an account is only part

Letters

of the story. In other words, it remains entirely unclear what to say with respect to God's knowledge of the nature of what is deemed by humans as randomness. It may very well be the case that randomness does not exist for God. We just do not know. Certainly, Story has not shown us in his article that what appears to be random for humans is true of God. Of course, he makes a number of assertions about randomness and God's sovereign control over it. But I have not seen for myself where he has shown this to be the case.

Third, Story claims that any discussion of how God works in the world must be seen in the light of scientific progress. But this begs the question, in that the claim assumes that genuine knowledge is the kind that is supported by science. We all know that every form of knowledge does not need science. For example, we do not need scientific support to know whether torturing innocent children is morally wrong, science has nothing to do whatsoever with whether salvation is possible through Christ, $2 + 2 = 4$, etc. Worse, the very claim that any discussion of God's action in the world requires scientific support, is itself not a scientific claim. Thus, it is self-defeating to assume that it is, in that the very claim per se cannot be subjected to empirical or experimental testing. So, in light of the above three objections, Story fails to show us how randomness and divine sovereignty can coexist.

Mihretu P. Guta
ASA Student Member
Biola University
La Mirada, CA 90639

Story Responds to Parsons and Guta

Parsons, in his critique of my article, states that I have equivocated in my definition or understanding of the term "randomness," something I took great pains to avoid doing. In his critique, he objects most strongly to a view of randomness as "a cause." This is a curious near-personification of the term, as if randomness becomes the creator rather than God, and I can see how this view would be unsettling. I argued in the article that randomness is an essential characteristic of the kinds of systems we see in nature, and that from these systems arise purposeful things, such as antibody molecules. Where we disagree, I think, is whether the final result (useful antibody proteins, for example) actually can come about through an "unguided" process. Here is where Parsons and others who argue against the processes of evolution more generally, go wrong. The cellular events that lead to genetic variation quite clearly are the result of highly unpredictable processes (I refer to these as random, you may call it "unguided"). This is not merely an assumption of randomness; this is the heart of the argument I am making in my article. So how does something useful arise from an unguided process? Here is the answer: Subsequent to these random events, the system (antibody-secreting cell, or entire organism) is put through a very nonrandom selection filter. In my example, cells producing detrimental (anti-self) antibodies are deleted, while cells that produce useful antibodies continue to grow and persist. It may be that Parsons objects to the idea that the *antibody generating system itself* could have come about through any sort of random process.

Here is a stronger argument. I do not see why, in principle, the very same processes of variation and selection would not operate on whole organisms whose genomes are known to have mixed and mingled in complex ways over planetary time scales. I do believe it is misguided to think of God as not being involved in these processes at a very fundamental level, as I argue in the article. But I also think there are good reasons to think that God does not micromanage the minute details. I recommend a paper by Oxford University physicist Paul Ewart (*Science and Christian Belief* 21, no. 2 [2009]: 111-31), in which he argues that God can still be sovereign in a world with true randomness, if one considers God's ultimate purposes unfolding on a grander time scale.

Guta suggests in his letter that I am arguing for certain ideas that I personally do not support. For example, I do leave open the possibility (likelihood) that what might appear random to us may not be random to God (p. 230). I may legitimately be critiqued for not more explicitly stating the point that I am speaking outside my field. Yet I do not believe that being a scientist disqualifies one from discussing philosophical ideas, as long as one acknowledges this openly. I understand the difference between a scientific and a philosophical argument, and I find fault with those such as Dennett and Dawkins for failing to clearly make this distinction. Nor would I agree that because biology as a field does not study itself, biology cannot have anything to add to a philosophical discussion. I think it is important that observations about the natural world be consistent with our philosophical understandings. I would never argue, as Guta suggests, that "God's action in the world requires scientific support." In fact, I am not sure what he actually means by this. I am suggesting that it is important to attempt to fit our theological and philosophical beliefs, and our biblical interpretations, together with the principles of the natural world that are learned by careful scientific observation. Perhaps Guta is making a stronger claim, that the observations of science are unreliable at a fundamental level. This is his right to do so. However, I would hold that argument as weak, one that certainly will not agree with most people's personal observations. While my article may be viewed as "very controversial" to some, I remain hopeful that it may be enlightening and thought-provoking at the same time.

Craig M. Story
ASA Member
Gordon College
Wenham, MA 01984

A Good Revelation about Revelation

Mary VandenBerg's fine article on the "Two Books" concept ("What General Revelation Does [and Does Not] Tell Us," *PSCF* 62, no.1 [2010]: 16-24) is an important contribution. I hope it will be widely read, especially by those who expect Scripture to give us scientific truth.

Paul Seely
ASA Fellow
1544 SE 34th Avenue
Portland, OR 97214
PHSeely@msn.com

□

American Scientific Affiliation

The American Scientific Affiliation (ASA) is a fellowship of Christians in science and related disciplines, who share a common fidelity to the Word of God and a commitment to integrity in the practice of science. Founded in 1941, the purpose of the ASA is to explore any and every area relating Christian faith and science. *Perspectives on Science and Christian Faith* is one of the means by which the results of such exploration are made known for the benefit and criticism of the Christian community and of the scientific community. The ASA Statement of Faith is at www.asa3.org/ASA/faithASA.html

Executive Director, ASA:

RANDALL D. ISAAC, PO Box 668, Ipswich, MA 01938-0668

Executive Council, ASA:

EDWARD B. DAVIS, Messiah College, One College Ave., Grantham, PA 17027
–President

WALTER L. BRADLEY, One Bear Place, Waco, TX 76798-5467
–Past President

JENNIFER J. WISEMAN, 16 Folly Farms Ct., Reisterstown, MD 21136
–Vice President

SUSAN A. DANIELS, 501 Garden View Way, Rockville, MD 20850-6098
–Secretary-Treasurer

ROBERT KAITA, Princeton University, Plasma Physics Lab Box 451,
Princeton, NJ 08543

THOMAS E. ROBEY, 116 Nash St., New Haven, CT 06511
–Students and Early Career Scientists Representative

Advisory Council, ASA:

DOROTHY F. CHAPPELL, Ph.D., Biologist –Dean, Natural and Social Sciences,
Wheaton College, Wheaton, IL 60187

VERNON J. EHLERS, Ph.D., Physicist –U.S. Congressman, Grand Rapids, MI
ANN H. HUNT, Ph.D., Chemist –Research Scientist (retired),
Eli Lilly and Company, Indianapolis, IN

SARA J. MILES, Ph.D., Historian of Science –Founding Dean *Emerita*,
Esperanza College of Eastern University, Philadelphia, PA

CHARLES H. TOWNES, Ph.D., 1964 Nobel Laureate in Physics,
University of California, Berkeley, Berkeley, CA

Editors, ASA/CSCA Newsletter:

DAVID FISHER, 285 Cane Garden Cir., Aurora, IL 60504-2064

MARGARET G. TOWNE, 8505 Copper Mountain Ave., Las Vegas, NV 89129

Canadian Scientific & Christian Affiliation

A closely affiliated organization, the Canadian Scientific and Christian Affiliation, was formed in 1973 with a distinctively Canadian orientation. The CSCA and the ASA share publications (*Perspectives on Science and Christian Faith* and the *ASA/CSCA Newsletter*). The CSCA subscribes to the same statement of faith as the ASA, and has the same general structure; however, it has its own governing body with a separate annual meeting in Canada. Contact CSCA by writing to: Canadian Scientific and Christian Affiliation, PO Box 63082, University Plaza, Dundas, ON L9H 4H0 or visit their website at www.csc.ca

Executive Director, CSCA:

DON McNALLY, NetAccess Systems, Hamilton, ON

Executive Council, CSCA:

THADDEUS TRENN, Colborne, ON –President

JAMES J. RUSTHOVEN, McMaster University, Hamilton, ON –Vice President

BOB GEDDES, The Presbyterian Church in Canada, Hamilton, ON
–Secretary-Treasurer

DENIS LAMOUREUX, St. Joseph's College, University of Alberta, Edmonton, AB

HEATHER A. LOOY, The King's University College, Edmonton, AB

JUDITH TORONCHUK, Trinity Western University, Langley, BC

ANTHONY WHITEHEAD, McGill University, Montreal, QC

How Do I Join the ASA?

Anyone interested in the objectives of the Affiliation may have a part in the ASA. Membership and subscription applications are available at www.asa3.org/ASA/joinASA.html

Full membership is open to all persons with at least a bachelor's degree in science who can give assent to our statement of faith. Science is interpreted broadly to include anthropology, archeology, economics, engineering, history, mathematics, medicine, political science, psychology, and sociology as well as the generally recognized science disciplines. Philosophers and theologians who are interested in science are very welcome. Full members have voting privileges and can hold office.

Associate membership is available to interested nonscientists who can give assent to our statement of faith. Associates receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office.

Full-time students may join as **Student Members** (science majors) with voting privileges or as **Student Associates** (nonscience majors) with no voting privileges.

Spouses and **retirees** may qualify for a reduced rate. **Full-time overseas missionaries** are entitled to a complimentary membership.

An individual wishing to participate in the ASA without joining as a member or giving assent to our statement of faith may become a **Friend** of the ASA. Friends receive all member benefits and publications and take part in all the affairs of the ASA except voting and holding office.

Subscriptions to *Perspectives on Science & Christian Faith (PSCF)*, are available at \$40/year (individuals), \$65/year (institutions) and \$20/year (students).

How Do I Find Published PSCF Articles?

Articles appearing in *Perspectives on Science and Christian Faith* are abstracted and indexed in the *Christian Periodical Index; Religion Index One: Periodicals; Religious & Theological Abstracts*, and *Guide to Social Science and Religion in Periodical Literature*. Book Reviews are indexed in *Index to Book Reviews in Religion*. Present and past issues of *PSCF* are available in microfilm form at a nominal cost. For information, write to NA Publishing, Inc. PO Box 998, Ann Arbor, MI 48106-0998.

Contents of past issues of *PSCF* are available at www.asa3.org/ASA/PSCF.html



American Scientific Affiliation
55 Market Street, Suite 202
PO Box 668
Ipswich, MA 01938-0668

Phone: (978) 356-5656
FAX: (978) 356-4375
E-mail: asa@asa3.org
Website: www.asa3.org



Editorial

- Psychology, Neuroscience, and the American Scientific Affiliation 73 Matthew S. Stanford

Articles

- Minding Emotions: The Embodied Nature of Emotional Self-Regulation 75 Paul Moes
Biology of Spirituality 89 Kevin S. Seybold
Spirituality Research: Measuring the Immeasurable? 99 David O. Moberg
Conscious Experience and Science: Signs of Transition 115 Thaddeus J. Trenn
Peering into People's Brains: Neuroscience's Intrusion into Our Inner Sanctum 122 D. Gareth Jones

Essay Review

- The Erosion of Biblical Inerrancy, or Toward a More Biblical View of the Inerrant Word of God? 133 Denis O. Lamoureux

Book Reviews

- Grace for the Afflicted: A Clinical and Biblical Perspective on Mental Illness* 139 Matthew S. Stanford
Neuroscience, Psychology, and Religion: Illusions, Delusions, and Realities about Human Nature 139 Malcolm Jeeves and Warren S. Brown
Sacred Desire: Growing in Compassionate Living 140 Nancy K. Morrison and Sally K. Severino
How God Changes Your Brain: Breakthrough Findings from a Leading Neuroscientist 142 Andrew Newberg and Mark R. Waldman

Letters

- A Tale of Two Randomnesses 143 Larry Parsons
How Far Can Science Take Us? 143 Mihretu P. Guta
Story Responds to Parsons and Guta 144 Craig M. Story
A Good Revelation about Revelation 144 Paul Seely