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GOD ON THE BRAIN
The Curious Coupling of Science and Religion

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Each morning, as the sun rises I pray. The shaharith service is largely unvarying, except that there is a different Psalm for each day of the week. I know most of the prayers by heart, and often close my eyes as I recite them. This purposeful blindness allows me to retreat from the distractions of the surrounding world. My Jewish heritage is mixed -- the tight scholastic rationalism of Vilna, in Lithuania, on my father's side, and the ecstatic Hasidic mysticism of Hungary's Carpathian Mountains, on my mother's -- and, while praying, I try to touch both traditions. Sometimes I will think about the root of a particular word in an attempt to delve deeper into the message of the text. Other times, I recite the ancient Hebrew words in a rapid monotone until they flood over me, submerging distinct thought.

As I near the end of the prayers, I search for a kernel of meaning for the day ahead. For example, on Tuesdays, which I generally spend in the clinic, seeing people with cancer, blood diseases, and AIDS, I recite Psalm 82; it instructs us to "uphold the downtrodden and the destitute." Fridays are devoted to analyzing the week's accumulated laboratory data -- the sequence or function of a novel gene, the structure of a cellular protein, the effects of a new drug -- and that day's Psalm, No. 93, celebrates the mystery and majesty of the physical world.

But there are many mornings, at home or in synagogue, when ritual fails to bring meaning. Etymology then feels like a self-indulgent parlor game; the rhythmic chanting is distracting rather than transporting. Closing my eyes brings only darkness and a chilling sense of emptiness.

In the past, religion and biology have usually been in sharp conflict, but in recent years scientists of faith have sought to narrow the divide. Technological advances have made it possible to chart the neural circuits that are switched on and off during religious experiences; this work dovetails with studies examining the physiological effects of repetitive prayer, chanting, and meditation, and with recent attempts to measure the effects of religion on health. Data on the science of spirituality are being sought not only in the laboratory and in the clinic but also in the church and the synagogue and the mosque. Much of the funding for these studies has come from the John Templeton Foundation, a philanthropy that focuses on reconciling science and religion. But what does this new partnership signify? And can the burgeoning biology of religious experience be used to argue convincingly for the existence of God?

In the past decade, Dr. Herbert Benson, of the Harvard Medical School, has attempted to assess the physiological consequences of prayer. In the early seventies, he showed that a “relaxation response” occurs in human beings during periods of intentional tranquillity: the heart rate, respiratory rate, and glucose metabolism all slow down. In his recent book “Timeless Healing: The Power and Biology of Belief” (Scribner; \$14), he provides considerable data showing that the relaxation response can ameliorate hypertension, asthma, cardiac arrhythmias, and, of course, anxiety. But Benson, himself a believer, also broadens his focus here, arguing that faith -- by providing meaning to one’s life, relief from existential angst, and hope during times of difficulty -- can significantly affect one’s recovery during periods of poor health. Benson does point out that a secular humanist can achieve the same beneficial effects through meditation, and he is careful not to assert that any of his experimental data should be construed as indicating the presence of a deity, but the book’s science is clearly serving a larger inspirational goal.

Is religion really good for you? In a monumental new work, “Handbook of Religion and Health” (Oxford; \$65), Dr. Harold G. Koenig, of Duke University Medical Center, Michael E. McCullough, of Southern Methodist University, and Dr. David B. Larson, of Duke and Northwestern, subject that popular assumption to rigorous analysis. They review and evaluate some sixteen hundred twentieth-century studies and articles concerning the impact of belief on health. Their conclusions are not entirely encouraging: they suggest that although the relationship between health and spirituality is clearly worthy of serious study, much of the research done in the field to date has been shoddy. Koenig and his collaborators also go to great lengths to educate the reader about negative effects of belief and orthodoxies, which, in the current cultural climate, are rarely mentioned, such as the fear that disease is punishment for sin, and that assistance is preferably derived through miracles rather than through medicines.

Koenig suggests that the logical evolution of such research is to seek the place where religious beliefs originate in the brain; this nascent field is called “neurotheology.” Dr. Andrew Newberg, of the radiology department at the University of Pennsylvania, with his late colleague Dr. Eugene d’Aquili, in the Department of Psychiatry, open their book “Why God Won’t Go Away: Brain Science & the Biology of Belief” (Ballantine; \$24.95) with a sophisticated SPECT-scan study of a Buddhist engaged in Tibetan meditation. The authors also cite studies of seven other Tibetan Buddhists and several Franciscan nuns. The researchers mapped these subjects’ brains both before and at the peak of their transcendent feelings. Beforehand, the scan’s computer portrays the brain’s activity as a palette of fierce reds and rich yellows. During meditation or prayer, however, a marked color change was noted in a small region on the left side of the cerebrum called the posterior superior parietal lobe, which is just behind the crown of the skull. The flaming reds had turned into a deep azure, signalling a substantial decline in activity.

The parietal lobe is involved in how we locate ourselves in physical space; it integrates cues from the environment so that we do not walk into a door, or fail to raise our foot and step smartly off an escalator. The authors term this region the “orientation association area,” or O.A.A., and they believe that the decrease in its activity during meditation or prayer is highly significant. With no sensory stimulus to delineate the borderline between the self and the world, the authors conclude, the brain would “have no choice” but to perceive that the self is “endless and intimately interwoven with everyone and everything the mind senses.”

A dulling of spatial perception could well be key to experiencing a fluid sense of spiritual communion, such as many mystics do; this would also help explain why mystical occurrences, across a wide range of faiths, are often described in metaphorically similar terms. But then the authors take matters one step further. After declaring that these experiences are “not outside of the range of normal brain function,” they conclude, “In other words, mystical experience is biologically, observably, and scientifically real.” Later, they say, “If we do trust our perceptions of the physical world, we have no rational reason to declare that spiritual experience is a fiction that is ‘only’ in the mind.”

This is the cardinal error of neurotheology: mixing terms and methods of science and religion in an attempt to confer the former’s authority on the latter. Revelation, the authors suggest, need no longer be relegated to the spiritual realm -- the sort of thing available only to a select few in the form of burning bushes or thundering voices in the desert. It can be seen on a computer screen, in vibrant colors, by all. The authors entertain the hypothesis that the images of the left posterior superior parietal lobe may provide a “photograph of God.” Indeed, it is through this neural pathway that “God gets into your head.” And they come close to asserting that the SPECT scan proves the existence of God, or, in the authors’ cross-cultural term, Absolute Unitary Being:

Those who have experienced advanced states of mystical unity, however, claim that these states do feel like a higher reality. ... They insist that when compared to our baseline sense of reality, Absolute Unitary Being is more vividly, more convincingly real. ... Logic suggests that what is less real must be contained by what is more real. ... So, if Absolute Unitary Being truly is more real than subjective or objective reality -- more real, that is, than the external world and the subjective awareness of the self -- then the self and the world must be contained within, and perhaps created by, the reality of Absolute Unitary Being.

Yet everything that happens in the mind happens in the brain, and can, in principle, be imaged with the new technology. It is all, in some sense, “real,” because it represents the flux of electrons along neurons and the flow of neurotransmitters at synapses. Colors would also change on a SPECT scan during illusions and delusions, making them similarly “real.” For example, hallucinogens, like peyote, that were used by some Native American tribes in their religious rites caused profound alterations in circuits of the brain which mediate sensory perceptions, like vision and hearing. Similarly, dreams -- which my Hasidic forebears often interpreted as messages from a supernatural world -- are associated with various changes in cerebral regions, particularly those which mediate visual perceptions from the retina, even though the eyes of the dreamer are closed. The words “real” and “illusory” become meaningless if one stays strictly within the cranium.

Not only do the studies of Newberg and d’Aquili fall prey to circular reasoning; they address only one facet of religious experience and elevate it to universal significance. My Vilna ancestors dismissed the mystical flights of their Hasidic brethren, staying steady on the rational road to God. Their parietal lobe on a SPECT scan would appear to be hot as they argued legalistic Talmudic questions and Biblical exegeses, not cooling down. Similarly, scholars like St. Thomas Aquinas and Moses Maimonides encountered God through reason rather than through ecstasy. Nor is the orientation-association area likely to be altered in the religious experiences that are familiar to most of today’s Judeo-Christian faithful -- learning the Bible, listening to sermons, observing the Ten Commandments. In other words, during the forms of worship practiced by most religions in the West today, the activity of the left posterior superior parietal lobe would not be sufficient to generate “God’s photograph.”

Carol Rausch Albright and the late James B. Ashbrook come at neurotheology from a nonmystical angle, but their reasoning is equally dubious. Albright was the executive editor of *Zygon*, a journal devoted to science and religion, and is currently at the Zygon Center for Religion and Science; Ashbrook was a professor of religion and personality at the Garrett-Evangelical Theological Seminary, in Evanston, Illinois, a United Methodist institution. The guiding argument of their collaboration, "Where God Lives in the Human Brain" (Pilgrim; \$22.95), is that our cerebral circuitry provides a Rosetta stone that will allow us not only to decipher how we experience religion but also to decode God's attributes and intentions.

While disclaiming phrenology and acknowledging that all parts of the brain interact, Albright and Ashbrook nonetheless frame their discussion using the reductionist model of a "triune," or three-part, organ. This is the primitive "reptilian" brain, mainly the brain stem and hypothalamus; the overlying "mammalian" brain, which includes limbic emotive and hippocampal memory centers; and the neocortex, the most developed outer part of the cerebrum, which mediates higher functions such as cognition. This tripartite model roughly parallels the evolution of the nervous system of animals. And our descriptions of God, the authors say, roughly correspond to these different parts of the brain. For example, God as perceived in the concrete world is attributed to the workings of our reptilian brain, whereas God felt as nurturer, an object of affection and love, reflects the emotive system of the mammalian brain, and God as the Word, Logos, is a New Testament portrayal of the divine which is affirmed through the advanced neocortex.

It is perfectly plausible that emotions and thoughts that relate to God are mediated by the same circuits in the brain that mediate similar responses to worldly objects and activities. Yet here again neurotheology begins with science and ends in mythology. Albright and Ashbrook turn our cerebral experience of seeking God into finding God in our cerebrum -- an inversion that prompts the authors to reformulate virtually every human discipline and domain into "neurotheological" terms. For example, the source of the Hebrew people's possessive feelings for the Holy Land is said to be derived from the reptilian brain, which stimulates a primitive animal's fierce sense of territoriality. Deep spiritual love and its memory are depicted as outgrowths of the emotive mammalian brain. Exegesis of a prayer's intellectual content is the outer cortex. So, as I face east, toward Jerusalem, I veer reptilian; as I recite Kaddish, I ascend to the mammalian level; and as I analyze a prayer I emerge neocortical.

In fact, what is missing from neurotheology is precisely what all neuroscience demands: rigorously designed experiments. Such experiments always include controls that provide both a known positive result and a clear negative result, which should be null for the expected phenomenon. With this essential methodology in mind, we would want to analyze the SPECT-scan experiment done on the Tibetan Buddhist at the moment he feels united with the universe and relinquishes his sense of self. The positive control for the observed change in the orientation-association area would be an event when the human soul actually merges with the divine, since that would validate the hypothesis that the O.A.A. is fundamental to authentic connection with the deity. And that event is -- what? Is it a Cabalist unveiling the mystery of God through the mental gymnastic of numerology? Or is the positive control an exhausted Catholic penitent carrying a massive cross on his back along the Via Dolorosa, or a flagellant whipping himself in a Spanish rite? What do SPECT scans look like then? Forms of worship that demand mathematical

calculations or the experience of physical pain would recruit different neural circuits from those used during serene Buddhist meditation or Franciscan prayer. Should we search for “a photograph of God” in these other brain regions during such mystical experiences?

One is equally hard put to identify a negative control for the SPECT-scan experiments. That would require a nonreligious experience, when the brain is totally detached from the divine. If God is omnipresent, a cardinal concept in nearly all faiths, then every experience at every moment can have religious valence. Even doubting God is a part of faith, the Protestant theologian Paul Tillich argues. If that is so, then a SPECT scan done on me when I feel a cold emptiness after praying would not serve as a “negative control.” Paradoxically, such alienation could be a key religious experience bringing me closer to God, even though my parietal lobe would appear to be metabolically “on,” flaming yellow and red.

Albright and Ashbrook make even less of an effort than Newberg and d’Aquili to embrace the structure of experimental neuroscience. Their basic premise -- that dissecting man’s brain provides a template for God’s attributes and intentions -- doesn’t allow for any positive and negative controls in experiments that may affirm, or refute, this hypothesis. Perhaps, as the authors suggest, evil should be taken as a counterpoint to God. Then the triune brain of a Nazi is a negative control. Its dark impulses, these authors write, reflect excess reptilian activity. But the data for this, of course, are nonexistent, and Albright and Ashbrook do not even feign to find them. Moreover, Adolf Eichmann appeared to be highly cerebral -- a calculating, organized intelligence -- and all the more evil for it. The genocidal apparatus he designed was more likely the product of his neocortex than of his reptilian brain.

For centuries, religion staked its claims on reality by skirting the scientific method, as Galileo and Darwin well knew. There are still creationists in our society who reject astrophysics and evolution, but for the vast majority science has become both pervasive and welcome in our daily lives. Its power, we are told, is unlimited. For example, the success of the human-genome project inspired intoxicated enthusiasts to proclaim that the new information will ultimately control disease and retard our aging. It seems that nothing is beyond the reach of our astounding new technologies. Science is emerging as an entity of unending veneration -- with the attributes of omnipresence, omnipotence, and omniscience, and promises of a veritable paradise on earth. Sound familiar?

This ascendancy of science frames the question: Why do we have this strained attempt, clothed in the rubric “neurotheology,” to objectify faith with the bells and whistles of technology? Polls show that we live in a time of spiritual thirsting, and that nearly all of our citizens (some ninety-five per cent) believe in God. About eighty per cent pray on a regular basis, and more than forty per cent attend church weekly. It would be comforting to be able to worship at the altar of science if that altar could be relocated to a church or a synagogue or a mosque or a Buddhist temple. Doubt and uncertainty are erased by science’s insistence on reproducible, measurable results.

But science does not seek such worship. The attempt to overlay its authority with the cloak of mysticism or the imprimatur of Logos tells us more about the persistent sense of vulnerability that people of faith, like myself, live with than about the deeper workings of the Deity. Man is a proper subject for study in the world of science. God is not. Science is a discipline that demands accurate

measurements of phenomena upon which to build models of cause and effect. But the dimensions of what we call the soul -- the divine spark in human life -- cannot be so delineated, and thus the soul must be excluded from such considerations. Religion in modern culture seeks properly to attribute spiritual meaning to the experience of the physical world, whereas science lays no claim to meaning: it is always agnostic. The possibility that we are intrinsically wired for spirituality cannot be dismissed; the complexities of the cultural forms we know as religion may well grow from blueprints in the brain that have evolved over the millennia. But, as has been the case with all past attempts to “prove” the presence or intent of God, SPECT scans and cerebral anatomy fall far short of doing so. Indeed, to believe that science is a way to decipher the divine, that technology can capture “God’s photograph,” is to deify man’s handiwork. And that, both religious mystics and scholars agree, is the essence of idolatry.