The Neurology of Consciousness: Cognitive Neuroscience and Neuropathology edited by Steven Laureys and Giulio Tononi. Academic Press, 2008. 423 pp. $104 (hardcover). ISBN 9780123741688.

This information-packed volume, without doubt a landmark event in the developing neuroscientific study of consciousness, deserves the attention of anyone interested in this subject. It is a sequel and companion to an earlier collection, *The Boundaries of Consciousness: Neurobiology and Neuropathology*, also edited by Steven Laureys (2005), which contains the proceedings of a 2004 conference sponsored by the Association for the Scientific Study of Consciousness (ASSC). Published initially as a special issue of *Progress in Brain Research* (volume 150), *Boundaries* has been reissued in paperback and appears on the ASSC website as one of its official titles. Both volumes include many prominent figures in contemporary neuroscience, and the two volumes together constitute about as clear, comprehensive, and authoritative a picture as one can find anywhere of the current state of mainstream neuroscientific thinking about consciousness and the brain. Like classical physics of the late 19th century, it is a picture of great power and beauty; nevertheless, just as discordant phenomena such as black-body radiation and the photoelectric effect presaged the rise of quantum mechanics, this book, precisely because of its clarity, reveals signs of trouble ahead.

The two volumes overlap considerably, with many topics and authors carried directly over from the first to the second. The new volume, however, in addition to updating various topics covered previously, shows greater signs of editorial and doctrinal control, with a narrower range of subjects treated in more deliberately organized fashion. Whereas *Boundaries* contains 40 chapters contributed by 87 authors, ordered according to no discernible principle, the present volume contains 28 chapters by 39 authors, organized into four main sections. I will begin by summarizing, in necessarily telegraphic fashion, the main content of these chapters.

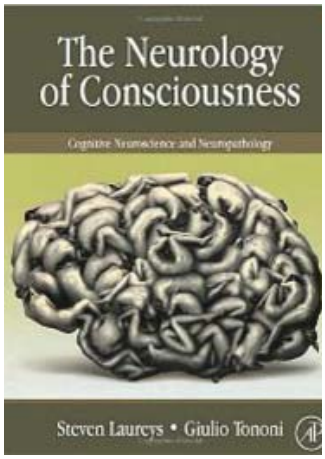
Section I, "Basics," consists of six chapters. The first, by Antonio Damasio and Kaspar Meyer, titled "Consciousness: An Overview of the Phenomenon and of Its Possible Neural Basis," sketches the general picture that will be developed in detail in subsequent chapters. Consciousness is produced by the brain, has a nested multilevel structure that emerges in the course of biological evolution, and can be studied both behaviorally, from the third-person perspective of an external observer, and introspectively, from the first-person perspective of the subject within. Alterations of consciousness and behavior produced by particular types and locations of

brain injury are particularly valuable in revealing brain structures associated with normal conscious functioning, and this results in a methodological emphasis, echoed throughout the book, on in-depth n = 1 neurological investigations of patients with rare forms of injury. Consciousness per se, as distinguished from its occurrent contents, seems to require integrity of a distributed system of midline structures including the upper brainstem, thalamus, and medial cortical areas including in particular frontal, posterior, and cingulate cortex. Chapter 2, by Hal Blumenfeld, provides an excellent description of neurological examination techniques and their deployment in differential diagnosis of the major forms of impaired consciousness including brain death, coma, vegetative states, minimally conscious states, and associated conditions such as the terrifying locked-in syndrome in which patients can be fully and normally conscious but deprived of all or nearly all motor function and unable to communicate. In brain death, all cortical, subcortical, and brainstem function has been irreversibly lost, and only spinal-cord reflexes remain. Stages of recovery—ranging from comatose states in which patients are totally unresponsive and unarousable, to vegetative states with sleep/waking cycles and brainstem reflexes present and eyes occasionally opening but without signs of purposeful or meaningful response to external stimuli, to minimally conscious states with inconsistent but clear indications of consciousness—occur in conjunction with progressive functional restoration of the activation systems in the upper brainstem and diencephalon and their associated cortical targets. Blumenthal correctly emphasizes the difficulties of these diagnostic distinctions and provides numerous hints and guidelines for making them correctly. He also points out in this connection the increasing use and potential diagnostic value of modern neuroimaging procedures. These in turn form the subject of Chapter 3 by Steven Laureys, Melanie Boly, and Giulio Tononi, which provides a brief but generally accurate introduction to the main imaging techniques and associated image-processing and analysis procedures. In a magnificent Chapter 4 titled “Consciousness and Neuronal Synchronization,” eminent German neuroscientist Wolf Singer outlines theory and evidence linking conscious states to the formation of large-scale distributed neural assemblies united by shared neuroelectric activity transiently synchronized at frequencies extending into the gamma range. This picture is common to all forms of contemporary “global workspace” or “global neuronal workspace” theory, of which Singer is a principal architect. An excellent Chapter 5 by Geraint Rees develops that picture in greater detail in the context of visual consciousness, seeking to identify differences in terms of neural activity between identical stimuli that do, versus do not, reach conscious awareness. In general, activity in functionally specialized

areas of the visual system corresponding to stimulus properties such as color, shape, and motion in depth is necessary but not sufficient for awareness of those properties. In keeping with the global workspace picture, visual awareness occurs when the received stimuli are also able to ignite larger-scale patterns of synchronous neuroelectric activity reciprocally linking widely distributed cortical zones including frontal cortex. Chapter 6 by Naotsugu Tsu-chiya and Christof Koch is still more specialized in character, focusing on the relationship between consciousness per se and selective, top-down visual attention, and arguing on the basis of various kinds of psychophysical and neurophysiological observations that these are distinct phenomena.

Section II, "Waking States, Sleep, and Anaesthesia," consists of four chapters. Chapter 7 by Marcus Raichle and Abraham Snyder, titled "Intrinsic Brain Activity and Consciousness," develops a theme first introduced in Chapter 1 by summarizing important recent work by themselves and others on the structure of background activation in the awake but resting brain—the so-called "default mode network"—which appears to be closely associated with the sense of self at the root of one's first-person conscious perspective and with consciousness per se (versus specific contents of consciousness), and which accounts for a large proportion of the brain's energy consumption. This network includes in particular midline cortical structures of frontal and parietal cortex whose activities are correlated among themselves but anti-correlated with those of structures activated under particular task conditions. Individual moments of conscious experience with all their specific contents are thus portrayed as being somehow realized upon this more fundamental "backbone" system. In Chapter 8 Giulio Tononi ably summarizes the current state of knowledge concerning normal sleep and dreaming plus associated topics such as daydreaming, lucid dreaming, sleepwalking, and narcolepsy, emphasizing overall patterns of brain activity associated with these various conditions. Chapter 9 by Claudio Bassetti provides a more specialized and clinically oriented review of one particular sleep-related phenomenon, somnambulism. The final chapter of this section, by Michael Alkire, provides an authoritative review of the effects of general anesthetics on brain and consciousness. Although much remains to be learned, anesthetics clearly produce their effects by disrupting operation of the global workspace—i.e. by preventing the precise temporal coordination of neuroelectric activity across large-scale thalamocortical networks that is deemed necessary by contemporary systems neuroscience for the occurrence of conscious experience.

Section III, "Coma and Related Conditions," contains eight chapters. These are mainly clinical in orientation and with one possible exception noted below broadly consistent with the general global-workspace picture



developed in earlier chapters. Chapter 11 by G. Bryan Young deals with coma, and covers precipitating conditions plus issues surrounding differential patient diagnosis, prognosis, and management. Chapter 12 by James Bernat presents his widely accepted concept of human death as brain death—irreversible cessation of the clinically relevant functions of the brain—contrasting this formulation with various alternatives and outlining the required diagnostic and confirmatory tests that are used to determine its occurrence. Chapter 13 by Adrian Owen, Nicholas Schiff, and Steven Laureys focuses on the vegetative state and the potentially vital contribution of neuroimaging techniques such as PET and fMRI to differential diagnosis. Of particular theoretical interest, however, is their claim to have demonstrated, using such techniques, the presence of conscious awareness in patients who are truly vegetative by the standard behavioral and neurological criteria; I will return to this subject later. Chapter 14 by Joseph Giacino and Nicholas Schiff covers minimally conscious states, which have only recently been distinguished from vegetative states and understandably present many of the same difficulties of differential diagnosis, prognosis, and care. These authors emphasize again the increasing role of neuroimaging studies in clarifying anatomical and functional differences between these disorders, and in identifying possible neural correlates of the considerable fluctuations in functional competence that commonly accompany both of them. Chapter 15, by five authors including Steven Laureys, deals with the locked-in syndrome and is strongly clinical in orientation; one point of special interest, however, is that such patients typically show normal or only mildly abnormal EEGs and evoked potentials, unlike persons suffering the more severe disorders of consciousness treated above. Chapter 16, by Pietro Petrini, Eric Salmon, and Paolo Nichelli, discusses degenerative disorders such as Alzheimer's disease and frontotemporal dementia, emphasizing the degree to which the progressive destruction of particular aspects of mind and consciousness mirrors the progressive destruction of anatomical and functional connectivity among disease-specific cortical areas in different classes of patients. Chapter 17 by Andrea Kubler surveys recent work on brain–computer interfaces (BCI), by means of which paralyzed or locked-in patients without usable motor function can interact with the external environment through self-regulation of selected aspects of brain activity.

Accomplishments are so far rather modest, but they are of enormous value to those who need them, and there appear to be possibilities of extending the basic approach to more severely impaired patients such as those in minimally conscious states. In Chapter 18, which concludes this section, Joseph Fins outlines scientific and ethical challenges posed by work with patients suffering from disorders of consciousness, particularly in light of our currently primitive level of understanding, and presents his "pragmatic" approach to managing these challenges in typical neuropalliative care settings.

Section IV concerns "Seizures, Splits, Neglects, and Assorted Disorders," and contains no fewer than 10 chapters. The first of these, by Hal Blumenfeld, surveys the main forms of epileptic seizure (absence, generalized tonic–clonic, and complex partial seizures), all of which produce impairments of consciousness despite seemingly wide differences in etiology, outward form, and accompanying electrophysiology. Relying on recent advances in both electrophysiology and other neuroimaging modalities, he is able to show that these seizures in fact share a common pattern of disrupted activity in key elements of a global network associated with normal consciousness, including upper brainstem and medial thalamus, anterior and posterior interhemispheric connections, and frontal and lateral association cortex. He also underscores the interesting fact that the excessive and abnormal neural synchrony associated with seizure activity, like the *absence* of such large-scale synchronous interactions in coma and vegetative states, is incompatible with normal consciousness. Chapter 20 by Michael Gazzaniga and Michael Miller attempts to summarize decades of work on split-brain subjects, and to explain the astonishing fact that the linguistically competent left hemisphere in such patients shows no awareness that the right hemisphere has gone missing, despite its demonstrated superior capabilities for certain specialized perceptual and cognitive tasks. They do this by assimilating the split-brain case to other known forms of anosognosia such as left-side neglect in patients with strokes of the right parietal region. They conceive of the general situation as one in which an "interpreter" located somewhere in the left hemisphere—a conscious person, essentially—is constantly making up a story about its world based on all the information presently being funneled to it from a vast number of specialized brain modules. Where this interpreter is located and how it operates is not specified. They also offer some speculations about the probably impoverished but conscious experience of the disconnected right hemisphere. I should probably confess in passing that I have always found the split-brain work rather confusing and ultimately uncertain in terms of its bearing on mind/brain relations; see also Nagel (1979:Chapter 11). Chapter 21 by Lionel Naccache on the neurology

of visual consciousness describes how recent studies of neuropsychological syndromes such as blindsight, visual agnosia, and so on, together with associated experimental studies in healthy subjects of the principles they suggest, have led to development of the global neuronal workspace theories of consciousness advanced by himself and various colleagues (e.g., Baars 1997, Crick & Koch 2003, Dehaene & Naccache 2001, Edelman & Tononi 2000, Engel, Fries, & Singer 2001, Varela, Lachaux, Rodriguez, & Martinerie 2001). Chapter 22, by Patrick Vuilleumier, concerns the neurophysiology of "hysteria" or conversion disorder, and asks whether the relatively few neuroimaging studies that have so far been carried out have shed any new light on the central enigma as to how ideas in a patient's mind can produce circumscribed and physiologically improbable effects, such as glove anesthesia, in that patient's body. Indeed, it is noteworthy that this diagnosis is usually applied only after recognized organic or physiological causes of the presenting symptoms have been ruled out. The main generalization from neurophysiological studies to date seems to be that the problems arise somehow within high-level attentional and control systems associated with orbitofrontal and medial prefrontal cortex rather than within the lower-level perceptual and motor processes themselves. Whether this approach will yield anything more than speculative translation of old psychodynamic concepts into modern neurophysiological ones remains to be seen. Chapter 23 by Olaf Blanke and Sebastian Dieguez covers out-of-body and near-death experiences. In the *Boundaries* volume these topics had been covered separately, with Blanke writing the OBE chapter from a relentlessly reductive-physicalist point of view and Chris French, widely regarded as a moderate skeptic, writing on NDEs in critical but open-minded fashion. French's replacement by Blanke immediately struck me as an ominous development, and indeed this new combined chapter proved to be profoundly unsatisfactory for reasons I will explain shortly. Chapter 24 by Bradley Postle, titled "The Hippocampus, Memory, and Consciousness," reviews (with special reference to the celebrated patient Henry M.) the highly selective effects on various types of memory as well as imagination and consciousness that result from injury to structures in and around the medial temporal lobe. Chapter 25 by Chris Butler and Adam Zeman surveys three clinical syndromes of transient amnesia—transient global amnesia, transient epileptic amnesia, and psychogenic (hysterical) amnesia—and what is presently known about their etiology and impacts on memory and consciousness. Chapter 26 by Paolo Nichelli examines effects of various forms of aphasia on working memory, inner speech, error monitoring, and consciousness, using Alan Baddeley's multicomponent model of working memory as a theoretical framework. Chapter 27, "Blindness and

Consciousness," by Pietro Pietrini, Maurice Ptito, and Ron Kupers, surveys a variety of clever neuroimaging and transcranial magnetic stimulation (TMS) studies in blind and sighted humans, as well as some neurosurgical studies with animals, to explore issues related to sensory overlap and substitution, cortical plasticity, and the abstract or "supramodal" character of cortical representations of the perceptual world. With regard to the latter, for example, parts of the dorsal or "where" pathway in the visual system are activated by apparently moving *auditory* stimuli as well as similarly moving visual stimuli, and this occurs in congenitally blind or early-blind subjects as well as sighted ones, indicating that the auditory effect is not mediated by visual imagery. Visual cortex in congenitally blind persons can become involved in a host of perceptual and cognitive tasks not normally associated with visual cortex, and this appears to occur primarily by unmasking and reinforcement of preexisting connections rather than generation of novel ones.

Chapter 28 by Giulio Tononi and Steven Laureys, titled "The Neurology of Consciousness: An Overview," appears as the final chapter of Section IV, but it could easily have constituted a separate Section V on its own. It is by far the longest chapter in the book, masterfully summarizing information presented in earlier chapters and integrating it with a still larger range of neurological and neurobiological research and theory. To indicate its impressively rich and thoughtful contents, I can do no better than to quote their own Abstract:

> First, the chapter reviews the evidence suggesting that consciousness can be dissociated from other brain functions, such as responsiveness to sensory inputs, motor control, attention, language, memory, reflection, spatial frames of reference, the body, and perhaps even the self. The chapter then summarizes what has been learned by studying global changes in the level of consciousness, such as sleep, anesthesia, seizures, and vegetative states. Next, it asks what can be said at this point about the role of different brain structures in generating experience. Then dynamic aspects of neural activity are discussed, such as sustained vs. phasic activity, feedforward vs. reentrant activity, and the role of neural synchronization. The chapter ends by briefly considering how a theoretical analysis of the fundamental properties of consciousness can complement neurobiological studies. (p. 376)

The specific "theoretical analysis" referred to here is the information integration theory of Tononi (2004) and subsequent refinements, but as the authors acknowledge this is one variant of a larger class of global neuronal workspace theories having a great deal in common. Tononi thinks that his theory has certain advantages over the others (p. 405), but I am skeptical of this and in any case what matters more for present purposes is the deep

commonalities among them. Specifically, despite differences in detail, all hold that the kinds of complex, unified experience that constitute normal waking consciousness require, as a necessary condition of their occurrence, an intact brain capable of sustaining large-scale cooperative neuroelectric interactions linking widely distributed regions of the thalamocortical network at frequencies extending into the gamma range. Furthermore, they all agree that these neurophysiological conditions are abolished in largely parallel ways under a variety of conditions in which consciousness is severely attenuated or abolished, including coma and vegetative states, deep sleep, adequate general anesthesia, and cardiac arrest. This general picture constitutes the central take-home message of the book, and it has continued to develop and flourish in the more recent neurobiological literature (e.g., Dehaene & Changeux 2011, Edelman, Gally, & Baars 2011, Siegel, Donner, & Engel 2012).

Having described as best I can in such short compass the great strengths of this book, let me turn now to some defects, starting with minor ones. The book was typeset in India and printed and bound in China, and although this process undoubtedly helped keep the price down it somehow resulted in an unusually large number of misspellings and grammatical oddities. Production people or perhaps even the editors themselves could also have done more to improve numerous sentences written in non-English (especially German) syntax, and to fix missing or incomplete references. I also wish they had not used numerical referencing, which saves space but makes it much harder to locate work by particular authors.

A slightly more serious issue concerns the wide variation among chapters in terms of clinical versus theoretical emphasis. Some chapters, particularly in Sections III and IV, are sometimes so densely packed with clinical jargon as to be nearly unintelligible to someone not specifically immersed in the corresponding medical specialty.

Most serious by far are issues related to doctrinal control. This is a book totally committed a priori to the standard mainstream view that mind and consciousness are generated, without residue, by physical processes occurring in brains. Thus for example Laureys declares in his Preface (p. ix) that it "tackles one of the biggest challenges of science; understanding the biological basis of human consciousness." A little further on he says without qualification that "You are your brain," ironically citing Wilder Penfield in this context without mention of Penfield's well-known dualist sympathies. Similarly, Allan Hobson in his Prologue (p. xi) proclaims that "Consciousness, like sleep, is of the Brain, by the Brain, and for the Brain. A new day is dawning." Dissenting views and evidence potentially threatening to the classical physicalism giving rise to these triumphal proclamations are

apparently not to be tolerated, and in fact are systematically and I presume deliberately excluded from the book.

The exclusions take two main forms. The first involves editorial decisions about what topics to include in the book and what to leave out. Widely shared and increasing philosophical doubts about physicalism, for starters, are nowhere mentioned, and the "hard problem" is never confronted (Chalmers 1996, Koons & Bealer 2010). I was also disappointed, although not surprised, that states of consciousness represented in the book range almost exclusively *downward* from normal waking consciousness, with scarcely a mention, let alone discussion, of things such as mystical or even psychedelic states.

Much more distressing, however, is the treatment within the book itself of evidence discordant with its central point of view. There are a number of relevant examples, but I will focus here on two in particular. The first concerns the claims made in Chapter 13 and elsewhere about conscious experience occurring in vegetative states. This claim was initially advanced by Owen, Coleman, Boly, Davis, Laureys, and Pickard (2001), who carried out fMRI studies with a female victim of traumatic brain injury from a car accident. This patient strictly satisfied the current diagnostic criteria for persistent vegetative state (PVS), including in particular total behavioral unresponsiveness. The key finding was that when she was asked to imagine playing tennis, or walking around in her own house, distinct patterns of cortical "activation" appeared that strongly resembled those produced by the same instructions in normal awake subjects. The investigators argued, and continue to argue, that this demonstrates conclusively the presence of conscious awareness in otherwise totally unresponsive persons. They have subsequently discovered several additional cases of similar type (Monti, Vanhaudenhuyse, Coleman, Boly, Pickard, Tshibanda, Owen, & Laureys 2010), but it is worth mentioning in passing that all of these involve traumatic brain injury rather than the sort of global anoxia resulting from cardiac arrest.

Several things need to be said about this. First, I do not find their argument compelling, either logically or evidentially: logically, because we do not know enough about the limits of unconscious processing to be so confident that conscious awareness necessarily accompanied the fMRI effects seen in her brain; evidentially, because we are told very little about the baseline condition of that brain in terms of physical damage, metabolic status, and neuroelectrical output both resting and stimulus-evoked. It certainly doesn't help that Steven Laureys was apparently duped by "facilitated communication" into thinking that the Belgian PVS patient Rom Houben had really been fully conscious during the 23 years following

his car accident (Boudry, Termote, & Betz 2010). What would be really convincing, of course, would be for the patient herself to wake up and report remembering the experiments, but so far as I know that hasn't happened and is unlikely to happen. The more fundamental and interesting point, however, is this: If that patient (and others like her) can be more or less fully conscious under conditions in which the global workspace has really been functionally degraded in the devastating manner characteristic of vegetative and comatose states, then global workspace theory as currently formulated is *false*. That important possibility goes unnoticed in Chapter 13 or anywhere else in this book.

The same possibility arises, of course, in any other condition in which the global neuronal workspace becomes functionally disabled, and this leads to the second and more important example, the chapter by Blanke and Dieguez on OBEs and NDEs. By way of background, let me say first that in Chapter 6 of *Irreducible Mind* (Kelly, Kelly, Crabtree, Gauld, Grosso, & Greyson 2007) we made an explicit argument of the type just indicated, and did so in the deliberately chosen context of OBEs and NDEs occurring in conjunction with deep general anesthesia and cardiac arrest. We made that choice specifically because it is relatively straightforward in such cases, as compared with cases of the sort above that involve traumatic brain injuries of incompletely known, uncertain, and probably fluctuating sorts, to demonstrate that complex, profound, and life-transforming experiences can and sometimes do occur under conditions in which the global neuronal workspace has been unambiguously disabled, and in which contemporary mainstream neuroscience therefore decrees that no experience of any sort, let alone *that* sort, should be possible. This conflict is head-on, profound, and in my opinion inescapable (see also Holden, Greyson, & James 2009, van Lommel 2010).

Blanke and Dieguez, however, do not see it that way, and although they certainly know of this argument they do not deign even to mention it, let alone discuss it. Instead, they try desperately to evade it. Their chapter amounts to an update of Blanke's original unsatisfactory treatment of OBEs in the *Boundaries* volume, now extended to cover NDEs in parallel reductive fashion. For them the conventional production model of brain/mind relations is proven, axiomatic, unquestionable. In forcing OBEs and NDEs into that framework, however, they necessarily do violence to the data at a number of critical points. In discussing cases occurring under general anesthesia, for example, they try to evade the disabling of the global workspace by making the astonishing suggestion (p. 308) that all such patients must in fact have woken up during the surgery due to inadequate anesthesia. Now it is undoubtedly true that there have been some patients

who woke up during surgery and then had an OBE or NDE in connection with that experience, but in general these are very different states with radically different phenomenologies and sequelae and very little overlap. Surgical awakenings are in the vast majority of cases highly traumatic events characterized by total paralysis, fear, panic, pain, and helplessness, with a legacy of resentment and high rates of post-traumatic stress disorder; only a tiny minority include OBEs or NDEs, and it is surely little wonder that one would do anything possible to escape such terrifying circumstances if means were available! All of this is heavily documented in our chapter in *Irreducible Mind*. Blanke and Dieguez even ignore the main message of a case which they themselves cite approvingly (Lopez, Forster, Annoni, Habre, & Iselin-Chaves 2006), one involving a teenage boy who during one operation had an unpleasant awakening, and during another a typical NDE without awakening. The authors of that paper, as well as the boy himself, clearly recognized that inadvertent surgical awakenings and NDEs are utterly different phenomena that need to be clearly differentiated; why can't Blanke and Dieguez?

Moving on to NDEs occurring in conjunction with cardiac arrest, they make another astonishing and in my opinion scientifically indefensible move. Specifically, they assert (on p. 315 and elsewhere) that in studies such as that of van Lommel, van Wees, Meyers, and Elfferich (2001), we really don't know whether patients were unconscious or what sort of condition their brains were in. Why not? Because full neurological and EEG examinations could not be performed *on those particular individuals* under the demanding conditions of resuscitation. With all due respect, that is pure evasion: The presence of cardiac arrest or ventricular fibrillation is determinable with complete reliability from EKG records, which van Lommel et al. had for all of their patients, and the consequences of such events for cerebral physiology are also known in detail and with high reliability from a large number of previous experimental studies in both animal and human subjects. These consequences are spelled out in considerable detail both in our chapter and in van Lommel (2010), among other places, and they are unquestionably tantamount to total disabling of the global neuronal workspace during the period of arrest.

The only remaining way to try to circumvent this argument is to argue that the experience actually occurred at another time, usually either before full arrest or during recovery from it. This move is blocked by subjects' verifiable reports of events occurring during the period of unconsciousness, but of course Blanke and Dieguez give no credence to any such reports, or to anything paranormal for that matter. Cases such as that of Pam Reynolds are not even mentioned in their chapter, unlike Chris

French's in the *Boundaries* volume. They also totally fail, again unlike French, to come to grips with the hyper-reality, enhanced mentation, and transformative impact characteristic of deep NDEs. Instead, like many previous reductively inclined commentators, they wear on at length, with abundant but largely irrelevant citations of neurological literature, about alleged phenomenological similarities and hence "links" between NDEs and sundry other syndromes of known etiology. We've seen this approach before, and we and many other commentators have pointed out numerous deep flaws in it, but to hear Blanke and Dieguez tell it there's only one scientifically proper way to think about the matter, and that's *their* way, as if no such problems had been discovered. This is not genuine science, in my opinion, but rather a quasi-religious scientistic defense of a dogmatically held a priori opinion. I think Chris French himself also underestimated the challenge posed to current neuroscientific thinking by OBEs and NDEs, but he at least was willing to look at actual evidence and think about its possible meaning. Blanke and Dieguez are apparently incapable of that.

What should be the governing principle here was stated forcibly by Francis Bacon (1620/1960) at the beginning of the scientific era: "The world is not to be narrowed till it will go into the understanding . . . but the understanding to be expanded and opened till it can take in the image of the world as it is in fact" (Bacon 1960:276). What is ultimately at stake here is correct interpretation of the intimate mind–brain correlation that everyone agrees holds under normal conditions of conscious mental life. From a historical point of view it is perfectly natural to interpret this correlation exclusively, as current mainstream thinking does, in terms of production of the mental by the physical, and it is certainly appropriate and desirable that this point of view be developed as vigorously and fully as possible. The volume under review does that for the most part in a sophisticated, wide-ranging, and up-to-date way, and for that reason I strongly recommend it. But in the examples cited I think we also see facts that are not readily accommodated by the standard view, and that could make better sense in terms of an alternative and broader interpretation proposed by James (1900) and Myers (1903), among many others, according to which mind normally operates in close coordination with the brain as a sensorimotor organ, but has features and capacities that cannot be explained in conventional physicalist terms. It is only by honestly and squarely facing potentially decisive facts of the sorts described above, and many others like them (Kelly et al. 2007), that we can hope eventually to arrive at the correct view, whatever that might be. As Myers himself cautioned, "Our notions of mind and matter must go through many a phase as yet unimagined."

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