BOOK REVIEWS

Jill Bolte Taylor: *My Stroke of Insight: A Brain Scientist's Personal Journey.* London: Hodder & Stoughton, 2008. ISBN: 978-0-340-98048-4, 183pp., £12.99.

There is an increasing proliferation of personal accounts from those who have survived acquired brain injuries of many kinds. All are extremely important, placing the survivor's subjectivity firmly within the public domain—an essential accompaniment to the burgeoning neuroscience literature that, while fascinating, often objectifies.

Within the body of first-person accounts, a number have been written by neuroscientists, medics, and/or mental health professionals who have sustained a brain injury or other neurological condition. A useful compendium for these narratives has been provided by Narinder Kapur (1997) in his *Injured Brains of Medical Minds*.

My Stroke of Insight by Dr Jill Bolte Taylor is the latest addition to this genre, and her perspective is unique. Prior to her left-sided hemorrhagic stroke, she was a neuroanatomist. Indeed, she had initially turned to the level of anatomy to understand and explain schizophrenia. From growing up with a brother diagnosed as schizophrenic, Jill's life moved toward the dissection and analysis of postmortem brains to develop a biological account of psychosis, alongside an impassioned teaching of neuroanatomy to college students.

It is from this radical materialist position that Jill sets about narrating, explaining, and recovering from her stroke and the severe communication difficulties that it initially created. The first few chapters present a basic grounding in neuroanatomy with a strong lateralization focus, establishing a dominant lexicon for the rest of the book. This is then followed by three chapters that trace the minutiae of her subjective experience of the acute phase of a left-hemispheric hemorrhage (originating from an arterio-venous malformation, AVM, within the left middle cerebral artery territory, a left perisylvian focus with the resultant hematoma covering left superior temporal and inferior and middle parietal cortices). I have never read or heard such a rich, eloquent, and fascinating account of the acute breakdown of cognitive, symbolic faculties concurrent with physical debilitation that characterizes this kind of stroke during the first hour of onset.

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We follow her heroic yet frustrated attempts to seek help, isolated in her home, as her sense of intentional, personal agency, together with mnemonic communicative faculties are slowly disappearing. These chapters alone are worth buying the book.

Within these chapters is also the introduction of an unlikely bedfellow for neuroanatomy—a language flavored by Eastern mysticism and mindfulness meditation. Jill describes the shutting down of her left-hemispheric language and symbolic centers during the stroke as allowing the new dominance of her right hemisphere in her subjectivity. She described this state as the experience of nirvana and enlightenment, suddenly aware of the whole universe, the ebb and flows of energies through the fabric of everything, and the awareness that the vessel of her body is but a temporary part of this fabric through which her life force passes for a lifetime and then proceeds on in its infinite journey.

Neuroanatomy is then brought back into dialogue with the universe. Jill presents a lateralist account of right-hemispheric gestalt and parallel qualities in its artistic processing of information, seeing the bigger picture and the fluid interrelatedness of things, free of categorical limitations and contradictions. This is then contrasted with the left hemisphere's "preferences" for sequential, linear processing, details, categories, and logic.

We are taken through Jill's time in hospital and immediate return home for two and a half weeks prior to her return into medical care to have the hematoma lying across her left hemisphere surgically evacuated. Following this successful procedure, her experience of post-acute recovery and rehabilitation is outlined, up to the point of returning to lecturing and teaching duties. We are then taken to a retrospective position eight years on, where Jill informs us that she has recovered all mental and physical functions—a rare claim among stroke survivors.

During this narrative, a central theme is Jill's priority of retaining the enlightened "right-hemisphere" perspective as her left-hemisphere abilities return to function. Subjectively she describes this as holding on to the bigger picture, mindful of the beauty of life and the world in the present, as her reemerging left-hemispheric symbolic functions coax her back into negative and narrow-minded thinking. This is her position on emotion poststroke—something that has wasted time and experience in her life pre-injury, and endangered her recovery post-injury, to be viewed with suspicion.

As a clinician-reader, I was both frustrated with this

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position but also valued one of the messages within it. Her emotional experience was always framed as something to minimize, rise above, etc. As a result we heard very little of darker times and more difficult moments, which I feel would be useful to other stroke survivors and people with aphasia who would read this book. When she does mention these experiences, they are invaluable. Following the comforting embrace of the enlightened state during the onset of the stroke, she described the horror of returning momentarily to her left-hemispheric perspective, experiencing disability, confusion, lack of meaning, and pain. She retreated back into the cosmic bliss while trying to retain enough mental agency to engineer her rescue.

Similarly, we only briefly and infrequently heard about emotions within relationships during her recovery—in contrast to the loving, nurturing, and sustaining care provided by her mother, Jill described the stark differences in interpersonal manner of the treating clinicians. Analogous to the imagery of the novel *The Celestine Prophecy* (Redfield, 1993), Jill described how some clinicians parasitically sapped her energy in their dehumanizing objectification of her, while others, in their respect for her dignity and I–Thou relating, nourished her personhood. This is a great account of projective identificatory processes within acute neurological care. While Jill emphasizes the individual subjective experiences of communication difficulties following her stroke, it is only here that we hear about the frustrating negotiation of self and dignity with others for someone with aphasia—this can be a lifelong endeavor for some (see www.ukconnect.org), and a longer-term perspective on this ongoing task would have been useful throughout the book.

Jill also described an increased sensitivity to the emotions of others poststroke. I personally believe this is a very important observation. I keep hearing a discourse from many brain-injury survivors of increased emotional sensitivity, interpenetrability with the emotional minds of others, a mystical opening of their third eye. Such accounts are presented even when some fail neuropsychological tests of mentalizing, emotion recognition, and other abilities related to empathy. I do not personally know what this all means as yet, but I am glad someone has put this experience in print. I would have liked to hear more about emotions and dealing with people, throughout all of the eight years poststroke. While Jill can recourse back to neuroanatomical materialism and consolidate her own professional identity in the process, other stroke survivors may find an emphasis on the psychosocial to be a more valuable and longer-term resource in their own personal journeys of recovery and adjustment.

Neuroscientist readers will find the continual focus on left- versus right-hemisphere functioning an outdated limitation and may be interested in why subcortical and mesial cortical interconnected circuits are not mentioned—all part of the emotional experience to be kept in check, it seems. Jill locates her ego, its passions, and unhelpful complexes within the left perisylvian area of neurological damage, very different from the primary-process quality of its contralateral hemispheric neighbor. This is an interesting assertion when read alongside Karen Kaplan-Solms and Mark Solms (2000). Their hunt for ego functioning amid the aphasias in the comparison of psychoanalytic treatment for patients with differing neuroanatomical lesions led them to the anterior, bilateral function of the frontal cortices.

However, Jill's sensuous account of her mindful state and its role in coping poststroke does have much to offer other survivors. Many clinicians working within time-limited therapy models are interested in mindfulness meditative techniques and mindfulness-based cognitive therapy as an alternative to traditional cognitive-behavioral therapy approaches for survivors of brain injury. It may be that for people with working memory, attentional, and executive difficulties, thinking positive thoughts can be equally effortful and as dominating of mental resources as the influence of negative automatic thoughts. Better, then, to help people disengage from ruminative thoughts and worries, anchor themselves in their embodied experience, and free up valuable mental space Encouraging results of mindfulness practices following brain injury have been reported by Bedard et al. (2008). To see a similar focus prioritized in a survivor's account is invaluable, and I have already recommended this book to a stroke survivor engaged in mindfulness practice. This may be a beginning of an important dialogue between survivors and clinicians concerning the mystical and/or consciousness dimension of post–brain-injury subjectivity.

The final recommendation is Jill's effective use of her academic and lecturing skills in constantly supplying digestible and accessible information throughout the book, in the form of Internet links for key organizations/topics, clear diagrams, and frank bulleted recommendations, at the back of the book, for survivors and clinicians. This is a great account, introducing some important new themes into the literature of poststroke subjectivity. I would love to read a follow-up of the day-to-day survivor struggles of emotional change and dealing with people who may objectify those with communication difficulties rather than engage and connect. But for now, buy this book.

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Avi Peled: *NeuroAnalysis: Bridging the Gap between Neuroscience, Psychoanalysis and Psychiatry.* New York; Routledge, 2008. ISBN: 978-0-415-45133-8, 150pp., £15.74.

While you are reading these lines, you change. Your eyes by means of their retinal cells scan the page, the cells detect the lines and dots of what is printed here, react with an outburst of action potentials, which in turn activate layers of cells in the upstream electrical current whose biochemical–electric discharges, after activating even more cells and passing several more relay stations in the backyards of your brain, finally culminate somewhere in the columns of your sensory cortex, and then these impulses and the patterns they produce are interpreted by cell ensembles located in the areas they call "Wernicke" and "Broca" as words that—hopefully—will transform your actual psychic status into one that gives you the impression (again due to another process somewhere else in your brain) that what you are doing makes sense to you. To whom? Consider yourself a conglomerate of interconnecting cells, forming tissues of different kinds, and, especially, nervous tissue. If you are still following me, you can be fairly certain that a sufficient amount of partial processes, all of which are unconscious, have produced what is called a "global brain state" that is a conscious experience—namely, "you" reading what "I," in a similar state, have written into my PC on a grey October afternoon. Lots of other partial processes in your brain, consisting of neural networks of cell assemblies with reentrant connectivity, dealing with a lot of things that are also important, didn't make it into that brilliant global state you are in now. They are dismissed or "repressed," for that matter. The result is that at this very moment you are not concerned about the rent you have to pay or your dog that destroyed your neighbor's garden. You feel much more comfortable, I hope, reading this review—actually, you come into existence as the "you" experiencing yourself consuming my thoughts about this book by reading these lines.

As you may assume, and rightly so, I have tried to give you an impression of how it might sound if we attempt to describe how the process of reading an article might come across in neuronal terms. Of course, this is very superficial, and the details of which proteins, which electrolytes, which synapses, which cell assemblies are concretely involved and in what type of interaction they find themselves would probably fill a very thick book. Let alone that probably even then we could not explain what a "thought" or a "feeling" is in its very essence neuro-scientifically. As Avi Peled declares in his small book, this is not his goal. Rather, he gives you a short account of some relevant concepts of both neuroscience and psychoanalysis in an attempt to make a crossing—a leap that Sigmund Freud, as many psychoanalysts now believe, would have happily taken, were he alive. It is an old dream of his, as stated in the "Project" (1950 [1895]), that at distant times the neurological–biological basis for the matters of the mind might be discovered and described, with numerous consequences for the therapy of mental disorders in general.

That Peled comes from a psychiatric and behavioral therapeutic background can be easily seen through his thoughts on schizophrenia and major depression. From their symptoms—for example, hallucinations, delusions, distractions of thought processes, etc.—you may well conclude that some breakdown in brain connectivity has occurred. Peled tries to systemize the various possible underlying disturbances and perturbations either with connectivity issues or hierarchy balances or imbalances between brain modules and centers. This leads him to a diagnostic system of building blocks culminating in overarching terms such as *Neural Complexity Disorders (NCD)*, *Neural Resilience Insufficiency (NRI),* or *Context Sensitive Processing Decline (CPD)*. Impressive terms indeed if you consider that they attempt to encompass a spectrum of psychic calamities that are most painful for the individuals affected. Taking into account the diagnostic assessment the psychiatrist using this instrument would have to follow—that is, giving values in numbers to certain aspects of psychic functions like "anxiety," "abulia," "delusion," and the like (i.e., detected = 1, nondetected = 0, questionable = 0.5, plus a so-called coefficient factor "w")—you get an impression of how far away we have got from a clinical interview based on affective understanding and insight, or transference and countertransference.

What follows from this diagnostic approach are considerations about treatment. Focusing on the idea that "synaptogenesis" will improve flexibility and connectivity in the brain and that this by itself will reduce the deteriorations in connectivity and hierarchical balance from which a less perturbed brain state will result, Peled then proposes measures on how to foster "synaptogenesis": pharmacotherapy for sure (there is a whole chapter about the substances involved); but also Virtual Reality Technology (VRT). Imagine a schizophrenic patient, haunted by the persecutory idea that the FBI is after him; you put him, just like in a computer game, into a virtual environment where he is introduced into the FBI headquarters. Everybody he meets is friendly to him, offers answers to all his questions—you get the idea. Peled's prediction is that after several of such VRT sessions, the schizophrenic's brain will reduce the top-down bias that pervades his cognition; persecutory ideas will vanish as connectivity is improved in orderly measures. This is kind of a modified exposition therapy, common in behavioral therapy. An even more sophisticated procedure is the Transcranial Magnetic Stimulation (TMS) pacemaker, the milder form of Electro-Convulsion Therapy (ECT); the idea behind this is to literally "manipulate" brain areas. The combination of these methods, Peled claims, will lead to a much faster recovery from such psychiatric disorders. For a psychoanalyst like me, it is almost unbearable to see him compare this kind of "manipulation" with psychotherapy: "It should be noted that conventional psychotherapy is also a type of manipulation of experience (in the form of interaction with the therapist)" (p. 97). If interaction with the environment (in which the primary caregivers surely belong) is indeed crucial for the establishment of balanced connectivity, as is widely accepted by now in the neuroscientific domain—is this manipulation? As attachment and education indeed shape the brain, you

may say so. But what we still believe in is that nature and nurture both account for the development of a human being. Therefore, it is a shortcoming of this book that Peled equals, for example, "chaotic" environmental influences with a fragmented and disintegrated connectivity pattern in the brain. There are indeed numerous examples in the history of psychiatric and psychoanalytic case studies where individuals with a chaotic and/or traumatic background develop into fine—and integrated—examples of human beings. There is more in the brain than tissues with issues of connectivity. The emergent property of the brain is a human psyche, once again demonstrating how capable it can be in overcoming dramatic circumstances. After all: thinking of all the trouble this species had to go through in its millions of years of evolution (and it still does), it is awesome indeed that in all the chaos our brain evolved with capacities to make some sense of it . . .

The book closes with case studies. For the psychodynamically orientated reader these studies offer no deeper understanding of the psychic development of the patients. Rather, they give an account of the symptoms, the way these are rated in the author's diagnostic brain map, and the resulting therapeutic approach.

I cannot judge the validity of Peled's system; what alienated me, though, was to find psychic conditions reduced to levels of neuronal connectivity disorders and imbalances of hierarchy. It seems to me that the logical conclusions he draws from his theory of NeuroAnalysis turn mental states into mere functionality issues, to be cured by a therapeutic reasoning concordant with this assumption: that you are what your brain does dependent on the variations of optimized or de-optimized brain states. There is no doubt that neural connectivity is at the biological basis of brain/mental functioning. But it is one thing to realize and acknowledge this, and yet another to make it the basis of your therapeutic approach. And therein lies the true missing link in his attempt to cross the leap: the role and meaning of an object relation. Let us return to the example of the schizophrenic patient who feels persecuted by the FBI. In Peled's version, it is a matter of applying VRT to "convince" him (i.e., "reset" his disturbed brain functions) that his feelings are delusions and do not reflect reality. His symptom is treated as if it were a matter of cognitive failure, biased by some strongholds of Hebbian synapses, probably in the limbic system, that override the incoming information. We know now that even in a behavioral therapeutic approach the relationship to the therapist is crucial for the success of the therapy. So it may well be that this method is successful. But it may also happen that the method itself is experienced by the patient as an even trickier persecutory action by the FBI—for example, accusing the therapist of being a "special" special agent. What do you do then? Set up just another VR and replay the scene with a modified plot? The problem, then, is not primarily rooted in a cognitive disturbance but in a need to defend against certain inner anxieties that are projected into the environment. How do you account for such a thing as projection in terms of neural connections? I would say it is impossible. Perhaps it is; but where does it lead you? You still have to deal with a person, the emergent property of a disturbed brain, deeply convinced that you are after him by the work of splitting and projection in order to keep him sane—or at least he hopes so.

In my view, this book is not the jump necessary to cross the gap between neuroscience and psychoanalysis. It offers a concise method to categorize symptoms of psychiatric disorders, correlates them to the possible dysfunction in the underlying neural layers and their interaction, and comes to conclusions for a neuropsychiatric, behaviorally oriented form of treatment. For the psychiatrist interested in such an approach, it gives an insight into how this can be achieved. But for the therapist with a more psychodynamic orientation it misses the point, as the conclusions offered are beyond what dynamic psychotherapists are dealing with. Avi Peled's views are interesting to know—but you do not need to know them in order to work as a dynamic psychotherapist.

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Louis Cozolino: *The Neuroscience of Human Relationships: Attachment and the Developing Social Brain.* New York: W. W. Norton, 2006. ISBN: 978–0393704549, 272pp, £25.

Recognizing that neuroscience has historically emerged from studying the brain in an asocial context, *The Neuroscience of Human Relationships* criss-crosses the terrain from neurons to neighborhoods in an effort to place the "social synapse" at center stage. As a psychotherapist with a command of the neuroscientific literature, Louis Cozolino offers a comprehensive introduction to how our brains shape each other's. Just as a single neuron does not exist in isolation, we cannot discuss brain development without interpersonal context—an argument that is flanked by both scientific and clinical examples throughout the book.

Cozolino makes clear from the outset that he is addressing those who don't wander through their days thinking about brain function. His book, with its clear and casual prose, interweaves a wide spectrum of neuroscience with psychotherapeutic insight. Each chapter begins by reviewing a topic from a neurobiological perspective and closes with a relevant clinical encounter. This refreshing structure draws the reader into a soothing oscillation of pedagogy and narrative, thereby offering a memorable demonstration of the neurobiological concepts.

For those of us who do in fact wander about during our days thinking about brain function, Cozolino provides extensive citations (85 pages of references), as well as clearly structured tables and schematic figures. As a cognitive neuroscientist, I found the book to be an engaging review of

functional neuroanatomy and a rigorous introduction to neuroscientific perspectives on the social realm.

The first two sections of the book offer a general introduction to neuroanatomy and questions surrounding the neural processing of social interaction. The third section describes various aspects of attachment with respect to brain development and function. Cozolino goes on to discuss the perceptual elements of social interaction in the fourth section, detailing fascinating topics such as pupil dilation, blushing, and eye contact. While I would have liked to see blink-rates addressed as well, the topics addressed offer a judicious review.

The fifth section tackles disorders of the social brain such as anxiety, interpersonal trauma, social phobia, borderline personality, psychopathy, and autism. Here, Cozolino also addresses the developmental basis of shame in early social memories, situating it as the embodied experience of "being shunned and expelled from social connectedness" (p. 234). From a physiological standpoint, this experience is characterized by a rapid shift from sympathetic to parasympathetic dominance. While prolonged shame may impact the development of affective regulation and the brain's attachment circuitry, Cozolino explains that healthy autonomic regulation can be returned to a balance through attunement with caregivers.

I found the chapter "From Neurons to Narratives," which opens the final section, to be the most conceptually creative for the author's use of a neurobiological concept as an analogy for human social behavior and adaptation. He proposes a model of human social connection based on the three messenger systems of neuronal communication. These systems are: (1) exchange of information via neuromodulators, (2) modification of internal biological state, and (3) transcription of mRNA and modification of neuronal structure. Drawing a parallel between the neuronal synapse as the point of interneuronal interaction, Cozolino describes interpersonal communication in terms of a corresponding three-part model that constitutes communication across the "social synapse." This model of communication gives a framework for discussing and researching the impact of the social world on our individual brains.

By the end of the book, every region of the brain has been conceptualized through the filter of its role in social function. As would be expected, the obvious candidates such as the orbitofrontal, anterior cingulate, and insular cortex receive extensive discussion. However, Cozolino offers several unanticipated examples. For example, the cerebellum, often only discussed in the context of motor control and procedural learning, made an unexpected appearance in the chapter on autism and the asocial brain through its potential role in autonomic visceral regulation. I was also happy to learn of the vomeronasal organ known as Jacobsen's Organ, which is involved in pheromonal communication. Although present in humans during gestation, it is thought to become a vestigial structure early in life. The function of such a neural structure in adult function is still unclear, but it may play a significant role in early bonding.

The reader is left with a solid introduction to systems neuroscience with respect to emotional and social processing and a vocabulary with which to describe the neural aspects of interpersonal interaction. Along the way, the intimacy in the author's stories makes it an enjoyable read. For instance, in order to illustrate the concept of resonance behaviors, Cozolino describes his own experience practicing aikido. During a memorable encounter with a 70 year-old aikido master, he found himself quickly toppled to the mat without ever having made contact with his opponent—the impact of the man's gestures on his own response were enough to set Cozolino off-balance.

One aspect that will no doubt be of interest to a psychoanalytically interested reader is that throughout the book Cozolino discusses the impact of early childhood relationships on the social circuitry of the brain, specifically addressing the caregiver–child interaction. Although much of the book's content is of implicit relevance to linking neuroscience and psychoanalysis, it is in his chapter on implicit social memory that psychoanalytic theories make two of their rare explicit appearances. The superego is defined by Cozolino as the "early implicit memory of our experience of how our parents experienced us" (p. 132). Transference is also addressed as the process through which implicit social memories impact on our contemporary relationships. Although some may find these definitions simplistic, by drawing psychoanalytic theories into concepts founded on social memory, Cozolino is also able to elaborate their neural correlates and link them within his larger framework of social brain function. Cozolino's tactic here, of using neuroscientific perspectives on the social brain as a foundation for linking various psychotherapeutic theories, becomes clear when he argues in the final section for a common clinical dialogue based in neuroscience.

While Cozolino embraces neuroscientific knowledge as a potent explanatory model, he also offers an essential critique that would be well heeded by practicing neuroscientists: "Neuroscientists already know that an individual neuron does not exist in nature. When designing their experiment, they now need to remember that this is also true of rats, monkeys, and humans" (p. 301).

In what I found to be a more contentious proposal, Cozolino argues in the final section for the translational role neuroscience can serve in unifying the diverse therapeutic community. Although the possibilities for neuroscience to eventually offer an underlying basis for interdisciplinary communication are attractive, I believe it is important to recognize that neuroscience is further from consensus on many theories of brain function (especially with respect to higher functions of the prefrontal cortex) than we would prefer to believe. To assume a universality of neuroscientific knowledge, while certainly a goal of the field, may be an idealization at this stage.

While the narrative weight of neuroscientific perspectives makes for convincing clinical interpretations, we currently arrive at these interpretations through interpersonal interaction—brain-based narratives are only overlain post hoc. Until neuroimaging can be a part of psychotherapeutic diagnostics, we should remember that our models of brain function serve as models within our own theoretical frame-

works. It is difficult to imagine how dysfunction of a neural system could serve as an effective translational language between different clinicians until the day that functional neuroimaging technologies are commonplace in diagnostic practice. Nonetheless, the importance of brain-based models for clinical encounters should not necessarily be completely dismissed on those grounds.

What is of clear clinical relevance for Cozolino is the value of putative brain-oriented narratives during the psychotherapeutic process. While psychotherapies may offer a path to healing that is far beyond the scope of the contemporary psychopharmacopoeia, Cozolino presents a theoretical and practical example of how the brain can play a role in the therapeutic process without necessarily resulting in pharmacological intervention. In the case of Joaquin, a middle-aged man who went into therapy due to increasing awareness that a consuming fear was impeding his life, Cozolino offered Joaquin an explanation for how his family's emotional trauma had indirectly affected his own neural development: "Whether or not the story we co-created was accurate, I don't know, but we liked it, came to a tentative belief in its veracity, and were most impressed by its usefulness. We agreed that it not only made sense but provided us with a valuable tool for our work" (p. 112).

Given the increasing role the brain is playing in our self-understanding, a brain-based perspective such as is offered in *The Neuroscience of Human Relationships* may be just the bridge needed for engaging our biological foundations without losing perspective on the sociality that makes us human.

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Leonard F. Koziol & Deborah Ely Budding: *Subcortical Structures and Cognition: Implications for Neuropsychological Assessment.* Newark, NJ: Springer, 2009. ISBN 978-0-387-84866-2 (hbk.), 381 pp., $125.

Although this book would not generally be thought of as having a direct bearing on the relationship between psychoanalysis and neuroscience, I am giving it a review in the Journal for several reasons. First of all, the book is very well written and well organized. Second, it offers a badly needed corrective to corticocentric concepts in neuropsychology of "executive functions" and gives a more balanced and vertically integrated view of what the central neuropsychological concept of "executive functions" might really mean in neural-system terms. The fundamental notion of executive functions is clearly one of the more central bridges between psychoanalysis and neuroscience, and elucidation of the current thinking about this concept from the neuroscience side of the border is critical to better bridge building between the disciplines of psychoanalysis and neuroscience. Clearly, the concept of executive functions has become both central to neuropsychology and a touchstone concept for neuroscience investigations of behavior. Unfortunately, my discipline, clinical neuropsychology, has tended to "cognize" the concept, leading students and the more suggestible among us to believe that *all* aspects of behavior are cognitively organized, and it has also encouraged a second closely related misconception—namely, that all aspects of executive functions are organized in the cortex. Both of these assumptions are very questionable. "Underneath" the more cognitive aspects of executive functions (classically defined as planning, task organization, working memory, cognitive flexibility and set shifting, and cognitive inhibition of automatic modes of responding) and interdigitating with this large group of cognitive operations sit more affective aspects of executive functions. This would include all those fundamental aspects of behavior informed by emotion, which provides core motivational energies for all behavior. Underneath that large group of core emotional processes (see Panksepp, 1998, for a now classic exposition on the small handful of prototype emotional states) reside even more ancient and primitive aspects of behavioral organization organized by homeostasis.

Of course, these three domains of cognition, emotion, and homeostasis are seamlessly integrated in human awareness and behavior (presumably largely through extensive vertical connectivities and also the contributions of critical paralimbic systems that constitute a critical bridge between neocortex and more ancient brain systems), but this vertical integration has unfortunately led to two largely unchallenged assumptions. First of all, it has led thinkers who are more cognocentric to believe that they could collapse all aspects of behavioral organization into cognition, the last layer on the onion. Second, it has led to a related set of assumptions that, instead of cortex working in an intimate partnership with a whole host of more ancient structures, cortex could be understood as *the* prime mover of all behavior, almost in isolation (perhaps with some token acknowledgment of the great dependence of cortex on thalamus). Although this book deals mostly with cognition, and less with emotion proper and minimally with homeostasis, it offers an eloquent rebuttal to both of these pervasive assumptions. Of course, no one who is reasonably sophisticated about the fundamental connectivity of the cortex, or who has done much research on its functions, would be likely to endorse any notion of functional isolation, but within clinical neuropsychology these assumptions unfortunately are rampant.

Unfortunately, too, the saddest corollary to the overemphasis on an image of the cortex as both functionally dominant and largely disconnected from critical subcortical systems appears to be a kind of "species-ism," in which our uniqueness in the animal kingdom is overemphasized, and, correspondingly, the common ground we share with all vertebrates (including probably the experience of pain), and particularly all mammals, is tragically minimized. This is particularly true in relationship to findings from affective neuroscience, where the evidence is that we share a fundamental group of subcortical architectures related to the generation of all prototype emotions such as fear, rage, lust, play, separation distress, etc. (Panksepp, 1998). Although the massive explosion of cognition and language processing clearly transforms prototype emotion in humans, our

cognized emotions retain a fundamental connection to a prototype state. For example, separation distress might be the original prototype state out of which loneliness, sadness, and feelings of abandonment, rejection, desertion, etc., as well as shame and guilt, all emerge. All of these are, in a sense, cognized flavors of separation distress.

This kind of thinking clearly offers a more evolutionarily sophisticated view of the brain, consonant with the basic idea that evolution takes what already works well and, by adding onto or modify existing functions, tweaks it to make it work even better. From this point of view, emotion is not some completely new process that mysteriously popped into existence millions of years ago; rather, it may instead reflect a forward-looking predictive algorithm added to homeostatic processing, an adaptive tweaking of a well-established set of processes. In other words, fear may have emerged from the ability to predict tissue damage and pain in the context of confrontation with predators or members of one's own species. Similarly, one has to assume that cognition emerged presumably as an additional tweaking of what were originally primarily affective operations. This kind of view of function emphasizing vertical integration and phylogenetic continuity is exactly the kind of metapsychology Koziol & Budding appear to embrace. For this reason, readers familiar with the above arguments and familiar in particular with Jaak Panksepp's work will find the view of the cognitive brain in this book quite "simpatico" and a refreshing antidote to the corticocentric climate of more traditional neuropsychology.

Although the book does not deal in any great detail with emotion, it offers a very fine overview, organized around 12 chapters, of the neuroanatomy of cognition, focusing on the basal ganglia and cerebellum and on their intimate relationships with the cortical forebrain. The first chapter offers an outlining of concepts informing the notion of a basic vertical organization in the human brain. The second reviews basic thinking about the basal ganglia and its relationship to prefrontal systems, while the third outlines basic looping corticostriatal thalamocortical networks. The fourth looks at basic learning theory as it relates to the basal ganglia. The fifth summarizes what is known about the anatomy and basic function of the cerebellum. Chapter 6 examines the differences between automatic versus more deliberative modes of executive control, a subject that has obviously special relevance to psychodynamics, where more automatic modes of control clearly have intimate connections to the core concept of defense. Chapter 6 also offers some most interesting ideas on how we can understand social cognition as well as language from the standpoint of more procedural versus more declarative aspects of both phenomena. Chapter 7 deals with commonplace psychiatric disorders (schizophrenia, OCD, ADHD, mood disorders, Alzheimer's disease), in terms of what we know about the disruption of these multitiered executive systems, and is particularly useful for clinicians in various psychiatric and mental health disciplines. This chapter provides useful applications of their concepts, outlining differential contributions of various frontostriatal networks to these classic disorders. Chapter 8 examines clinical evaluation of the frontostriatal systems and how various classic neuropsychological tasks (familiar to most neuropsychologists) illuminate function and dysfunction in the frontostriatal systems. Chapter 9 examines the notion of "speed of processing" as a critical executive variable and its close relationship to automaticity, while chapters 10 and 11 examine individual clinical cases and neuropsychological test findings. These two chapters offer excellent examples to practicing clinicians about how to understand and apply neuropsychological test findings in the real world with real patients. Chapter 12 offers a theoretical integration and summary overview, including some interesting reflections on a neural-system typography for psychiatric conditions, developmental disorders, and learning disabilities. This intriguing scheme breaks down all of these conditions according to whether or not they might reflect difficulties in declarative learning versus procedural learning, and it then breaks down various procedural learning conditions into various subtypes (e.g., developmental motor issues primarily related to dysfunction in corticostriatal pathways vs. corticocerebellar pathways).

The overall principles in their treatment are how different groups of distributed networks underpin all adaptive functioning and how higher order executive control interdigitates with more stimulus-based habitual responding systems, in the direction of making what is initially effortful and conscious increasingly effortless and relatively unconscious. This, of course, saves enormous amounts of energy and effort and means that the brain does not have to reinvent the wheel in every new situation. Although we do not minimize the notion that we are creatures of habit, habitual modes of responding make up an enormous fraction of our behavior, underlining how important procedural memory systems are in human life. A central implication of all this is that we are in some sense continually trying to make our behavior more automatic, reserving the more deliberative modes of responding involving trial-and-error learning to environments and tasks in which we have no established mastery or well-grooved routines. Psychoanalysis, of course, has appreciated this business of the continual creation of procedural memories from another critical vantage point—namely, how characterological defenses operate in a mostly unconscious function and basically automatically. Indeed, one way of thinking about psychodynamic defense emerging from this set of critical concepts about executive functions (beautifully outlined by the authors in this volume) is that they are *affective stress-related procedural memories aimed at the minimization of negative affect*. Of course, this suggests that psychodynamic defense must operate mostly through the more ancient basal ganglia systems (olfactory tubercle and nucleus accumbens, in partnership with various anterior cingulate and other paralimbic regions). This supposition is supported in recent work on psychodynamic defense (Northoff, Bermpohl, Schoeneich, & Boeker, 2007). It is easy to apply their analysis (in terms of how higher order executive control systems can potentially interrupt automaticity and make it possible for dysfunctional habits and procedural memories to be reworked) to the work of exploratory psychotherapy. For those coming from a psychoanalytic background and looking

to get state-of-the-art concepts from the other side of the border about executive functions, and to appreciate how these might be potentially applied to strengthen the bridgework between neuroscience and psychoanalysis, this explication of executive function is heuristic and very useful.

What was also informative and interesting for me was to peruse on Amazon.com reviews of the book (all of them favorable) from neuropsychologists and other clinical professionals, suggesting that (for virtually all of the reviewers) the book's emphasis on central roles played by the basal ganglia and cerebellar systems in cognition was "news." It might be news to neuropsychologists trained in a corticocentric model of brain function, but it is not news to anybody else in neuroscience! Indeed, much of the fundamental work on which this fine overview was based actually took place in the 1980s and 1990s. If anything, this underlines that the theoretical neuroscience foundations in clinical neuropsychology, at least in terms of what is typically presented in many graduate school curriculums, are *badly* out of date.

Parenthetically, in my own professional development, I realized 25 years ago that virtually all of my early training in neuropsychology about the brainstem and subcortex was so badly incomplete as to be virtually wrong. I was taught that the brainstem (a staggeringly complex concatenation of 40+ nuclei, with an enormous range of functions and a foundational role in the integration of everything that the brain does) was a "dumb arousal center" and that virtually all of the important aspects of consciousness were contributed by the cortex, perhaps even the creation of consciousness itself. But the real story, of an enormous hierarchy of vertically integrated systems, turned out to be much more interesting and theoretically compelling than our traditional oversimplification and virtual "condescension" toward the subcortical brain. The brainstem and particularly the mesodiencephalon may supply much of the original anatomical foundation for integrative mechanisms underpinning a conscious state, ancient neuroanatomy that allows the cortex to make its critical contributions (the explosion of long-term memory capacity, and "high-resolution" processing at both the sensory and motor ends), but, without neurodynamic connection to these more ancient mesodiencephalic systems, the cortex is completely nonfunctional. The best evidence for this comes, of course, from the tragic cases of persistent vegetative state associated with severe upper-brainstem/mesodiencephalic injuries. The cortex is completely intact anatomically, but the person (including any version of cognitive processing) is completely gone, and this suggests, of course, that cortical systems must be bootstrapped by the upper brainstem. (For a brilliant theoretical exposition and literature review of the upper brainstem and its critical role in the creation of conscious states, see Bjorn Merker's 2007 *Behavioral and Brain Sciences* target article, "Consciousness without a Cerebral Cortex")

Of course, no volume, however finely written, is perfect. One of my few concerns is the authors' assumption that most readers will be intimately familiar with virtually all of the neuropsychological tests, and thus there is a heavy reliance on abbreviations for these tests, their subtests, and so forth. Because of this assumption, data and test score summaries will be difficult to decipher for some readers if they are not familiar with conventions for certain neuropsychological tests. However, a few nitpicks from time to time do not detract from the overall excellence of the volume. This book applies a long overdue corrective to a discipline that in some sense has been blinded by the simplistic corticocentric view of brain function. If the book prompts neuropsychologists to read outside their traditionally rather constricted domains (namely, the neuropsychological testing literature), and to more fully explore other domains of neuroscience, it will have performed a double service. I recommend it very highly.

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