Neurocentrism: Implications for Psychotherapy Practice and Research

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IN 1989, SAMUEL GUZE, then one of the doyens of American psychiatry, laid down the gauntlet to his academic colleagues in a provocative article, entitled "Biological Psychiatry: Is There Any Other Kind?", published in a prestigious medical journal. On the opening page, Guze answered his own question with a resounding "no": "There can be no such thing as a psychiatry which is too biological" (Guze, 1989, p. 316). For Guze, the study of mental illness must focus squarely on the brain as the principle, if not the exclusive, level of explanation. Because all psychiatric conditions are ultimately instantiated in neural tissue, he insisted, they are all physiological disorders once one drills down to the most fundamental level of analysis—the brain. Hence, it is only at this level, Guze maintained, that research will ultimately bear fruit in understanding, treating, and preventing mental afflictions.

Over a quarter of a century later, we find ourselves confronting the same question raised by Guze, but with respect to psychology. We also find ourselves in an era of creeping neurocentrism. By neurocentrism, we mean the propensity of scholars to embrace the brain and remainder of the central nervous system (CNS) as inherently the most appropriate level of analysis for conceptualizing and treating psychological phenomena, including mental disorders (Satel & Lilienfeld, 2013; Schwartz, Lilienfeld, Meca, & Sauvigné, in press). In its most extreme form, neurocentrism regards the CNS as essentially the only adequate level of analysis for conceptualizing and treating psychological phenomena.

The early 21st century is also awash in talk of psychological conditions as "brain disorders." For example, in a 2013 TEDx talk, Thomas Insel, director of the National Institute of Mental Health (NIMH), argued that "what we need conceptually to make progress here is to rethink these disorders [mental disorders] as brain disorders" (Insel, 2013; see also Insel & Cuthbert, 2015).

But is neurocentrism helpful in clarifying our thinking about the causes and treatment of mental disorders? What are its implications for psychotherapy practice and research?

The Long Swing of the Pendulum

While an undergraduate at Cornell University during the late 1970s, the first author enrolled in a course on psychopathology. The professor, a clinical psychologist by training, confidently informed the class that infantile autism (today known as autism spectrum disorder; American Psychiatric Association, 2013)

was a disorder of purely environmental etiology. Autism, he assured us, is a consequence of inadequate or neglectful parenting. To buttress his point, he assigned Bruno Bettelheim's (1967) *The Empty Fortress*, an impassioned tome that identified "refrigerator mothers" as responsible for autism (this theory, originated by child psychiatrist Leo Kanner, 1943, has since been debunked).

This kind of thinking was hardly unusual at the time. As a number of commentators have observed, much of clinical psychology and psychiatry in that era could best be described as largely "brainless" (Eisenberg, 1986). Many mainstream authors conceptualized human nature as something akin to a "blank slate," often according scant consideration to the genetic or neurobiological context of behavior (see Lykken, 1991, Pinker, 2003, for discussions). A provocative book entitled *Not in Our Genes* (Lewontin, Rose, & Kamin, 1984), which argued forcefully against genetic and other biological influences on intelligence, schizophrenia, and behavioral phenotypes more generally, was widely read and taken seriously by scores of academic psychologists of a radical environmentalist bent. How times have changed.

As the pendulum has—thankfully—swung away from the often "brainless" psychology and psychiatry that were widespread only a few decades ago, a growing cadre of scholars, ourselves included, have expressed concerns that these disciplines now risk becoming "mindless" (Eisenberg, 2000; Lipowski, 1989; Satel & Lilienfeld, 2013). Because mental phenomena carry negative connotations in some domains of psychology, such as radical behaviorism (e.g., McDowell, 1991), we should be explicit about what we do and do not mean in this regard. First, by "mind," we do not imply a spooky, metaphysical essence that is either immaterial of or materially independent from the brain. Instead, as we later delineate in more detail, we refer to a psychological level of analysis that differs from, but complements, the neural level. Second, by "mindless," we do not mean foolish or vacuous. Rather, we mean an undue neglect of what William James (1890, p. 1) regarded as the essence of psychology, namely, the "science of mental life" (see also Cacioppo & Tassinary, 1990). A mindless psychology, in our view, focuses so substantially on the neural level of analysis that it excludes or at least minimizes a host of other important levels of analysis, such as the traditionally personological, social, and cultural levels.

Psychiatrist Kenneth Kendler (2014) similarly warned of "fervent monism" or the undue reliance on only one explanatory level, whether neural or psychological, for understanding human nature (see also Craddock, 2014, for a discussion of the need to accommodate both neuroscientific and social levels of analysis in psychiatry). Concerns regarding fervent monism were also expressed by a recent past president of the Association for Psychological Science, Nancy Eisenberg (2014), who lamented the "increasing tendency to assume that studying genetic/neural/physiological processes is more important than research on behavior and psychological processes per se because biological findings will eventually explain most of human psychological functioning" (p. 1). She noted that this trend is evident in "the funding priorities at some of the National Institutes of Health … it can also be seen in the hiring patterns of many psychology departments that place a priority on hiring people who study biological processes or aspects of cognition that can be tied to neuroscience" (p. 1).

Evidence for the Ascendance of Neurocentrism

In a recent article, we (Schwartz et al., in press; see also Kagan, 2013; Miller, 2010, for similar arguments) laid out several lines of evidence suggesting that mainstream psychology is increasingly adopting a neurocentric approach to human nature. Among other things, we pointed to a dramatic recent upturn in the proportion of academic positions calling for expertise in neuroscience, many of which even mandate functional brain imaging skills; to the growing number of elite psychology departments (e.g., Indiana University, University of Colorado at Boulder) that have modified their names to emphasize neuroscience (e.g., "Department of Psychology and Brain Science"; see also Lilienfeld, 2012); to findings that, compared with journals in other medical areas, psychiatry journals are publishing a much higher percentage of articles devoted largely or entirely to biological correlates (Stone, Whitham, & Ghaemi, 2012); and to survey data we collected indicating that 27% of research psychologists reported "often," "always," or "almost always" feeling pressured to incorporate neuroscientific measures into their grant proposals.

We also addressed recent public statements by leading administrators at NIMH and the National Institute on Drug Abuse (NIDA) that appear to signal a marked shift toward neurocentrism. For example, the draft of the NIMH's (2014) new Strategic Plan informs readers that this agency's major objectives comprise "defining the biological basis of complex behaviors" (p. 15), "describing the molecules, cells, and neural circuits associated with complex behaviors" (p. 17), and "mapping the connectomes for mental illness" (p. 18). As of this writing, the "Director's Page" for NIDA, which highlights the work of director Dr. Nora Volkow, states that "Dr. Volkow's work has been instrumental in demonstrating that drug addiction is a disease of the human brain" (http://www.drugabuse.gov/about-nida/directors-page/biography-dr-nora-volkow). Conspicuously, this web page provides visitors with no mention or even hint of research-based or conceptual criticisms of this view, which demonstrate that drug addiction, although genetically influenced in many cases, is often highly responsive to external incentives, classically conditioned cues, and other nonbiological environmental influences (Lewis, 2015; Satel & Lilienfeld, 2013).

To fully appreciate the logical assumptions underpinning neurocentrism and its implications for psychotherapy practice and research, however, we first need to examine the oft-misunderstood concept of reductionism. It is to this thorny concept that we now turn.

Reductionism and Its Two Flavors

Many psychologists routinely decry "reductionism" as a scientific approach. But such criticism overlooks a key point: Reductionism is not one thing (Robinson, 1995). In particular, we must be careful to distinguish constitutive from eliminative reductionism (Ilardi & Feldman, 2001; Lilienfeld, 2007). Constitutive reductionism, which we wholeheartedly endorse, posits that the mind is what the CNS does, and that all psychological phenomena are ultimately traceable to neuronal activity. Constitutive reductionists reject "substance dualism," the dubious notion endorsed by Descartes (see Damasio, 2001) that mind and brain are composed of different material "stuff." At the same time, some constitutive reductionists, ourselves included, remain open to "property dualism," the proposition that mind and brain, although materially identical, differ in their level of analysis—much as Beethoven's 9th symphony can be conceptualized as a

jumble of thousands of notes at one level and as a majestic subjective experience at another.

Eliminative reductionists, in contrast, go well beyond constitutive reductionists. According to them, scientists will eventually be able to dispense entirely with the psychological level of analysis, including such ostensibly "prescientific" concepts as "personality," "thoughts," "motives," and "emotions" (Kihlstrom, 2010). Once the relation between brain and behavior is fully mapped out, eliminative reductionists predict that these and other psychological concepts will become superfluous, and that psychology will be reduced and relegated to a branch of biology. Philosopher Daniel Dennett (1993) termed this perspective "greedy reductionism" because it implies that the more basic levels of analyses (e.g., the neuronal), which are lower in Comte's (1842) familiar pyramid of the sciences, will eventually "gobble up" the higher levels (e.g., the psychological).

Eliminative reductionism remains alive and well in many circles, even including some psychology departments. About a decade ago, a psychology department chair (who was a systems neuroscientist by specialization) was defending to one of us the hiring of a researcher whom many of his colleagues perceived as insufficiently interested in behavior. The chair gestured proudly to a book on his shelf by eminent neuroscientist Michael Gazzaniga (1998), entitled *The Mind's Past,* and opened to the Preface, which proclaimed unequivocally that "psychology itself is dead . . . the odd thing is that everyone but its practitioners knows about the death of psychology" (p. 1). The department chair insisted that it only was a matter of time, and not much time at that, before psychologists would be regarded as expendable in departments of psychology. Some prominent neuroscientists are advocates of eliminative reductionism, either explicitly or implicitly. In his book *Neuronal Man*, Jean-Pierre Changeux (1997) wrote that "all forms of behavior mobilize distinct sets of nerve cells, and it is at their level that the final explanation of behavior must be sought" (p. 97). Similarly, physicist and popular writer Robert Park (2008) argued that "Psychology is becoming a 'hard science,' one that is last transforming the subjective study of human behavior into objective measurements of the physical entities that define us ... we need to get inside the brain to see what's actually happening among the billions of neurons, and simplify it to the most basic functions" (p. 198).

One pointed challenge to eliminative reductionism derives from theorizing on emergent properties: complex, higher-order phenomena that are not fully reducible to lower-order levels. Cognitive scientist Douglas Hofstadter (2007) offered a "traffic jam" as an example of an emergent property. The meaning of a traffic jam, he observed, cannot be extracted solely from its basic elements, such as cars, buses, cabs, and trucks. "You won't locate a traffic jam," Hofstadter observes, "if you restrict your search to the insides of a single taxi" (p. 787). To "find" a traffic jam, one must instead look to the higher-order interaction of its constituents, such as the number of cars on the road, the timing of traffic lights, the spacing between cars, the decision of drivers to change lanes at the last moment, slow driver reaction times, and so on. The whole is more than—and substantially different from—the sum of its parts (see also Marr, 1982). Although the existence of emergent properties is still actively debated among philosophers of mind, for the foreseeable future valuable information about behavior will almost always be lost when descending from higher to lower levels of analysis. Psychologist Jerome Kagan (2006) made the same point with regard to works of art. He noted that to appreciate an impressionistic painting, one must perceive more than just the sum of its parts. "As a viewer slowly approaches Claude Monet's painting of the Seine at dawn there comes a moment when the scene dissolves into tiny patches of color." When we adopt eliminative reductionism and focus solely on the lower-order elements of a painting, though, "the coherent psychological component vanishes" (p. 213).

Kenneth Kendler (2005) has advanced similar arguments, arguing forcefully for the importance of considering multiple levels of analysis in understanding psychopathology. Specifically, he contended that certain levels of analysis are more helpful than others for approaching different scientific questions (see also Cacioppo & Tassinary, 1990). For example, when developing and testing medications intended to target the amyloid plagues and neurofibrillary tangles of Alzheimer's disease, the brain-based level of analysis will be the most helpful. In contrast, when attempting to understand the causes of racial prejudice and strategies to combat it, the psychological and cultural levels will be most relevant. In principle, of course, we may one day trace prejudice to the firing patterns of specific neurons in the brain. But in doing so, we would inevitably leave out crucial parts of the story—most notably, the psychological meaning of prejudice to both its experiencer and its target.

Neurocentrism: Implications for Psychological Treatment

Neurocentrism may offer us a one-dimensional view of human nature, but is it potentially harmful? We are inclined to think so. For one thing, controlled data suggest that although the framing of mental illnesses, such as schizophrenia and major depression, as brain diseases typically diminishes blame toward individuals with these illnesses, it heightens pessimism regarding prognosis and (probably) perceptions of dangerousness (Kvaale, Haslam, & Gottdiener, 2013). Although well-intentioned, the movement to reconceptualize mental disorders as brain diseases has at best mixed success in reducing stigma (Deacon, 2013). We further worry that neurocentrism has led some scholars, practitioners, and laypersons to assume that the brain is not merely the optimal level of analysis for understanding mental illness, but for treating and preventing it as well. In this way, neurocentricism may narrow the foci of potential intervention targets to the constituents of the CNS, such as neurotransmitters, neuromodulators, and receptors, often to the neglect of higher levels of analysis, such as psychological states—for example, attitudes, moods, motives, and thinking styles—that may be amenable to treatment.

This misapplication of neurocentrism may stem in part from *ex juvantibus* reasoning, a mouthful of a logical fallacy meaning "reasoning backward from what works" (Ross & Pam, 1995). It is tempting, but fallacious, to assume that if the causes of a mental disorder are in part biological, its proper treatment must also be biological, and vice-versa. But we should bear in mind the medical truism that headaches are not caused by a deficiency of aspirin in the brain. Nor do schizophrenia and vomiting share the same etiology even though both can be alleviated by means of medications, such as Compazine or Haldol, that block the binding action of the neurotransmitter dopamine in the brain. Inferring etiology from treatment, or treatment from etiology for that matter, is a tricky business.

Just as important, the assumption that biomedical interventions are necessarily the optimal line of attack for psychological disorders has not stood up under empirical scrutiny. Despite the growing preeminence of neurocentrism in the public eye, psycho-

logical and psychiatric researchers are busily working behind the scenes to develop effective psychological interventions for mental disorders, even those marked by a hefty genetic component. Although one would be hard-pressed to surmise it from the plethora of medication ads flooding our web pages and magazines, research increasingly demonstrates that cognitive-behavioral therapy (CBT), which focuses on modifying maladaptive thinking patterns and behaviors and imparting helpful skills to combat them, is at least as effective for treating major depression in the short run as is antidepressant medication. Furthermore, in several large-scale studies, CBT has emerged as more effective than medication for preventing recurrences of major depression (Butler, Chapman, Foreman, & Beck, 2006; but see Johnsen & Friborg, in press, for suggestions that the efficacy of CBT for depression is declining), probably because it provides individuals with enduring skills for warding off relapse. Similarly, the devastating signs and symptoms of schizophrenia, until recently believed to be resistant to psychosocial interventions, are now proving to be at least somewhat amenable to family and individual therapies designed to help patients manage everyday stressors (Jauhar et al., 2014).

Neurocentrism has also born witness to, and almost certainly fueled the popularity of, legions of novel—and dubious—brain-based psychotherapies of various stripes (see Cozzolino, 2002). Although these treatments differ in their specifics, all purport to draw on findings in basic neuroscience to inform psychological intervention. A selective sampling of some items from the growing menu of brain-based treatments includes the following:

• **Brain-based trauma therapy** (see Arden & Linford, 2008) is a broad approach that "synthesizes neuroscience, evidence-based treatment, psychotherapy research, and attachment theory into a hybrid therapeutic model" and accords "special attention to the neurodynamics of PTSD and the crucial role of memory" (http://www.aasw.asn.au/events/event/brain-based-trauma-therapy-integrating-neuroscience-and-psychotherapy_brisbane).

• **Neuropsychotherapy** (Grawe, 2007) advocates contend that "armed . . . with microscopic insight into the activity of a particular neural network involved with a client's fear, as well as a macroscopic view of their interpersonal relationships and environment, the neuropsychotherapist . . . [can obtain] a thorough grasp of the client's situation" (http://www.neuropsychotherapist.com/about/).

• **Brain-spotting** (Grand, 2013) directs clients' eye movements to specific positions that are purportedly linked to emotional trauma housed in specific brain regions, such as the amygdala and hippocampus. According to its proponents, "the maintenance of that eye position/Brainspot within the attentional focus on the body's 'felt sense' of that issue or trauma stimulates a deep integrating and healing process within the brain. This processing . . . appears to take place at a reflexive or cellular level within the nervous system" (https://brainspotting.pro/page/what-brainspotting).

• **Brain Gym**, an educational technique in use in more than 80 countries, consists of 26 prescribed activities (most involving movement) that supposedly influence the activity of brain areas involved in learning and memory. For example, Brain Gym ostensibly claims to augment blood flow to the brain by massaging specific bodily regions ("brain buttons"), thereby boosting the acquisition of new information (Dennison & Dennison, 1989).

• **Neuropsychoanalysis**, although more of a research program than a school of therapy per se, aims to integrate Freudian therapeutic principles with cutting-edge developments in neuroscience (Panskepp & Solms, 2012; C. Schwartz, 2015), perhaps consistent with Freud's (1895) view that psychoanalysis would ultimately be reduced to neuroscience. For example, some advocates of neuropsychoanalysis maintain that functional brain imaging data demonstrating the potency of limbic regions (e.g., amygdala, insula) in psychological processing helps to vindicate Freudian claims regarding the overriding influence of unconscious sexual and aggressive urges on behavior.

In all fairness, it is conceivable that some or all of these techniques may eventually prove to be efficacious, at least for certain clinical problems. Nevertheless, to our eyes, there are at least two serious difficulties with the marketing and dissemination of brain-based approaches. First, the claims associated with these methods go well beyond the available research evidence. Notably, none of the interventions described in the preceding bulleted list has been subjected to even a single published controlled trial, a salient caveat that one would be hard pressed to glean from an inspection of their web sites and promotional materials. Second, these interventions are bedeviled by a vexing conceptual problem. Although it is plausible that basic neuroscience knowledge may one day inform the development and implementation of psychological treatments, not nearly enough is presently known about the linkages between such knowledge and psychopathology to effectively bridge the multiple levels of analysis that intervene between neurons and abnormal behavior (Schwartz et al., in press). As a consequence, it is not at all evident that basic brain science can tell us much about the design of psychotherapies that we do not already know. For example, although neuropsychoanalysis advocates are surely correct that emotional processing shapes our psychological make-up in powerful ways, functional brain imaging findings are not needed to achieve this age-old insight (Ramus, 2013).

Similar cautions regarding the overeager application of neuroscience are not new, and were sounded by B. F. Skinner (1955) decades ago. As described by O'Donohue (2013), "Skinner judged that [there] was too much of what he came to call 'premature physiologizing'—that the zeitgeist of psychology of his time thought it was imperative that any discussion of perception and learning must be cased out in terms of the physiology of the nervous system" (p. 112).

The central problem with assertions regarding brain-based psychotherapies is not that they are necessarily incorrect. Instead, it is that these assertions are premature and almost always promise far more than they can currently deliver. As a consequence, mental health practitioners and consumers alike must be vigilant of "brain scams" (Beyerstein, 1990): glitzy but unsupported techniques that capitalize on the cachet of neuroscience to persuade the unwary that they are grounded in high-quality science.

Implications of Neurocentrism for Treatment Research

Neurocentrism also carries noteworthy implications for research on mental illness and its treatment. For example, neurocentrism can lead policymakers to funnel grant funding primarily or exclusively to projects that target the brain as the principal level of analysis for approaching the diagnosis, etiology, treatment, and prevention of psychological disorders. Indeed, over the past

decade, obtaining federal funding to examine the psychosocial correlates and causes of psychological maladjustment has become increasingly challenging (Schwartz et al., in press). In the case of substance addictions, the lion's share of grant funding has been channeled into the largely quixotic search for medications (e.g., vaccines, endogenous opiate antagonists) as opposed to psychosocial interventions, despite the more promising track record of efficacy of the latter (Lewis, 2015).

Another reason for caution concerning neurocentrism derives from the Research Domain and Criteria (RDoC) initiative recently launched by NIMH. RDoC aspires to develop a psychiatric classification system that can provide a viable alternative to those of both the *Diagnostic and Statistical Manual* (DSM) and the closely related International Classification of Diseases (ICD), which many scholars believe are rapidly approaching an asymptote in terms of scientific progress (Insel, 2009). Specifically, RDoC regards mental disorders as the products of dysfunctions in brain circuitry, and it delineates several promising psychobiological domains (e.g., positive valence systems, negative valence systems, arousal systems) that may go awry in these conditions (Insel et al., 2010; Sanislow et al., 2010).

RDoC has much to recommend it, especially its loosening of the hegemony of the reigning DSM-ICD "paradigm" over psychopathology research. In this respect, it may offer a fresh transdiagnostic perspective on psychiatric classification that could eventually yield enhanced treatment utility.

At the same time, several scholars have voiced concerns that RDoC may push psychological and psychiatric research, including work on treatment and prevention, in an even more biological direction (Berenbaum, 2014; Lilienfeld, 2014). To be clear, RDoC is open to the inclusion of measures at multiple levels of analysis, including self-report, interview, and behavioral observations, and does not limit its scope to biological indices per se (Cuthbert, 2014). Nevertheless, it is worrisome that a number of prominent figures in psychiatry appear to view RDoC more narrowly than its original formulators. For example, in a comment in support of RDoC, John Scully, the American Psychiatric Association's chief officer, stated that "We want him [Thomas Insel, director of NIMH] to get biomarkers for us" (Gever, 2013; see also Pine & Liebenluft, 2015). In addition, a recent past president of the American Psychiatric Association characterized RDoC as a blueprint for "the creation of a new diagnostic system based upon genetics, neurobiology, brain circuits, and biomarkers" (Lieberman & Ogas, 2015, p. 284). As RDoC moves forward in the coming years, NIMH must therefore ensure that the biological level of analysis is not privileged at the expense of other levels in our attempts to understand and treat mental problems. The search for biomarkers of psychopathology is valuable and should be encouraged, but it should not preclude research at alternative levels of analysis.

Parting Thoughts

Given that the history of clinical psychology and allied disciplines has long been characterized by radical pendulum swings between dogmatic sociotropy and dogmatic biotropy (see Meehl, 1990, for a discussion), some readers may justifiably wonder whether we are sounding an unjustified alarm call. After all, they might contend, it is probably only a matter of time

before the pendulum swings away from neurocentrism, ideally equilibrating into a position in which social and biological levels of analysis are both valued.

Perhaps such readers are correct; we certainly hope so. At the same time, there are ample reasons for concern. Because faculty hiring, research, and grant funding are increasingly being directed toward neuroscientific approaches to psychopathology and away from competing approaches, there is a danger that psychosocial research on mental disorders and their treatment will not receive the attention that it deserves. As a consequence, we may be left with an impoverished picture of the causes and amelioration of psychopathology.

Furthermore, it is crucial that future generations of graduate students in clinical psychology and allied fields receive multidisciplinary training that bridges diverse levels of analysis, including the cellular, physiological, psychological, social, and cultural (Shoham et al., 2014). If anything has become clear in psychopathology research over the past decade, it is that the causes of most or all mental disorders are exceedingly multifactorial (Kendler, 2005). To make substantial inroads into the etiology and treatment of mental disorders, we will therefore need to draw upon and integrate insights from disparate disciplines, and to avoid the errors of simplistic sociotropy and biotropy that have so often impeded our field's scientific progress.

References

American Psychiatric Association (2013). *Diagnostic and statistical manual for mental disorders* (DSM-5). Washington, DC: Author.

Arden, J. B., & Linford, L. (2008). *Brain-based therapy with adults: Evidence-based treatment for everyday practice*. New York: John Wiley & Sons.

Berenbaum, H. (2013). Classification and psychopathology research. *Journal of Abnormal Psychology, 122*, 894-901.

Bettelheim, B. (1967). *The empty fortress*. New York: Simon and Schuster.

Beyerstein, B. L. (1990). Brain scams: Neuromythologies of the New Age. *International Journal of Mental Health, 19*, 27-36

Butler, A. C., Chapman, J. E., Forman, E. M., & Beck, A. T. (2006). The empirical status of cognitive-behavioral therapy: A review of meta-analyses. *Clinical Psychology Review*, *26*, 17-31.

Cacioppo, J. T., & Tassinary, L. G. (1990). Inferring psychological significance from physiological signals. *American Psychologist, 45*, 16-26.

Changeux, J. P. (1997). *Neuronal man: The biology of mind*. Princeton, NJ: Princeton University Press.

Comte, A. (1842). *Cours de Philosophie positive* (selections translated by Margaret Clarke as The Essential Comte). New York: Barnes & Noble.

Cozzolino, L. J. (2002). *The neuroscience of psychotherapy*. New York: Norton.

Craddock, N. (2014). Social neuroscience: Bringing an end to the destructive and misguided "social" versus "biological" in psychiatry. *World Psychiatry, 13*, 140-141.

Cuthbert, B. N. (2014). Response to Lilienfeld. *Behaviour Research and Therapy, 62*, 140-142.

Damasio, A. (2001). *Descartes' error: Emotion, reason and the human brain*. New York: Random House.

Deacon, B. J. (2013). The biomedical model of mental disorder: A critical analysis of its validity, utility, and effects on psychotherapy research. *Clinical Psychology Review, 33*, 846-861.

Dennett, D. C. (1993). *Consciousness explained*. London: Penguin.

Dennison, P. E., & Dennison, G. (1989). *Brain gym handbook*. Ventura, CA: Edu-Kinesthetics.

Eisenberg, L. (1986). Mindlessness and brainlessness in psychiatry. *The British Journal of Psychiatry, 148*, 497-508.

Eisenberg, L. (2000). Is psychiatry more mindful or brainier than it was a decade ago? *The British Journal of Psychiatry, 176*, 1-5.

Eisenberg, N. (2014, September). Is our focus becoming too narrow? *Association for Psychological Science Observer*. https://www.psychologicalscience.org/index.php/publications/observer/2014/september-14/is-our-focus-becoming-overly-narrow.html

Freud, S. (1895). *Project for a scientific psychology*. Unpublished manuscript.

Gazzaniga, M. S. (1998). *The mind's past*. Berkeley: University of California Press.

Gever, J. (2013, May 20). APA leaders defend new diagnostic guide. *MedPage-Today*. http://www.medpagetoday.com/MeetingCoverage/APA/39241

Grand, D. (2013). *Brainspotting: The revolutionary new therapy for rapid and effective change*. Boulder, CO: Sounds True.

Grawe, K. (2007). *Neuropsychotherapy: How the neurosciences inform effective psychotherapy*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Guze, S. B. (1989). Biological psychiatry: Is there any other kind? *Psychological Medicine, 19*, 315-323.

Hofstadter, D. R. (2007). *I am a strange loop*. New York: Basic books.

Ilardi, S. S., & Feldman, D. (2001). The cognitive neuroscience paradigm: A unifying metatheoretical framework for the science and practice of clinical psychology. *Journal of Clinical Psychology, 57*, 1067-1088.

Insel, T. R. (2009). Translating scientific opportunity into public health impact: A strategic plan for research on mental illness. *Archives of General Psychiatry, 66,* 128-133.

Insel, T.R. (2013). *Toward a new understanding of mental illness*. [TED talk]. http://www.ted.com/talks/thomas_insel_toward_a_new_understanding_of_mental_illness/transcript?language=en

Insel, T. R., & Cuthbert, B. N. (2015). Brain disorders? Precisely. *Science, 348*, 499-500.

Insel, T. R., Cuthbert, B. N., Garvey, M. A., Heinssen, R. K., Pine, D. S., Quinn, K. J., ... Wang, P. S. (2010). Research domain criteria (RDoC): Toward a new classification framework for research on mental disorders. *American Journal of Psychiatry, 167*, 748-751.

James, W. (1890). *The principles of psychology*. New York: Dover.

Jauhar, S., McKenna, P. J., Radua, J., Fung, E., Salvador, R., & Laws, K. R. (2014). Cognitive-behavioural therapy for the symptoms of schizophrenia: systematic review and meta-analysis with examination of potential bias. *British Journal of Psychiatry, 204*, 20-29.

Johnsen, T. J., & Friborg, O. (in press). The effects of cognitive behavioral therapy as an anti-depressive treatment is falling: A meta-analysis. *Psychological Bulletin*.

Kagan, J. (2006). *An argument for mind*. New Haven: Yale University Press.

Kagan, J. (2013). Equal time for psychological and biological contributions to human variation. *Review of General Psychology, 17*, 351-357.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2*, 217-250.

Kendler, K. S. (2005). Toward a philosophical structure for psychiatry. *American Journal of Psychiatry, 162*, 433-440.

Kendler, K. S. (2014). The structure of psychiatric science. *American Journal of Psychiatry, 171*, 931-938.

Kihlstrom, J. F. (2010). Social neuroscience: The footprints of Phineas Gage. *Social Cognition, 28*, 757-783.

Kvaale, E. P., Haslam, N., & Gottdiener, W. H. (2013). The 'side effects' of medicalization: A meta-analytic review of how biogenetic explanations affect stigma. *Clinical Psychology Review, 33*, 782-794.

Lewis, M. (2015). *The biology of desire: Why addiction is not a brain disease*. New York: Public Affairs.

Lewontin, R. C., Rose, S., & Kamin, L. (1984). *Not in our genes: Biology, ideology, and human nature*. New York: Pantheon.

Lieberman, J. A., & Ogas, O. (2015). *Shrinks: The untold story of psychiatry*. Boston: Little, Brown.

Lilienfeld, S. O. (2007). Cognitive neuroscience and depression: Legitimate versus illegitimate reductionism and five challenges. *Cognitive Therapy and Research, 31*, 263-272.

Lilienfeld, S. O. (2012, October). Letter to the editor: Identity shift. *APS Observer*. http://www.psychologicalscience.org/index.php/publications/observer/2011/october-11/letter-to-the-editor-2.html

Lilienfeld, S. O. (2014). The Research Domain Criteria (RDoC): An analysis of methodological and conceptual challenges. B*ehaviour Research and Therapy, 62*, 129-139.

Lipowski, Z. J. (1989). Psychiatry: Mindless or brainless, both or neither. *Canadian Journal of Psychiatry, 34*, 249-254.

Lykken, D. T. (1991). What's wrong with psychology anyway? In D. Cicchetti & W. M. Grove (Eds.), *Thinking clearly about psychology Volume 1: Matters of public interest* (pp. 3-39). Minneapolis: University of Minnesota Press.

Marr, D. (1982). *Vision: A computational approach*. San Francisco: Freeman.

McDowell, J. J. (1991). Irreconcilable differences and political reality in these dark ages. *The Behavior Analyst, 14*, 29-33.

Meehl, P. E. (1990). Toward an integrated theory of schizotaxia, schizotypy, and schizophrenia. *Journal of Personality Disorders, 4*, 1-99.

Miller, G. A. (2010). Mistreating psychology in the decades of the brain. *Perspectives on Psychological Science, 5*, 716-743.

O'Donohue, W. (2013). *Clinical psychology and the philosophy of science*. New York: Springer.

Panksepp, J., & Solms, M. (2012). What is neuropsychoanalysis? Clinically relevant studies of the minded brain. *Trends in Cognitive Sciences, 16*(1), 6-7.

Park, R. L. (2008). *Superstition: Belief in the age of science*. Princeton, NJ: Princeton University Press.

Pine, D. S., & Leibenluft, E. (2015). Biomarkers with a mechanistic focus. *JAMA Psychiatry, 72*, 633-634.

Pinker, S. (2003). *The blank slate: The modern denial of human nature*. New York: Penguin.

Ramus, F. (2013). What's the point of neuropsychoanalysis? *The British Journal of Psychiatry, 203*, 170-171.

Robinson, D. N. (1995). The logic of reductionistic models. *New Ideas in Psychology, 13*, 1-8.

Ross, C. A., & Pam, A. (1995). *Pseudoscience in biological psychiatry: Blaming the body*. New York: John Wiley & Sons.

Sanislow, C. A., Pine, D. S., Quinn, K. J., Kozak, M. J., Garvey, M. A., Heinssen, R. K., ... Cuthbert, B. N. (2010). Developing constructs for psychopathology research: Research domain criteria. *Journal of Abnormal Psychology, 119*, 631-639.

Satel, S., & Lilienfeld, S. O. (2013). *Brainwashed: The seductive appeal of mindless neuroscience*. New York: Basic Books.

Schwartz, C. (2015). *In the mind fields: Exploring the new science of neuropsychoanalysis.* New York: Deckle Edge.

Schwartz, S. J., Lilienfeld, S. O., Meca, A., & Sauvigné, K. C. (in press). The role of neuroscience within psychology: A call for inclusiveness rather than exclusiveness. *American Psychologist*.

Shoham, V., Rohrbaugh, M. J., Onken, L. S., Cuthbert, B. N., Beveridge, R. M., & Fowles, T. R. (2014). Redefining clinical science training: Purpose and products of the Delaware Project. *Clinical Psychological Science, 2*, 8-21.

Skinner, B. F. (1955). Section of psychology: The control of human behavior. *Transactions of the New York Academy of Sciences, 17*(7 Series II), 547-551.

Stone, K., Whitham, E. A., & Ghaemi, N. (2012). A comparison of psychiatry and internal medicine: A bibliometric study. *Academic Psychiatry, 36*, 129-132.

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Can Biomedical Models of Psychopathology Interfere With Cognitive-Behavioral Treatment Processes?

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THE DOMINANCE OF BIOMEDICAL models of psychiatric disorders is undoubtedly due to multiple factors. Modern research has, without question, revealed a wealth of biological factors implicated in the pathophysiology and maintenance of psychiatric problems. Grant funding has increasingly been directed at investigations of biological mechanisms and treatments, some from pharmaceutical companies and some through agencies such as the National Institute of Mental Health (Deacon, 2013) or foundations such as the Brain and Behavior Foundation. Additionally, advocacy groups like the National Alliance on Mental Illness have emphasized to consumers and the general public alike that psychiatric conditions are akin to any other medical condition or disease. The present manuscript is not, however, concerned with the validity of biomedical models of psychiatric disorders. We instead wish to focus on the individual, professional, and societal consequences of such conceptualizations.

Research has found that public adoption of the biomedical model has been on the increase (Pescosolido et al., 2010; Schnittker, 2006). Many might hope or believe this would lead to reduced stigmatization of psychiatric disorders (Pescosolido et al.), but evidence suggests the opposite has occurred (Kvaale, Gottdiener, & Haslam, 2013; Kvaale, Haslam, & Gottdiener, 2013; Read, 2007). Biomedical explanations of psychiatric disorders may cause laypeople to believe that those with psychiatric disorders are fundamentally different (Corrigan & Watson, 2004) and that these differences are nonmalleable (Lebowitz & Ahn, 2014). These associations may stem from "genetic essentialism" and "neuroessentialism," which refer to views in which DNA or neurobiology, respectively, are seen as the immutable