

The Pernicious Effect of Mind/Body Dualism in Psychiatry

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Abstract

The purpose of this review is to clarify and demystify a set of ideas and assumptions, which pervade the field of psychiatry and cause confusion and unfortunate consequences for the practice and teaching of psychiatry. These crystallize in the so-called mind/body problem or mind/body dualism. Mind/Body dualism has adverse consequences for psychiatry, such as stigmatization of mental illness, restricted funding for research and patient care, discrimination against patients with psychiatric or addictive disease in the insurance market place and leads to cognitive distortions affecting the training and practice of psychiatry. This paper attempts to deconstruct a set of ideas, which tend to under girth our intuitive mind/body dualism and proposes that neuroscience is increasingly capable of describing human cognition, emotion and psychopathology as the manifestations of brain activity.

Psychiatry operates in a border region of the neurobiology of the brain and mind. Mind is the overarching concept incorporating notions of consciousness, phenomenological experience, free will and the idea of the soul. Psychiatric practice involves modifying brain functions by the use of medications and other means, as well as interventions broadly described as psychotherapy. Psychiatry as a medical discipline has an ambivalent and uneasy relationship with the idea of mind/brain. In this paper, we attempt to trace this tension to the pervasive, intuitive mind/body dualism that lay people as well as scientists tend to adopt. A rapidly growing empirical literature is eroding the idea of mind/ brain dualism. We will review claims that consciousness, first person phenomenological experience or "qualia," and free will are ontologically beyond the grasp of empirical study. A growing number of neuroscientific research results are placing increasing constraints on these claims. We suggest an alternative view based on the philosophy of pragmatism, which we believe would recommend a critical reappraisal of our intuitive beliefs, by means of an empirically responsible stance. The literature on these topics is extensive. We restrict our review to very recent results from neurobiology.

Keywords:

Dualism; Psychiatry; Mind

Introduction

There is nothing inherently dehumanizing or "stigmatizing" about a psychiatric diagnosis. Ironically, such inflammatory charges only worsen society's animus and prejudice toward those with mental illness, by implying that having a psychiatric disorder is grounds for shame. Diagnoses in other medical specialties rarely provoke such a reaction...I believe that psychiatric diagnoses are castigated largely because society fears, misunderstands and often reviles mental illness [1]. There has been systematic discrimination against patients with mental illness for many decades by insurance companies. The coverage for psychiatric disorders was "carved out" from the coverage for other illnesses and payments for psychiatric services were declined or denied. The Mental Health Parity Act of 1996 (expired September 2001) had only limited effect and its provisions were easily circumvented [2]. The Surgeon General declared that "equality between mental health coverage is an affordable and effective objective" in 1999 (Mental Health: a report of the Surgeon General. Rockville, MD: DHHS, 1999). The report finds that mental disorders can be reliably diagnosed, impose an enormous burden, and can be effectively treated. The Mental Health Equitable Treatment Act of 2001 has not delivered a fundamental change in the treatment of patients with mental illness. State parity statutes vary and continue to restrict access to care [2].

The persistent stigma of mental illness [3] is an important factor driving such discriminatory policies. Public acceptance of a neurobiological concept of mental illness has increased in recent years, however, stigma among the American public appears to be surprisingly fixed [3]. A review of 33 studies showed that "biogenetic" causal attributions of mental illness do not result in increased tolerance but were in fact related to stronger rejection in most studies examining schizophrenia [4]. Psychiatry has failed to effectively address the stigmatization of mental illness. This failure may be traced to lack of clarity about the fundamental issue facing the field, the mind/body dualism pervasive in our culture. Dualism has consequences for defining what psychiatry is and what it aspires to become. Psychiatry is in an increasingly severe crisis as a result. It is a discipline built on a fault line straddling the tectonic plate of neuroscience, which includes neuro-psychopharmacology and other biological treatments on the one hand, and the tectonic plate of the "psychosocial" which includes a host of psychotherapies and social systems interventions. The unfortunate divorce of psychiatry from neurology occurred many decades ago. Psychiatry left the home of the brain and got involved in a long-lasting affair with psychoanalysis and other disciplines that emphasized the notion that there was more to the human mind and its afflictions than a reductionist "bag of enzymes [5]." With the ascent of biological psychiatry, the tension between psychological and medical approaches increased and the synthesis of the "biopsychosocial" model [6] became the official philosophy of the American Psychiatric Association and its diagnostic manual, the DSM, now in its 5th edition. Despite the exponentially increasing literature supporting a "reductionist and materialistic" model of the mind /brain, most of us remain intuitive dualists. A study of 250 students at Edinburgh University and 1858

healthcare workers and members of the lay public studied at the University of Liege [7] found that the majority of participants regarded mind and brain as separate entities. A similar study of 136 mental health faculty members at McGill University showed that mental health professionals continue to employ a mind/ brain dichotomy when reasoning about clinical cases, despite attempts to adopt an integrated bio-psychosocial model in psychiatry [8]. A number of psychiatrists have attempted to lay a foundation for a non-dualist approach to psychiatry. Cutting through ambivalence, announced that "no philosophical concept has been as widely influential in our fields or as potentially pernicious in its effects as that of Cartesian dualism [9]." He declared, "Cartesian dualism is false". He experienced difficulties, however, in sustaining a thorough monistic physicalist viewpoint by accepting the notion of "mind- to -brain causality." He denies reintroducing dualism "through the back door" by invoking a philosophical position of "nonreductive materialism". We will attempt to show in subsequent sections of this paper that this position is not empirically supportable and incoherent. proposed that, "Mental illnesses have historically been distinguished from other medical illnesses because they affect the higher cognitive processes that are referred to as "mind" [10]. The relationship between mind and brain has been extensively discussed in contemporary philosophy and psychology, without any decisive resolution. One heuristic solution, therefore, is to adopt the position that the mind is the expression of the activity of the brain and that these two are separable for purposes of analysis and discussion but inseparable in actuality." Eric Kandel discussed the expansion of psychoanalytically oriented psychiatry which eventually claimed medical illnesses such as hypertension, gastric ulcers, asthma and ulcerative colitis for its treatment domain under the banner of "psycho"-somatic theory and advocates for a thorough grounding of psychiatrists in genetics and neuroscience. However, he stays clear of the mind/brain dualism by suggesting that "the relationship between brain and mental processes is understood poorly and, and only in outline". We will try to show that a great deal of progress has been made since Kandel wrote these words in 1998 [11].

Consciousness, Phenomenal First Person Experience, Qualia, Free Will, and the Soul

Lower level neurobiological processes in our brain cause all our conscious states, without exception, and they are realized in the brain as higher-level system features. It's about as mysterious as the liquidity of water [12]. The conscious mind, its ability to have phenomenological experiences (so called "qualia"), its apparent exercise of free will and its expansion into concepts such as the self and the soul is intuitively felt to be non-reducible to biological terms [13]. Qualia have frequently been cited as evidence for an "explanatory gap" which ontologically separates the physicalist/ materialistic account of reality and the individual (first person) experience. Qualia lie at the core of the so-called "hard problem" of consciousness [14]. An empirical physical theory of consciousness has to be consistent with evolution and reject any explanatory ideas outside of the physical universe such as dualism. Frameworks for such an approach to consciousness have been formulated [15-18].

We will attempt to deconstruct the claim that consciousness, and phenomenological experience, cannot be studied in neuroscientific terms; we will examine empirical constraints on the concept of free will and examine the idea of the soul and its possible function in the human animal. Our focus will be on very recent results from the

neurosciences which in the aggregate suggest that physicalism provides an adequate account of the mind/brain with its emergent manifestations.

Mind/Brain is a Product of Evolution

The brain and its sensory organs are adapted to the environment the animal inhabits and implement the behaviors necessary for survival and reproductive success. The evolution of the brain is a demonstration of the conservation of structural and functional features linking the human brain to distant relatives in profound ways. It is difficult to identify an entry point for non-physical entities such as the soul in this continuous chain of evolutionary adaptations. There is a vast literature in this field. We will highlight only some very recent findings that serve as examples of the profound connectedness of neuronal function and the circuitry implementing behaviors throughout evolution. Dopamine is the neurotransmitter involved in the reward circuits [19] from the drosophila nervous system to the human brain [20]. There are converging genetic data pointing to a deep homology of vertebrate basal ganglia and the arthropod central complex, suggesting that the circuits essential for behavioral choices have been conserved through deep evolutionary time [21]. The default mode network in humans, which supports self referential cognitive functions such as recollection, conceptual processing and conscious awareness [22-24], is found both in other primates [25] and in the evolutionarily distant rodent brain [26,27]. The evolutionary roots of consciousness of affective experiences we share with other animals probably involve areas in the upper brainstem [28]. We share highly evolved social cognitions such as empathy with our primate relatives [29]. Recently, an evolutionary molecular mechanism has been found that may drive the expansion of cognitive complexity in vertebrates involving gene duplications [30,31]. Also, the genetic basis of heritable complex behavioral adaptations in rodents affecting distinct behavioral modules has been identified [32] providing first direct evidence for the "extended phenotype".

Consciousness is not Beyond the Scope of Science

Phasic cycling of internally generated activity, accessing first primary sensory but then successively more general and abstract processing units of the homotypical cortex, should allow for continual updating of the perceptual image of self and self-in -the-world as well as matching functions between that perceptual image and impinging external events. This internal readout of internally stored information, and its match with the neural replication of the external continuum, is thought to provide an objective mechanism for conscious awareness. That mechanism is not beyond the reach of scientific inquiry (Mountcastle, 1982). The study of consciousness has long been avoided by neuroscience because of the "mistake of supposing that the subjectivity of consciousness made it beyond the reach of an objective science" [33]. Consciousness emerges as a result of the coordinated activity of brain networks spanning many scales of space and time. These networks have "small world" architecture [34] and enable high efficiency information processing, particularly at higher frequencies [35]. Neuroscience is responding to the challenge of modeling how functionally distinct brain states emerge from interactions of a large number of brain regions, each containing millions of neurons, by rapid, real-time integration without the supervision of an executive controller [36]. These networks, while providing long range connectivity of cortical regions which may facilitate sensory-motor integration, preserve a fractal small world topology which allows for

correlated high frequency (gamma band) oscillations. These in turn provide the substrate of temporal binding and permit rapid state-related changes [37]. The function of neural circuits in bringing about mental states is emergent, arising from complex and constantly changing interactions of many neurons [38]. A number of strategies have been used to identify brain states that are required for consciousness. The thalamocortical system plays a critical role in the breakdown and re-emergence of consciousness as shown in studies using anesthesia [39]. The conscious state requires the coupling of subcortical and limbic regions with parts of the frontal and inferior parietal cortex [40]. Loss of consciousness induced by the anesthetic propofol is associated with a rapid change in cortical network dynamics and a resultant decrease of communication between distant cortical areas [41]. The fading of consciousness at the onset of sleep is also associated with a breakdown of connectivity between cortical regions [42].

Coherent oscillations of distributed cortical networks are the physical substrate for perceptual, motor and cognitive representations in the brain, with gamma phase synchrony as a possible mechanism for large scale cognitive integration [43,44] summarize a number of studies which show that converging neuroimaging and neurophysiological data, acquired during minimal experimental contrasts between conscious and nonconscious processing, point to objective neural measures of conscious access: late amplification of relevant sensory activity, long-distance cortico-cortical synchronization at beta and gamma frequencies, and “ignition” of a large-scale prefronto-parietal network. These studies are consistent with theoretical models of conscious processing, including the Global Neuronal Workspace (GNW) model according to which conscious access occurs when incoming information is made globally available to multiple brain systems. The Global Workspace Theory was originally formulated by [45] and has been able to accommodate an increasing number of empirical findings. Experiments on visual perception using binocular rivalry show that the onset of a new conscious percept coincides with the emergence of a new gamma-synchronous neuronal assembly locked to an ongoing theta rhythm, suggesting that oscillatory networks linking relevant cortical regions are critical for furnishing consciousness for the percept [46]. The “perception” and monitoring of one’s own cognitive processes (metacognition), a hallmark of conscious awareness, has been shown in an error detection paradigm to involve brain mechanisms distinct from more automated and unconscious mental processes [47]. Recently, differential oscillatory coupling of prefrontal, parietal and parahippocampal cortices has been shown to mediate temporal versus spatial components of episodic memory [48]. The conscious processing of mathematical expressions has been traced with fMRI and Magneto-Encephalography (MEG) suggesting that mathematical syntax becomes compiled into visual-spatial areas in trained mathematicians [49].

Constraints on the Concept of Free Will

My first act of free will shall be to believe in free will (William James)
Many of our intuitive common-sense ideas and strongly held beliefs have proven to be wrong or inadequate in describing nature and our place in it. The human brain is adapted to process only a very limited spectral bandwidth of electromagnetic radiation and sound waves. Our experience of space and time is limited by our embodied cognition [50]. For example, the findings of Special and General Relativity are not intuitively obvious to us. Likewise, the results of

quantum mechanics, a theory empirically verified to unprecedented precision, demonstrate deeply counter-intuitive events such as entanglement (“spooky action at a distance”), and events traveling backwards in time, among others, which can be captured by mathematical formalisms but not visualized or truly understood by the human mind/brain. The philosophical interpretation of the implications quantum mechanics remains unsettled since the Copenhagen interpretation of Niels Bohr (1935), and Feynman (1965) has claimed that “nobody understands quantum mechanics”. However, our lack of capacity to “understand” these issues did not prevent us from building the electronics industry, which is based on the foundation of quantum mechanics, or using GPS satellites, which would be quite inaccurate without invoking the concepts and mathematics of Einstein’s relativity. The subjective experience of Free Will is deeply imbedded in our concept of ourselves, and how we function in the world. People are quite invested in the idea of free will and generally believe that the tenets of free will apply more in their own lives than in the lives of others [51]. An exaggeration of the sense of personal agency may even be a hallmark of mental health [52] but may also lead people to illusions of control and magical beliefs that their will is influencing the outcome of events [51,53,54] Wegner has suggested an explanation for the apparent mental causation based on the idea that Free Will is an experience arising from interpreting one’s thoughts as the cause of actions whether or not a causal relationship exists [55,56]. The philosophical debate about free will is ongoing.

Neuroscience places significant constraints on the common sense notion of free will. We will present the viewpoint that in a physicalist model of reality Free Will as commonly understood may well an illusion created by our brain [57] offered this formulation: This belief in the freedom of decisions is fundamental to our human self-concept. It is so strong that it is generally maintained even though it contradicts several other core beliefs. For example, freedom appears to be incompatible with the nature of our universe. The deterministic, causally closed physical world seems to standing the way of “additional” and “unconstrained” influences on our behavior from mental faculties that exist beyond the laws of physics. Interestingly, in most people’s (and even in some philosophers’) minds, the incompatible beliefs in free will and in determinism coexist happily without any apparent conflict. One reason why most people don’t perceive this conflict might be that our belief in freedom is so deeply embedded in our everyday thoughts and behavior that the rather abstract belief in physical determinism is simply not strong enough to compete.

The first landmark study of the brain in the process of engaging in a free will transaction conducted by [58] revealed that the brain initiates preparatory electrophysiological for motor behavior 500 milliseconds before the subject reports first becoming aware of the wish to perform the behavior. The implications of this result proved difficult to accept for many, including Libet (1999) who while admitting that “initiation of the freely voluntary act appears to begin in the brain unconsciously, well before the person consciously knows he wants to act”, provides an escape hatch by suggesting that during the 100 msec immediately preceding the motor act, “conscious will might block or veto the process, so that no act occurs.” The Libet study has been criticized for its experimental limitations. However, more recent experiments using fMRI scans have confirmed the original findings and demonstrate that the outcome of a decision can be encoded in neuronal activity of the frontal and parietal cortex up to 10 seconds before it enters conscious awareness [59]. This finding was replicated, demonstrating that motor intentions were encoded in frontopolar cortex up to seven seconds

before participants were aware of their decisions, and the characteristic patterns became more stable with increasing temporal proximity to the conscious decision. This supported the conclusion that the frontopolar cortex is part of a network of brain regions that shape conscious decisions long before they reach conscious awareness [60]. In recent years the challenges to the causal status of free will have mounted, and it has become apparent that setting, pursuing, and realizing goals can occur without conscious interventions [61]. Humans make judgments about others while unconscious of the profound influence an incidental haptic sensation (touching a soft or hard object or holding a light or heavy clipboard) unrelated to the situation had on their evaluation [62].

Phenomenal Experience and Qualia

We also maintain that previously argued categories such as *selfhood* and *phenomenal experience* can be explained biologically in terms of *patterns of neural activity* [63]. Qualia, or “what it is like to have the experience” of the color red, or “of being a bat” [64], have long been evoked as the major stumbling block for a physicalist theory of consciousness [14]. How is it possible to reduce the Qualia of the rich sonority of the Quartetto Italiano playing a Beethoven string quartet into mere physical representation? Consider a digitized recording of this performance of the music on compact disc. It does not reveal the phenomenological content of its information until it is played back on an appropriate system of digital to analog converters, amplifiers and speakers [65] have pointed out that we will, of course, never have the experience of being a bat, “the qualia produced by the bat’s radar (sic!) system along with everything else in its conscious life, which Nagel claims we cannot know”, because our mental life is completely different from that of a bat. The authors go on to suggest a thought experiment involving a rod monochromat (color blind) scientist who studies the brain of a normal color perceiver and arrives at a complete understanding of physical events from the photoreceptors to that neural activity that generates the report “red.” Despite his complete understanding of the molecular and neural events, the scientist will not have the experience of “red” until he connects a cable from the area V4 of a normal color perceiver and connects it to the same area in his brain, bypassing his eyes (which are missing the appropriate cone cells). Therefore, it is in principle possible to experience another person’s qualia. This thought experiment was meant to drive home the point that an appropriate “play back” system is required to instantiate the phenomenal experience of sensory input and was not recommended for experimental verification by the authors. However, we have come a long way since 1997 when this idea was published. Very recently a brain- to- brain interface (BTBI) has been described that enabled behaviorally meaningful real time transfer of sensorimotor information between the brain of two rats [66]. Patterns of cortical sensorimotor signals coding for a particular behavioral response were recorded by microelectrode arrays from the “encoder” rat and transmitted directly via intracortical microstimulation to the “decoder” rat. Pairs of rats fitted with this BTBI cooperated to achieve a common behavioral goal. The authors observed drastic changes in the behavior of the encoder and decoder rats as soon as they started to work as part of a dyad and concluded that operation of a BTBI by an encoder-decoder rat dyad allowed decoders to rely exclusively on neuronal patterns donated by encoders in order to produce the encoder’s behavioral choice. Although we cannot verbally interrogate the rats involved in these experiments, we may hypothesize that the qualia, or “what it is like being a rat involved in the specific

sensorimotor behavior”, have been transferred from the encoder rat to the decoder rat by physical means.

Edelman (2003) naturalizes qualia and broadens their range from an evolutionary perspective by invoking the following sequence: 1. consciousness evolved in concert with the evolution of neural systems that are able to integrate a very large number of sensory inputs and motor responses occurring in parallel; 2 these systems connect sensory inputs with memory and imagery allowing thereby for learning and optimization future behavior and 3. consciousness consists of qualia, by which I mean not just isolated submodalities of red, warm, etc., but also complex scenes, memories, mages, emotions; indeed, the entire rich panoply of subjective experience. If, as I have suggested, the neural systems underlying consciousness arose to enable high order discriminations in a multidimensional space of signals (Edelman and Tononi, 2000), qualia are those discriminations. Differences in qualia correlate with differences in the neural structure and dynamics that underlie them. Thus, for example, olfactory neurons and their circuits differ from retinal neurons and circuits, and such differences seem sufficient to account for differences in their respective qualia. He counters the complaint that no scientific description can provide the actual phenomenological experience of qualia quite definitively: to expect that a theoretical explanation of consciousness can itself provide an observer with the experience of “the redness of red” is to ignore just those phenotypic properties and life history that enable an individual animal to know what it is like to be such an animal. A scientific theory cannot presume to replicate the experience that it describes or explains; a theory to account for a hurricane is not a hurricane. Qualia have been considered “private” first person experiences and therefore assigned to an ontological class different from phenomena that can be studied with the quantitative methods of science. The experience of pain is often cited as an example of such private phenomenal experience. A recent study using fMRI has extracted a neurological signature primarily derived from thalamus, the insula, anterior cingulate cortex and periaqueductal grey matter that predicts pain intensity at the level of the individual person. It discriminates between pain and non-painful warmth with 93% sensitivity and specificity and between physical pain and social pain with 85% sensitivity and 73% specificity [67]. Other “private” mental states such as visual perceptions, covert attitudes and lying can also be decoded from multivariate analysis of fMRI data (Haynes and Rees, 2006). Continuous and subject- driven free streaming cognitive states [68] can now be “decoded” using whole brain functional connectivity analysis [69]. The content of visual imagery during dreams, perhaps the most private phenomenal experience, can be predicted by neural decoding using fMRI in association with machine learning strategies, demonstrating that visual experience during sleep shares brain activity patterns that are generated also by stimulus perception and allowing the uncovering of the subjective content of dreaming [70].

The Self and the Soul

Suppose the mind to be reduced even below the life of an oyster. Suppose it to have only one perception, as of thirst or hunger. Consider it in that situation. Do you conceive of anything but merely that perception? Have you any notion of self or substance? If not, the addition of other perceptions can never give you that notion [71]. The concept of self is used in many contexts, and its meaning covers a wide range of definitions and ideas. Hume (1888) approaches this confusion by atomizing the content of consciousness and in the process eliminating any notion of a reified self. The brain generates at set of

illusions, one of which is the experience of the self. Descartes first devised the thought experiment of the “evil demon” that creates a pervasive illusion that we mistake as our experiences and thoughts, anticipating *The Matrix* motion picture. The experience of the self may be the result of a “self-model” produced by the brain [72] suggesting that “no such things as selves exist in the world: nobody ever was or had a self.” What we consider to be our Self appears to be the phenomenological manifestation of neuronal networks involved in the regulation of positive vs. negative emotional states which have evolutionary roots. We are able, however, to engage in self referential mental activity.

When subjects are asked to evaluate whether a visual scene evoked a pleasant or unpleasant feeling, an increase in metabolic activity (and by inference neuronal activity) in their medial prefrontal cortex (MPFC) is observed [73]. This midline brain region is part of the default mode network (DMN) which is deactivated during non-referential goal-directed tasks [74]. Depressed patients show increased stimulus-induced activity in the DMN, and fail to down-regulate this circuit during reappraisal of the stimulus. This suggests that focus on the Self may have adverse consequences for emotional regulation and the ability to engage in cognitive tasks that require a deactivation of the DMN [75]. Conversely, treatment of depressed individuals with antidepressant medication normalizes the DMN [76]. Self-evaluation is fraught with illusionary distortions which probably are adaptive, such as optimism bias and illusions of control (Taylor and Brown, 1988). The cognitive bias of “superiority illusion”, judging oneself as being superior to average people in various desirable traits, may be evolutionarily selected [77] and has been linked to resting-state functional connectivity between MPFC and the striatum regulated by inhibitory dopaminergic neurotransmission [78]. The activity of the self-referential network can be down-regulated over time and its connectivity to other brain areas can be modified [79] by meditation, a form of meta-awareness used in Buddhist practice to loosen the grip of the illusionary self of the functioning of the mind/brain and thereby alleviating suffering. A much more rapid and dramatic decrease in DMN activity can be achieved by administration of psilocybin [80]. The soul, a concept intimately linked to the notion of the self and its existence, has also been questioned. Greene [81] says that “we haven’t seen the absence of the soul. Rather, we have inferred its absence, based on our background assumptions about what makes one scientific theory better than another. But to truly, deeply believe that we are machines, we must see the clockwork in action. We have all heard the soul is dead. Now we want to see the body. This is what neuroscience promises to deliver, and it is no small thing.” Greene equates the soul’s “core competence” with the ability to render moral judgments, while other competencies such as perception, memory and language production and perception have now been mapped onto the activity of specific brain circuits and thereby “outsourced “ from the domain on the soul [81]. Brain imaging studies argue against the attribution of moral judgments to a “moral faculty” and rather suggest that these judgments are implemented by circuitry which is also involved in self-interested decisions which involve material rewards [82].

Summary

In this paper we attempt to challenge a set of long standing ideas that appears to support a natural mind/body dualism. Consciousness, Phenomenal First Person Experience (Qualia), Free Will, and the idea of the Soul have all been used to stake out an ontological domain that

is seen as non-compatible with a unified physicalist view of the universe. The result is a separation of mind and body which has an immediate impact on how we view psychiatric illness and on the way psychiatric residents perceive their identity as physicians. We have reviewed recent findings from neuroscience to deconstruct the notions of mind/body and self, consciousness and the soul. The “explanatory gap” separating the brain from first person experience is rapidly closing. Current studies are showing that the brain is constantly modified on time scales from seconds to decades by epigenetic modification of genes and modification of brain circuitry and brain connectivity. The challenge is to demonstrate how the profound plasticity of the human brain allows for a unitary, non-dualistic formulation of psychiatry.

There are implications of these findings for the training of young psychiatrists

1. Mind/Body Dualism continues to be pervasive in teachers and residents and leads to stigmatization of mental illness.

2. Mind/Body Dualism is buttressed by the exemption of first person phenomenological consciousness, free will, the self and its soul from scientific analysis and by assigning them a unique ontological status and locating them outside a unified physicalist reality.

3. An increasing number of converging studies demonstrate that consciousness and first-person experience can be studied by physical science and mapped to specific brain circuits.

4. A unified physicalist description of psychiatric diagnosis and treatment is now in reach. This will map brain changes in time scales ranging from minutes to decades produced by epigenetic changes of gene expression (social forces) and changes in brain connectivity by both psychopharmacology and psychotherapy.

5. Residents training in psychiatry can self identify as brain specialists gaining increasingly refined insight into the potential of the plasticity of the human brain interacting with the world and will learn to apply these insights for the benefit of their patients.

References

1. Pies R (2013) Invitation to a Dialogue: Psychiatric Diagnoses, letter to the editor, *New York Times*, 3/19/2013.
2. Frank RG, Goldman HH, McGuire TG (2001) Will Parity in Coverage Result in Better Mental Health Coverage? *N Engl J Med* 345: 1701-1704.
3. Pescosolido BA, Martin JK, Link BG (2000) Americans’ views of mental health and illness at century’s end: continuity and change. Bloomington, Ind.: Indiana Consortium for Mental Health Services Research.
4. Angermeyer MC, Holzinger A, Carta MG, Schomerus G (2011) Biogenetic explanations and public acceptance of mental illness: systematic review of population studies. *B J Psych* 199: 367-372.
5. Ghaemi SN (2006) Paradigms of psychiatry: eclectic and its discontents. *Curr Opin Psychiatry* 19: 619-624.
6. Engel GL (1977) The Need for a New Medical Model: A Challenge for Biomedicine. *Science* 196: 129-196.
7. Demertzi A, Liew C, Ledoux D, Bruno M-A, Sharpe M, et al. (2009) Dualism Persists in the Science of Mind. *Disorders of Consciousness: Ann N.Y.Acad.Sci.*1157: 1-9.
8. Miresco MJ (2006) The Persistence of Mind-Brain Dualism in Psychiatric Reasoning About Clinical Scenarios. *Am J Psychiatry* 163: 913-918.
9. Kendler KS (2005) Toward a Philosophical Structure for Psychiatry. *Am J Psychiatry* 162: 433-440.

10. Andreasen N (1997) Linking Mind and Brain in the Study of Mental Illnesses: A Project for aScientific Psychopathology. *Science* 275: 1586-1593.
11. Kandel ER (1998) A New Intellectual Framework for Psychiatry. *Am J Psychiatry* 155:457-469.
12. Searle J (2013)
13. Popper K, Eccles JF (1977) *The Self and its Brain*, New York: Springer.
14. Chalmers D (1996) *The Conscious Mind: In Search of a Fundamental Theory*. New York: Oxford Univ. Press
15. Mountcastle V (1982) An Organizing Principle for Cerebral Function: The Unit Model And The Distributed System. In GM Edelman, VB Mountcastle, *The Mindful Brain*, pp 7-50, Cambridge, MA: MIT Press
16. Edelman GM (2003) Naturalizing Consciousness: A theoretical framework. *Proc.Natl.Acad. Sci. USA* 100: 5520-5524.
17. Metzinger T (Ed) (2000) *Neural Correlates of Consciousness: Empirical and Conceptual Questions*. Cambridge, MA: MIT Press.
18. Crick F, Koch C (2003) A framework for consciousness. *Nature Neuroscience* 6:119-126.
19. Wise RA (2004) Dopamine, learning and motivation. *Nature Rev. Neurosci.* 5: 483-494.
20. Liu C, Placais PY, Yamagata N, Pfeiffer BD, Aso Y, et al. (2012) A subset of dopamine neurons signals reward for odour memory in *Drosophila*. *Nature* 488: 512-517.
21. Strausfeld NJ, Hirth F (2013) Deep Homology of Arthropod Central Complex and Vertebrate Basal Ganglia. *Science* 340: 157-161.
22. Buckner RL, Andrews-Hanna JR, Schacter DL (2008) The brain's default network: Anatomy, function, and relevance to disease. *Ann NY AcadSci* 1124: 1-38.
23. Binder JR (1999) Conceptual processing during the conscious resting state. A functional MRI study. *J Cogn Neurosci* 11: 80-95.
24. Horowitz SG, Braun AR, Carr WS, Picchioni D, Balkin TJ, et al. (2009)
25. Rilling JK, Barks SK, Parr LA, Preuss TM, Faber TL, et al. (2007) A comparison of resting- state brain activity in humans and chimpanzees. *Proc. Natl.Acad. Sci.USA* 104: 17146-17151.
26. Burke CJ, Huetteroth W, Oswald D, Perisse E, Krashes MJ, et al. (2012) Layered reward signaling through octopamine and dopamine in *Drosophila* 492: 433-437.
27. Lu H, Zou Q, Gu H, Raichle ME, Stein EA, et al. (2012) Rat brains also have a default mode network. *ProcNatl. Acad. Sci.*109: 3979-3984.
28. Panksepp J (2012) Affective consciousness: Core emotional feelings in animals and humans. *Conscious.Cogn.* 2005, 14: 30-80.
29. De Waal FBM (2012) The Antiquity Of Empathy. *Science* 336: 874-876.
30. Ryan TJ, Kopanitsa MV, Indersmitten T, Nithianantharajah J, Afinowi NO, et al. (2013) Evolution of GluN2A/B cytoplasmic domains diversified vertebrate synaptic plasticity and behaviour. *Nature Neuroscience* 16: 25-32.
31. Nithianantharajah J, Komiyama NH, McKechnie A, Johnstone M, Blackwood DH, et al. (2013) Synaptic scaffold evolution generated components of vertebrate cognitive complexity. *Nature Neuroscience* 16:16-24.
32. Weber JN, Peterson BK, Hoekstra HE (2013) Discrete genetic modules are responsible for complex burrow evolution in *Peromyscus* mice. *Nature* 493:402-406.
33. Searle J (2000) Consciousness. *Annu Rev Neurosci* 23:557-578.
34. Watts DJ, Strogatz SH (1998) Collective dynamics of 'small world' networks. *Nature* 393: 440-442.
35. Bassett DS, Bullmore ET, Meyer-Lindenberg A, Apud JA, Weinberger DR, et al. (2009) Cognitive fitness of cost-efficient brain functional networks. *Proc.Natl.Acad. Sci.USA* 106: 11747-11752.
36. Sporn O, Honey CJ (2006) Small world inside big brains. *Proc.Natl. Acad. Sci.USA* 103:19219-19220.
37. Bassett DS, Meyer-Lindenberg A, Achard S, Duke T, Bullmore E (2006) Adaptive reconfiguration of fractal small-world human brain functional networks. *Proc. Natl. Acad. Sci USA* 103: 19518-19523.
38. Alivisatos AP, Chun M, Church GM, Greenspan RJ, Roukes ML, et al. (2012) The Brain Activity Map Project and the Challenge of Functional Connectomics. *Neuron* 74: 970-974.
39. Hwang E, Kim S, Han K, Choi JH (2012) Characterization of Phase Transition in the Thalamocortical System during Anesthesia-Induced Loss of Consciousness. *PLOS ONE* 7: 1-8.
40. Langsjo JW, Alkire MT, Kaskinoro K, Hayama H, Maksimov A, et al. (2012) Returning from Oblivion: Imaging the Neural Core of Consciousness. *J Neurosci.* 32: 4935-4943.
41. Lewis LD, Weiner VS, Mukamel EA, Donoghue JA, Eskandar EN, et al. (2012) Rapid fragmentation of neuronal networks at the onset of propofol-induced unconsciousness. *Proc.Natl.Acad. Sci. USA* 109: E3377-E3386.
42. Massimini M, Ferrarelli F, Huber R, Esser SK, Singh H, et al. (2005) Breakdown of Cortical Effective Connectivity During Sleep. *Science* 309: 2228-2232.
43. Rodriguez E, George N, Lachaux JP, Martinerie J, Renault B, et al. (1999) Perception's shadow: long-range synchronization of human brain activity. *Nature* 397: 430-433.
44. Dehaene S, Changeux JP (2011) Experimental and Theoretical Approaches to Conscious Processing. *Neuron* 70: 200-227.
45. Baars BJ (1994) A Thoroughly Empirical Approach To Consciousness. *Psyche*1 (6) (1994)
46. Doesburg SM, Green JJ, McDonald JJ, Ward LM (2009) Rhythms of Consciousness: Binocular Rivalry Reveals Large-Scale Oscillatory Network Dynamics Mediating Visual Perception. *PLoS ONE* 4: 1-14.
47. Charles L, van Opstal F, Marti S, Dehaene S (2013) Distinct brain mechanisms for conscious versus subliminal error detection. *NeuroImage*: in press.
48. Watrous AJ, Tandon N, Conner CR, Pieters T, Ekstrom AD (2013) Frequency-specific network connectivity increases underlie accurate spatiotemporal memory retrieval. *Nature Neuroscience* 16: 349-358.
49. Muruyama M, Pallier C, Jobert A, Sigman M, Dehaene S (2012) The cortical representation of simple mathematical expressions. *NeuroImage* 62: 1444-1460.
50. Lakoff G, Johnson M (1999) *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York, New York, USA: Basic Books
51. Pronin E, Wegner DM, McCarthy K, Rodriguez S (2006) Everyday magical powers: The role of apparent mental causation in the overestimation of personal influence. *J Pers Soc Psychol* 91: 218-231.
52. Taylor SE, Brown JD (1988) Illusion and well-being: A social psychological perspective on mental health. *Psychol Bull* 103: 193-210.
53. Langer EJ (1975) The illusion of control. *J Pers Soc Psychol* 32: 311-328.
54. Matute H (1996) Detecting response-outcome independence in analytic but not innaturalistic conditions. *Psychol Sci* 7: 289-293.
55. Wegner DM (2002) *The illusion of conscious will*. Cambridge, MA: MIT Press.
56. Ebert JP, Wegner DM (2011) Bending Time to One's Will in: *Conscious Will and Responsibility* , pp 134- 145 ,Sinnott-Armstrong W, Nadel L (Eds), NY: Oxford University Press.
57. Haynes JD, Rees G (2006) Decoding mental states from brain activity in humans. *Nature Rev Neuroscience* 7: 523-534.
58. Libet B (1999) Do We Have Free Will? *Journal of Consciousness Studies* 6: 47-57.
59. Soon CS, Brass M, Heinze H-J, Haynes JD (2008) Unconscious determinants of free decisions in the human brain *Nature Neuroscience* 11: 543-545.
60. Bode S, He AH, Soon CS, Trampel R, Turner R, Haynes JD (2011) Tracking the Unconscious Generation of Free Decisions Using Ultra-High Field fMRI. *PLoS One* 6: e21612.
61. Custers R, Aarts H (2010) The Unconscious Will: How the Pursuit of Goals Operates Outside of Conscious Awareness. *Science* 329: 47-50.
62. Ackerman JM, Nocera C, Bargh JA (2010) Incidental Haptic Sensation Influence Social Judgments and Decisions. *Science* 328: 1712-1714.

63. Edelman GM, Gally JA, Baars BJ (2011) Biology of consciousness. *Frontiers in Psychology* 2: 1.
64. Nagel T (1974) What Is It Like to Be a Bat? *The Philosophical Review* 83: 435-450.
65. Ramachandran VS, Hirstein W (1997) Three Laws of Qualia. What Neurology Tells Us about the Biological Functions of Consciousness, Qualia and the Self. *Journal of Consciousness Studies* 4: 429-458.
66. Pais Vieira M, Lebedev M, Kunicki C, Wang J, Nicolelis MAL (2013) A Brain-to-Brain Interface for Real-Time Sharing of Sensorimotor Information. *Sci. Rep.* 3:1319.
67. Wager TD, Atlas LY, Lindquist MA, Roy M, Woo C-W, et al. (2013) An fMRI-Based Neurologic signature of Physical Pain. *N Engl J Med* 368: 1388-1397.
68. James W (1918) *The Principles of Psychology*. Vol.1. New York: Holt and Company.
69. Shirer WR, Ryali S, Rykhlevskaia E, Menon V, Greicius MD (2012) Decoding Subject-Diven Cognitive States with Whole-Brain Connectivity Patterns. *Cerebral Cortex* 22: 158-165.
70. Horikawa T, Tamaki M, Miyawaki Y, Kamitani Y (2013) Neural Decoding of Visual Imagery During Sleep. *Science expresses* 10.1126:1-6.
71. Hume D (1888) *A Treatise of Human Nature*. Oxford: Clarendon Press.
72. Metzinger T (2003) *Being No One: The Self-Model Theory of Subjectivity*. MIT Press Cambridge MA.
73. Gusnard DA, Akbudak E, Shulman GL, Raichle ME (2001) Medial prefrontal cortex and self-referential mental activity: Relation to a default mode of brain function. *Proc. Natl.Acad. Sci.USA* 98: 4259-4264.
74. Raichle ME, MacLeod AM, Snyder AZ, Powers WJ, Gusnard DA, et al. (2001) A default mode network of brain function. *Proc.Natl.Acad. Sci.USA* 98: 676-682.
75. Sheline YI, Barch DM, Price JL, Rundle MM, Vaishavi SN, et al. (2009) The default mode network and self-referential process in depression. *Proc.Natl.Acad. Sci.USA* 106: 1942-1947.
76. Posner J, Hellerstein DJ, Gat I, Mechling A, Klahr K, et al. (2013) Antidepressants Normalize the Default Mode Network in Patients With Dysthymia. *Jama Psychiatry*.455: E1-E10.
77. Johnson DDP, Fowler JH (2011) The evolution of overconfidence. *Nature* 477: 317-320.
78. Yamada M, Uddin LQ, Takahashi H, Kimura Y, Takahata K, et al. (2013) Superiority illusion arises from resting-state brain networks modulated by dopamine. *Proc.Natl. Acad. Sci.USA* 110: 4363-4367.
79. Brewer JA, Worhunsky PD, Gray JR, Tang YY, Weber J, et al. (2011) Meditation experience is associated with differences in default mode network activity and connectivity. *Proc. Natl.Acad.Sci.USA* 2011 108: 20254-20259.
80. Carhart Harris RL, Erritzo D, Williams T, Stone JM, Reed LJ, et al. (2012) Neural correlates of the psychedelic state as determined by fMRI studies with psilocybin. *Proc .Natl.Acad.Sci.USA*109: 2138-2143.
81. Greene J (2011) Social Neuroscience and the Soul's Last Stand. In: Todorov A, Fiske ST, Prentice DA (Eds.) *Social Neuroscience. Toward Understanding the Under pinnings of the Social Mind*. New York: Oxford University Press, 263-273.
82. Shenhav A, Greene JD (2010) Moral Judgments Recruit Domain-General Valuation Mechanisms to Integrate Representations of Probability and Magnitude. *Neuron* 67: 667-677.