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# The Unbearable Lightness of Reductionist Physicalism in Contemporary Psychiatry

**Necati Serkut Bulut, Suha Can Gursoy, Mustafa Kemal Sayar**

*Marmara University Pendik Research and Training Hospital, Department of Psychiatry, Pendik, Istanbul, Turkey*

**Abstract**

Being one of the most renowned subjects in philosophy, mind-body problem focuses on the relationship between physical and mental phenomena. Various approaches have been developed throughout history with two perspectives having been the most prominent: the claim that mind is of material nature (physicalism) and that mind is radically separate from physical existence (dualism). With its core premises, mind-body problem and different approaches to it are crucially relevant for psychiatry. Psychiatry, in its daily practice and theory, is situated right at the site of this so-called mind-body gap. Psychiatrists' conceptualization of mind-body problem is deeply related not only to their views on the nature of subjectivity and free will; but also to their implicit and explicit assumptions about psychopathology. In this mind-body problem framework, physicality is mostly attributed to the nervous system, more specifically to the brain. Advances in genetics, molecular biology, cognitive science, psychopharmacology and brain imaging techniques have led neuroscientific paradigm to be the de facto conceptual framework for understanding mental activity and psychic experience. In this view, as with the rest of all psychological phenomena, mental disorders are also brain disorders and physical (i.e. reductionist) methods are key to understand, prevent, and treat these conditions. With the advent of neuroscience, biological approaches to psychopathology have also paved the way for the birth of a popular neuro-culture that shadow other approaches to psychopathology. Explaining complex phenomena through neurobiological substrates has paralleled the acceptance of a popular motto that can be summarized as "you are your brain". Despite all expectations, diverted resources, and intellectual interest, neurobiological reductionism has yet to bring about the anticipated breakthrough in clinical practice of psychiatry. In this article, we aim to provide a brief overview of the mind-body problem, describe various aspects of neurobiological reductionism, and address its theoretical impasses and implications for psychiatry.

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## MIND BODY PROBLEM

Contemporary discussions of mind-body problem have their roots in 17th century philosopher Descartes' thought. According to Cartesian dualism, two different substances exist: material (i.e. body, res externa) and immaterial (mind, res cogitans). These interact but are fundamentally distinct. Mind is independent from physical space and its main work is thinking. This distinction is exemplified by the argument that while everything that is perceived can be suspected and approached with radical skepticism, the act of thinking itself cannot be doubted. This undoubtable nature of thinking distinguishes it from the percepted world (i.e. externalities) and provides a solid ground for subjective existence, hence the dictum "cogito ergo sum". Since two substances are radically distinct, their existence are not dependent on each other [1]. This distinction of Cartesian dualism has not only affected philosophical arguments, but the idea of "mind separate from externality" also paved the way to major notions of Western thought such as universal subjectivity and humanism [2]. Although Descartes' original thoughts of "*substance dualism*" have been heavily criticized for not sufficiently elaborating the interaction between these different substances, various dualistic approaches differing in terms of their ontological perspective (e.g. property, predicate dualism etc.) or the explanations they provide on mind-body interactions (e.g. interactionism, epiphenomenalism etc.) are still active and strong [3-5].

While Descartes' thought have deeply influenced the evolution of ensuing dualistic models, another French thinker, La Mettrie, has a similar historical significance for the opposite position: physicalism (i.e.monism). Broadly put, physicalism is the idea that the universe and

**Corresponding author:** Necati Serkut Bulut, E-Mail: serkutbulut@gmail.com

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everything in it is ultimately physical in nature. Physicalism can roughly be categorized as reductive and nonreductive. According to the less rigorous nonreductive physicalist view, mental states are realized in relation to physical states (causal reducibility) but they cannot be reduced to them (ontological irreducibility) [6]. The general idea is that A's can be reduced to B's, insofar as A's are "nothing but" B's. The presence of mental phenomena can be reduced to and accounted for by brain functions, yet specific mental phenomena cannot be, as specific phenomena are not "nothing but" brain functions [7]. Feeling of cold is caused by physical sensations, but the experience of coldness cannot be accounted in terms of physical states. This view is criticized for making an ontological distinction between mental and physical, resembling epiphenomenalism (hence dualism). On the other end of the spectrum is reductionist physicalism, which argues that everything that exist, including all mental activities and states, is of physical nature and can be accounted in natural science terms.

Regarded as a manifesto against Cartesian dualism, in "L'Homme Machine" (Man a Machine), La Mettrie argued that the idea that mind and body are two distinct substances is not plausible and humans and animals only consist of material (res externa), mind and body both operate like that of a machine. These ideas, which can be viewed as an example of reductionist physicalism, resemble current positions which presuppose that all behavior, thought and emotion can be explained in terms of materialistic causality [1]. Considering the rising interest in neuroscientific explanations of experience, one might say that physicalist ideas that presuppose that all mental states and experience can be reduced and examined through observable neural activity, are getting increasingly popular.

## Reductionist physicalism and neuroscience

Advances in physics in the 20th century fueled the desire to find a common, reducible explanatory site to understand and describe complex phenomena and strengthened the idea that all kinds of knowledge can be expressed by mathematical models in many different fields. Psychology was not exempt from this wave and areas like psychophysiology, with reductionist materialistic premises, started to develop. Reductionist radical materialism holds that by careful analysis of human body/brain, characteristics and distinctive properties of psychological phenomena will be sufficiently explained by biological measures as relevant technical difficulties are overcome. Today, biomedical approaches that deem fields such as molecular biology, genetics, and brain imaging studies to be of most relevance for psychiatry, can be said to have similar assumptions with regards to psychopathology [8].

In 1882, by discovering the relationship between regional blood flow in the brain and mental activities using his "human circulation machine", Italian physiologist Angelo Mosso has pioneered the theoretical framework for today's functional brain imaging. During the same period, Broca's observations on speech disturbances in people with brain damage had paved the way for the "modular organization of the brain" thesis (by contrast, Wernicke held that any brain function required participation from multiple areas and it was not the location, but the way networks operate that dictated the characteristics of any given function) [9]. In the following years, neurologists following Broca came to the conclusion that since the anatomical location of a brain lesion corresponds to a specific mental dysfunction, it would be possible to shed light on a particular mental function by analyzing the related neural organization [10]. As neuropsychology was gaining prominence during the 1950's, discovery of DNA's molecular structure had also lighted the fuse for another revolution in biology. Through 1980's and 1990's, the development of new imaging technologies such as positron emission tomography (PET) and functional magnetic resonance imaging (fMRI), which allowed researchers to see the "brain at work", heralded the birth of a new research domain. This period also witnessed the emergence of numerous subfields with neuro-prefix and a "neuro-culture" in popular science and neuroscience moved from being a discipline that simply contributes to our understanding of human biology to a site of almost mythic accounts of subjective experience and human condition. Approaches that reduce different aspects of subjective experience to corresponding neural activity have gained popularity both in academia and popular science [11]. However, the claim that notions like consciousness, free will, logic are localizable functions of the brain and that complex phenomena of human subjectivity should be accounted in physics terminology has been criticized extensively for the inconsistencies and contradictions of its underlying assumptions. Declaring a molecule, receptor, or some type of neural activity to be the very phenomenon it shows correlational relationship with, is an example of reification fallacy and is akin to equating a book with the concept of knowledge.

This fallacious aspect becomes quite visible in neuroscience's struggle to colonize psychology. Larry Young suggested that romantic love can be explained by AVPR1A gene. Francis Crick, who had said "you're nothing but a pack of neurons", claimed that free will resided in anterior cingulate gyrus. Gerald Edelman's famous motto "you are your brain" has been widely adopted in popular culture [12]. These claims are blatantly contradictory since the movement of neuroscience's deconstructive approach to subjective phenomena ultimately has to start from references to humanistic/psychological theories. The notions and processes that are being studied are rendered operational by their psychological theories, not physical properties. There is no study of "love" without a psychological framework of emotions and experience, as there is no study of "inflation" without a theory of economics. This conceptual background also expands into the methodological techniques. From the design of the stimuli to be used in brain imaging studies to the interpretation of findings of an experiment, a set of assumptions from which the method is justified as valid and relevant must be present explicitly or implicitly. Measurability and associability alone cannot be said to overcome this necessity by virtue of objectivity and simplicity. It would

be incoherent to claim to study "inflation" by examining the color patterns of banknotes in circulation and denying any need for an economical theory since color pattern is an objective measure and such objectivity would inevitably lead to a deeper understanding of inflation as data accumulate. Since neuroscientific approach to human experience cannot be independent from psychological models, possibility of an objective, independent perspective that precedes these models and guarantees validity (punctum Archimedis) is questionable.

### Neuro-madness

Reductive physicalist approaches, with brain imaging studies being frontrunners, have allowed neuroscience to be strengthened as a domain of explanatory myths in popular science field. Today, many speculative studies with limited evidence levels seduce especially unprofessional readers and contribute to the rise of a popular neuro-culture. Many sub-disciplines with a "neuro" prefix (such as neuro-economics, neuro-theology) have turned to describe and explain various phenomena by neurophysiological models, bypassing psychology and humanities. In today's popular science magazines, it is not rare to stumble upon articles implying brain regions as causative for things ranging from belief to love, infidelity, and political orientation. Oversimplified models, illustrations and language create a false sense of clarity and lead readers to regard mind processes and subjective experience as to be reducible to brain regions/neural networks [10].

An article on the front page of New York Times on 11th November 2007 entitled *"This is your brain on politics"* can be considered a striking example of this popular reductive neuroscientific position. In the study that the article was based on, Iacoboni et al. examined brain activity via fMRI while the participants are exposed to stimuli with political content and managed to obtain findings predicting electorate preferences. This study, unsurprisingly becoming popular, have then been criticized by various quarters including a group of 17 well-known neuroscientists, citing small sample size and reported methodological framework being unsuitable to reach such conclusions [10, 13].

Search for simple explanatory narratives, which magically render complex phenomena plausible, have been prevalent throughout history (as in the case of mesmerism and mystical accounts of electricity). It is also not uncommon that such explanations are presented with (pseudo)scientific references to improve plausibility. Today, for human behavior and subjectivity, the field that is appealed for credibility can be said to be neuroscience. In their study; Weisberg and Keil examined the effect of neuroscientific content on plausibility of explanations by dividing the participants into two groups and presenting them explanations about several well-known psychological phenomena [14]. The explanations had been prepared in two categories, "good" and "bad". One group was presented with good and bad explanations, and the other group was presented with neuroscientific verbiage in addition to good and bad explanations. The participants were asked to rate every explanation with regards to plausibility/logical soundness. Post hoc tests revealed that two groups did not differ on ratings of good explanations; however, "bad" explanations with additional neuroscientific information yielded with more satisfying scores than bad explanations without a neuroscientific jargon. In the final phase of the experiment, participants were neuroscience experts and no main effect of neuroscience information was observed, indicating that subjects rated explanations in the same way regardless of the presence of neuroscientific information. Taking research trends into account, it can be said that this "seductive allure of neurobiological reductionism" has exceeded pop-psychology and deeply affected the conceptual transformation of psychiatry.

### Psychiatry from the perspective of reductionist physicalism

Of all contemporary professions, psychiatry is most concerned with the relationship of mind and brain [15]. Arguments about reductionist physicalism, eclecticism and dogmatism have been relevant since the beginning of history of modern psychiatry. In the 19th century, biological approaches focused on discovering etiopathogenesis of mental disorders in the nervous system, similar to neurological disorders. In a period when mental disorders had been mainly viewed through optics of mystical, religious, and moral dogmas; Griesinger brought a new perspective to psychopathology by claiming that mental disorders should be approached as the brain disorders. The idea that mental disorders, like neurological or cardiological disorders, could be the subject of medical research with epidemiological, etiological, and prognostic aspects was revolutionary indeed [16]. In the early 20th century, however, biological theories of psychopathology started to lose popularity as Freud's psychoanalytical model was growing as an alternative paradigm. Despite advances in somatic therapies such as electroconvulsive therapy (ECT), psychotropic drugs such as chlorpromazine, lithium and imipramine; psychoanalysis and psychosocial theories continued to enjoy dominance in the field. After WWII, psychoanalytical approach could be said to have burnt the bridges with biological models and for many critics, assumed a dogmatic position. Disorders like schizophrenia were regarded mainly as psychosocial disturbances, i.e. bad mothering, insufficient or inappropriate caring. This approach not only led to inflict extreme feelings of guilt on many families, but also long, arduous and expensive psychotherapy methods were providing very limited improvement. Things, in time, were also complicated with the rising popularity of skeptical positions and the anti-psychiatry movement. It was now questioned whether psychiatry had the necessary qualities of being a proper medical branch. To "save" psychiatry as a medical field, biological revolutionaries started to organize under the radar [17]. This "Neo-Kraepelinian" camp's first big impact was in 1980 with the publication of DSM-III which aimed to integrate mental disorders in the medical field and ground psychiatric nosology and treatment approaches to a biomedical model. Up until then, the DSM had very limited use in clinical practice and was mainly utilized as a

categorization scheme for research or insurance purposes. What made DSM-III different was that it moved away from psychoanalytic terminology, broke apart psychoanalytically formulated conditions such as hysteria into different entities, focused on symptom clusters and measurable clinical findings rather than speculative explanatory models. With this approach, psychiatry was expected to turn its face towards positive science and the antipsychiatric argument of "psychopathology as a myth" could be countered. Although explanatory models were removed from focus; researchers assumed firmly that biomarkers and biological precursors of psychopathologies would eventually be deciphered in the future [18]. With the biological revolution, psychiatry made an almost 180 degree conceptual turn.

From the early 1980's, with advances in psychopharmacology, molecular neuroscience, and neuroimaging; biological paradigm soared to the heights of popularity. 1990's was declared "decade of the brain" in the USA and high hopes were tied on the biological paradigm for providing major breakthrough and innovation in psychiatry. Psychiatric conditions were to be understood with neural circuits, interactions, and biomarkers. Genetic screening would allow accurate and precise risk assessment for mental disorders. Like with neurological conditions, by showing the roots of illness in organic processes, stigma associated with psychopathology was to be diminished. Psychopathological conditions would be explained not with vague psychological theories, but with observable, replicable neural dysfunction patterns. Thoughts like "psychiatrists should be called clinical neuroscientists" were not uncommon [19].

Yet, after 3 decades, contributions of neuroscience and biology to psychiatry failed to accomplish the anticipated progresses and to produce a comprehensive theoretical model of any major psychiatric disorder [20]. Despite all hopes, expectations and diverted resources, very few clinically important finding was obtained. Apart from Alzheimer's disease, there is no instrumental method or biomarker for reliably diagnosing or attributing specific gene variants to any mental disorder. No breakthrough was achieved for treatment of schizophrenia for 60 years and depression for 30 years [21-23]. Treatments did not radically change in accord with advances in neuroscience; on the contrary, several big players in pharmaceutical industry receded from the field due to low expectation of succes (24). The assumption that biologically grounded explanations would automatically decrease stigmas associated with psychiatric disorders was contradicted with empirical findings in the field studies.

Instead of rethinking the reductionist biological paradigm's role in psychopathology, the position was "doubled down": the problem was with vague nosological categories, outdated subject-centered approaches and overall bad practice. In 2013, The National Institute of Mental Health (NIMH) put forward the Research Domain Criteria (RdoC), which was based on biobehavioral dimensions expected to be more compatible with neurobiological techniques and had "measurability" as the central tenet (25). Used as a research funding policy guide, RDoC was expected to eventually allow accumulation of sufficient data of high quality to put forward specific neural substrates for psychopathological conditions and novel treatment targets that were more valid and effective. It can be said that these policies have also fallen quite short to provide the expected progress. In an interview for Wired magazine in 2017, Thomas Insel, who had been the chair of NIMH for 13 years, stated that while many interesting papers were published and some $20 billion was diverted to such neuroscience-based research, no improvements were achieved with regards to suicide rates, hospitalization, morbidity and mortality of psychopathology. Apart from failing to meet expectations, this approach that considers measurability with current neuroscientific methods as the main validity criteria is interpreted also as a threat to rich, "subject-centered" descriptive psychopathology literature and traditional clinical understanding [26, 27]. Parallel to arguments about reductionism, it is very questionable whether mental disorders can be reliably examined through clear, well-delineated modular functions as put forward by RDoC system. Reduction of mental processes to localized neural activity may not guarantee neat, valid, generalizable findings for psychopathology since mental disorders of interest can be complex, context dependent and inherently fuzzy processes [28, 29].

It is without a doubt that neuroscience and biological approaches in general have immensely contributed to the scientific understanding of neural biology and cognition. It is also true that this understanding has allowed clinicians to utilize treatment options that were not available before. Studies on neuroimaging, emotional circuits, neuronal plasticity keep developing as serious scientific fields and continue to shed light on these aspects of various conditions. However, reframing reductionistic assumptions of these fields as central tenets of psychiatry leads to an expectation that as technology catches up with brain sciences, mental health will inevitably improve. Given the complexity and the multilayered nature of psychiatric conditions, one should not be surprised by the fact that no matter how significant in other ways, new discoveries and developments in neuroscience may still be far from translating into a breakthrough in providing help for patients in clinical settings [20].

In order to overcome this apparent impasse, Fuchs proposed the model of "circular causality": mental disorders are both a failure of integration of different functions of the organism (i.e. vertical circularity) and responsivity in the social world (i.e. horizontal circularity) [12]. This approach integrates the two dichotomous aspects (ecclecticism and reductionism), favors the embodiment concept of cognition and experience instead of representationalism, argues for formulation of psychopathology as problems of interaction, and define psychiatry as "a relational medicine in an encompassing sense: as a science and practice of biological, psychological, and social relations and their disorders" [16].

## CONCLUSION

Methodological reductionism is the key stone of natural sciences and medicine. Today, neuroscience has rendered tremendously complex organization of the brain understandable by studying functional units of different dimensions: neurons, proteins, genes, networks etc. These models can and do help us gain a deeper understanding of how the neural system is organized, what changes occur in what layer in which conditions. Problems regarding the brain and mind relationship arise when this methodology of reductionism, is mistaken to be the equivalent of the original phenomena instead of a research strategy, resulting in a short circuit between natural science level (especially neurobiological constructs) and intersubjective level. Psychopathology always includes subjective experience and cannot be sufficiently accounted for by the description of correlated physiological events. The assumption that biologically grounded descriptions are the ultimate explanatory horizon for mental disorders also do not seem plausible. Approaches that do not limit their focus on a reductionist viewpoint can be said to be of critical importance for addressing psychiatry's current problems.

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**Informed consent:** Informed consent was obtained from all individual participants included in the study.

**Ethical approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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