



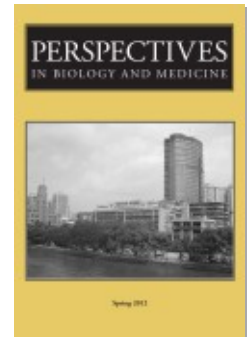
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THE PHILOSOPHICAL “MIND-BODY PROBLEM” AND ITS RELEVANCE FOR THE RELATIONSHIP BETWEEN PSYCHIATRY AND THE NEUROSCIENCES

LUKAS VAN OUDENHOVE* AND STEFAAN E. CUYPERS†

ABSTRACT Parallel to psychiatry, “philosophy of mind” investigates the relationship between mind (mental domain) and body/brain (physical domain). Unlike older forms of philosophy of mind, contemporary analytical philosophy is not exclusively based on introspection and conceptual analysis, but also draws upon the empirical methods and findings of the sciences. This article outlines the conceptual framework of the “mind-body problem” as formulated in contemporary analytical philosophy and argues that this philosophical debate has potentially far-reaching implications for psychiatry as a clinical-scientific discipline, especially for its own autonomy and its relationship to neurology/neuroscience. This point is illustrated by a conceptual analysis of the five principles formulated in Kandel’s 1998 article “A New Intellectual Framework for Psychiatry.” Kandel’s position in the philosophical mind-body debate is ambiguous, ranging from reductive physicalism (psychophysical identity theory) to non-reductive physicalism (in which the mental “supervenes” on the physical) to epiphenomenalist

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dualism or even emergent dualism. We illustrate how these diverging interpretations result in radically different views on the identity of psychiatry and its relationship with the rapidly expanding domain of neurology/neuroscience.

PSYCHIATRY IS A DISCIPLINE on the border between the biomedical sciences on the one hand and the humanities and social sciences (most notably psychology and anthropology) on the other. This unique position undoubtedly contributes to the attractiveness of psychiatry as a medical specialism for many young doctors, but it also causes significant problems. Unlike other medical disciplines, in which the definitions of diseases are based on objective, measurable pathophysiological underpinnings, psychiatric diagnosis and classification has been based on descriptions of inherently subjective mental and behavioral symptoms that are supposed to be deviant from “normal” psychology or behavior, as reflected in the current classification system of psychiatric disorders, the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV; APA 1994).

Knowledge of the biological basis of psychiatric disorders has grown rapidly since the “decade of the brain” in the 1990s, fuelled by exciting new neuroscientific research tools including functional brain imaging. However, although its implications for everyday clinical practice remain fairly limited, the neuroscientific (r)evolution carries the risk of reducing psychiatric disorders to their neurobiological basis. This is the point where philosophy may prove helpful, by providing insights that transcend a purely neuroscientific or psychiatric perspective. Like psychiatry, “philosophy of mind” occupies a borderline position, studying the relationship between the mental (mind, psyche, studied in human sciences) and the physical (matter, brain, studied in biomedical sciences, including neuroscience). Contemporary analytical philosophy, unlike older forms of philosophy of mind, is not based exclusively on the methods of introspection and conceptual analysis, but it also draws upon the empirical methods and findings of the natural sciences. Thus, philosophy of mind may offer a meta-position transcending the human and exact scientific paradigms, thereby offering valuable new insights.

Interest in philosophy in general, and in contemporary analytical philosophy of mind in particular, has grown in the psychiatric literature over the past few years, as exemplified by the Oxford University Press series “International Perspectives in Philosophy and Psychiatry” (Fulford, Thornton, and Graham 2006; Radden 2007), among others (Bennett and Hacker 2003). This article will outline the conceptual framework of the philosophical mind-body problem for a broad scientific audience and argue that this philosophical debate has potentially far-reaching implications for psychiatry as a clinical-scientific discipline, especially for its own autonomy and its relationship to neurology/neuroscience. We will illustrate this claim with a conceptual analysis of the five principles formulated by the eminent neuroscientist and Nobel Prize winner Eric Kandel in his influential article, “A New Intellectual Framework for Psychiatry” (1998).

TABLE 1 THE MIND-BRAIN RELATIONSHIP AND THE POSITIONS IN THE MIND-BRAIN DEBATE, WITH RESPECT TO THE AUTONOMY THEY GRANT TO THE MENTAL LEVEL

<i>Mind</i>	<i>Brain-Body</i>
mental properties/phenomena (thoughts, sensations, emotions, etc.)	physical properties/phenomena (mass, neurophysiological state, etc.)
not spatially extended	spatially extended
private, privileged access (first person)	public access (third person)
conscious (subjectivity, phenomenality, intentionality)	non-conscious
humanities (qualitative, <i>verstehen</i>)	neurosciences (quantitative, <i>erklären</i>)

THE “MIND-BODY PROBLEM” IN CONTEMPORARY ANALYTICAL PHILOSOPHY

The relationship between mind and brain has always been a puzzle, even a mystery. The physical, spatially extended, and tangible reality seems to be radically different from the mental reality that can only be accessed through our own subjective consciousness (Table 1). Or is this distinction, although intuitively clear, false? A radical difference between the physical and the mental domain seems to be at variance with another intuition, namely that of a continuous reciprocal interaction between both. We assume, for instance, that our intentions are capable of moving our limbs (“mental causality”). How brain and mind relate to each other and their mutual interaction remains until today a matter of great debate, especially in the analytical philosophy of mind (Kim 1998, 2006; Maslin 2001). In this section, we will provide a brief overview of the different positions on the mind-body (mind-brain) relationship in contemporary analytical philosophy of mind.

Physicalism

The core idea of *physicalism* (or *materialism*) is that the human being, including the mind, is nothing but complex physical matter—all human properties can thus in principle fully be explained by the laws of exact natural sciences, most notably physics. When applied to the mind-brain problem, physicalism defends the thesis that the nature of mental properties (mental states or events, including beliefs, sensations, etc.) and of the subject having them, is purely physical (Kim 2006; Maslin 2001).

The impact of scientific fieldwork—especially of empirical research in cognitive psychology and neurosciences—on philosophy of mind has profoundly shaped its identity and character. Contemporary philosophy of mind is a special branch of philosophy of science, or even just a part of cognitive science itself. The philosopher adopts, accordingly, the position of a meta-theorist or even that

of a full-fledged theorist. This scientific—even scientistic—trend has brought about the naturalization of analytical philosophical psychology. Contemporary philosophy of mind develops in close relationship with the naturalism of the natural and cognitive sciences. The picture of man and world in contemporary philosophy of mind, just like in the sciences, is standardly mechanistic and deterministic. It follows that the starting-point for a naturalized philosophy of mind can be no other than the objective, materialistic, third-person world of the sciences. Modern materialism also goes under the name of physicalism precisely because it tries to account for mental phenomena within the bounds of contemporary physics, which functions as the prototype of an exact science. Consequently, physicalism is the dominant position in analytical philosophical psychology nowadays, with the discussion focusing on what specific variety of physicalism is the most defensible.

Eliminativism, defended by Churchland (1986, 1995), is the most radical position within physicalism. It simply denies the existence of mental properties. According to eliminative physicalism, talking about these mental phenomena should be regarded as a remnant of pre-scientific “folk psychology” (the ubiquitous commonsense strategy to explain and predict behavior in terms of beliefs, desires, and other mental states). In this view, folk psychology suffers not only from explanatory impotence with regard to key psychological phenomena, such as memory and learning, but also from historical stagnation and theoretical isolation. It has not made any significant progression since Greek antiquity and cannot be integrated into the emerging synthesis of the empirical sciences. Since folk psychology has no empirical integrity, it is quite probably false. According to the eliminativists, one should therefore take a resolute attitude towards folk psychology, analogous to the already widely accepted rational attitude towards Aristotelian cosmology and 17th-century alchemy: “junk it!” Because of its massive empirical failings, folk psychology should simply be replaced by computational neuroscience (Churchland 1986; Kim 2006; Maslin 2001). However, due to its radical nature, eliminativism has not gained much support. All other forms of physicalism try to save mental phenomena by reconciling the commonsense view—there are mental events and states such as pains and beliefs—with the scientific view that man is nothing but a physico-chemical mechanism.

A second physicalist position, *reductive physicalism*, does not deny the existence of mental properties (thus, talking about them remains meaningful), but postulates that they are ontologically reducible to physical properties. This reduction can be conceptualized in different ways, but we will limit ourselves to the psycho-physical identity theory. This theory holds that the brain is a necessary and sufficient condition of the mental (“neurophysiological sufficiency”), and that mental states are fully reducible to the physical states of human brains. Since mental states are identical to inner brain states, mental causality is unproblematically a form of physical causality. The mental has, therefore, neither autonomy nor any causal power of its own vis-à-vis the physical. The central thesis of neu-

rophysiological sufficiency implies that the relations to sensory input and behavioral output are inessential to the individuation of mental states. In sum, the identity-theory defines the mind as a relationally truncated “brain in a vat” (Kim 2006; Maslin 2001).

Yet, intuitively, the mind seems to be an essentially relational entity: mental states only make sense as related to input (perception), output (behavior), and “intervening variables” (other mental states). A third position, *functionalism*, tries to account for this basic intuition. In this view, mental states are topic-neutrally defined as abstract inner states of the organism that fulfill a certain function or causal role in the bringing about of behaviors—in other words, as states that are apt to be the causes of certain behavioral effects (or the effects of certain sensory causes). A mental state is not a natural kind (like “water”), but a functional kind (like “table”) that is defined in terms of its macroscopic causal relations to sensory input, behavioral output, and other intervening mental states. Thus, for example, what makes a state “the belief that it is raining” is that it has certain sensory causes such as “experiences of rain,” and that in combination with certain other mental states, including “the desire to keep dry,” it has certain behavioral effects such as “taking an umbrella.” This functional conception of the mental obviously incorporates its causal as well as its relational character. For, employing a well-known distinction made by computer science between software and hardware, functionalism plausibly holds that “software” mental states that play certain causal roles can be implemented or realized in “hardware” brain states that physically execute those causal roles.

Although functionalism thus defined is a non-reductive theory of the mind, it still remains straightforwardly compatible with physicalism. Indeed, in the recent philosophy of mind, it is almost exclusively linked with the “supervenience” thesis, resulting in *non-reductive physicalism* or *supervenience physicalism*. In this view, mental properties are not reduced to physical properties, but they are regarded as higher-order functional properties supervening on lower-order physical properties. The supervenience relationship is characterized by covariance, asymmetric dependence, and non-reducibility of the supervenient properties vis-à-vis the subvenient properties. But although the mental (supervenient) level is dependent on and determined by the physical (subvenient) level, the same (or identical) mental properties do not necessarily imply the same (or identical) physical properties. The supervenient mental level therefore has, in this view, a certain, although weak, autonomy vis-à-vis the subvenient physical level, as well as its own (weak) causal power. Moreover, functionalism is “radically liberal” regarding the allocation of mindedness in the physical universe because mental states as functional states are not only realizable in human brains, but also multiply realizable in the brains—or analogous mechanisms—of animals, computers, Martians, and other E.T.’s.

Hence, apart from doing justice to both the causal and the relational character of the mind, functionalism can also meet other important requirements of a

physicalist research program, namely, the autonomy of cognitive psychology, as well as the integrity of a naturalistic worldview. But notwithstanding the virtues of a functional analysis of the nature of mental states, functionalism is beset with difficulties of its own when confronted with the problems of intentionality (in the philosophical sense of “aboutness” of mental states, for example, beliefs) and qualia (subjective phenomenality, or the inherently subjective quality of sensations). The causal role of a propositional attitude—such as the belief that it rains—does not seem to constitute its intentional content (that it rains); similarly, the causal role of a sensation—such as a headache—does not seem to determine its phenomenological quality (what it is like to feel pain in the head) (Kim 1998, 2006; Maslin 2001).

Dualism

Although physicalism is the orthodox thesis in the contemporary debate, *dualism* remains an important antithesis, challenging all the different physicalist positions. Dualism as a position in the mind-body debate contrasts with physicalism through its core idea that nonphysical substances and properties exist, besides physical substances and properties.

Within dualism, we should distinguish between two sub-positions. The first is *substance dualism*, which assumes the existence of immaterial, nonphysical (mental) substances, besides and independent of physical (bodily) substances. Cartesian dualism constitutes the classic example, although it should be noted that Descartes was actually convinced of the reciprocal interaction between physical (bodily) and mental substances, a conception that seems to be forgotten by modern neuroscience (Damasio 1994; Kim 2006; Maslin 2001). A second and related sub-position is *property dualism*, which starts from the assumption that only physical substances exist. However, these physical substances may have physical as well as mental properties, which are ontologically radically different from each other, without the mental being reducible to the physical (Kim 1999, 2006; Maslin 2001). Consequently, mental properties are nonphysical or immaterial.

Within property dualism, two theories should again be distinguished. Epiphenomenalism and emergentism are both property dualist positions, but they differ radically concerning the autonomy and causal power attributed to the mental. *Epiphenomenalism* sees the mental only as an epiphenomenon or by-product of the physical, on which it is fully dependent, and without any causal power in the physical domain. *Emergentism*, on the contrary, assumes that complex neurobiological systems may give rise to mental properties that are radically new and different from physical properties. Emergentism attributes to the mental not only a strong autonomous status, but also its own causal power vis-à-vis the physical (so-called “downward causation”) (Kim 1999; Maslin 2001; McLaughlin 1989). Although emergentism can account for mental causation in a robust sense, it does not—like substance dualism—respect the causal closure of the physical domain. Conversely, whereas epiphenomenalism can comply with this plausible

requirement of causal closure, it implausibly denies mental causation in even the weakest sense possible.

**KANDEL’S “NEW INTELLECTUAL FRAMEWORK
FOR PSYCHIATRY”**

With the conceptual framework in place, we now turn to Eric Kandel’s influential article “A New Intellectual Framework for Psychiatry,” published in the *American Journal of Psychiatry* in 1998. In the article, Kandel presents “five principles that constitute the current thinking of biologists about the relationship of mind to brain” (p. 460). In this section, we will introduce Kandel’s principles and then investigate which position in the philosophical mind-brain debate is most applicable to Kandel’s formulation of the principles.

Kandel was trained as a clinical psychiatrist in the early 1960s, a time when psychoanalytic thought still dominated psychiatric thinking in the United States. After finishing his training, Kandel decided to pursue a scientific rather than a clinical career. He became one of the leading neuroscientists in the world, famous for his studies of the cellular neural mechanisms of learning and memory, a line of research that eventually resulted in his being awarded the Nobel Prize in Physiology or Medicine in 2000 (Kandel 1998, 2006). In his 1998 article, Kandel first describes how, in the mid-20th century, somatic medicine developed into a science firmly grounded upon an expanding knowledge of (molecular) pathophysiological mechanisms. Psychiatry, on the contrary, mainly under the impulse of psychoanalysis, moved away from brain science, which was first seen as premature and later even as irrelevant to understanding psychiatric disorders. However, the dawn of psychopharmacology and the rapid growth of neuroscientific knowledge in the 1970s brought about a convergence of psychiatry and brain science, with Kandel being one of the most important contributors. It is Kandel’s opinion that psychiatry, as well as cognitive psychology and psychoanalysis, are still valuable, as they can define for biology the mental functions that need to be studied for a meaningful and sophisticated understanding of the biology of the human mind. In this interaction, psychiatry can play a double role. *First*, it can seek answers to questions on its own level, questions related to the diagnosis and treatment of mental disorders. *Second*, it can pose the behavioral questions that biology needs to answer if we are to have a realistically advanced understanding of human higher mental processes (p. 459).

Kandel outlines five principles as a first step towards a “rapprochement” between psychiatry and neurobiology. We will cite these principles verbatim, as their exact formulation is essential for the subsequent analysis.

Principle 1—All mental processes, even the most complex psychological processes, derive from operations of the brain. The central tenet of this view is that what we commonly call mind is a range of functions carried out by the brain. The actions of the brain underlie not only relatively simple motor behaviors,

such as walking and eating, but all of the complex cognitive actions, conscious and unconscious, that we associate with specifically human behavior, such as thinking, speaking, and creating works of literature, music, and art. As a corollary, behavioral disorders that characterize psychiatric illness are disturbances of brain function, even in those cases where the causes of the disturbances are clearly environmental in origin.

Principle 2—Genes and their protein products are important determinants of the pattern of interconnections between neurons in the brain and the details of their functioning. Genes, and specifically combinations of genes, therefore exert a significant control over behavior. As a corollary, one component contributing to the development of major mental illnesses is genetic.

Principle 3—Altered genes do not, by themselves, explain all of the variance of a given major mental illness. Social or developmental factors also contribute very importantly. Just as combinations of genes contribute to behavior, including social behavior, so can behavior and social factors exert actions on the brain by feeding back upon it to modify the expression of genes and thus the function of nerve cells. Learning, including learning that results in dysfunctional behavior, produces alterations in gene expression. Thus all of “nurture” is ultimately expressed as “nature.”

Principle 4—Alterations in gene expression induced by learning give rise to changes in patterns of neuronal connections. These changes not only contribute to the biological basis of individuality but presumably are responsible for initiating and maintaining abnormalities of behavior that are induced by social contingencies.

Principle 5—Insofar as psychotherapy or counselling is effective and produces long-term changes in behavior, it presumably does so through learning, by producing changes in gene expression that alter the strength of synaptic connections and structural changes that alter the anatomical pattern of interconnections between nerve cells of the brain. As the resolution of brain imaging increases, it should eventually permit quantitative evaluation of the outcome of psychotherapy. (p. 460)

KANDEL’S PHILOSOPHICAL POSITION IN THE MIND-BRAIN DEBATE

It is clear from the principles cited above and the article as a whole, that Kandel cannot be regarded as an eliminativist, as he firmly believes that psychology and its concepts are still valuable in the era of neuroscience, a position clearly in contrast with the eliminativist view. The first quote from Kandel cited above (p. 459) is, however, ambiguous. The first and the last part suggest that Kandel sees the role of psychology (“mental”) as only secondary to neurobiology (“physical”), merely defining the concepts that should be studied at the biological level. The middle part (“first . . .”), however, points towards a more autonomous status for

psychiatry/psychology, leaving room for its own identity and methodology. Similar ambiguities can also be found throughout the formulation of the principles, as will be illustrated below. Following Kandel, we will not distinguish between behaviors/actions and mental (or psychic) processes.

Kandel might object to this allegation of ambiguity by claiming that he did not intend to take a definitive position in the mind-brain debate but only adopted a pragmatic approach in his study of the mind-brain relationship that tolerates a certain level of indistinctness. We agree largely with this objection and believe that Kandel succeeded to an important extent in combining the study of mind and brain in this pragmatic way. We would maintain, however, that the ambiguities we draw attention to are nevertheless really problematic from the (conceptual) standpoint of the philosophy of mind and, more importantly, that the resolution of these ambiguities is crucial for the future status of psychiatry, as we will argue below.

Principle 1

The formulation “behavioral disorders that characterize psychiatric illness are disturbances of brain function” suggests a reductionistic physicalist position (psycho-physical identity theory). This implies that the mental (and psychology/psychiatry as sciences of the mental) have no autonomy vis-à-vis the physical (and the exact sciences studying it), which is in this view the only relevant category for scientific study. Other formulations in this principle, however, seem more compatible with functionalism/non-reductive (supervenience) physicalism, thereby saving some autonomy for the mental level and the sciences studying it. Expressions like “derive from” and “underlie” are open to several interpretations, within physicalism (both reductionist and non-reductionist) as well as dualism (more specifically epiphenomenalism, which sees the mental as a “causally impotent” and therefore irrelevant by-product of the physical). The phrase “mind is a range of functions carried out by the brain” almost literally suggests a functionalist conception of the mind-brain relationship.

Principle 2

This principle (stemming from evolutionary psychology) states that genes “exert a significant control over behavior.” It is open to several physicalist interpretations, as it suggests an asymmetrical relationship from the physical to the mental—with the physical being the primary level—without saying anything about a putative relationship in the opposite direction.

Principle 3

The first part of this formulation (“so can behavior and social factors exert actions on the brain”), in our opinion, strongly supports the autonomy and causal powers of the mental vis-à-vis the physical, and is therefore most in line

with non-reductive physicalism or even emergent dualism, two positions attributing considerable autonomy to the mental level. The second part (“all of ‘nurture’ is ultimately expressed as ‘nature’”), however, seems to point again to a primacy of the physical level, which makes an emergent dualistic interpretation, with strong autonomy for the mental, rather unlikely. This second part seems to be more in line with a reductive physicalist (identity theory) or epiphenomenalist dualist position, leaving no autonomy or causal power for the mental level as such, as its causal powers are reduced to (and therefore nothing above) those of its physical basis. We also note that Kandel not only attributes causal powers to mental factors but also to social factors, thus explicitly adopting a biopsychosocial view.

Principle 4

As this principle is a synthesis of principles 2 and 3, we refer to our analyses of these two principles.

Principle 5

This last principle formulated by Kandel can also be interpreted in several ways. First, it may be read as emphasizing “downward causation” from the mental to the physical level, thereby saving the autonomy of the mental (and psychiatry/psychology). Kandel indeed says that psychotherapy, a treatment clearly starting primarily at the mental level, may cause changes at the physical level. In this case, principle 5 may be another example expressing Kandel’s non-reductionist physicalist or even emergent dualist position in the mind-body debate. However, this principle may also be interpreted as follows: “treating the mental level *only* works via the physical (neural) level, which therefore is the only relevant level, representing the final common pathway of all changes in mental functioning, whether induced by psychopharmacological or psychotherapeutic treatment” (Glas 2006, p. 852). Especially the last sentence, stating that the effect of psychotherapy should be primarily studied at the physical level (using brain imaging), points toward such an interpretation. Principle 5 may then again reflect Kandel’s reductionist or epiphenomenalist, rather than non-reductionist physicalist or even emergent dualist position.

In summary, the five principles formulated by Kandel and their position in the philosophical mind-brain debate remain largely ambiguous, even after meticulous conceptual analysis. Moreover, the same applies to the whole article and even to his autobiography. Kandel gives the impression that he joins the biological and the sociopsychological approach within psychiatry by placing them at the same level, but it remains far from clear how this joining should be conceptualized. However, resolving these ambiguities is crucial for the future status of psychiatry relative to neurology/neurosciences.

THE FUTURE OF PSYCHIATRY/PSYCHOLOGY

The philosophical discussion sketched above is not merely abstract theorizing, as this debate has, to our opinion, far-reaching theoretical and practical implications for psychiatry/psychology as a clinical-scientific discipline. Parallel to the ambiguity in Kandel's theoretical framework, there is a clear gap between psychiatry as a clinical discipline (with a strong emphasis on a broad, biopsychosocial conceptualization of mental illness) and contemporary psychiatric research, where a reductionist neurobiological paradigm is explicitly or at least implicitly dominant. As a result, most research in psychiatry tries to ground clinical practice almost exclusively in neurobiology, although strikingly little of the massive amount of neuroscientific insight gained over the past 20 years have been able to truly change clinical psychiatric practice.

In conclusion, we elaborate on the implications of our diverging interpretations of Kandel's framework. First, Kandel's “new intellectual framework” may be the articulation of a reductionist (psycho-physical identity theory) or epiphenomenalist view on the mind-brain relationship. If this is the case, even though Kandel stresses the importance of psychiatry/psychology for defining the mental functions to be studied by neuroscience, psychiatry/psychology as the study of the mental level will and should be gradually replaced by neurobiology (the study of the physical level underlying mental phenomena), as it is likely that neuroscientific methodology will continue to evolve over the next few decades and result in a substantial increase in knowledge about the biological basis of mental functions. The rapprochement between psychiatry and neurology proposed by Kandel may then be a mere reduction, rather than a true cooperation between both disciplines. In this view, modern psychiatrists should be nothing other than “neurologists of the mind.” The two concluding paragraphs in Kandel's article (after the elaboration on the individual principles) seem to point to such a position (pp. 466–68).

Second, a roughly equal number of formulations in the principles may be in line with non-reductionist physicalism/functionalism, in which the mental supervenes on its physical (neurobiological) base. In this case, the mental (and hence, psychiatry and psychology as the sciences studying it) retains a certain autonomy (and causal power) vis-à-vis the physical (and neuroscience studying it). It should be noted that the mental remains dependent on, but is not fully reducible to, its physical basis in this position. It is therefore not a form of what social scientists from the Center for Advanced Studies in the Behavioural Sciences, cited by Kandel, call “radical dualism, in which it is assumed that the processes and products of the mind have very little to do with the processes and the products of the body” (p. 461). This radical conception of mind-body dualism is a caricature, as it goes even beyond classical Cartesian dualism. A position like this is, therefore, very unlikely to be defended by any contemporary philosopher of mind, psychologist, or psychiatrist. In the citation given by Kandel, the

radically opposite position, reductive physicalism/materialism is presented as the only alternative to the radical dualism as outlined above.

We hope that this article makes clear that there are several alternatives between the two extreme positions, and that these positions are not incompatible with modern neuroscientific findings. This may even be the case for emergent dualism, which clearly states that mental properties arise from the physical properties of neurobiological systems (Kim 1999, 2006; Maslin 2001; Popper and Eccles 1977).

It is our opinion that a non-reductionist physicalist position is most in line with contemporary psychiatric practice, in which the mental remains an at least equally important level of study, besides the physical (neurobiological) level. We firmly agree with Kandel that (clinical) psychiatrists should be interested in and trained in modern neurobiological insights, and that this will improve their knowledge of the pathophysiology and treatment of mental disorders. However, it is crucial for the identity of psychiatry and for its functioning as a clinical discipline that the study of the mental level as such, including psychotherapy, not be merely reduced to its neurobiological basis. The position of many leading neuroscientists in this debate, including Kandel, Joseph LeDoux, and others, remains ambiguous (Bennett and Hacker 2003; Glas 2004, 2006). We hope this paper will stimulate a constructive dialogue between neuroscientists, psychiatrists, psychologists, and philosophers on this important issue.

This article remains to some extent programmatic and conceptual in nature, which may be regarded as a limitation. However, we believe this nature is in line with its major aim, namely defending the message that conceptual thinking on the nature of the relationship between the mind and the brain may be as important for psychiatry as empirical, often excessively reductionist neurobiological research, which may be overrepresented in the leading psychiatric journals of the 21st century. We also believe that the theoretical framework that is offered to us by modern philosophy of mind is invaluable in clarifying this complex mind-brain relationship.

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