

Psychotherapy, Biological Psychiatry, and the Nature of Matter:

A View from Physics

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Biological psychiatry has marginalized psychotherapy, and it is difficult for psychotherapists to counter its hegemony. The reductionist/materialist position seems incontrovertible and self-evident. An important factor in maintaining this stance is the belief that the physical world is understandable, solid, unproblematic, especially when compared to the realm of the psychological. Developments in quantum and relativity theories, however, cast doubt on that belief. They show the fundamental nature of the material world to be problematic, enigmatic, paradoxical, impossible to understand or conceptualize in terms of everyday experience. This insight weakens the prima facie case for privileging the material over the psychological, and alternative (i.e., nonneurobiological) approaches to mental health matters should, therefore, be able to compete on an equal footing. However, the materialist-reductionist stance is kept in place by powerful forces and is well defended; rational arguments alone are unlikely to have an impact. This pervasive ideological resistance to rational, often well-founded critiques of physical reductionism continues to be a major impediment to changing the present materialist climate. That resistance has to be addressed before any significant shift in orientation can be expected to occur.

A major concept that has channeled thinking, research, and practices within and on the periphery of the mental health fields is the polarity of the mental or psychosocial against the physical/material or neurobiological. It is the legacy of Cartesian mind/body dualism which is "so marked a feature of our spiritual and moral landscape" (1, p. 6).

While a wide variety of positions and associated practices reflecting differences in the relative weight given to each pole are found among mental health clinicians and researchers, few would quarrel with the conclusion that the positions that privilege the material, neurobiological

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pole virtually have won the day. As Elliot Valenstein, Professor Emeritus of Psychology and Neuroscience at the University of Michigan reports,

now it is widely believed by most authorities and the public alike that the cause [of mental disorders] is a chemical imbalance in the brain. . . . Brain chemistry is believed to be not only the cause of mental disorders, but also the explanation of the normal variations in personality and behavior. . . . Today, the disturbed thoughts and behavior of mental patients are believed to be caused by a biochemically defective brain, and symptoms are not “analyzed,” but used mainly as the means of arriving at the diagnosis that will determine the appropriate medication to prescribe. Almost all current chairmen and the majority of the staffs of psychiatry departments are committed to a biochemical approach to mental illness. (2, p.1)

The dominance of neurobiological or biomedical orientation has brought with it a marginalization of psychotherapy. It has even “fueled speculation that one day soon all forms of talking therapy will be obsolete. . . . [C]onsumers increasingly rely on insurance companies and health maintenance organizations, which prefer cheap pharmacology to expensive psychotherapy” (3, p. 17).

Is this marginalization justified? The answer will depend on one’s position on a number of issues, including, for example, how one judges the efficacy of various psychotherapies, what one considers to be the goals of treatment, or what importance one places on simple economic considerations. Another major factor is one’s position on *materialism* or *physicalism*—roughly, on the premise

that everything in the world is physical, or that there is nothing over and above the physical, or that the physical facts in a certain sense exhaust all the facts about the world. (4, p. 41)

If one believes this premise, one will naturally tend to reduce mental domain to the physical:

Everything mental or spiritual is a product of material processes. (5, p. 214)
[O]ne can explain *everything* in terms of the motion of elementary particles moving inexorably according to the rules of mechanics—*there is nothing else*. . . . [I]n principle one can envisage a chain of analysis in which sociology is analysed into psychology, psychology into physiology, physiology into biology, biology into chemistry and chemistry into physics. This view of science is called “reductionism” by those who don’t like it and “the unity of science” by those who do. (6, pp. 12, 14)

For the reductionist, once all the facts about the brain are in, then the facts

about mind "are a free lunch" (4, p. 41). Describing mental phenomena will simply be redescribing facts about the brain.

THE CREDIBILITY OF THE MATERIAL DOMAIN

It is apparent that in the mental health fields, both advocates as well as critics of physical (neurobiological) reductionism see the material domain (especially the brain) as having a major role. Mental health professionals are either strict physical/material/biological reductionists or, more commonly, dualists who believe that both poles of the Cartesian dyad are needed in the field: "The reality . . . is that all of what are termed diseases (in either psychiatry or physical medicine) have a combination of mental and physical characteristics" (7, p. 37). Thus, even those who would challenge the hegemony of a neurobiological, material/reductionist position usually support a dual approach to the conception and treatment of mental disorders that would integrate, or at least draw on, both Cartesian poles. Examples are a neuropsychodynamic model (8), organic unity theory (9), a biopsychosocial model (10), or a so-called double-aspect model that would use theories based on neuroscience or on the mind as needed, depending on the particular situation, problem, context, or clinical application at hand: "Biomedical, neurobiological, and psychosocial perspectives . . . are all necessary" (11, p. 68; see also 12).

However, both groups, reductionists as well as dualists, apparently do not question the nature of matter. The ubiquitous unexamined assumption is that, essentially, the physical realm is uncontroversial, incontrovertible, tangible, scientifically well established, respectable, understandable, quantifiable, measurable, and directly observable. Both groups accept at face value, and without question, the existence and reality of, for example, brain tissue, nervous system, hormones, neurotransmitters, genes, or electrochemical events. Both groups broadly agree on what such "things" and phenomena "are," even when they disagree on their role and function in, say, the etiology and treatment of "mental disorders." Unlike the inner, psychological domain, the domain of the solid, measurable, objectively observable, predictable well-studied material world has enormous scientific credibility. It is seen as essentially straightforward conceptually and ontologically, essentially unproblematic.

I submit that here, in this face validity and seeming incontrovertibility of the material domain, lies a major and compelling reason for the appeal and hegemony of reductionist neurobiopsychiatry. (I will mention and comment on other factors that support this hegemony in my concluding discussion.) It is easy to privilege the brain and mar-

ginalize the psyche when matter has such enormous, apparently unchallengeable credibility.

OUTLINE OF THE ARGUMENT

If a belief in materialism sustains the biological stance that marginalizes and devalues nonpsychopharmacological approaches, then the hegemony of that stance will be challenged if the belief is shaken. But how can that be done?

The argument of the body of this work is one response to this question. Of course, numerous arguments have been advanced against material/biological reductionism from various perspectives (e.g., clinical, sociocultural, ethical or spiritual). In philosophy, its legitimacy has been extensively (and inconclusively) debated for centuries under the general rubric of “the mind-body problem.” The debates in the vast literature typically have centered about the question of how events in the physical domain—specifically, in the brain—could possibly explain the events in the domain of inner experience (consciousness, perception, affect, meaning, personhood, and the like). Thus, we find, for example, the following typical argument against reductionism:

How could a physical system such as a brain also be an *experiencer*? . . . Present-day scientific theories hardly touch the really difficult questions about consciousness. We do not just lack a detailed theory; we are entirely in the dark about how consciousness fits into the natural order. . . . Neurobiological processes . . . can also tell us something about the brain processes that are *correlated* with consciousness. But none of these accounts explains the correlation: we are not told why brain processes should give rise to experience at all. From the point of view of neuroscience, the correlation is simply a brute fact. (4, pp.xi, 115)

The argument I shall present against reductionism will rely on another rationale, however. I have already mentioned my premise that a major factor in establishing and maintaining the hegemony of the biological is a belief in *the apparently unproblematic nature of matter*. I want to argue that this faith in the material world is poorly founded: our conviction that we more or less “understand” what the physical world “is,” is without a sound basis. To support this point, I will draw on the insights and implications of contemporary physics—quantum mechanics and relativity theory. (Readers who readily concede the point may not wish to follow the details of the argument presented in the next section.) Thus, if the material domain turns out to be just as problematic as the mental/psychological, then the convinced belief that a biological reductionist approach should predomi-

nate in the mental health field becomes less defensible. The limited objective of this paper, then, is to demonstrate the poverty of our understanding of the physical realm.

Because discussions of quantum mechanics and relativity theory constitute a large portion of this paper, it would be easy to infer that I am arguing for a psychology, psychotherapy, or psychiatry grounded in contemporary physics. That is *not* so. Quite the contrary, and in the concluding sections I will refer to previous publications which explicate my position: I do *not* believe that eventually progress in physics will (or can) “explain” consciousness.

I reemphasize that the main points I will be making from the perspective of physics are one, the belief that we understand the material domain is unwarranted, and two, that therefore our faith in reductionism is on shaky ground.

PHYSICS AND ONTOLOGY

The Conflation of Two Levels

What can, what does, physics tell us about ontology, about what exists in the world? The received view is, a great deal. I submit, however, that in an important sense that is not quite the case. To see why this is so let us consider two distinct levels of conceptualizing existence. The first is the domain Wolfgang Smith (13) calls the *corporeal*—the realm of everyday objects, movements, events, what we know through our perceptions, through our normal experience of our world.

The second domain is the level of *physics*. I will be using this latter term to refer to the realm of abstractions in the natural sciences. Its “objects” are various mathematical entities (e.g., variables, equations), symbols, operations, and theoretical laws. (I will not address the issue of how these two levels are connected. The connection between abstraction and “raw data,” which involves perception and thought, has posed daunting, apparently insuperable philosophical problems and paradoxes that continue to elude understanding and clarification [13-18].) Obviously, the two domains are very different from one another ontologically—that is, as far as their nature, being, existence are concerned. It seems beyond question that their respective constituents—roughly, material, observed objects and events in one, mathematical objects in the other—are drastically different from one another.

If these two domains are so different ontologically, how is it that according to the prevailing view, the understandings achieved on the plane of (theoretical) physics *do* tell us what the “real” nature of objects in the

corporeal plane is? I believe that this misperception arose because during the long reign of classical (i.e., prerelativistic, prequantum-mechanical) physics, it so happened that the mathematical formalisms and findings that obtained at the *physics* level seemed to have obvious meanings and corresponding counterparts at the *corporeal* level. That is, there was a close and conceptually apparently unproblematic fit between the formal characteristics of the world of mathematical objects and those of the experiential world of macroscopic objects. Take, for example, the familiar Newtonian formula, $F=ma$. It seemed easy and natural to identify the three mathematical variables with our corporeally based, experiential ideas of physical force, massiveness, and accelerated movement, respectively.

During that era, this kind of analogizing was possible across a wide range of phenomena. Various mathematical entities in the physics domain were readily identified with springs, pulleys, water waves, colliding billiard balls, orbiting planets, clocks, and other apparently corresponding objects in the corporeal domain. It was relatively easy to “understand” the physics in terms of corporeal experiences, and this fostered the illusion that physics was telling us what the world was like. The two levels were conflated, and it became natural and easy to *reify* the level of physics, to clothe its “mathematical entities with imaginary forms and thereby in a way ‘corporealize’” them (13, p. 138).

Consequently, a curious synergism was established between the two domains: the solidity of the corporeal world gave an apparent solidity to the mathematical world, and, in turn, the established truths of the mathematical laws gave a privileged status to phenomena at the corporeal level. Under those circumstances it became tempting and easy to become convinced that the material world was essentially unproblematic, well understood, and—by extrapolation—capable of explaining all phenomena. This mirroring relationship between classical physics and corporeal “confirming” experience was a major factor in establishing and maintaining the hegemony of a positivist, physicalist, reductionist worldview, one where all general knowledge would be contained within the boundaries of physical science and especially of physics, and where any other belief would be dismissed either as metaphysical or as mystical obfuscation.

The fallacy in this line of reasoning is that it failed to take into account the step of *interpretation* in science, the process of moving from mathematics to statements about “what there is” in the world. One always *must* “interpret” the formalistic findings achieved at the level of the physics plane in order to impute physical meaning to the mathematics. The mathematical formalisms by themselves leave ontological questions open,

as we shall see. Interpretation may be explicit or implicit, visible or concealed, but it always is in the picture when one draws ontological conclusions from physics, when one moves from the realm of mathematics to speaking about “what there is,” “what the world is like.” As we shall see more clearly below, this step is speculative, creative, uncertain. It is *not* a step that can be taken deductively, that would lead by logical inference from theory to solid, unambiguous conclusions about ontology, about what the material world is like.

During the classical era of science, the ready conflation of the two realms—appealing and possible for the reasons discussed above—tended to push questions of interpretation into the background. They were of interest mostly to philosophers of science (see [18] for discussions concerning the problems with so-called “coordinating definitions” or “correspondence rules”). The problem of interpretation became more visible and pressing, however, when quantum mechanics and relativity theory emerged as the master theories in physics. The ontological implications of the mathematics became highly problematic; interpretation became controversial. The very nature of the material domain turned obscure and uncertain. What matter “is” could no longer be conceptualized in terms of familiar models drawn from the corporeal realm. The mathematical formalisms of quantum theory and relativity simply do not lend themselves to such modelling.

The Ineffable in Contemporary Physics

I want to demonstrate that the characteristics of the mathematics have no conceivable counterpart in the characteristics of our corporeal world. One such discrepancy concerns

the problem of understanding what, in quantum-mechanical terms, happens when we observe a physical system. Popular understanding of the theory would have it that, according to quantum theory, observation invariably involves a physical interference with the system being observed; and that is why the observer comes to play an active role in the theory. But, this . . . is a gross misconception (albeit one that many physicists, who really ought to know better, have had a hand in perpetuating). The apparent “entanglement,” within quantum mechanics, of observer with observed, is a far subtler and far more mysterious affair than the popular account would suggest. It cannot in general be understood in terms of any (ordinary) physical effect that the activities of the observer may have on the objects of observation. (17, p.x)

A second peculiarity is the “holistic awareness” displayed by a “particle” (but quantum-mechanical “objects” are not really like the kinds of material particles we know in the corporeal world) in so-called “two-slit”

experiments. When a single particle is projected through one of two slits in a screen, quantum mechanics tells us that the path it actually will take after passing through that first slit will depend on whether the other slit had been open or shut. Somehow the particle “knows” the status of that second slot (13, pp. 115-119). That kind of effect makes no sense in terms of our experiences on the corporeal plane; the condition of the second slit should not have any influence on a single particle’s path. In terms of its path pattern, the “particle” will behave like a particle when the second slit is closed and like a “wave” when it is open. The usual explanation that this paradoxical behavior arises from something called “the wave-particle duality” actually explains nothing; the term is “a collection of empty words that indicate only that we really do not understand [i.e., cannot meaningfully *interpret*] quantum theory” (6, p.180; see also 13, pp. 117-118). Interpreting the experimental results in such terms only serves to trivialize and obscure the strangeness of the physical domain.

Another phenomenon that is inexplicable in terms of our macroscopic experience is the well-known interpretation of Heisenberg’s uncertainty principle. Quantum mathematics says that when measuring the values of two particular kinds of related variables of a system (so-called “conjugate observables”), the more exactly one is measured, the less accurately can the other be known (13, p. 50). In our usual world, measurements of system parameters are not coupled in this strange kind of inverse relationship, and we cannot make sense of this phenomenon in terms of our experiences at the corporeal level.

Perhaps the strangest feature of the quantum world is the uncanny holism, the unbroken wholeness, implicit in Bell’s so-called “interconnectedness theorem” (13, pp. 68-71). Quantum theory predicts that when two originally proximal and interacting particles separate they continue to retain a close connection: making an observation on one has an instantaneous effect on the other, even when their separation is very great. We no longer can assume locality:

that we can study what happens in some small region of space, over a small time, without having to worry about what is happening in regions of space very far away. (6, pp.167-168)

Some have called this so-called “failure of locality” the most important discovery made by physics, ever. At any rate, it again exemplifies a counterintuitive phenomenon that seems to have no corresponding experiential counterpart at the corporeal level. That is, we cannot conceptualize

it or understand it in terms of any macroscopically meaningful and familiar model.

Furthermore, the failure of locality implies that “the fundamental process of Nature lies outside space-time . . . but generates events that can be located in space-time” (the physicist Henry Stapp, quoted in 13, p. 69); “reality as such is neither space, time nor matter, nor indeed can it be contained in space or time” (13, p. 69). A consonant finding comes from relativity theory:

The unsettling feature . . . [of the theory is that] the geometrical and temporal aspects of things as we ordinarily conceive of them get mixed up. . . . If one accepts the view that the true character of physical reality is captured by the theory of relativity, then one must be prepared to deal with something that is neither spatial nor temporal but more fundamental than either spatiality or temporality. (19, pp. 280, 281)

Here, too, there are no lived experiences at the corporeal level, the level at which time and space seem utterly distinct, that could make sense of this kind of space:time “mixture.”

In this sense, then, physics *cannot* tell us anything meaningful about the fundamental nature of our physical world. What its “thin,” mathematical formalisms say is unintelligible in experiential terms. We can find no understandable macroscopic *interpretation*, no way of making (ontological) sense of the information that exists at the physics plane:

the basic laws of physics . . . do not tell us what *is*, but instead they tell us about what will happen when we *make an observation*. In fact they only do this in a probabilistic way, i.e., they tell us the probability of certain outcomes of observation. . . . The basic problem of quantum theory is that there is a gap between what the theory says about the world, and the experience we have of the world. (6, pp. 20, 21)

There is no consensus about the ontological implications of contemporary physics. It “confer[s] a logical structure on physical reality” (20, p. 142), but that is all it can do. In a fundamental sense, *we do not know what “matter” is*. That is why we now have *the multiplicity of interpretations of quantum theory* (6, chap. 13), different and mutually incompatible ontological speculations, extrapolations, best guesses about what the implications of the mathematical findings at the level of physics might be for the experiential, macroscopic, corporeal domain:

When . . . we ask how the theory *explains* what is happening, or enquire what it says about the external world . . . we meet only confusion and controversy! This is the interpretation problem of quantum theory. . . . [W]e have only a

very vague idea of what the external world really *is*. Perhaps the only thing of which we can be confident is that we do not understand it! (6, pp. 177, 225)

If physics could provide direct and unambiguous ontological information, there would be little room for competing and incompatible interpretations of quantum or relativity theory.

In other words, the levels of physics and corporeality can no longer be identified with one another. We no longer can claim to “understand” the basic constituents of the material world. That world is vastly more problematic, mysterious, strange than is generally recognized within and without the mental health field. Its nature is largely unknown and apparently unknowable. The mathematics cannot be conceptualized, interpreted, or modeled in terms of familiar, commonsense concepts, mechanisms, phenomena, or events—forces, waves, particulate objects, definite paths in space, straightforward measurements—that characterize our experience in the macroscopic world. Consequently, we can no longer claim that the material world is less mysterious and elusive than the inner world, the realm of the psyche. I submit, therefore, that if one takes physics seriously, it has to be admitted that the material domain can no longer claim to have a privileged conceptual status over the “mental.” Fundamentally, the material is no less intangible and elusive. Therefore, physicalist “explanations” given in terms of the material domain (e.g., the brain) ultimately dissolve, disappearing into an unknown and unknowable realm.

THE QUESTION OF RELEVANCE

The Issue of Scale

It is still widely believed, and particularly by non-physicists, that classical physics and its ontological views continue to describe the macroscopic world in a fundamental way. Of course, in many practical situations one can safely operate on that assumption. For example, in most routine scientific or engineering applications one can—indeed, usually *must*—use classical rather than contemporary science. Consequently it is widely believed that whether or not classical physics gives the “correct” picture of the world in a given instance is a question of *scale* (for quantum mechanics) or *velocity* (for relativity theory). However, from a deeper, ontological perspective, that is false: *In a fundamental sense, quantum theory is valid not only in the microworld, and relativity not only in the range of very high velocities* (13, pp. 62-65). In the early part of the twentieth century

[i]t was still possible to escape with some vague feeling that big objects did not obey quantum theory. From a later-20th-century viewpoint, such an escape no longer seems to be available. (6, p.181)

This point is echoed by the philosopher Michael Lockwood:

There is a widespread belief about quantum mechanics, as also about relativity, that it is something that one is entitled to ignore for most ordinary philosophical and scientific purposes, since it only seriously applies at the microlevel of reality: where 'micro' means something far smaller than would show up in any conventional microscope. What sits on top of this microlevel, so the assumption runs, is a sufficiently good approximation to the old classical Newtonian picture to justify our continuing, as philosophers, to think about the world in essentially classical terms. I believe this to be a fundamental mistake. . . . [T]he world is quantum-mechanical [and relativistic—LSB] through and through; and the classical picture of reality is, even at the macroscopic level, deeply inadequate. . . . [Q]uantum mechanics is not to be regarded as just another scientific theory. To the extent that it is correct, it demands a complete revolution in our way of looking at the world. (17, pp. 177-178; see also 13, pp. 62-65)

This is an extremely important point. It implies that whether the old or the new physics is relevant and appropriate for a given application is *not necessarily* a question of scale and may not be self-evident, since from the perspective of physics the conceptual bedrock and ruling theory *always* is ultimately postclassical. In any given field of work, then, the question may be: Can that fact be ignored with impunity? *In that field*, is it appropriate, adequate, productive, to predicate one's thinking on a classical ontology? It is safe to say that there are no absolute ground rules for deciding that question, although in many applications and contexts the answer is obvious and considerations of scale and velocities do play a deciding role. But that may not always be true.

Contemporary Physics and the Mental Health Field

I have shown that physics suggests one cannot conceptualize the basic aspects of the material domain in terms of the familiar concepts, perceptions, ways of thinking that we use to deal with the everyday corporeal realm, that in its own way, then, the material domain is just as elusive and baffling conceptually as is the domain of the psyche. Can one still maintain, against this understanding, that in the mental health field the material should be privileged over the psychological because the former is somehow solid, substantial, unproblematic? Can one continue to argue that the insights of contemporary physics are irrelevant? In other words, do we know whether in the mental health fields one can safely ignore the conceptual/ontological implications of postclassical developments in physics and continue to privilege a materialist approach based on the earlier conceptions of matter, particles, waves, energy, fields, and the like?

I submit that *no one* can be sure of the answer. We saw that one cannot argue for valorizing materialism simply on the basis of scale alone—that is, on the basis that the insights of physics have a bearing only on the microscopic, not the macroscopic, domains. All that can be said about this question of relevance is that opinions are divided. The situation is ironic: mainstream psychiatry seems to assume that the classical framework will do and that it justified privileging “ordinary” physicalism (as even a cursory look at the mainstream psychiatric literature will demonstrate), while many important physicists and mathematicians who are knowledgeable about quantum mechanics and relativity theory think otherwise. Members of this latter group tend to appreciate more acutely the conceptual limitations inherent in classical ontology and tend to surmise that the concepts of contemporary physics are likely to be relevant in those fields that deal with person, consciousness, subjectivity.

It seems, then, that a deeper understanding of contemporary physics has led a number of its prominent practitioners to conclude that dealing with persons as material entities conceptualized in classical terms can never significantly advance our understanding of the domain of consciousness or subjective experience—the very domain that ought to be the focus of mental health professionals’ concerns. These scientists have concluded that the brain as conceived along traditional material lines can never explain the psyche: The laws and frameworks of classical physics are “too simple and narrow to account for even the lowest processes of life” (Heinrich Hertz, quoted in 20, p. 141). A much more radical framework seems to be needed:

The foundations of quantum theory . . . imply a world-view much more hospitable to resolving the mind-body problem, or the relationship of consciousness to physical reality, than classical metaphysics. (21, p. 10)

The list of physicists, mathematicians, and philosophers who broadly agree with these views includes such luminaries as Wolfgang Pauli, Werner Heisenberg, Heinrich Hertz, Alfred North Whitehead, David Bohm, Erwin Schrödinger, John von Neumann, Eugene Wigner, Ludwig Wittgenstein, and Henry Stapp, as well as numerous less familiar names (6, 14, 17, 22). Let me emphasize that while no one has *proved* that postclassical physics needs to be taken into account when one is working in the mental health field, *neither has anyone proved that conventional views of the brain, and a physicalist approach to psychopathology and its treatment can suffice*. Therefore, the self-assured certainty of those who would privilege classi-

cally-based neurobiological approaches rests on questionable ontological assumptions.

Could the Psychological Domain Be Grounded in the New Physics?

What I have said so far might be construed as a recommendation to conceptually ground psychiatry and clinical psychology in contemporary physics. David Chalmers lists and documents a number of proposals that have been made along this line (4, pp. 118-120, 153, 333, 357; see also 14, 17, 23-25) which assume that "that the key to the explanation of consciousness may lie in a new sort of physical theory" (4, p. 118).

Although I have drawn heavily on postclassical physics in my discussion I am *not* advocating a quantum-mechanical approach to mental health research and treatment. Quite the opposite. As I have argued elsewhere in some detail (26-30), I do not believe that even the most exotic or esoteric advances in physics can *ever* lead to a deeper understanding of the phenomenal/experiential/psychological domain. I have argued at length, primarily via critiques of the use of what I have called "state process formalisms," that at least as long as physics remains a mathematical discipline as we know it, one that deals with "the structure and dynamics of physical processes" (4, p. 118), it will remain unable to address the mental domain adequately: "No set of facts about physical structure and dynamics can add up to a fact about phenomenology. . . . The explanatory gap is as wide as ever" (4, pp. 118, 119). In a nutshell: My critiques of state process formalisms (the generic, underlying mathematical structure on which *all* formal sciences rely) demonstrate that mathematics does not have "in it" the potential to adequately capture the phenomena that are central in mental health work.

Thus, a reminder: I did not present the material about quantum and relativity physics to suggest that future psychiatries or psychologies should be grounded in such a framework. I have had a different purpose in mind. I wanted to provide a science-based argument against an apparently unassailable biological reductionist stance. The discussions and arguments about postclassical science that I presented were designed mainly to challenge and undermine the hegemony of that worldview. The point was to show that the material domain is itself most mysterious and conceptually highly problematic and that, therefore, there is little justification for the presumption that it is the royal road to understanding and treating psychopathology. That is to say, if we have to admit that apparently we are unable ultimately to conceptualize or understand the material domain in terms of macroscopically meaningful models, then the commonsense,

compelling argument for privileging that domain in the mental health field is weakened, undermined.

I also noted earlier that in addition to the critiques from philosophy of science, other kinds of critiques of physicalism, particularly of reductive physicalism, have been offered from a variety of other positions and perspectives. For example, significant flaws can be identified in the interpretation of data, research methodology (1, 2, 31-36). Questionable ethical practices and the impact of economic interests motivate a physicalist approach (2, 33, 34, 40, 41). Crosscultural studies have provided another kind of critique (37-39). Yet other critiques are based on the demonstrated influence of psychological factors on material events in the brain (2, pp. 126-132).

Still, there are no signs that this body of criticism has had any impact on the dominance of neurobiology on theory, research, or clinical practices in the mental health field. The mainstream psychiatric and psychological literature continues to be steeped in biological approaches, and in my own experience, few clinical colleagues are even aware of the existence of these critiques let alone affected by them.

Biological reductionism thus displays an uncanny resilience, apparently being immune to the steady stream of criticism. It seems highly unlikely, however, that reductionism persists because *all* of criticisms are flawed; surely, at least some are solidly grounded and deserve to be taken seriously. Yet, "the pro-materialist positions have become so forceful that any claim to refute them . . . appears naive" (40, p. 13). I will conclude by briefly commenting on this state of affairs.

THE PROBLEM OF IDEOLOGY

I believe that the apparent immunity of neurobiological reductionism to criticism can be understood from a restricted as well as a wider perspective. Both pertain to *ideology*—roughly, the covert promulgation of false or deceptive beliefs, of "false consciousness," typically in the service of powerful interests and often "securing the complicity of subordinated classes and groups" (41, p. 30).

I have mentioned that reductionism serves the interests of many groups involved either directly or peripherally in mental health matters. For example, consider some of the gains derived from biological explanations and treatments of addictions, depression, or attention deficit disorders. Such explanations encourage patients—and often their families—to defensively disclaim responsibility for their difficulties, to avoid looking at problematic psychodynamics, and to dismiss out of hand any need for

deeper and costly psychotherapy. Of course, it is readily apparent that these biological explanations provide other gains as well. For instance, obviously they advance the financial interests of drug and insurance companies; they rationalize the need for profitable research programs; they allow nonspecialists to treat "mental disorders," and so on (2, 31).

These are ideological aspects of material reductionism in a narrow sense, in that they manifest specifically the context of mental health issues. In a wider sense, they can also be identified in the very broad context. They are an aspect of the ideology of *modernism* whose roots can be found in the Enlightenment era (42-44). (Some would trace the roots back to the age of Plato.) This vast ideology and its pathological symptomatology has been articulated and addressed in various critiques by major thinkers, such as Nietzsche, Marx, and Heidegger, and elaborated in an extensive secondary literature. The critics broadly agree on the major symptoms: an overvaluation and overapplication of science, objectivity, and rationality ("scientism"); a priority given to control, prediction, manipulation ("a kind of technological self-assertion" [42, p. 5]); the devaluation of subjectivity, tradition, history, context. As one philosopher has put it, The "heart of the modernity problem" is

the intrusion of market considerations into every aspect of life, the effects of a mass, eventually media-dominated society, or the narcissism and impatience created by modern institutions, each or all signal[ling] some vast decline in the moral sensibilities or taste. . . (42, p. 84)

The value given to physical reductionist views concerning the nature of psychopathology and its rational treatment can thus be seen as but a manifestation in the microcosm of the mental health field of a much broader, culturally pervasive condition. Both expressions of materialist, physicalist ideologies are maintained by powerful, complex, and often poorly understood socioeconomic, cultural, psychological, material, scientific, and political factors. Both are deeply embedded and demonstrate an uncanny homeostasis. They are virtually immune to criticism, no matter how well conceived and compelling it might be.

One must ruefully conclude, therefore, that, by themselves, rational critiques of biological reductionism based on logical arguments cannot be expected to alter the prevailing orientation of the current mental health scene. The homeostasis of ideology in both the narrower as well as in the wider context will maintain the *status quo*. Proposals for radically different alternative clinical approaches (e.g., 14, 30, 45) are unlikely to receive serious consideration under these conditions. One might well ask whether

it is even possible to alter the ideological climate within the narrow, restricted clinical domain as long as the larger, general cultural materialist ideology remains in place. The ideologies are well and rigidly defended.

What *would* make an impact on this climate? How could one begin to counter the ideologies and their effects? These are baffling yet vitally important questions. Perhaps what some clinicians see as effective ways of dealing with individual maladaptive behaviors that are maintained by potent defensive needs and beliefs (e.g., 46) could somehow be generalized and put to use in this wider application and context. I hope to explore that possibility in future publications.

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