

## Scientific pluralism is the only way forward for psychiatry

In the search for a coherent epistemological structure for psychiatry, many reductionistic methods and orientations have failed to provide a satisfactory account of mental disorders that is sufficient for all our clinical and scientific tasks. This has resulted in the realization that a plurality of perspectives is needed in psychiatry. In this context, we address and comment on the recent editorial by Fountoulakis<sup>1</sup> which presents a defense of reductionism in psychiatry and sees it as the only scientific way forward. We find Fountoulakis's argument to be unsatisfactory and offer a critique of his arguments in this letter. We contend that Fountoulakis overlooks the crucial philosophical difference between *ontological* and *explanatory* varieties of reductionism, and conflates being “scientific” with adopting a “neurobiological” orientation.

We would like to clarify at the outset that neither we nor the leading proponents of anti-reductionism and pluralism in psychiatry advocate for a stance of dualism. The mind is embodied. All psychological phenomena are realized through the activity of the brain. This does not, however, mean that psychological processes can simply be understood only with reference to the activity of the brain. Aspects of psychological life, such as intentionality, are not translatable at the level of neurobiology, even though it is neurobiology that gives rise to intentionality. This can be explained with reference to the philosophical distinction between ontological and explanatory reductionism. Ontological reductionism is a proposition about entities and processes that can be reduced to more fundamental entities and processes. With regard to psychiatry, an ontological reductionist position would maintain that all psychological processes are fundamentally neurobiological processes, a position that is, if not universal, widely accepted in the scientific community. Explanatory reductionism, however, goes beyond ontology. It maintains that scientific explanations that relate to a certain level of organization or analysis can be reduced to scientific explanations at a lower level of organization or analysis. It implies that if we knew everything there was to know about neurobiology of the brain, psychological explanations would be rendered superfluous, because any explanation that utilizes psychological constructs could instead be reduced to an explanation that utilizes neurobiological constructs. We can, in theory, *eliminate* psychological explanations in favor of neurobiological explanations,

without any loss of explanatory power.<sup>2</sup> All biological processes can be ontologically reduced to physical and chemical processes (there is nothing in biology that is ultimately not physical or chemical), yet scientific explanation of biological systems requires distinctive concepts such as homeostasis, reproduction, evolution, that cannot be eliminated and replaced by (ie, reduced to) the language of the laws of physics and chemistry, even though nothing in biology violates the laws of physics and chemistry.<sup>3</sup> This is as true of biological systems as it is of psychological and social systems, and just as there is no metaphysical barrier between biology and chemistry, there is no metaphysical barrier between biology and psychology. This does not make either biology or psychology *less scientific* than physics or chemistry.

Fountoulakis gives the example of water as a case of emergentism that can be successfully reduced. He writes, “Conclusively, water and its properties are absolutely reducible to hydrogen and oxygen atoms.” This shows a confusion between ontological and explanatory aspects of reductionism. Water can be reduced to hydrogen and oxygen in the sense that water is made up of hydrogen and oxygen atom, but it *cannot* be reduced to hydrogen and oxygen in the sense that the chemical properties of water cannot simply be inferred from the chemical properties of hydrogen and oxygen. This suggests that whether or not reductionism is possible and helpful depends on the scientific questions we ask. A reduction of water into hydrogen and oxygen is helpful if our question is “what is the molecular structure of water?”, but not if our question is “what is the dynamic viscosity of water?” As an example, when it comes to cardiac rhythm, the cardiac rhythm is eventually a result of opening and closing of ion channels in the cell members, no model of cardiac rhythm can be built only at the level of the ion channel.<sup>2</sup>

In a similar vein, there are questions and aspects of psychiatric conditions where reductionism may be possible and helpful (“mood is regulated by which brain circuits?”), but this does not mean that all scientific questions of interest to us relating to psychiatric conditions will have neurobiological answers. Psychological and phenomenological constructs are valid targets of scientific study and scientific interventions.<sup>4</sup> Even if explanatory reduction were possible in theory, the complexity of these phenomena may nonetheless necessitate that we continue to talk in terms of higher-level

constructs. What is relevant to science is the explanatory and predictive power of our models, not whether the models are constructed at the lowest level of reduction. Even if explanatory reductionism is true in theory, it may nonetheless be that psychological models offer us the most explanatory and predictive power.

We are not the first to make these arguments. The limitations of reductionism have been obvious to most philosophical commentators in psychiatry and psychology. In fact, a recent book “Levels of analysis in psychopathology: cross-disciplinary perspectives”<sup>5</sup> with contributions from prominent scientific leaders makes these same arguments in a manner that is both philosophically and scientifically robust, and we encourage all readers to pursue this body of literature. It is a strawman fallacy to assert that the only non-reductive approach to psychopathology is one that involves divine/supernatural explanations.

What is, then, the methodological path that we should take in our effort to understand mental illness? The answer was given to us at the beginning of the 20<sup>th</sup> century by the philosopher-psychiatrist Karl Jaspers. No single scientific method is satisfactory, and we require a pluralism of empirically rigorous methods and perspectives. Methodological pluralism requires the recognition of strengths and limitations of any given method, and the questions for which it can provide the best answers.<sup>6</sup> It recognizes the existence of distinct and independently meaningful levels of analysis with the potential for “patchy reductionism” and “piecemeal integration”.<sup>7</sup> Since single-level and single-system analyses will not provide comprehensive answers for our scientific questions, we should strive toward interdisciplinary, pluralistic scientific efforts in psychiatric research, embracing this complexity,<sup>8</sup> while appreciating benefits and shortcomings of any given methodological approach.

#### CONFLICTS OF INTEREST

None.

#### PEER REVIEW

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