

Recent advances in the computational psychiatry. Theory-driven vs. data-driven approach

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Both theory- and data-driven computational approaches to mental disorders are developing so rapidly that psychiatrists themselves are confused by the amount of data provided by the neural networks. The rate of progress and the number of publications in the computational psychiatry has also numerous far-reaching philosophical consequences for the general epistemology, philosophy of mind and philosophy of medicine.

In theory-driven approaches, neural processes can be modelled by algorithmic representations that describe information processing in the complex multi-level neural system. Both the structures and mechanisms of the nervous system are described in terms of information processing. For example, impairments in the processes involved in predictive coding could potentially explain a variety of psychopathological phenomena, ranging from the impoverished theory of mind in autism spectrum disorder to peculiar abnormalities of smooth-pursuit eye movements in schizophrenia. Exemplary for a data-driven approach is digital phenotyping, which is paving the way for quantitative psychiatry more broadly and will set the stage for more scalable, accessible, and precise diagnostic techniques in the field.

Integrating computational modelling into psychiatry can facilitate research in several fundamental and novel ways. How do local dysfunctions of the endocrine or immune system create complex interactions with the nervous system and finally lead to some mental illness? Does digital phenotyping really facilitate the understanding of complex mental disorders? Or maybe the pursuit of more and more data in computational psychiatry follows the law of diminishing return and has rather limited clinical value? Are data-driven and theory-driven approaches to mental disorders two sides of the same coin or rather only partially overlapping methodologies?

Last but not least, computational psychiatry creates an interesting opportunity for an epistemologist to reevaluate computational theories of mind, which have been discarded due to the neurobiological turn. From such a research perspective mental disorders can be analysed as suboptimal algorithms running by the computational mind and resulting in dysfunctional behaviour.

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Marcin Rządeczka, Ph.D.

Institute of Philosophy
Maria Curie-Skłodowska University in Lublin

Marcin Rządeczka holds a Ph.D. in philosophy and currently works at the Institute of Philosophy of Maria Curie-Skłodowska University in Lublin. He is the Head of Laboratory for Multimodal Research. He has a keen interest in philosophy of science, with particular focus on the philosophy of biology and the philosophy of computer sciences. He is the author of one book and several papers and the member of the Polish Philosophical Society and the Polish Cognitive Science Society.