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Networks, intentionality and multiple realizability: not enough to block reductionism

(commentary accepted for publication in *Behavioral and Brain Sciences*)

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Target article: D. Borsboom, A. Cramer and A. Kalis: Brain disorders? Not really ... Why network structures block reductionism in psychopathology research

Abstract: Borsboom, Cramer, and Kalis propose that the network approach blocks reductionism in psychopathology. We argue that the two main arguments, intentionality and multiple realizability of mental disorders, are not sufficient to establish that mental disorders are not brain disorders, and that the specific role of networks in these arguments is unclear.

Main text:

We are sympathetic to the idea that mental disorders are not just brain disorders, and the article by Borsboom, Cramer and Kalis does an excellent job in conveying this antireductionist message to the psychological community. In this commentary, however, we will show that the two main arguments provided (more specifically, intentionality and multiple realizability of symptoms) are not yet sufficient to block reductionism, and moreover, that defending antireductionism does not require taking a network perspective.

The core idea of the network approach is that mental disorders should be seen as networks of causally interacting symptoms. A new insight that the authors put forward in the target article is that symptoms also often have intentional content (i.e., they are about something) and are meaningfully connected to one another, and that these contents and connections are not visible at the biological level. This seems to make explanatory reductionism impossible or, at least, very unlikely.

This intentionality argument, however, is unlikely to sway a sophisticated reductionist. She could accept the importance of intentional contents and their meaningful relationships, but nevertheless

argue that the real causal work is done by brain states. For example, it is pragmatically useful to describe and predict human behavior in terms of beliefs and desires, but this is consistent with the idea that the real causes of behavior are biological or neural (this was, roughly speaking, Dennett's [1987] original view on intentional explanation). That is, even though the intentional contents of symptoms may have an important pragmatic or predictive role in studying mental disorders, they need not figure in the causal mechanisms of mental disorders. This can be illustrated with an analogy: The Ptolemaic system of astronomy, in which Earth is at the center of the universe and planets follow circular trajectories with epicycles, was a very useful predictive and descriptive tool for centuries, but as a representation of celestial mechanics, it is radically false.

Thus, to block reductionism, it would have to be shown that intentional states are not only pragmatically important, but are also part of the causal mechanisms of mental disorders. One step toward this would be to show that intentional states as such, and not just the underlying brain states, can be treated as (interventionist) causes, and can have genuine causal relevance (along the lines of Eronen 2017; see also note 9 in the target article). A second step would then be to show that the particular intentional states that appear in psychopathological networks *actually* satisfy the conditions for causal relevance. For example, by showing that intervening on the intentional content of a symptom while holding other factors fixed would result in a change in another symptom. For this purpose, the models presently used in the network approach (e.g., vector autoregressive models or Markov random fields) are not yet sufficient, because they are not causal models, and the extent to which they give causal information is unclear (see, e.g., Bulteel et al. 2016). Moreover, even if a reductionist is forced to accept that symptoms with intentional contents are real causes, she could still maintain that these higher-level causes will be reduced in the end to neural or biological causes. Therefore, more is needed to stop reductionism.

Indeed, Borsboom et al. anticipate this kind of response, and to counter it, argue that mental states (in this case, symptoms with intentional contents) are *multiply realizable*: A given mental state can be realized in different ways in different individuals, which seems to make it impossible to identify it with a single biological state. This between-individuals multiple realizability, however, is not yet enough to block explanatory reductionism. Even if "fear of heights" is realized by brain state X in John but by brain state Y in Mary, it can still be *locally* reducible: "Fear of heights" is brain state X in John's case and brain state Y in Mary's case (Kim 1992). That is, even though "fear of heights" might not be identical to a single brain state, in each specific context, it could be reduced locally to a specific brain state (e.g., "fear of heights" in John is identical to a brain state X). This is sufficient for explanatory reductionism: For example, temperature is widely regarded to be a reducible property, although it is realized in a different way in a solid, gas, or plasma (Bickle 2016). More generally,

Polger and Shapiro (2016) recently have put forward a book-length skeptical account of the relevance of multiple realizability, arguing that most putative cases of multiple realizability can be explained away by a closer look at the scientific details. Thus, multiple realizability is unlikely to provide a strong foundation for the irreducibility of symptoms or networks.

Finally, we would like to point out that taking the network perspective is not necessary for defending antireductionism in psychopathology. Debates on intentionality and multiple realizability of mental states have a long history in philosophy of mind, and the same applies to the other arguments put forward in the paper (e.g., the context-dependence and individual variation of mental states). These arguments predate the recent network approach, and thus, are not tied to it. What seems to be different compared to the earlier philosophical literature is that the focus is now on symptoms and their meaningful connections, and not just on intentional states in general. It is not clear, however, why *networks* would play an indispensable role in this kind of reasoning: Studying mental disorders by focusing on psychological symptoms and their meaningful connections does not require using network models or conceptualizing mental disorders as network structures (e.g., Eronen & Bringmann 2018; Miller 2010; Persons 1986). Thus, the specific and distinctive role of networks in the antireductionist arguments still needs to be clarified. Until this is done, there seems to be no need to adopt the recent network approach to argue that mental disorders are not brain disorders.

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