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Commentary on Danny Borsboom and Annemarie Kallis

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Abstract: Use of network models to identify causal structure typically blocks reduction across the sciences. Entanglement of mental processes with environmental and intentional relationships, as Borsboom ad Kallis argue, makes reduction of psychology to neuroscience particularly implausible. However, in psychiatry a mental disorder can involve no brain disorder at all, even when the

former crucially depends on aspects of brain structure. Gambling addiction constitutes an example.

The weight of theory and clinical evidence on mental disorders strongly supports the general perspective defended by Borsboom and Kalis (BK). Indeed, increasing numbers of philosophers of science regard it as probable that most of the causal structure of the world, as identified across the sciences including fundamental physics, is best modeled in terms of networks. This is an important part of standard explanations for the fact that most scientific progress does not involve reduction (Horst 2007). Scientific progress generally proliferates types of processes rather than collapsing them (Ladyman and Ross 2007), and the greatest challenge for most modelers is not *isolating* interrelated systems, but carefully *entangling* them in a way that still allows for rigorous estimation of parameters and causal effects in real empirical data.

The task that BK take on is explaining how and why network modeling undermines reduction in the specific case of psychiatry. Mental disorders, they argue, should seldom if ever be identified with brain disorders, though they recognize that the latter are often aspects of the former. However, they slightly *under*cook the radicalism of their challenge to reductionism as a *clinical* strategy. This is because their examples are limited to cases where the expression and perseverance of a complex brain state under a certain kind of mental characterization requires reference to intentional patterns, which by their nature involve reference to environmental conditions and behavioral responses. But these are among the factors that block reduction of minds to brains *generally;* they fail to isolate particular obstacles to reduction that arise for *disorders.*

In each case that BK consider, one or more brain disorders is at least involved, even if not the 'essence' of what make the phenomena kinds of *mental pathologies*. To illustrate the full extent to which reductionism is misguided as a specifically psychiatric methodology, it is helpful to focus on a case, if one can be found, where the brain's contribution to a mental disorder results from its working just as natural selection 'designed' it to do, but in an environment where this produces mental pathology. Gambling addiction is just such a instance.

Let us set the stage as conservatively as possible. Suppose that we apply the concept of 'addiction' stringently, so that it refers, where gamblers are concerned, only to people who experience aversive somatic withdrawal symptoms when not gambling, to the extent that normal cognitive and emotional functioning in non-gambling settings is crowded out. This conceptual stringency might on the face of it seem to stack the odds in favour of a reductionistic account. It separates people who have a particular physiological dependency from the much larger population of problem gamblers who struggle with a range of social coping and self management issues, and who lie along a smooth continuum with people for whom gambling is relatively low-cost recreation. The population of 'true addicts' can be statistically distinguished from the wider group of 'mere' problem gamblers (Kincaid et al 2013), and such separation can be legitimately motivated by the suggestion that the

former, but not the latter, are appropriately treated (in part) by neuropharmacological therapies (Ross et al 2008). Is this not an exemplary instance of a reductionist's response to a critique such as BK's, wherein those suffering from a brain disorder are systematically carved out from a class of behaviorally related cases where social forces mimic 'the real disease'?

As we add known causal details, the reductionist path seems at first to pay dividends. The forms of gambling that are addictive are those that involve sequences of statistically independent events that sometimes yield rewards and can be generated by simple, stereotyped actions on the part of the gambler. The addictive syndrome is made possible by a conjunction of three facts, which are indeed about neural mechanisms and architecture: (1) allocation of cognitive-emotional attention and reward prediction are approximately fused in the same neural learning circuit based in the ventral striatum; (2) the circuit in question operates a specific form of Rescorla-Wagner learning algorithm that cannot settle on a model of genuine randomness, preventing it from learning that there is nothing to be learned from repeatedly playing things like slot machines; and (3) once the wider system in which the striatal learning mechanism is embedded discovers an action pattern that reliably delivers information relevant to trying to predict the reward sequence, it automatically cues motor preparation for harvesting activity around the focus of attention. Somatic cravings are the subjective experience of such motor preparation in the absence of opportunity for action. The cravings cue thoughts about gambling, and the thoughts sustain attention and motor preparation; so there is self-sustaining feedback.

This story seems transparently to be mainly about the brain. But for medical purposes – i.e., as an account of a *disorder* – it is not reductive *at all*. This is because every component of the causal network that lies within the cranium is working just as evolution selected it to do. An easily accessible learning opportunity is presented, and the appropriate neural network tries to take advantage of it in the way that has garnered sustaining reward streams for active vertebrates for hundreds of millions of years. Alas, cunning manipulators have engineered an environment in which this 'proper functioning' (Millikan 1984) leads to emotional, cognitive, behavioral, and social disaster for people. Since the introduction of sophisticated digital technology into slot machine design, the proportion of casino revenues derived from addicts has exploded (Schüll 2012). There is no reason to hypothesize that any endogenous vulnerability in brains has recently increased; the entire cause of this psychiatric pandemic lies in malicious environmental engineering, plus regulatory failure. So we have an alarmingly widespread mental disorder, crucially reliant on neural properties of a causal network – and *no brain disorder at all*. There is not merely a failure of reduction but, contra a concession BK allow, even of supervenience, *with respect to what is disordered* – the mind (and society), but not the brain.

References

Horst, S. (2007). *Beyond Reduction: Philosophy of Mind and Post-Reductionist Philosophy of Science.* Oxford University Press.

Kincaid, H., Daniels, E., Dellis, A., Hofmeyr, A., Rousseau, J., Sharp, C. & Ross, D. (2013). A taxometric analysis of the performance of the Problem Gambling Severity Index in a South African national urban prevalence sample. *International Journal of Gambling Studies* 29: 377-392.

Ladyman, J., and Ross, D. (2007). *Every Thing Must Go: Metaphysics Naturalized.* Oxford University Press.

Millikan, R.G. (1984). *Language, Thought, and Other Biological Categories.* MIT Press.

Ross, D., Sharp, C., Vuchinich, R., & Spurrett, D. (2008). *Midbrain Mutiny: The Behavioral Economics and Neuroeconomics of Disordered Gambling*. MIT Press.

Schüll, N.D. (2012). *Addiction By Design.* Princeton University Press.