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# Coming to Terms with Holism: Minimalistic Conceptual Tools for Describing and Explaining Holistic Systems in Biology

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## Abstract

Session: Holism and Organicism: Conceptual Consensus or Historical Typologies? (Cheung, Mossio, Toepfer, Wolfe)

In my contribution, I will focus on some of the most important general concepts in recent discussions of organisms as holistic systems, namely "interdependency", "(causal) cyclicality", "(functional) coherence", and "(organizational) closure". All these concepts emerged within causal models of the organization of the living. I shall characterize these concepts in their presuppositions and implications and discuss their theoretical relationship to each other. For each of these concepts I will emphasize the crucial role of the relationship between the parts (or sub-processes) that together constitute the whole.

I shall further argue, that, to be united in a holistic system, the parts must (1) exert a causal influence on each other, (2) mutually depend in their existence from the influence of the other parts, and (3) be determined by their effect on the other parts. The three aspects refer to causal, ontological, and epistemic levels respectively. Terminologically, these three levels might be called "interaction", "interdependence", and "interdetermination". On this terminological basis, I shall discuss typical kinds of integrated dynamical systems in nature, organisms and other systems, for example, the water cycle, chemical reaction systems, and regulatory devices within the inorganic world. In discussing the relationship between holistic systems and teleology, I will argue that it is at least partly for contingent reasons that some types of dynamic wholes in nature are always described in functional terms (organisms) whereas others are not (e.g. the water cycle).

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