

On Choosing the Right Tools
Reductionism and Holism in Biomedical and Cognitive Sciences

Rasmus Grønfeldt Winther
rgw@ucsc.edu ; www.rgwinther.com

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Carlos López Beltrán carloslopezbeltran@gmail.com

Is an organism or ecosystem “nothing but” the sum of its parts or are there emergent and autonomous—and thereby, non-reducible—properties and causes at higher levels? A general tendency in literatures in the biomedical and cognitive sciences has been to endorse either a strategic reductionism (e.g., selfish gene theory, modularity of mind) or an emergent holism (e.g., developmental systems theory, biosemiotics, neo-Kantianism).

From my perspective, reductionism and holism are both legitimate experimental and analytical strategies, and must be understood within the context of the particular “compositional” research programs in which they live. Here are three such programs: mechanistic, structural, and historical. Each commits to a “partitioning frame,” which is a particular way of carving out “abstracted parts” (e.g., Winther [2006](#); [2011](#); [2014](#)). Training, mentor lineages and other institutional “scaffolding” (Caporael, Griesemer, and Wimsatt [2013](#)) together with personal preference, choice, and drive interact when particular researchers adopt one or more research programs as tools to analyze and articulate part-whole systems. Every justified research program contains some truth; both holism and reductionism shed some light. Thus, conventionalism of choice is intricately tied to pluralism of perspectives, qua tools of understanding.

As philosophers, we can and should explore the sheer plurality of perspectives, as well as the “dark sides” and “blind spots” of each partial perspective. Research programs are analogous to maps. Identifying mechanisms, articulating and formalizing structures, and tracing histories are kinds of mapping. Yet, the map is *not* the territory. The take-home lesson is that an integrated plurality of partial, pragmatic maps is required for understanding organisms, ecosystems and other kinds of wholes (e.g., the mind).