Underlying Concept Structure (Havstad)

Here I explore how the implications of pluralism for scientific knowledge can deepen as more radical instances of pluralism are considered, focusing specifically on conceptual practices from biochemistry and evolutionary biology.

For instance: the concept 'thalidomide' was initially understood to contain one kind of molecule, but later research revealed conceptual coverage of two chiral forms.[1] Pluralism of this sort can be handled rather deftly—by splitting the original concept, targeting each component, and tracking interactions between them. 'Fossil' is also pluralistic, as it once meant anything dug out of the ground, but now refers to naturally preserved remains of biological organisms.[2] Handling such temporally dynamic conceptual pluralism requires indexing concept use to particular times, and developing plausible accounts of conceptual change.

Then there are concepts like 'stasis' in evolutionary theory, with >10 different meanings, all of which might variably instantiate something like 'relative evolutionary stability over relatively long periods of geologic time'.[3] This sort of pluralism, of multiple conceptions occluding a core concept,[4] is likely to have reverberating effects—as different methodologies are required to detect different instantiations of the general concept, and the implications following from one instantiation may not also be carried by another.

Fuzzy sets with correspondingly vague boundaries lead to another form of conceptual pluralism. Pluralism about 'species' at least partially results from repeated attempts to give precise definitions, none of which comprehensively characterize the group, all of which are conceptual competitors. Handling this pluralism requires a mish-mash of strategies: identifying emblematic properties; ostending to paradigmatic instances; and contrasting with theoretical alternatives.[5]

Finally, pluralisms can overlap—producing multiple conceptions occluding split core concepts (e.g., 'biological individual'[6]), or temporally dynamic fuzzy sets (e.g., 'gene'[7]). Here, various strategies for dealing with different kinds of pluralism will likely need to be adopted together, while noting that such strategies might interact with one another in confounding ways.

Surveying this array of underlying concept structure can clarify what might be intended as well as at stake in the monist versus pluralist debates regarding various scientific concepts.

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[1] For a review of this issue, see "Putting Chirality to Work: The Strategy of Chiral Switches" in *Nature Reviews Drug Discovery* (Agranat, Caner, & Caldwell 2002).
[2] See Rudwick's *The Meaning of Fossils: Episodes in the History of Paleontology* (1975) for more.
[3] Summarized by the *Oxford Bibliographies* entry on "Stasis" (Lidgard & Hopkins 2015).
[4] The core concept / conception distinction is usually credited to H. L. A. Hart's *The Concept of Law* (1961).
[5] These three strategies track, respectively, three alternative accounts of conceptual difficulty from the philosophy of mind and language: exemplar theory; prototype theory; and theory-theory.
[6] Evidence in "Pathways to Pluralism about Biological Individuality" (Sterner 2015).
[7] Evidence in "1953 and All That. A Tale of Two Sciences" (Kitcher 1984).