

Dissertation Abstract

Towards a Classification of Continuity and On the Emergence of Generality

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This dissertation has for its primary task the investigation, articulation, and comparison of a variety of concepts of *continuity*, as developed throughout the history of philosophy and a part of mathematics. It also motivates, and aims to better understand, some of the conceptual and historical connections between characterizations of the *continuous*, on the one hand, and ideas and commitments about what makes for *generality* (and *universality*), on the other. Many thinkers of the past have acknowledged the need for advanced science and philosophy to pass through the “labyrinth of the continuum” and to develop a sufficiently rich model or description of the continuous; but it has been far less widely appreciated how the resulting description largely informs our ideas and commitments regarding how (and whether) things become general (or how we think of universality).

The introduction provides some motivation for the project and gives some overview of the chapters. The first two chapters are devoted to Aristotle, as Aristotle’s *Physics* is arguably the foundational book on continuity. The first two chapters show that Aristotle’s efforts to understand and formulate a rich and demanding concept of the continuous reached across many of his investigations; in particular, these two chapters aim to better situate certain structural similarities and conceptual overlaps between Aristotle’s *Posterior Analytics* and his *Physics*, further revealing connections between the structure of demonstration or proof (the subject of logic and the sciences) and the structure of bodies in motion (the subject of physics and study of nature). The network of connections that exists between the two is shown to hinge on a particular notion of continuity, especially as this notion relates to the concept of generality (through the largely ignored notion of what Aristotle calls “suggenicity,” or belonging to the same genus). This chapter also contributes to the larger narrative about continuity, where Aristotle emerges as an influential early proponent of an account that aligns continuity with *closeness* or relations of nearness.

Chapter 3 is devoted to Duns Scotus and Nicolas Oresme, and more generally, to the Medieval debate surrounding the “latitude of forms” or the “intension and remission of forms,” in which concerted efforts were made to re-focus attention onto the type of continuous motions mostly ignored by the tradition that followed in the wake of Aristotelian physics. In this context, the traditional appropriation of Aristotle’s thoughts on unity, contrariety, genera, forms, quantity and quality, and continuity is challenged in a number of important ways, reclaiming some of the largely overlooked insights of Aristotle into the intimate connections between continua and genera. By realizing certain of Scotus’s ideas concerning the intension and remission of qualities, Oresme initiates a radical transformation in the concept of continuity, and this chapter argues that Oresme’s efforts are best understood as an early attempt at freeing the concept of continuity from its ancient connection to closeness.

Chapters 4 and 5 are devoted to unpacking and re-interpreting Spinoza’s powerful theory of what makes for the ‘oneness’ of a body in general and of how ‘ones’ can *compose* to form ever more composite ‘ones’ (all the way up to Nature as a whole). Much of Spinoza reads like an elaboration on Oresme’s new model of continuity; however, the legacy of the Cartesian emphasis

on local motion makes it difficult for Spinoza to give up on closeness altogether. Chapter 4 is dedicated to a closer look at some subtleties and arguments surrounding Descartes' definition of local motion and understanding of 'one body', and Chapter 5 builds on this to develop Spinoza's ideas about how the concept of 'one body' *scales*, in which context a number of far-reaching connections between continuity and generality (through his *common notions*) are also unpacked.

Chapter 6 leaves the realm of philosophy and is dedicated to the contributions to the continuity-generality connection from one field of contemporary mathematics: sheaf theory (and, more generally, category theory). The aim of this chapter is to present something like a "tour" of the main philosophical contributions made by the *idea* of a sheaf to the specification of the concept of continuity (with particular regard for its connections to universality). The concluding chapter steps back and discusses a number of distinct characterizations of continuity in more abstract and synthetic terms, while touching on some of the corresponding representations of generality to which each such model gives rise. The dissertation ends with brief discussion of some of the dominant arguments that have been deployed in the past to claim that continuity (or discreteness) is "better."

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