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Abstract

Editor's Introduction to the Special Issue 'The Cognitive Ontological Dimensions of Naturalness', including brief introductions of the individual contributions.

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Debates about naturalness go far back into the history of philosophy. Just think of the famous (yet somewhat morbid) metaphor of cutting nature at its joints, harking back to Plato's *Phaedrus*. The idea of Plato and his fellow naturalness enthusiasts is that nature has a structure to be discovered, rather than being invented – which corresponds to the familiar distinction between realism and anti-realism. Although realism is typically considered to be the more intuitive position, it does face a number of challenges. Biologists, for instance, have been unable to produce a univocal definition of species. Does that mean the way we carve up life into kinds is *merely* a matter of convention? Even among realist philosophers who dispute this conclusion, most recognize that our knowledge of nature is infected by our epistemic interests, and shaped by the way we think and reason. This insight, however, can be spelled out in many different ways, with varying degrees of ontological commitment.

An inventive realist approach that takes this point seriously and aims to get by with minimal ontological commitment comes from recent cognitive science. Peter Gärdenfors holds that conceptual content is structured geometrically, that is, it is organized in so-called *Conceptual Spaces* (CS). Such spaces consist of points, quality dimensions, and metrics, and are postulated to explain and predict the behavior

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of cognitive agents. Crucially, Gärdenfors' version of CS is equipped with cognitive criteria of naturalness which are based on cognitive economy and optimal design principles. Natural properties and concepts are thought to exhibit a certain topology that results from the similarity structure of the categories in question. Members of a given natural kind, for example, exhibit mutual resemblance in relevant respects. One might even say this is precisely what makes them members of the kind (cf. Quine, 1969). In CS, similar objects are represented as spatially adjacent. Thus, the topologically cohesive concepts are thought to be the most natural ones. They are optimally designed in that they carry a great deal of information without overloading the memories of the cognitively limited organisms we are.[1] In a nutshell, the criteria are based on the geometric properties of our conceptual representations.

The underlying notion that naturalness has something to do with properties of the mind is an older one. John Locke distinguished between nominal essences, which "[…] are the abstract ideas that constitute the definitions of species or genera", and real essences, which are the "underlying cause[s] of the object's observable qualities" (Jones, 2023: 1). The nominal essences are somewhat related in spirit to Gärdenfors' natural concepts in that they are thought to be the referents of natural kind terms. Locke, however, was mostly concerned with naming and language, while Gärdenfors draws attention to the psychological nature of the concepts. Moreover, to this date, he is the first to propose empirically testable criteria that demarcate natural from non-natural concepts. For this reason alone, the account deserves the attention – and indeed philosophical scrutiny – it receives in this special issue.

There is a problem, however. According to David Lewis, a metaphysician with considerable influence on the naturalness debate, accounts such as Gärdenfors' are a non-starter:

> Nor should it be said […] that as a contingent psychological fact we turn out to have states whose content involves some properties rather than others, and that is what makes it so that the former properties are more natural. (This would be a psychologistic theory of naturalness). (Lewis, 1983: 377).

As a diehard realist, Lewis is concerned with what we call "ontological naturalness". This dimension of the debate is all about the structure of the external world. Conceptual spaces are a paradigmatic instance of "cognitive naturalness" – they are about the structure of the internal world. This special issue asks how the two dimensions are related.

While Lewis seems to think that there is no meaningful relation, the following case study shows that this might be an unwarranted prejudice. While, according to a famous line of argument by Nelson Goodman (*Fact, Fiction, and Forecast*, 1955), we use some predicates in our reasoning (e.g., *being green*), we do not do so with other predicates, sometimes called "gerrymandered" (e.g., *being grue*). We may refer to the former as projectible predicates, while the latter are non-projectible ones. As there is no obvious criterion in sight for distinguishing these kinds of predicates, however, this seems to undermine the justifiability of our reasoning practices. It is frequently assumed that projectible predicates are precisely the ones that refer to natural properties or kinds. This is to say many philosophers address the problem in

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[1] This is a simplification; for elaboration of the design principles, see Douven & Gärdenfors (2019).

terms of ontological naturalness. Gärdenfors, however, presents his version of cognitive naturalness as a solution to this very problem, maintaining that projectible predicates are those that refer to topologically cohesive concepts. One relevant link between cognitive and ontological naturalness thus leads via the problems addressed by these concepts.

As this topic is at the interface of various fields of inquiry, this special issue brings together perspectives from different philosophical sub-disciplines, as well as cognitive psychology. The individual contributions are briefly presented below, starting with the two main representatives of the conceptual spaces account.

For many actors in the naturalness debate, social kinds (e.g., money, democracy) are not natural, basically because they are human affairs. In his *Naturalness, Scientific Concepts, and the Substantivity of Social Metaphysics*, Douven disagrees and subjects varieties of French feminism to analysis. To do so, he adopts elements of Lewis's Best Systems Analysis of natural laws – but without endorsing his thorough realism.

Gärdenfors uses his paper *Natural Concepts and the Economics of Cognition and Communication* to present further developments of his approach. In particular, he discusses how his naturalness criteria are related to the psychological notion of coherence and how they enable mutual understanding in communication.

From a psychological point of view, concepts are clearly products of the mind. Thus, a concept can be said to be natural if it occurs naturally in our languages and our everyday common thoughts. In *Varieties of Natural Concepts,* Hampton argues on the basis of empirical evidence that such concepts do not form a uniform class – some are structured by similarity relations and are thus easily captured by CS, while others are differently constituted. Interestingly, among the ones not fitting CS are natural kind concepts, which are the prime example of ontological naturalness.

While most philosophers are convinced that natural kinds and thus ontological naturalness play their most important role in the natural sciences, this claim is essentially an empirical claim. Kendig investigates the role of naturalness in the sciences, taking the history of plant morphology as her example. In her *Naturalness in the Making: Classifying, Operationalizing, and Naturalizing Naturalness in Plant Morphology*, she shows that the mutually inconsistent conceptualizations of the fundamental parts of plants can be traced back to different conceptions of naturalness. She concludes that the notion of naturalness as applied in biology is not a pure ontological notion, as suggested by philosophers, but rather a concept contextually bound to specific models, theories, set of practices or disciplines.

According to Scholz (*Conceptual Spaces: A Solution to Goodman's New Riddle of Induction?*), CS do not offer an innovative solution to the riddle of projectibility, after all. While Gärdenfors does make significant progress in the description of our reasoning practices, the evolutionary pragmatism he advances fails to ground projectibilty in a notion of naturalness that would shed light on the normative dimension of the riddle: Why *should* we project the topologically cohesive concepts?

While the conjecture that projectibility and naturalness of predicates are closely related is mostly based on intuition, Thorn and Schurz investigate this relation formally. In the first step of *Induction with and without natural properties: a new approach to the New Riddle of Induction*, they show that projectibility is rather a matter of statistical background conditions like domain stability and random sam-

pling. However, in their second step, they can show by way of simulation that natural properties of the Gärdenfors's style indeed fare better in predictions (if all statistical conditions are met).

In his paper *Ecological Empiricism*, Vosgerau argues that the putative gap between ontological and cognitive naturalness can be bridged if we attend to our interactions with the world. Based on the notion of affordances, he argues that those properties that are revealed to us in interacting with the world are natural. By adding further criteria to his "Ecological Empiricism", he shows that ontological and cognitive naturalness can be viewed as being of the same kind, although different.

Data availability No datasets were generated or analyzed during the current study.

Declarations

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