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Carving nature at its joints using a knife called concepts

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Abstract

That humans can categorize in different ways does not imply that there are qualitatively distinct underlying natural kinds or that the field of concepts splinters. Rather, it implies that the unitary goal of forming concepts is important enough that it receives redundant expression in cognition. Categorization science focuses on commonalities involved in concept learning. Eliminating “concept” makes this more difficult.

Categorization researchers hypothesize that minds group objects to reflect natural groupings in the world. For example, theorists often point to the family-resemblance relationships embodied by biological taxonomies. Poodles resemble each other more than they do Labradors; dogs resemble each other more than they do bears, and so forth. These similarities presumably hold in the world and in our mental lives. Of course, there is a fundamental separation between categories in the world and concepts in the mind. Fortunately, though, categorization science finds its grounding and coherence at both the ecological (world) and psychological (mind) levels of analysis. Unfortunately, this often leads to the misconception that “category” and “concept” are equivalent or interchangeable terms – as Machery correctly points out in *Doing without Concepts* (Machery 2009, pp. 8–14).

The world contains coherent assemblages of objects that are sometimes called natural kinds, family-resemblance categories, or consequential stimulus regions. All organisms share the profoundly important goal of learning the concepts that summarize these assemblages. These concepts are behavioral and psychological equivalence classes – they let creatures behave similarly toward similar things and understand similar things similarly. Concepts are the mind’s tool for representing and responding to natural kinds.

The conceptual goal of living organisms is unitary – to develop psychological representational schemes that preserve these assemblages in acting and understanding. The fitness consequence of not doing so is unitary. The assemblages of things in the world – the natural kinds – may have a unitary structure, too. One sees that categorization science is motivated by this unitariness. That concepts are a staff of life for living organisms is a profound truth that would be lost by breaking the field into process splinters. This is a principal reason for preserving the coherence of the field.

Now it is true that minds lack direct access to the world’s things in themselves. Therefore, minds must create mental concepts that estimate natural-kind categories. Given this

necessary distinction between natural-kinds in the world and our mental estimates of them, it is not clear why concepts, prototypes, exemplars, theories, or any other mental representation would be considered a natural kind. Indeed, if there are any groups that are *not* natural kinds, mental representations are likely among them.

Machery (2009, p. 241) contends that because it does not pick out a unified natural kind, “concept” is a useless, or perhaps even harmful, term. We disagree. It does not shatter the field of concepts if it turns out – as it does – that concept estimation produces a marvelous variety of concepts and learning processes – including prototypes, exemplar memories, category rules, decision bounds, and theories. This only means that the phenomenon of concepts is rich and diverse. It also means that the unitary goal of estimating concepts is central enough to survival that it deserves and receives redundant expression within cognitive systems. To us, this centrality emphasizes the need for a coherent field of concepts and categorization.

Of course, the field sometimes seems less than coherent because researchers tailor category tasks to elicit different processes. Prototype theorists use large stimulus sets that reduce stimulus repetition and defeat exemplar memorization. These categories also have family-resemblance organization that encourages prototype formation. Exemplar theorists often use categories that share little or no family resemblance. Perhaps the most iconic of these are “5–4” categories. As Machery (2009, pp. 175–77; see also Smith & Minda 2000) correctly notes, these categories share few features, preventing prototype formation, and the stimulus sets are small. Participants see many repetitions of each stimulus and naturally memorize them. Rule-based tasks are clearly simply unidimensional in character, encouraging hypothesis testing, reasoning, and solution by rule formation.

However, the progress in this area shows the method in the madness. Researchers have found that the dominant categorization process is strongly affected by the size of categories, their perceptual coherence, the dimensionality of the task’s sufficient solution, the stage of category learning, the default tendencies of the categorizing organism, and so forth (Ashby & Maddox 2005; Blair & Homa 2003; Couchman et al., in press; Homa et al. 1981; Murphy 2002; Smith & Minda 1998; 2000). Moreover, it is clear that these generalizations are not just isolated findings. It is insufficient to claim that the effect of stimuli on categorization is captured completely by a description of prototypes, exemplars, or theories (as Machery [2009, sect. 8.3.2] requires). Rather, organisms tune sensitively to the affordances of their category experience in order to choose the most cognitively economical and adaptive learning solution they can. Viewed from a broader perspective, these different strategies are instances of organisms navigating upon a multidimensional fitness surface. But the goal, the navigation, and the surface all embody a unitary fitness potential that must not be overlooked and that really is not divisible.

This broader perspective also raises many important theoretical questions. What species have which categorization potentialities and which constraints? What were the antecedents of humans’ categorization system in the vertebrates or primates? What are the affordances of language and symbolic reasoning, and how do they change the nature of concept formation? What are the developmental stages by which humans acquire their mature concepts and

adaptive action patterns in the world? What are the implications of cognitive development, cognitive aging, and neurological impairments for category learning, both regarding constraints and regarding preserved or spared capacities on which remediation could capitalize to maximize education and training? Replacing “concept” with “prototype,” “exemplar,” or “theory” as Machery (2009, p. 242) suggests would unwarrantedly deemphasize these important questions. In our view, answering all these questions is also best served by understanding the unitary nature of the task at hand.

That task is to carve nature at its joints using the psychological knife called concepts. It is true, it is profoundly important to know, and it is all right for the progress of science that the knife is Swiss-Army issue with multiple blades.

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