Muhammad A. Khalidi, *Natural Categories and Human Kinds: Classification in the Natural and Social Science*, Cambridge University Press, 2015, pp. 268, $ 32.99, ISBN 9781107521728

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The first noticeable and remarkable aspect of this book is the title. *Natural kinds*, the types or sorts into which our natural world is divided, are usually opposed to *human categories*, divisions which mankind builds up to serve its scopes or to differentiate itself or its conspecifics. In the title of his work, Muhammad A. Khalidi switches these terms, so highlighting, on the contrary, the close connection between the kinds which are in the world and the categories that we invent to classify the things in it, claiming also that some of the categories in which humans themselves are divided can be considered natural kinds.
This book indeed is "about the assortment of categories that scientists have devised to study the multifaceted nature of reality, and specifically which of these categories are valid or […] correspond to 'natural kinds'" (p.II).
This division of natural kinds has been usually explained by a famous view which can be already found rooted in Aristotle: Essentialism. According to this account, there is a relatively small set of privileged categories, and each individual object in the universe belongs properly to one category, based upon its essence. On the contrary, the author mainly aims to argue, on one hand, that central claims of philosophical essentialism have either not been adequately justified or that they depend on what modern science tells us. On the other hand, Khalidi does not want to defend the classical position against essentialism, namely the social constructionist (or conventionalist) approach. This view holds that all our categories, whether scientific or folk, are creative human inventions, made up to fulfill various practical and social purposes, but without the presumption of depicting the reality. Khalidi innovatively proposes an alternative position: "a naturalist position, which takes into account the discoveries of various scientific disciplines while at the same time trying to derive general conclusions about the validity of our categories" (p.II). He argues that there is no conflict between what these two accounts, essentialism and conventionalism, claim, provided that we acknowledge that our

classification schemes and taxonomic practices enable us to focus on some features of reality while neglecting others. This is in order to serve our epistemic purposes and to give an account of patterns of change and constancy.

The book is divided into six chapters, preceded by an articulated preface, in which the author states the aim of the book and briefly sketches the structure of every section. The focus of the first chapter is the supposed contrast between categories that really correspond to the divisions in nature and those that merely serve our practical purposes. The author examines the various criteria and desiderata that have been picked out to distinguish natural from artificial kinds, trying to determine which of them, if any, can be regarded as marks of the natural. To do so, he considers the two main theses about natural kinds which have dominated the philosophical scene during the past few decades: Metaphysical Realism and essentialism. According to realism, "what distinguishes natural from nonnatural kinds is that the former correspond to real entities, and that these entities are abstract objects endowed with metaphysical reality" (p.5). However, Realism – the author claims – does serve a little to the aim of identifying which kinds are natural, for "it does not equip us with a method of distinguishing real or natural properties from non-properties" (p.10). Often associated with realism about natural kinds is essentialism, which, on the contrary, attempts to specify certain criteria that serve to determine the class of essential properties, and hence that of natural kinds. These properties are defined by certain recognizable features, such as: necessity and sufficiency; modal necessity; intrinsicality; microstructure; and discoverability by science. In the rest of the chapter, Khalidi considers each of these aspects of essentialism, reaching the conclusion that also essentialism encounters many problems, since the criteria it provides "are not adequately motivated and some are incompatible with the findings of contemporary scientific theory about paradigmatic natural kinds" (p.41).

In Chapter 2, the author introduces his own positive account of natural kinds as investigative or epistemic kinds, "in the sense they are the categories revealed by our systematic attempts to gain knowledge of nature" (p.43). He develops this view by comparing it with the accounts of Locke, Mill, Quine, Duprè, and Boyd. Since science is the discipline dedicated to acquire knowledge about the world, natural kinds are usually determined

by the various branches of science. Accordingly to this claim, Khalidi then tries to defend two basic realistic claims: first, that natural kinds are discoverable by science, and second – a much more controversial thesis – that all scientific categories correspond to natural kinds. What is innovative and fundamental about his thesis is that he affirms that "any endorsement of the current categories of science is corrigible and subject to revision in light of future inquiry" (p.IV). Another remarkable aspect of this theory is that this epistemic conception of natural kinds eventually leads to a characterization of them in terms of causality, i.e. in metaphysical terms. Khalidi explains indeed that since science aims to identify projectible properties, especially those that point to other property clusters, and since this fact shows that there are causal links between these properties, then projectibility is the epistemic marker for the metaphysical relation of causality. These causal properties or clusters of properties are what characterize natural kinds. He is then proposing a revisited "simple causal theory" of natural kinds. However – the author underlines – even though, consequently, the naturalness of a kind may become a matter of degree, this does not mean that the existence of any of this properties is put into question.

In Chapter 3, the author aims "to determine whether there are any grounds to disqualify special science categories from corresponding to natural kinds" (p.82), arguing in the end that there are not. This section starts by criticizing some general arguments for disqualifying the existence of kinds and properties in the special sciences, which claim that all "higher-level" kinds and properties either are just multiple realizable disjunctions of "lower-level" kinds or are reducible to them. Then, Khalidi proceeds by arguing against a closely related argument, for which special-science kinds and properties cannot have a causal efficacy, since all the causal work must be done at a lower-level. Moreover, the author aspires to cast doubt on the view according to which there are no laws in the special sciences or, if there are, their character is very different from the one of the laws of non-special sciences. His argument against each of the theses mentioned is focused on *Newtonian fluid* and its strictly associated property, *viscosity*. The picture of special sciences which transpires from this discussion is one of disciplines and subdisciplines which instead intend to identify kinds and properties on the basis of causal relations found in

proprietary domains. Khalidi finally aims to respond to the challenge which arises for his "simple causal theory", threatened by the observation that causal patterns are ubiquitous in nature and that natural kinds will be too numerous and ineffectual to be worth the name. He defends the idea that systems of natural kinds can crosscut one another, given the fact that they pertain to different aspects of the natural worlds.

The account just given of natural kinds in the special sciences develops further Khalidi's *naturalist* position, which is not *epistemicism* (see p.123). As he himself claims: "I have argued that these kinds [biological and social kinds] ought to be regarded as genuine instances of special-science kinds […]. Some of them are etiological, copied, interactive, and mind-dependent, without thereby jeopardizing their claim to be natural kinds" (p.164). This is the focus of Chapter 4, which is organized around several specific arguments that have been advanced by those philosophers who think that biological or social kinds are fundamentally different from kinds in other domains, and so cannot be natural kinds, simply because special science kinds cannot. Khalidi critically examines all these views, providing good arguments against each of them.

The author then examines, in Chapter 5, a number of widely accepted and controversial kinds, in order to ascertain whether the natural kind label can be ascribed to them. He takes into consideration several case studies from basic sciences (physics; chemistry; biology and physiology), such as lithium, polymer, virus, cancer and cancer cells, and case studies from psychiatry and cognitive science, such as attention deficit and hyperactivity disorder. This is in order to endorse, amplify and better illustrate some of the claims he makes in the previous sections, as well as to clarify further certain features which characterize natural kinds. In this respect, one of the main revolutionary conclusions is that "what determines membership in a kind is not the possession of a requisite number of properties in the cluster but rather involvement in many of the same causal relations" (p.200).

The last chapter is dedicated to showing that this naturalist approach to natural kinds is compatible with realism about these kinds. This new account also has the merit to provide a unified view of characterizing natural kinds across different scientific domains, since they can all be defined as nodes in a causal network. This does not mean that Khalidi denies the obvious

asymmetry between the basic and special sciences or between the study of microscopic and macroscopic phenomena: he only claims that this "should not lead us to conclude that the only natural kinds in the universe are those in the domain of elementary particles" (p.229). The author then proceeds by clarifying the relationship between natural kinds and properties and the role of causality in the proper characterization of natural kinds. Following the conclusions already sketched in Chapter 2, Khalidi affirms that, although he has a pluralist view of natural kinds which does not set a limit to the number of natural kinds which may exist, these kinds (as well as their properties) really are in the world. He further rejects the traditional way of grounding realism, according to which kinds are real if they are mind-independent, for it rules out the existence of psychological and social kinds: mind-independence is not a requirement. The kinds must only be manifested in the world. To guarantee that our categories identify real kinds – he claims – we just need to pursue a scientific method that serves epistemic purposes.

Natural Categories and Human Kinds ultimately provides a noteworthy naturalist approach to natural kinds. With his book, Khalidi succeeds in arguing that "the question concerning which kinds are real (or natural) would seem to reduce to one about which categories figure in our best theories of the world, or form a part of our settled knowledge of nature" (p.2). He thus characterizes the focal distinction between natural and nonnatural kinds from a new angle. By his detailed examination of classification in the natural and social realms, Khalidi offers a good argument against the position which has been dominating the philosophical scenario for the past few decades, while also giving a significant treatment of kinds in the social sciences.