NATURAL CATEGORIES AND HUMAN KINDS

The notion of "natural kinds" has been central to contemporary discussions of metaphysics and philosophy of science. Although explicitly articulated by nineteenth-century philosophers like Mill, Whewell, and Venn, it has a much older history dating back to Plato and Aristotle. In recent years, essentialism has been the dominant account of natural kinds among philosophers, but the essentialist view has encountered resistance, especially among naturalist metaphysicians and philosophers of science. Informed by detailed examination of classification in the natural and social sciences, this book argues against essentialism and for a naturalist account of natural kinds. By looking at case studies drawn from diverse scientific disciplines, from fluid mechanics to virology and polymer science to psychiatry, the author argues that natural kinds are nodes in causal networks. On the basis of this account, he maintains that there can be natural kinds in the social sciences as well as the natural sciences.

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Classification in the Natural and Social Sciences

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For Diane,
one of a kind,
and Layla,
in a category by herself

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Preface

As an undergraduate majoring in physics in Beirut, Lebanon, I once came across a smartly illustrated volume by Philip Morrison and Phylis Morrison, entitled *Powers of Ten*. Intriguingly subtitled, "A Book About the Relative Size of Things in the Universe and the Effect of Adding Another Zero," it was a photographic journey through 42 orders of magnitude, from the scale that corresponds to the size of the observable universe (10^{25} m) to the scale of elementary particles (10^{-16} m). There was a familiar scene depicted somewhere in between these two extremes, on a scale of the order of 1 m, of a woman and a man picnicking in a park in downtown Chicago. The book zoomed out from the picnic to the city, continent, planet, solar system, galaxy, and beyond, and then zoomed in to the cells in the man's hand, to the molecules and atoms constituting them, and eventually to the quarks inside the protons and neutrons in the nuclei of the atoms. It was bracing to experience the universe as a series of logarithmic steps from the inconceivably large to the unimaginably small. This picture of the world, which is the one conveyed to us by modern science, suggests realms of existence arranged in levels, from smallest to largest. But these are not self-contained, compartmentalized levels like the floors in an apartment building, since there are intricate relations and interactions between the levels, or *domains*, as I shall call them later in this book. Additionally, the domains are not discretely arranged in a hierarchy. Much of the universe is a jumble of domains, some coexisting at the same spatiotemporal scale and within the same regions of space-time and others overlapping partially, or, to use a term that I have used elsewhere, "crosscutting" each other. Modern science has evolved an array of disciplines, subdisciplines, and interdisciplinary research programs to study this complex multiplicity, each with its toolkit of categories, generalizations, and methods. This book 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, to use the philosophical jargon, correspond to 'natural kinds'.

Many philosophers favor a picture, which may be as old as Aristotle, in which there is a relatively small set of privileged categories, and according to which each individual object in the universe belongs properly to one category, which conveys its essence. Essentialism, which may have a bad name in the culture at large, is alive and well in academic philosophy departments, though many of its proponents would deny that the philosophical doctrine corresponds to the set of popular ideas that bear the same name. Be that as it may, I will argue that the central claims of philosophical essentialism have either not been adequately justified or are at variance with what modern science tells us. Philosophical doctrines should not find themselves out of step with the scientific worldview – at least that is what a naturalist stance in philosophy would recommend. Some other philosophers, and many academics outside of philosophy departments, tend to think that the unfeasibility of essentialism is glaringly obvious. They may then go on to add that it is equally clear that all our categories, whether scientific or folk, are creative inventions, constructed by human beings to fulfill various practical and social purposes, but without any serious claim to drawing an accurate picture of the universe. To think otherwise is to be guilty of a kind of anthropocentric hubris. This social constructionist (or conventionalist) position is often pitted against the essentialist position in a dialogue of the deaf. What I aim to do in this book is to defend an alternative position that is neither essentialist nor social constructionist (or conventionalist). It is 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.

The pigeonholes into which we slot objects in the world are convenient devices that enable us to fulfill our explanatory needs and predict future contingencies, but insofar as they succeed in this regard, they do so precisely because they are attuned to regularities and patterns in the natural world (including the social world). I will argue that there is no conflict between the claim that our categories serve our purposes and the claim that these categories correspond to natural kinds, provided that they serve genuinely epistemic purposes. Our classification schemes and taxonomic practices enable us to focus on some features of reality while neglecting others in order to make sense of these patterns of constancy and change.

The title of this book is a bit perverse. Many readers might instead expect *Natural Kinds and Human Categories*. That is because *natural kinds*, the types or sorts that the natural world is divided into, are usually contrasted with *human categories*, which human beings concoct to serve their idiosyncratic interests. Kinds of natural objects are also sometimes

contrasted with the categories into which we divide ourselves and our conspecifics. So 'human categories' can refer either to those categories devised by humans or to the categories into which human beings are divided. But this book questions some of the assumptions inherent in these distinctions. First, as I have already suggested, I will argue that there is often a close connection between the kinds that are present in the world and the categories that we invent to understand the world, and second, I will defend the position that some of the types into which humans are divided can also be considered natural kinds.

In Chapter 1, I take on two philosophical theses about natural kinds that have prevailed in the philosophical literature during the past few decades: metaphysical Realism and essentialism. Metaphysical Realism holds that natural kinds are a type of universal; that is, that they are abstract entities over and above their members. This Realist (as opposed to Nominalist) position considers natural kinds to be more than just collections of particulars. Though this position may be justified by certain philosophical considerations, it is of limited use if our aim is to identify which kinds are natural. That is because it does not give us a way of distinguishing natural from nonnatural kinds. It simply says that the natural ones correspond, metaphysically speaking, to universals rather than sets of particulars. This view is often coupled with essentialism about natural kinds, which continues to be the dominant theory of natural kinds among contemporary analytic philosophers. Unlike metaphysical Realism, essentialism purports to put forward criteria for distinguishing natural from nonnatural kinds. On an essentialist view of natural kinds, each natural kind is associated with a set of properties that are necessary and sufficient for membership in the kind, modally necessary (i.e., pertain to the kind or to its members in every possible world), intrinsic, microphysical, and discoverable by science. But I argue that the essentialist view of natural kinds is difficult to maintain in the face of modern science and argue that each of these conditions except the last is either inadequately supported or out of step with our current knowledge of the natural world.

Chapter 2 introduces my own positive account of natural kinds, according to which natural kinds are epistemic kinds, which I develop by situating it in relation to the views of Locke, Mill, Quine, Dupré, and Boyd. I find something to agree with in the views of each of these philosophers, though I also take issue with each of them in some way. Natural kinds correspond to those categories that enable us to gain knowledge about reality. Since science is the enterprise dedicated to acquiring knowledge about the world, natural kinds are identified by the

various branches of science. Of course, we do not know which categories will remain part of our settled scientific account of the world, so any endorsement of the current categories of science is corrigible and subject to revision in light of future inquiry. This view is defended against the charge that it is too restrictive as well as the charge that it is too liberal. The charge that the account is too restrictive concerns the existence of natural kinds outside of scientific inquiry, corresponding to the folk categories of ordinary language, but I argue that many folk categories are not introduced to serve an epistemic purpose and should not therefore be taken to provide an accurate account of the kinds that exist in reality. As for the charge that the account is too liberal, it amounts to identifying certain further conditions that natural kinds must satisfy (i.e., in addition to being discoverable by science). Some of the most prominent of these conditions have already been examined and dismissed in Chapter 1 in the course of criticizing essentialism. In this chapter, I discuss other conditions, which are also found problematic: that natural kinds must be discrete or have sharp boundaries, that natural kinds cannot crosscut one another but must be arranged in a nonoverlapping hierarchy, and that each natural kind must be associated with a causal mechanism that maintains its associated properties in a state of equilibrium, i.e., "homeostatic property clusters" (Boyd 1989, 1991). While Boyd's account is too restrictive in that it posits a causal mechanism that keeps all the properties in the cluster in homeostasis, it does point to the importance of grounding the epistemic efficacy of natural kinds in causal relations. Building on recent philosophical work, I therefore propose a "simple causal theory" of natural kinds (Craver 2009). Hence, the epistemic conception of natural kinds leads naturally to a metaphysical account in terms of causality.

Chapter 3 defends the view that natural kinds can occur in the 'special sciences' just as much as in the basic sciences. There is a widespread assumption that the kinds of the special sciences are importantly different from those of the basic sciences. The former are often thought to be functional kinds, which are either just multiply realizable disjunctions of "lower-level" kinds or else reducible to them. Moreover, special-science kinds and properties are thought not to have causal efficacy since all the causal work must be done at a "lower level." It is also sometimes argued that there are no laws in the special sciences or, if there are, they are very different from the laws of the nonspecial sciences. I argue against each of these claims, while focusing on a particular natural kind from fluid mechanics, *Newtonian fluid*, and a closely associated property, *viscosity*. These arguments provide further support for the "simple causal theory" of

natural kinds introduced in Chapter 2. But that theory is challenged by the claim that natural kinds will be too numerous and ineffectual to be worth the name. I defend the account against this objection and provide further evidence for the idea that systems of natural kinds can crosscut one another because they pertain to different aspects of the natural world. This leads me to introduce the notion of a scientific *domain*, which I distinguish from the more widespread idea of "levels" of reality.

The claim that natural kinds are epistemic kinds implies that categories derived from the biological and social sciences can also be natural kinds. In defense of this claim, in Chapter 4, I critically examine several attempts to distinguish kinds in the natural sciences from those in the biological and social sciences. Some philosophers think that biological and social kinds cannot be natural kinds for the very reason that special-science kinds generally cannot. But others hold that they cannot for other reasons, the most prominent of which are explored in this chapter, and I argue in each case that they give us no grounds for thinking that biological and social kinds cannot be natural kinds. I consider the view that biological kinds are etiological kinds, individuated by causal history rather than causal powers. I also examine the distinction between "eternal kinds" and "copied kinds" (Millikan 1999), the latter being kinds whose members resemble each other not as a matter of natural law but as a result of a copying process. Then I counter the view that social kinds are conventional (Searle 1995); though the most conventional of kinds are not natural kinds, it is clear that many social kinds are not conventional, or not entirely so. Hacking (1999, 2002) claims that human kinds can be interactive whereas natural kinds cannot, but some natural kinds also come into existence as a result of human intervention and they can interact in various ways with our thoughts and actions. Finally, Griffiths (2004) holds that at least some social kinds are normative or evaluative in character, a feature that distinguishes them from kinds in the natural sciences. However, normativity is by no means a feature of all social kinds, and when it is, it can be detected. I conclude that categories in the biological and social sciences are not fundamentally different from those in the natural sciences and that biological and social kinds can be natural kinds as well.

Chapter 5 looks at several case studies drawn from a range of sciences in order to test the claims about natural kinds that I have made so far. In the spirit of philosophical naturalism, I examine a number of widely accepted and controversial kinds to ascertain whether they can be considered natural kinds. The case studies are drawn from basic physics and chemistry (*lithium*); chemistry, materials science, and polymer science (*polymer*);

biochemistry, physiology, and virology (*virus*); physiology, medicine, and oncology (*cancer* and *cancer cell*); and psychiatry and cognitive science (*attentiondeficit/ hyperactivity disorder* [ADHD]). These case studies enable me to corroborate and amplify some of the claims that I make in earlier chapters and also to further elaborate and illustrate these claims. Though in all cases, I conclude that the kinds examined are good candidates for natural kinds, I also encounter some kinds along the way that I argue are probably not natural kinds.

Finally, in Chapter 6, I attempt to show that this naturalist approach to natural kinds is compatible with realism about kinds. Though I do not engage in a full-blown defense of scientific realism (not to be confused with metaphysical Realism, discussed in Chapter 1), I give some reason for adopting a realist attitude towards natural kinds. In doing so, I further clarify the relationship between natural kinds and properties and the role of causality in the proper characterization of natural kinds. In defending a realist account of natural kinds, I counter the charge that natural kinds are determined by our interests or perspective on the world. Though my account of natural kinds is pluralist and does not set an upper limit on the number of natural kinds that may exist, it holds that these kinds really exist in the world. It is common for philosophers to express realism about kinds in terms of the claim that kinds are human- or mind-independent, but I reject this way of grounding realism since it threatens to rule out all psychological and social kinds. More importantly, to be real, a kind need not be independent of human beings or their minds; it must simply be manifested in the world (a world that includes the human mind). The surest way to ensure that our categories identify real kinds is to pursue a scientific method that serves epistemic purposes. Finally, I relate this discussion to the "social constructionist" position about categories or kinds; though some versions of the social constructionist thesis are compatible with my naturalist position, other social constructionist claims are either trivial or false.

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This book has taken me a few years to write but I have spent many more years thinking about some of the questions that I address in these pages. A number of people have helped me think through these issues, often setting me straight on certain points, indicating the deficiencies of my arguments, or revealing certain lines of argument that had not occurred to me. It is difficult to recall all the conversations that I have had over this period and I am sure I am forgetting to credit some of them, but I would like especially to acknowledge the help and encouragement of Ian

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