

# **Revitalizing Causality**

Realism about causality in philosophy  
and social science

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## 9 Inessential Aristotle

### Powers without essences

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A groundswell of recent work in philosophy has sought to revitalize the analysis of causation by appealing to “active principles” such as powers, dispositions, capacities, tendencies, and propensities. These principles are described in a realist and rather Aristotelian fashion, in stark contrast to the deflationary and linguistic accounts of such principles characteristic of Humean thought and empiricist thinking more generally. Natures, essences, powers, and *de re* necessity are back in the analysis of causation. I do not argue in this chapter for the plausibility of the revitalization project in general; instead, I explain how I think one aspect of it must be understood if the project is to be plausible. I suggest that those who are moved to resist Humean austerity and embrace a realism about things such as causal powers should take care in how they formulate this realism. Some Aristotelian notions, such as the concept of a causal power, may well be useful to modern studies of causation. Others, such as the notion that causal powers are determined by essences which comprise the natures of things, are outmoded in many sciences today. This chapter focuses specifically on the notions of power and essence in the context of causation. Contra some of the most important recent proponents of the revitalization project, I contend that causal generalizations are not generally best understood as determined by the essential properties of natural kinds. How a member of a kind (natural or otherwise) behaves causally may be a function of its causal powers, but such powers need not constitute anything like the “essence” of a kind.

- 1 Revitalizing causation with dispositional essences.
- 2 Causal behaviour in kinds without essences.
- 3 Causal powers and inessential distributions.

#### Revitalizing causation with dispositional essences

After a renaissance in Aristotelian thought during the second to sixth centuries CE, and again after the twelfth to sixteenth centuries, declines in Aristotelianism were prompted in large measure, arguably, by overly conservative attempts to preserve it. It is doubtful, however, that it was *ever* reasonable to view the

extraordinarily broad-ranging conception of the natural world typically associated with Aristotle as wholly internally consistent. Recent work in philosophy has appealed to distinctly Aristotelian-sounding concepts in order to make sense of the nature of causation in the context of the sciences. I believe this programme to be very promising, but I am also wary of invoking past ideas in an overly conservative manner. Some aspects of the Aristotelian worldview yield great explanatory resources with which to interpret scientific knowledge, but others are best consigned to the past. There comes a time to remove the baby from the bathwater. In this chapter I hope to do precisely this in connection with recent work on the nature of causation.

The Aristotelian world is replete with substances, forms, essences, natures, causal powers, natural kinds, *de re* necessity, and teleology. With the possible exception of teleological explanation, all of these elements are present to some degree in recent philosophical work concerning realist interpretations of scientific knowledge. My interest here, however, will be rather more specific. As part of this programme of invoking Aristotelian concepts in the context of the sciences, many authors have appealed to a realism about “active principles” or causal powers, variously described as dispositions, capacities, tendencies, and propensities. It is largely the rejection of such a realism that constitutes the heart of many empiricist critiques of metaphysical speculation, including Hume’s. Several influential authors have recently situated their realism in an Aristotelian-sounding framework of natural kinds and essences, and it is this putative connection between causal powers and essences that will be my central concern here. I will argue that realists about powers are not generally well served by thinking that they constitute the essences of natural kinds. Consequently, causal generalizations about kinds of things are often not best understood as determined by essential properties. One may well account for causal behaviour in terms of causal powers, but, as we shall see, powers need not constitute anything resembling essences.

To be fair to those whose views I will dispute, it is important to acknowledge that they do not believe in essences as perhaps the common Aristotelian caricature describes them. According to this view, an essence is a unitary, fundamental feature of a thing that explains all of the other properties generally associated with things of that kind; it is the one feature that makes the thing the kind of thing that it is. (The requirement of a *unitary* essence may break down in Aristotle’s biology, where it is arguable that the essences of biological taxa consist in more than one fundamental feature.) Furthermore, an essence is here associated with the *telos* of the relevant kind: the natural goal, aim or function of its members; having a particular essence facilitates its proper functioning. Neither the idea that essences are unitary nor the emphasis on teleology appear to be important to the authors I have in mind. The notion of an essence which either comprises or otherwise confers the causal powers characteristic of a kind, however, is crucial.

Consider Roy Bhaskar (1975), for example: “The ascription of powers ... presupposes a non-conventional distinction between those properties of the thing which are essential to it and those which are not” (p. 88); “The real essences of things are their intrinsic structures, atomic constitutions and so on which

constitute the real basis of their natural tendencies and causal powers" (p. 174); "The importance of taxa in science may be expressed by saying what is non-accidentally true of a thing is true of a thing in virtue of its essential nature" (p. 212). Bhaskar here identifies kind essences with underlying properties, often called "categorical bases", of the causal powers of things. Along the same current but on a slightly different tack, consider the view of Brian Ellis (1999, p. 22), who dispenses with talk of categorical bases and identifies essences with causal powers even more directly<sup>1</sup>:

... the laws of action and interaction [laws describing causal processes] concerning natural kinds of things depend entirely upon the causal powers, capacities and propensities that these sorts of things have essentially. That is ... the properties and structures which constitute the real essences of a kind determine its laws of action and interaction.

Or again, in Ellis (2001, p. 1): "[causal] laws of nature depend on the essential properties of the things on which they are said to operate, and are therefore not independent of them". Despite the differences in formulation, authors such as Bhaskar and Ellis are united in opposing the Humean view according to which laws are "imposed" on otherwise passive, causally indifferent objects. This sort of empiricist understanding was commonly asserted in opposition to Aristotelianism, for example, by seventeenth-century natural philosophers, who held that the corpuscles out of which matter is composed are intrinsically inert, their behaviour being described and somehow determined from without by Boyle's and Newton's laws.

Before attempting to problematize the putative connection between causation and essences just described, let me clarify two matters of terminology. The first concerns the terms used to label what I earlier generically described as "active principles". "Causal power", "disposition", "capacity" and so on are terms of art; some authors use them synonymously and others make careful distinctions. I will use these terms synonymously, to refer to properties of things in virtue of which they behave in particular ways in particular circumstances. The second issue of terminology concerns the use of the term "causal law", as in the quotations above in which Ellis draws a link between causal powers and causal laws. Whether there are such things as laws let alone causal ones, and whether laws are relevant to all sciences, are matters of controversy. There are lively debates, for example, on the questions of whether there are laws in biology or the social sciences. I will use the term "causal law" in a relatively weak sense here, however, which I think renders it innocuous in application to almost all scientific disciplines. By "law" I mean any generalization about classes of things that functions effectively in scientific prediction or explanation, and by "causal law" I mean any law that can be used to give predictions or explanations regarding causal phenomena. This includes generalizations about mathematical relations between magnitudes of properties, such as that described by the ideal gas law,  $PV = nRT$ , relating magnitudes of pressure, volume, and temperature of gases. It also includes generalizations about

how classes of things behave in causal processes, such as "all planets in solar systems move in approximately elliptical orbits".

Given that my present concern is the putative connection between the causal behaviours of things and the essences of members of their respective kinds, the latter sort of generalization will take centre stage in much of the discussion to follow. Relations involving quantitative properties, however, are also very important in this context. Behaviours such as orbitings of suns by planets are often indicative of causal processes, and causal processes generally involve relations of various quantitative properties. Behavioural generalizations usually do not mention the underlying relations of properties that yield the regularities they describe, but such relations are generally there nonetheless. I will not subject this claim to scrutiny here, however. Instead, let us proceed to confront the matter of essences. In the next section I argue that essences are really beside the point of describing causation in terms of powers. Scientific practices such as prediction and explanation regarding causal phenomena are concerned not merely with kinds having essences, but also with kinds lacking them. If one's account of the connection between classes of things and these epistemic practices is premised on the idea that the members of such classes have essences, it is unclear what connection there can be where essences are lacking. The solution to this difficulty, I will suggest, is to think of causal laws in terms of powers that may or may not be possessed essentially. Causal laws that describe the behaviours of members of kinds are useful, to the extent that they are, because of the ways in which powers are distributed within classes of things, whether "essentially" or inessentially.

### Causal behaviour in kinds without essences

Let me define the concept of an essence more precisely. In the neo-Aristotelian sense in which most people understand the concept today, a kind essence is a set of intrinsic properties that are individually necessary and jointly sufficient for the membership of something in a class of things, or "kind". If a thing lacks any of these properties it is not a member of the relevant kind, and if it is not a member it lacks some one or more of the properties constituting the relevant essence. Armed with this definition, let me now make an observation about the kinds of objects described by contemporary sciences. The idea that scientific classes are ontologically distinguished by essences has a storied past, but many of the kinds we theorize about and experiment on today simply do not have essences. Indeed, many of these classes are groups whose members may have *no* distinguishing properties in common, let alone sets of properties that are necessary and jointly sufficient for membership. I will refer to kinds of things that appear to have essences and those that appear to lack them as *essence* kinds and *cluster* kinds respectively. The most familiar examples of essence kinds today come from physics and chemistry. The kind essence of an electron, for example, consists in a handful of determinate, state-independent properties – specific values of mass, charge, and spin – that are characteristic of all and only members of this kind. But many scientific classes do not fit this model.

The most common examples of cluster kinds today have come from attempts to give precision to the species concept in biological taxonomy. In this area it is generally agreed that the search for essences has failed. Despite their recent popularization by philosophers such as Saul Kripke and Hilary Putnam, intrinsic properties such as morphological and genetic features do not constitute species essences, because significant intra-species variation and overlap with other species generally entail that no one set of properties will distinguish all and only the members of a given species. Reproductive isolation is another frequently cited proposal for species essences. Let us suppose that one can analyze this sort of isolation in terms of sets of intrinsic properties shared by certain individuals that unite them reproductively and isolate them from others. This proposal also fails to specify essences, for several reasons: hybridization violates the requirement of reproductive isolation (and hybrid offspring are sometimes fertile, thus compounding the problem); some sub-populations within species mate successfully with others but not all; such reproductive criteria are irrelevant to asexual species. Furthermore these scientific facts jibe well, I think, with common sense. It is hard to imagine that morphological properties or reproductive features could be necessary conditions for species membership. After all, a sterile tiger with only three legs is still a tiger, and so is an albino, though lacking those famous, fearfully symmetrical stripes.<sup>2</sup>

Given that at least some things commonly regarded as kinds do not appear to have kind essences, many have chosen to relax the essence criterion in the demarcation of various, scientifically-sanctioned classes of things. Membership in kinds is generally described in these cases more loosely by means of suggestive metaphors: clusters, family resemblance, even "strands in a rope" (Hacking (1991, p. 115)). These are polythetic classes. The possession of a clustered subset of some set of properties, no one of which is necessary but which together are sufficiently many, entails membership. Now, consider the fact that the sciences that take such kinds as their subject matter are demonstrably interested in causal processes involving them. Animal behaviourists and ecologists trade in the causes and effects of the actions of organisms. Anatomists, physiologists, and cell biologists study causal processes involving organisms, organ systems, organs, and tissues. Immunologists spend their days worrying about kinds of proteins, which may be cluster kinds. Classes of things lacking essences, it seems, engage in causal processes and are described by causal generalizations.

What then of the idea that causal laws are somehow related to the essences of the kinds they describe? It seems to me that those who wish to connect causal powers and laws to essences now face a difficult task, prompted by the fact that scientific disciplines routinely theorize about and experiment on kinds without essences. Such a person may insist that only essence kinds are in some sense "genuine" kinds, but then they owe us an account of how cluster kinds are to be reasonably dismissed or otherwise explained away, despite the fact that the sciences appear to be interested in causal processes involving them. I believe there are at least two routes open to this person, but neither is compelling. Let us consider them in turn.

Wilkerson (1995, p. 132) and Ellis (2001, p. 21) take one route when they suggest that, in apparent cases of cluster kinds, essence kinds are generally lurking in the neighbourhood. For example, populations often regarded as biological species are not kinds *per se*, but rather groups of closely related kinds whose essences are composed of genetic constitutions. *Homo sapiens* are not all members of the same kind because different human beings have different genetic constitutions, but different human beings nonetheless have closely related genomes. Let me generalize this argumentative strategy: in the case of a cluster kind, simply refine the search for essences until acceptable candidates emerge, and explain the efficacy of causal generalizations regarding the cluster in terms of degrees of similarity between its members. In the case of biological taxa this search for essences is concluded in the genomes of individuals. This manoeuvre is no help, however. The possibility of formulating causal generalizations in such cases is not a function of the essence of the kind described (since *ex hypothesi* there is none), but rather a function of some high degree of similarity between the properties of vast numbers of kinds composed of individuals (or identical twins, clones, etc.) with unique genetic constitutions. Laws about causal behaviour are useful for prediction and explanation in such cases because of these similarity relations, *not* because of anything resembling an essence of the class of things these laws describe.

A second potential essentialist strategy for explaining cluster kinds away is to invoke the possibility of reductionism. One might think of certain basic essence kinds as the building blocks out of which cluster kinds are made, and then argue that causal generalizations concerning the behaviours of cluster kinds are reducible to causal generalizations concerning different combinations of their more basic essence kind constituents. One might thus contend that the challenge presented by the fact that some sciences appear to theorize about and experiment on classes of things lacking essences can be met. Again, however, I believe this response is misleading. The idea that causal generalizations about essence kind constituents might explain why causal generalizations about members of cluster kinds hold, to the extent that they do, suffers from the same sort of difficulty as the attempt to refine the search for essences just considered. The fact that members of some cluster kinds are subjects of causal generalizations reflects the degree to which they share causally efficacious properties, not the fact that they may be composed of essence kinds *per se*.

Let me spell this out in more detail. Different flavours of reductionism are debated in different philosophical contexts, but for present purposes it will suffice to consider a simple distinction between ontological and explanatory reduction. The sort of reductionism one might invoke so as to explain away cluster kinds is ontological in the first instance. Members of cluster kinds, it is said, are ontologically composed of arrangements of essence kinds parts. It is the next move that is crucial, however. Given ontological reduction, one might then suggest that the behaviours of clustered wholes are in principle explainable in terms of their essence kind parts. If this were the case it would be possible, in principle, to explain the behaviours of things like members of biological taxa in terms of the behaviours of the essence kinds out of which they are composed.

As it happens, the explanatory implications of ontological reduction are widely disputed. Some hold that properties of constituent parts are explanatorily complete in the sense that causal interactions of wholes can be explained in terms of the causal powers of their constituents, but others maintain that wholes are in some cases greater than the sums of their parts, and that organized systems have emergent properties that are not mere combinations of the properties of their constituents.<sup>3</sup> If the latter parties to this debate are correct about emergent, causally efficacious properties, then the causal behaviours of things are not in general explainable in terms of causal laws regarding more basic essence kind parts, even in principle.

I do not intend, though, to dwell on debates about the possibility of emergent properties here, for even if reductionists are right to deny this possibility, the idea that causal generalizations pertaining to cluster kinds are explanatorily reducible to causal generalizations pertaining to more basic essence kinds is still a non-starter. Let us grant for the sake of argument that in general, the behaviours of *individual* members of cluster kinds are explanatorily reducible to their essence kind constituents. Would this entail that causal generalizations about cluster kinds are likewise amenable to reduction, in principle if not in practice? It would not. For even assuming that token iguanas are exhaustively composed of some basic essence kinds, and that the causal powers of token iguanas can be explained in terms of the causal powers of these components, this would not by itself explain why causal generalizations about the kind iguana obtain, to the extent that they do. Explanatory reductionism concerning token things is incapable of yielding an explanation of why classes of things lacking essences admit of causal generalizations. The fact that the *kind* iguana is a cluster kind entails that its members may be composed of different essence kinds. Thus, the degree to which we may formulate causal generalizations about iguanas depends on the degree to which the members of this population have the same or similar causally efficacious properties, not anything having to do with properties possessed essentially. Explanatory reduction is no help to the essentialist.

Earlier I suggested that causal generalizations concerning scientific classes of things lacking essences present a serious challenge to those hoping to connect causal powers and laws to essences. Neither of the two strategies I have considered for meeting this challenge – refining the search for essences in cases of clusters, and reducing members of cluster kinds to essence kind components – is capable of dispelling this challenge. It is time to try something different. Essences were ineluctable for Aristotle, but they are not so for us. In the next and last section I propose an understanding of causal powers and causal generalizations that is applicable to the wide diversity of classes of things embraced by the sciences today, including both kinds with “essences”, and those lacking them.

### **Causal powers and inessential distributions**

If one were only ever concerned to formulate causal generalizations about classes of objects that can be identified with sets of properties, each of which is necessary

for class membership, it might seem a simple matter to explain why these generalizations are true, or at least true enough to be useful. For in such a case, assuming that at least some of the properties composing the essence of the relevant kind are (or ground, or confer, as categorical bases) causal powers, all members of the kind will have these powers. Here the fact that membership requires the instantiation of a specific set of properties underwrites the causal behaviours described, and thus it is no surprise that in such cases, one might be tempted to say that causal laws are determined by essences. But in the case of cluster kinds there is no recourse to essences, so how is one to analyze the causal generalizations one formulates about them?

Let me begin to answer this question by setting the notion of essences to one side, and asking whether there is anything else here that might play the metaphysical role of underwriting causal generalizations. One might begin this investigation by considering first the classes I have called essence kinds. What explains the causal behaviours of their members? Well, to take physics as an example, our theories describe properties such as mass, charge, and spin, in virtue of which very small constituents of matter are thought to interact. The ambiguous phrase “in virtue of” here opens up the possibility of different interpretations of this claim, one of which has the distinctly Aristotelian flavour of the revitalization project: these properties confer causal powers on the things that have them. It is because subatomic particles have the properties and thus the powers that they do, that causal generalizations about them, where true, hold. So far so good, but now consider this: the same can be said about iguanas. Causal laws are determined by the causal powers of things regardless of whether they belong to essence kinds or cluster kinds. The attempt to ground causal laws in the essences of kinds is a red herring, for what explains why causal behaviours obtain is not the fact that some things are said to have essences – at least not in the first instance. Causal behaviours occur not merely as a consequence of the possession of essential properties by members of kinds with essences, but as a consequence of the possession of *any* causally efficacious property – a power or property that grounds or confers a power – by *any* sort of thing.

It should thus be clear that the question of whether a causally efficacious property is possessed essentially by a member of a kind is irrelevant to the causal behaviours of which it is capable as a consequence of having that property. Powers explain behaviours regardless of whether they are necessary for membership in a particular class of thing. With this understood, let me now propose a simple understanding of causal generalizations that is applicable to both essence kinds and cluster kinds. To introduce a metaphor of my own, it is a striking fact about things in the world that causally efficacious properties are systematically “sociable” in various ways. They seem to “like” each other’s company. The highest degree of sociability is present in what I have called essence kinds, where particular sets of properties are always found together. In other circumstances, however, sociability is a looser affair, and in these cases we find cluster kinds. In all cases, it is the fact that there are shared, causally efficacious properties that underwrites the causal generalizations to which classes lend themselves. Kind essences are one kind of sociability giving rise to causal laws but, so to speak, they are not essential.

Sociability is just a metaphor, of course. It is intended to describe the metaphysical fact that wherever we recognize classes of things, whether within or outwith scientific contexts, property instances tend to cluster together. In the upper limit of sociability, the properties that compose the sets definitive of kinds are always present together, and we describe them as necessary and jointly sufficient for membership. In other words, we call them "essences". The metaphor of sociability is amenable to analysis on a case by case basis, but I doubt that any one analysis will apply to all classes of things. Richard Boyd (1999), for example, analyzes this phenomenon as arising in some circumstances from what he calls "homeostatic clustering". Homeostasis is understood here in terms of causal mechanisms that produce clusters of properties occurring together. These mechanisms may consist in causal relations between properties in a cluster that favour their co-instantiation, or underlying processes that favour co-instantiation, or both. This is an attractive idea, but it seems clear that sociability will not be analyzable in this way in many cases. Homeostatic mechanisms are not responsible for the co-instantiation of the mass, charge, and spin of an electron, for instance. Here, so far as we can tell, sociability is a brute fact admitting of no causal decomposition. The presence of homeostatic mechanisms is a special case of sociability, not an exhaustive account.

The preceding discussion suggests that the emphasis placed on essences by important proponents of the causal revitalization project is misplaced. In some cases it may well be that the causal powers typically manifested by the members of a class consist in (or are grounded in or conferred by) what we regard as their essential properties. In other cases, however, the causal powers typically manifested by the members of a class will have nothing to do with their essential properties, because there is simply no essence to be had. The important focal points of attention here are causally efficacious properties and their patterns of distribution within populations of interest, not whether they are possessed essentially. Causal laws often do not make reference to kinds of objects at all, but rather summarize relations between quantitative, causally efficacious properties of objects. Whether the kinds whose members have these properties are essence kinds or cluster kinds is another matter entirely. Dispositions for causal behaviour are present wherever such properties are found, and to the extent that they are found in members of the same kind, behaviours are subject to causal generalization. Members of classes that share such properties, whether strictly in the case of essence kinds, or loosely in the case of cluster kinds, can be expected to behave in similar ways in similar circumstances. How useful a causal generalization may be is purely a function of the strictness or looseness of the kind at issue, and the purpose or end to which the generalization is applied.

One of the most important features of the idea that causal powers are often inessentially distributed is that it respects the epistemic status of causal generalizations in the sciences. There are cases in which generalizations are strict, perhaps most likely in sciences whose subject matters are sufficiently fundamental or uncomplicated. In many cases, however, causal generalizations are susceptible to exceptions and *ceteris paribus* qualifications. Here the number

of exceptions will vary according to the extent to which members of kinds figuring in the relevant generalizations share the same causally efficacious properties. The study of sociable properties and their relations distinguishes strict generalizations from weaker but nonetheless helpful ones, and the fact that one must often take causal generalizations about kinds as helpful rather than absolute guides is common not only in the social sciences, but also in the natural sciences. It is obvious why this is so in the case of cluster kinds, since their members need not possess any one of the properties associated with the set defining them. But even members of essence kinds can behave differently in exactly similar circumstances. Since the other, inessential properties of members of essence kinds may be causally efficacious as well, most causal laws concerning even these classes hold at best *ceteris paribus*. Consider a canonical example of essence kinds: atoms of particular elements. All atoms of a given element share an atomic number as their essence, but different ions (having different electric charge) and different isotopes (having different numbers of neutrons) of one and the same kind of atom may behave in very different ways in exactly similar conditions.

I began this chapter with the goal of considering whether a powers-based approach to understanding causation is properly associated with the concept of essences. Some who are keen to revitalize the analysis of causation in contemporary philosophy by appealing to certain Aristotelian-sounding notions take the concepts of power and essence to be appropriately and intimately connected, but I believe this is a mistake. It is misleading to say that causal generalizations are determined by the essential properties of classes of things. Some classes have what may be regarded as essences and others do not, but almost all admit of causal generalization to some extent. The behaviours of members of kinds may be a function of their causal powers, but only sometimes do powers constitute "essences". Indeed, the behaviour of any given thing is determined by its causally efficacious properties (together with others in its environment) whether these properties are essential or not. Upon careful investigation, scientific taxonomies yield many useful generalizations, including causal ones. These generalizations are useful insofar as they systematically describe sociable distributions of properties among the members of the taxa they concern. Thinking of these properties dispositionally, as powers, is a rich and fascinating non-Humean approach to the metaphysics of the sciences. But inspiration from past heroes will serve this project best when we discern the parts of their views that are inessential.

#### Notes

- 1 Ellis & Lierse (1994) give sustained arguments for the thesis that dispositions (powers) do not require categorical bases.
- 2 The most widely used species concept in contemporary evolutionary biology is the phylogenetic concept, which identifies species with historical lineages bounded by speciation and extinction events, over which time the intrinsic properties of organisms belonging to a species may change significantly.

3 See Beckermann *et al.* (eds) (1992) for discussions of emergence. See also Mellor and Crane (1991/1990, p. 87) for examples from physics that resist explanatory reduction; indeed, the authors note that physics is sometimes *macroreductive*.

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