

Dispositional Properties, Acceleration, and Physical Forces (Description for the general public)

Apart from properties which appear to be full-blown, the world of our experience is replete with features which contain a measure of potentiality. A *cubic* lump of sugar, for example, is also *capable* of dissolving in water. Perhaps more intriguingly, many, if not all, microphysical properties appear to be of this kind. Thus, the electric charge of a particle seems to consist in its ability to attract and repel other charged particles. Properties of this kind are called dispositions.

The research I would conduct as an Opus fellow would attempt to buttress and expand the account of the basic traits of dispositional properties which I have proposed in a series of articles published in leading international philosophy journals. The account is a strongly causal version of the conditional approach to dispositions: at its heart lies the thesis that a dispositional property is characterized by a (potential) causal relation to a distinctive event known as its *manifestation*. More precisely, the idea is that the nature of a disposition is constituted by a (potential) causal relation involving the disposition (usually along with some circumstances called its *activating conditions*) and its manifestation. (Since the activating conditions are often absent, the relation is then described by specifying what *would* happen *if* they occurred, which is to say that its description is conditional in form.) Thus, at the first approximation, the account says that an object is soluble in water just in case it has a property such that if the object were put in water, then the property, along with having been put in water, would cause its dissolution (where having been put in water would be the activating condition and the dissolution would be the manifestation). The second major plank of the account is the contention that masks, that is, the most intractable of the interfering factors which threaten the conditional approach to dispositional properties, can be successfully specified, at least in the case of physical dispositions.

The most recent work on dispositions has yielded some ideas which may either be regarded as objections to the account just sketched or are at least *prima facie* inconsistent with it. It has, for example, been argued that some dispositional properties are noncausal, or that they lack a potential causal relation to their manifestations. Thus, a flower is said to be disposed to close when rain is in the near future, but the rain would not be a cause of the closing. Accordingly, the initial part of my research would amount to an examination of the recent claims which threaten to undermine my account.

Given the prominent role which the ideas about dispositional properties play in a number of important philosophical debates, the account in question will have ramifications for these debates. I have already applied some of the ideas of the account to the issue of the strictness (or exceptionlessness) of the fundamental laws of physics. I would like to supplement this discussion by an examination of the issues of acceleration and physical forces.

It is beyond dispute that forces are commonly invoked in physics. Coulomb's law of electrostatic interaction, for instance, is usually glossed as asserting that two charged bodies give rise to forces between them which are directly proportional to the product of the bodies' charges and inversely proportional to the square of their distance. Philosophers, however, have approached the question of the reality of forces more cautiously: some of them denied their existence while others harboured sufficient doubts about the existence to consider it to be in need of a proof. I think that there is a good prospect that my account of dispositional properties (especially its smooth accommodation of dispositions lacking activating conditions) may be employed to show how the work supposedly performed by forces is in fact done by other entities.

Given that dispositional properties seem to pervade the world, a comprehensive theory of them would be precious. Unfortunately, such a theory has proved very difficult to arrive at: the question of whether dispositions themselves (rather than some closely associated distinct properties, such as the molecular structure of an object soluble in water) participate in bringing about their manifestations is especially recalcitrant. Consequently, the focus of my work is a less ambitious account which is not intended to provide answers to all the pressing questions about dispositions. I hope that in virtue of describing their basic traits it may succeed in casting some light on these important constituents of reality and on many phenomena in which they play a significant role.