

Primary and secondary qualities

THE DISTINCTION

The distinction between ‘primary qualities’ and ‘secondary qualities’ was developed during the rise of modern science. In the first instance, we can think of this as a distinction between properties that science says objects have – size, shape, motion; and properties that depend upon particular ways of perceiving objects. Colour, by definition, is something that is experienced in vision. The work that scientists such as Newton, Descartes, and Galileo did on light laid the foundations for our modern theory of colour as wavelengths of the electromagnetic field we experience as light. Science, therefore, was beginning to develop an explanation for colour. And likewise, it has developed theories of sound, smell, taste and other secondary properties. But these theories – that colour is frequency of electromagnetic radiation, that smell and taste are chemical compounds – suggest that the world as we experience it through our senses and the world as science describes it are quite different. We experience all the wonderful properties of the senses; the world ‘as it is in itself’, as described by science, is ‘particles in motion’ and empty space.

The distinction is most famously associated with John Locke’s *An Essay concerning Human Understanding*. For Locke, primary qualities are those properties of an object that are not related by definition to perceivers. The primary qualities are size, shape, motion, number, and solidity. We might say that the object has these properties ‘in and of itself’. Primary qualities, Locke says, are ‘inseparable’ from a physical object, whatever changes it goes through. For example, physical objects always have some shape and size. These properties don’t depend, either conceptually or for their existence, on whether and how the object is perceived.

By contrast, secondary qualities are related to perceivers by definition. As we saw, colour, by definition, is something that is experienced in vision. So it is a property that an object can have only in relation to its being seen by someone. The other secondary qualities are temperature, smell, taste, and sound. Secondary qualities aren’t possessed by all physical objects, e.g. plain glass doesn’t have a colour or a smell. And they aren’t even possessed by the same physical object at different times, e.g. glass is made from sand, and sand does have colour. So sand loses its colour completely when it is made into glass.

ARE SECONDARY QUALITIES ‘SUBJECTIVE’?

Do secondary properties exist ‘in the object’ or ‘in the mind’ of the perceiver? Hume thought that modern science and philosophy had shown that secondary qualities exist only in the mind. Objects aren’t coloured; instead, we could say, their parts have certain properties of size and motion and so on, causing them to emit or reflect wavelengths of light (which is a type of vibration, not itself a colour). It is not until we turn to human experience – something mental – that we need the concept of colour, that we come across ‘colour experience’.

In his discussion of primary and secondary qualities, Locke claims that the 'ideas' (the sense impressions) of primary qualities – our sense-data of shape, size, motion and so on – 'resemble' the primary qualities that the object we are perceiving has. However, the sense impressions of secondary qualities – our sense-data of colour, smell and so on – don't resemble the object at all. The experience of seeing red, for example, just isn't like detecting a vibration – yet it is.

Does this show that secondary qualities exist in the mind? Locke's 'official' theory is that secondary qualities are *properties of the object* that are related to its being perceived by us. Secondary qualities

are nothing in the objects themselves but powers to produce various sensations in us.

Here Locke identifies the secondary quality with the power of the object. He goes on to argue that this power should be understood in terms of primary properties of the object's 'most minute parts', or as we would now put it, in terms of its atomic and molecular structure. As we suggested, secondary qualities can be causally explained in terms of primary properties.

We can use this definition to resist Hume's view that colours only exist in experience. The argument confuses the relation between secondary qualities and experience: secondary qualities are powers in the physical object to produce certain experiences in us. To be brown is to look brown to normal perceivers under normal conditions. So secondary qualities are no less real, no less part of the external world, than primary qualities; it is just that they are a different type of property, one defined in terms of how we perceive the world.

We could reply that physical objects aren't 'really' coloured or don't 'really' have a smell, because physical objects are made of molecules without colour or smell. But this misinterprets what it means to say that something is coloured or smells. To say that the table is brown is not to say that it must be composed of microscopic particles which are also brown. It is to say that the table looks brown to normal observers under normal conditions. The sub-atomic particles that make up a table don't have to be brown for the table to be brown! [

Take another example: solidity. Science tells us that solid objects are, in fact, mostly empty space; the distances between atoms are huge compared to the size of the sub-atomic particles themselves. Does this mean that a table, because it is mostly empty space, is not solid? Of course not; atoms forming this rigid pattern, even with a great deal of empty space, comprise a solid. This is what the word 'solid' means.

PERCEPTUAL VARIATION

But some philosophers, following an argument in Plato's *Theaetetus*, have argued that there is another contrast we can draw between primary and secondary qualities, which supports the view that secondary qualities exist in the mind. Plato argues that 'heat' isn't a real property of an object, since what is hot to one person is not. By contrast, we might think that 'being two feet long' is a property of an object, since this doesn't vary from one person to another. Locke also gives this argument, undermining his own 'official' theory.

Likewise, some philosophers, including Bishop Berkeley in his *Principles of Knowledge*, claim that secondary qualities vary from person to person. For example, the sea may look blue to me and green to you; an apple might taste sweet to me and sour to you. But the sea can't be both blue and green; an apple can't be both sweet and sour. So we shouldn't say that secondary qualities are properties of the object. What shade of colour is it – how you see it or how I see it?? Secondary qualities, they conclude, only exist in the mind of the perceiver, whereas primary qualities exist independently of the perceiver. Primary qualities are objective, but secondary qualities are subjective. It must be, then, that we don't perceive the object directly, that some of the properties we perceive are actually properties of the sensations that occur in each of our minds.

We could insist that whether the sea is blue or green depends on whether it looks blue or green to normal perceivers under normal conditions. But in this example, it is hard, perhaps impossible, to say who and what conditions will count as 'normal'. And in the case of the apple, taste in general seems to differ from one person to another. Direct realists could say that the taste is still a power in the object to create experiences, but that this power creates different experiences in each of us. So the apple is sweet-to-me and sour-to-you; the apple really is both of these – so we both perceive the apple when we taste it, not sense-data.