

# *Locke on Primary and Secondary Qualities*

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## 1 Ideas and Powers

For Locke, an idea is ‘the immediate object of perception, thought, or understanding’ (§8).<sup>1</sup> Perhaps this is something like a concept: he goes on to give examples of **white**, **cold**, and **round**, which look like they have some representational content.

What do these ideas represent? Locke defines a *quality*: ‘the power to produce any idea in our mind, I call quality of the subject wherein that power is’ (§8). The natural thought is that these ideas represent some quality of the object, which quality just *is* the power that the object has to produce that idea in us. Though the idea is in us, the power or quality is clearly in the object. Sometimes, it is true, we speak loosely and refer to the quality of the object by the same name that we use to refer to the idea in us, and talk of **white** being in the object, for example. Locke cautions that when we speak like this, we should ‘be understood to mean those qualities in the objects which produce them [the ideas] in us’ (§8).

## 2 Primary Qualities

Locke goes on to distinguish two kinds of qualities: *original* or *primary* qualities, and *secondary* qualities (§§9–10).

Primary qualities are ‘utterly inseparable from the body’. Indeed, this seems to be given a particularly mechanistic reading: Locke proposes a particular method of separating qualities from a body, by *division*, and suggests that primary qualities are those that a body could possess after arbitrary divisions. Our senses find primary qualities ‘in every particle of matter which has bulk enough to be

<sup>1</sup>‘§x’ refers to section x of Book II, chapter 8 of Locke (1706). You may wish to look at the nice *translations* of Locke (and others) into contemporary English that Jonathan Bennett is currently producing; the relevant chapter of Locke is at

<http://www.earlymoderntexts.com/pdfbits/lo21.pdf>

perceived' (§9), no matter what its size or alteration from the original body it was once part of. Indeed, when we carry out the thought experiment of continuing the division into particles that are too small to be sensed, the primary qualities are those that 'the mind finds inseparable from every particle of matter, though less than to make itself singly be perceived by our senses' (§9).

Locke gives several examples of qualities that he takes to satisfy this definition: **solidity**, **extension**, **figure**, **mobility** (later on in §9, 'motion or rest'), and **number**. It is not the case, of course, that Locke thinks that the particular **figure** of a grain of wheat is preserved after division—just that, after the division, each part has some **figure** or other.

Locke's example of **number** is particularly interesting. He says that division creates a lot of separate masses out of something which was a single mass before, 'all which distinct masses, reckoned as so many distinct bodies, after division make a certain number' (§9). It is not clear whether by this Locke means (i) the *original* body had a certain number, corresponding in some way to the number of insensible particles that it comes to be divided into; or (ii) the number of the original body was one, as it was a single body, and now we have a certain number of insensible bodies, and the original body is no more; or (iii) the aggregate of particles that the original body can be divided into has a certain number, which is neither the number of any of the distinct bodies, nor of the original body. (ii) seems more independently plausible, However, Locke's insistence that **number** is a primary quality of a body can only be interpreted non-trivially on understanding (i) or (iii). That is, if **number** is interpreted as (ii), then each distinct body trivially has the number one. But, Locke says, there is a simple idea of **number**, which is produced in us, and according to his view, there must be a quality of the body which is the power to produce that idea in us. This power or quality cannot be the trivial power that each distinct body has to produce the idea of a unit in us; it must rather be the power or quality that an *aggregate* has to produce the idea of multiplicity in us. It is a further suggestion to suppose that the original body has the power or quality in virtue of the aggregate of particles that it might be divided into having the power or quality—that is the difference between (iii) and (i). However, it does seem that for Locke, any quality must attach to a subject 'wherein that power is' (§8). Hence the aggregate must be a body possessing a certain power; no big step, then, to regard the body as possessing the quality insofar as the aggregate that it can be divided into does.

This understanding, that there are primary qualities of bodies that are had in virtue of the properties of the aggregates which that body can be divided into, gains more support from §10. Locke there glosses the primary qualities of objects as 'the bulk, figure, texture and motion of their insensible parts'. Two interpretations suggest themselves: (i) that the primary qualities of some object *O* are just

the primary qualities of *O*'s parts; or (ii) the primary qualities of *O* are the properties of the aggregate which *O* may be divided into, where these may include the properties of *O*'s parts, but need not be exhausted by those properties. It seems clear that (ii) is the intended reading: whether *O* is moving, for example, depends not just on whether *O*'s parts are moving, but also on whether *O*'s parts are moving *in concert*, where this is pretty clearly a property that only an aggregate (not a single part) can have. This is fairly clear when, in §14, Locke remarks that 'motion of parts' is a primary quality: presumably of the object with those parts, and not of the parts themselves individually. A final example is provided by §20, where Locke discusses the alterations in the powers of an almond that might be produced by pounding, and claims that it can alter the **texture** of an almond. Texture is clearly meant as a primary quality as opposed to the secondary qualities it supports; and it is clearly not identified with any intrinsic<sup>2</sup> properties of the insensible parts of the almond, since (by hypothesis) pounding merely rearranges those parts: here then is a property of an object which is essentially aggregative, and not reducible to any simple sum of the primary qualities of the parts.<sup>3</sup>

### 3 Secondary Qualities

Locke wishes to distinguish *secondary* qualities from primary qualities. He claims that secondary qualities 'are nothing in the objects themselves but powers to produce various sensations in us' (§10). This is fairly unhelpful: in §8, Locke claimed that *all* qualities are powers to produce various sensations in us. One thought is that perhaps Locke wishes to emphasise the constitutive or definitional role of our sensations with respect to secondary qualities. On that supposition, we might suggest that, while all qualities convey the power to produce sensations in us, nevertheless the primary qualities are not defined or individuated by this role, while the secondary qualities are defined and individuated by their role in producing various sensations in us.

That is, **white** might be *defined* as that power to produce white-sensations in us, while **round** would not be defined as the power to produce round-sensations in us, even though for an object to have the quality **round** is for it to have that power.

<sup>2</sup>An *intrinsic* property of an object is, roughly, a property that an object would have even if it was the only thing that existed. So 'being square' is intrinsic, since a square object would be square even if nothing else existed; yet 'being two miles from Exeter' is not intrinsic, since if Exeter did not exist, it could not be had. It is a useful working hypothesis that all primary qualities are intrinsic—though the case of motion is a little bit puzzling since we may think that it makes no sense to talk of something's moving when there is no reference framework of other entities for it to move with respect to.

<sup>3</sup>Though it may be reducible to those primary qualities *plus* the relations between the insensible parts, where those cannot be primary qualities but are perhaps accounted for by extrinsic properties.

Regardless of our take on this matter, it seems to fit ill with Locke's definition of primary qualities. For primary qualities were defined as those a body would keep under arbitrary division; it would be natural to expect that, in distinguishing secondary qualities from primary qualities, he would remark that secondary qualities are not preserved under arbitrary division. Perhaps he hints at this in the remark that secondary qualities 'are nothing in the objects themselves', but that remark is compatible with any number of suggestions about how secondary qualities are to be defined (and being something in the object itself is surely not only explicable in terms of persisting under division).

However, Locke's particular examples of secondary qualities—colours, sounds, tastes, etc.—do seem to be the kinds of properties that are not preserved under arbitrary division. If snow is white, that doesn't mean that all of the fundamental constituents of snow are white: for whiteness seems to be a property depending on surface reflectivity, and hence the structural primary qualities of the aggregate that snow can potentially be divided into.

More interesting is Locke's insistence that these secondary qualities, whatever they may be, are 'nothing' in the objects themselves *except* powers to produce various sensations in us. Certainly they are supposed to be grounded in or dependent upon primary qualities and powers in some way (secondary qualities are said to be powers conveyed 'by' the primary qualities in §10, and said to 'depend on those primary qualities' in §14), and hence are something in the objects themselves in some sense. But there is surely some contrast being drawn here, at least implicitly, with primary qualities, which are (by implication) something in the objects themselves over and above a power to produce sensations in us. What could this contrast amount to?

Some illumination is gained by considering Locke's discussion in §16 of the secondary qualities of a flame. He claims that one and the same flame, presumably with the same or similar primary qualities, can produce in us various sensations, depending on our distance from that flame. He asks, of some person, 'what reason he has to say that his idea of **warmth**, which was produced in him by the fire, is actually in the fire; and his idea of **pain**, which was produced in him the same way, is not in the fire'. This passage is somewhat equivocal: it is clear that Locke intends **pain** and **warmth** to be treated equally, but it is left open by Locke whether to treat **pain** as being in the fire, or **warmth** as being only a sensation. This conflict is quickly resolved, as Locke goes on to remark in §17 that

the particular **bulk, number, figure** and **motion of the parts** of fire or snow are really in them, whether anyone's senses perceive them or no; . . . [b]ut **light, heat, whiteness** or **coldness** are no more really in them than **sickness** or **pain** are in manna.

So it is clear that, again, secondary qualities are not really in the objects which have them, while primary qualities are. Yet Locke's remark that primary qualities are in the objects, independent of whether anyone perceives them, is very illuminating. This seems to indicate that the contrast Locke draws is between the subjective character of experience, and the primary qualities that *cause* that experience. Clearly, if secondary qualities were essentially experiential qualities, it would make perfect sense to take them to be dependent on 'whether anyone's senses perceive them or no'.

Further support for this reading is gained when Locke explicitly discusses the causal grounds of secondary qualities: **sweetness** and **whiteness** are merely

the effects of the operations of manna, by the motion, size, and figure of its particles, on the eyes and palate, [just] as the pain and sickness caused by manna are confessedly nothing but the effects of its operations on the stomach and guts, by the size, motion, and figure of its insensible parts. (§18)

The view that such passages suggest is the following:

- Every secondary quality corresponds to some particular characteristic subjective experience;
- Such experiences are caused by a particular primary quality of the object; this is the power of the object to cause various sensations in us;
- Yet the secondary quality is not *identical* to the primary quality that causes it, because the secondary quality is *necessarily* so as to produce an experience of a certain character, whereas the primary quality is not necessarily so.

This last item may need some clarification. Consider the primary qualities  $Q$  of surface texture that convey on an almond the power to produce the idea of whiteness in us—call this  $W$ . In some other creature, with another visual system, that same quality  $Q$  may produce the idea of redness: hence  $Q$  is not essentially 'the power to produce the idea of whiteness', but happens in our case to cause that secondary quality, though not in the case of the other creature.<sup>4</sup> Similarly, we can imagine that the qualities  $Q$  of an almond that convey  $W$  on it might be distinct from the qualities  $Q'$  of a cloud that convey  $W$  on *it*. So there is nothing about  $Q$  that is either necessary or sufficient to produce the idea of whiteness. At best, we might regard  $Q$  as the thing that happens in almonds to play the role of 'causes whiteness', where that role may be played by many different qualities in other objects, given other observers.

<sup>4</sup>You may wish to consider here the case of animals, like dogs, that are commonly said to see only in black and white; yet of course they see the same things as we do on occasion. So whatever accounts of the difference in the subjective character of experience between dogs and ourselves, it cannot be traced to any difference in qualities in the objects that we see.

But Locke goes a little further in his discussion of the mechanisms by which primary qualities and secondary qualities are related. He says

For if we imagine **warmth** as it is in our hands to be nothing but a certain sort and degree of motion in the minute particles of our nerves, or animal spirits, we may understand how it is possible that the same water may at the same time produce the sensation of heat in one hand and cold in the other... (§21)

Here, ‘warmth as it is in our hands’ must be the impact of the secondary quality of the object; yet it is ‘nothing but’ the motion of the ‘minute particles of our nerves’—that is, it is a primary quality of us! More slowly, the power in the water is a power to cause various changes in the insensible parts which make us up, by impact: for our nerves to respond to the primary qualities of the objects we sense, is just what it means for our nerves to be sense organs at all. But if this is so, then a power to produce a sensation in us must be a power to affect the **motion, figure** and **texture** of the insensible parts of our nerves; and hence it must be this particular arrangement and motion of the parts of our nerves that is constitutive of us having a particular subjective experience. Clearly the particular subjective character of our experience is in us, and it pretty clearly is a function not just of the powers of the objects, but also of the primary qualities of the insensible parts of our nerves: so we see that while the secondary quality is a power in the object, it does not invariably or easily cause a uniform effect in us, but rather depends on the extant state of our sense organs. Hence we should have no temptation to take the secondary qualities to be primary qualities of the objects which cause the sensations; it is merely the normally *transparent* functioning of our sense organs which leads us into this error in some cases.

#### 4 ‘Tertiary’ Qualities

Locke also distinguishes another kind of quality:

The power that is in any body, by reason of the particular constitution of its primary qualities, to make such a change in the **bulk, figure, texture** and **motion** of another body, as to make it operate on our senses differently from what it did before. (§23)

These *tertiary* qualities (as we might call them; Locke gives them no official title) are not primary qualities, since they are not intrinsic to the objects which bear them but rather depend on the relations of that object to affected objects. They are not secondary qualities, since they do not consist in a power to affect the subjective character of experience of the object which bears them. So they must be a third kind of power: a power in object *A* to alter the secondary qualities

of *B*—in virtue of the causal impact of the primary qualities of *A* altering the primary qualities of *B*.

Locke's examples of a tertiary quality is 'the sun has a power to make wax white' and 'fire [has a power] to make lead fluid' (§23). These examples, however, are a bit confusing. The first is a little confusing because of the primitive corpuscular theory which Locke holds, where all interaction must take place by 'impulse, the only way which we can conceive bodies operate in' (§11). But it is difficult to conceive of how action at a distance, like the sun's action on distant wax, is supposed to work, on such a model.<sup>5</sup> Nevertheless, we can easily imagine on a current model of physics how this works: the intrinsic properties of the constituents of the sun produce various physical effects in the constituents of the wax, for instance, an increase in mean kinetic energy (objective temperature), and this produces some kind of rearrangement of the insensible particles in the way that renders it white and opaque.

The second example is also puzzling, for a different reason: namely, one would not have thought that **fluidity** was a secondary quality, but rather a primary quality, since it is the kind of quality that could be had even if there were not anyone around to perceive it. This indicates that Locke regards tertiary qualities as centrally involved in altering the primary qualities of the bodies upon which they operate, and only having an ancillary impact on our sensations of those altered bodies. Indeed, though Locke does not discuss it, a power to produce a change in a body *O*, even if that was an unsensed (or even insensible) change, might still be regarded as a tertiary quality of *O*, simply because it is a power to produce alteration in the **figure, &c.**, of the insensible parts of *O*.

Regardless of our judgement of Locke's examples, it is clear that he regards secondary and tertiary qualities to be very similar: they are both 'nothing but powers relating to several other bodies and resulting from the different modifications of the original qualities' (§24). That is, whether or not the power of the sun is to alter the primary qualities of wax, or of my nerves, makes little difference to the nature of those powers. Yet obviously since the alteration of my nerves gives rise to an immediate and characteristic subjective experience, while the alteration of the wax does not, we might well, from our perspective as perceiving agents, wish to make a distinction, just as Locke does. But we would be wrong to over-emphasise this distinction, and to take the secondary qualities to be somehow more real, while denigrating the tertiary qualities as 'barely powers', when 'they are all equally powers' in the original objects (§24).

One apparently compelling argument for a real distinction in status between secondary and tertiary qualities rests on the consideration that ideas of tertiary

<sup>5</sup>See the discussion on page 11 below for a little more detail.

qualities do not correspond to real features of the objects, while ideas of secondary qualities do so correspond, because they *resemble* something in the objects (§25). Obviously Locke wishes to challenge this argument; before we can evaluate it, however, we shall have to turn to Locke's discussion of the resemblance thesis. (We return to this argument on page 12.)

## 5 Resemblance

Locke holds the following general thesis

that the ideas of primary qualities of bodies are resemblances of them, and their patterns do really exist in the bodies themselves; but the ideas produced in us by these secondary qualities have no resemblance of them at all. There is nothing like our ideas existing in the bodies themselves. (§15)

What could his reason for adopting this claim be? The claim has two parts: the positive thesis that primary qualities do resemble our ideas of them, and the negative thesis that secondary qualities do not resemble our ideas of them.

The negative thesis is fairly straightforward: ideas of secondary qualities do not resemble anything in the bodies themselves because they are merely powers of those bodies, and not in the bodies themselves. The only intrinsic properties in the bodies themselves are primary qualities; and it is clear that **blue**, **sweet** and **warm** do not resemble **figure**, **bulk** or **motion**. This argument is not by itself sufficient, however: for perhaps, though **blue** does not resemble **figure**, or any other particular primary quality, it does resemble some property in the body that emerges from the combinations of primary qualities—perhaps in virtue of the fact that **blue** *represents* a certain power in the body, which is constituted by the primary qualities.

This, however, is not a genuine possibility according to Locke, as we can see from consideration of the variability of response to a body which has constant primary qualities. Since those primary qualities are the only properties in the body which can ground any resemblance—they are the only features of the body, hence they are the only things that might be represented in our experience by an idea of a secondary quality—, if ideas of secondary qualities did resemble them, they would have to be constant if the set of primary qualities was constant. But if we think of the different responses one and the same fire produces in us as we vary the distance, and we think of the situation where one and the same body of water produces varying sensations in our limbs, then it is clear that these sensations cannot track or correspond to primary qualities, hence they cannot represent merely what is in the body, but must also be sensitive to features of the perceiver. If that is so, ideas produced by secondary qualities cannot resemble those secondary qualities, which are but powers dependent on the primary qual-



ities of the bodies. To reiterate: if ideas of secondary qualities resembled those qualities, they would have to resemble something in the body in which those qualities inhere. Hence, the ideas would have to be constant if the powers in the bodies were constant; yet they are not. So they cannot resemble.

Locke dismisses one argument for resemblance, namely, the argument that causal relations between objects and ideas can carry representational content. More slowly, the suggestion is that since a flower causes the idea of **blue** in us, that idea must resemble something in the flower. He says, in response, that it is

no more impossible to conceive that God should annex such ideas to such motions, with which they have no similitude, than that he should annex the idea of pain to the motion of a piece of steel dividing our flesh, with which that idea hath no resemblance. (§13)

That is, the connection between a particular cause and its effect on our ideas cannot be one of resemblance, for we have a counterexample in the case of pain. What is this counterexample? The thought behind it must be something like the following: if pain did resemble the causes of pain, then two things would follow:

1. We would be able to identify painful things merely by their appearance; and
2. We would have a necessary connection between painful things and the pains that they cause, because something could not be painful without having a feature that resembled the idea of pain as a part.

But neither (1) nor (2) are true. If (1) were true, once we had the idea of pain we would be able to see in everything, whether we had experienced it or not, whether it was painful. Yet since it is impossible to tell, except from experience, whether something will be painful or not, (1) cannot be true. Even if we have the idea of pain, something we have never experienced before may, or may not, be painful, and we cannot discover this without that experience. (2) must be false because what is painful to one creature may not be painful to another; so obviously the thing in question can resemble at most one of these creatures' ideas of pain, and hence it cannot resemble the idea of pain in general. There is no necessary connection between a painful cause and a painful effect, but only a contingent association.

That being said, it still might be the case that causal relations track *representation*: so that the idea of **blue**, though it resembles nothing in the flower, does represent the primary qualities of the flower that support the power to produce the idea of blue in us. This is not, however, a direct kind of representation—it is no more resemblance than the relationship between the word 'horse' and a horse is resemblance.

So much for the negative thesis. What of the positive thesis, that primary qualities do resemble our ideas of primary qualities? What argument can there be for this claim? Locke provides none, as far as I can tell, and we have every reason to suspect the claim false.

It is especially puzzling that Locke defends this claim, given that he has already warned us to distinguish our ideas from the properties of matter that give rise to those ideas

so we may not think (as perhaps usually is done) that they [the ideas] are exactly the images and resemblances of something inherent in the subject. . . (§7)

Nowhere between this caution, and his announcement of the resemblance thesis, does Locke give us any explicit reason to abandon this thesis when it comes to primary qualities.

As far as I can see, the best place to find something that might justify Locke lies in his discussion of the mechanics of the impulse theory of idea-production. He claims that in every case of where some object is perceived at a distance, some ‘imperceptible bodies must come. . . to the eyes, and thereby convey to the brain some motion, which produces these ideas which we have of them. . .’ (§12). Thus, in the case of the **motion** of the insensible parts of *O*, one might think that an *identical* motion is communicated to the insensible parts of our nerves by these intermediary particles—hence the idea of **motion** in us, which is constituted by the motions of our brains, really would resemble the **motion** of the body itself. But while this may appear defensible in the case of **motion**, it is beyond the bounds of plausibility when it comes to **shape**, **extension**, or **number**. How could, for example, a single imperceptible particle communicate the idea of the number of the particles in a distant body, or their overall configuration, by motion alone? This is not sufficient to ground Locke’s resemblance thesis, and yet this is all he provides. I conclude that we have no good reason to accept it.

Subsequent treatments of the resemblance thesis with respect to primary qualities have typically agreed with this harsh assessment. Here is Bennett:

[W]e have almost no vocabulary in which to describe our. . . sensory ‘ideas’ except through what they represent. So although my ‘ideas’ do not have colours and shapes, it is true that I cannot say much about them except in terms of colours and shapes. . . . Someone who has noticed this. . . can conclude ‘The adjectives that I need to characterise my sensory states fall into two groups: those that I do and those that I do not also need in doing physics. The former are the primary-quality ideas, the latter the secondary-quality ones.’ So far, so good. . . . There is trouble only if the philosopher infers that his ‘ideas’ of primary qualities resemble outer things, while his ‘ideas’ of secondary qualities do not. That is an error, based on a misunderstanding of *how* primary- and secondary-quality words come into the description of ‘ideas’. (Bennett, 2001: §193, p. 88)

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Turning back, finally, to the argument we considered at the end of the last section about the resemblance of tertiary qualities. Locke's defense of the close relationship between secondary and tertiary qualities as both powers rests on his claim that we are confused about secondary qualities. For, he says, the only reason we would make such a distinction is if we thought that secondary qualities did match up to something in the objects apart from the primary qualities. But once we realise that secondary qualities do not resemble anything in the objects themselves, we can more easily see the similarity between secondary and tertiary qualities—for in the latter case, we already recognise no resemblance and therefore 'look on it as a bare effect of power' (§25). So Locke's final judgment is that secondary and tertiary qualities are not distinct, and indeed are both secondary qualities:

the former of these, I think, may be called *secondary qualities immediately perceivable*, the latter *secondary qualities, mediately perceivable*. (§26)

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### References

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- Locke, John (1706), *An Essay Concerning Human Understanding*. Oxford: Oxford University Press.