Locke & Leibniz on Superaddition

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1 Mechanism & Materialism

The seventeenth century saw the rise of two distinct but related positions: *mechanism* and *materialism*. *Materialism* is a metaphysical theory concerning the natural world. It claims that the natural world consists fundamentally of a kind of *thing* or *stuff*—matter—and that this stuff, organized in various ways according to natural laws as characterized by physics, determines the nature and features of all the objects we experience as part of the objective (and thus mind-independent) natural world. Materialism says that there is fundamentally only one kind of thing—matter. Materialism thus stands in opposition to a *dualist* view like that articulated by Descartes. Descartes argues that there are fundamentally *two* kinds of thing—matter, and mind—and that the natural world consists of these two kinds of thing interacting with one another, sometimes in very special ways (as with the ensouled bodies of human beings).

Mechanism is part of a theory of *explanation*. Lisa Downing, a scholar of the Early Modern period, puts it this way,

> [Mechanistic doctrine] states that all macroscopic bodily phenomena should be explained in terms of the motions and impacts of submicroscopic particles, or corpuscles, each of which can be fully characterized in terms of a strictly limited range of (primary) properties: size, shape, motion (or mobility), and, perhaps, solidity or impenetrability. (Downing 1998, 381)

A 'corpuscle' is a extremely small parcel of matter with a determinate size, shape, motion, location, etc. It is the features of individual corpuscles, plus their interactions, which mechanism takes as sufficient for explaining the characteristics and behavior of the natural (material) world. Thus, while the claim that the natural world consists of nothing but corpuscles, or material particles, is a metaphysical claim about what there is, mechanism is an explanatory claim concerning how appeal to microscopic particles and their features is sufficient for explaining all natural phenomena. These views thus compliment one another and often go together. But one needn't be a materialist to endorse mechanism. For example, Descartes clearly endorses a mechanist outlook on material nature.

> I considered in general all the clear and distinct notions which our understanding can contain with regard to material things. And I found no others except for the notions we have of shapes, sizes and motions, and the rules in accordance with which these three things can be modified by each other—rules which are the principles of geometry and mechanics. And I judged as a result that all the knowledge which men have of the natural world must necessarily be derived from these notions. (*Principles* 4:203; (Descartes 1985))

One of the primary attractions of mechanistic explanation is that they seem especially intelligible, given the assumption that material beings are understood primarily as having properties that admit entirely of mathematical/geometric analysis and explanation.

In contrast to Descartes, who aimed primarily at a conception of material nature that could in principle be entirely concieved through the basic or primary attribute of extension, Robert Boyle and John Locke (both English philosophers) endorsed a mechanism largely as a working explanatory hypothesis, that could be confirmed or refuted on empirical grounds.

As Boyle put it,

> These Principles, Matter, Motion (to which Rest is related) Bigness, Shape, Posture, Order, Texture being so simple, clear, and comprehensive, are applicable to all the real Phaenomena of Nature, which seem not to be explicable by any other not consistent with ours. For, if recourse be had to an Immaterial Principle or Agent, it may be such an one, as is not intelligible; and however it will not enable us to explain the Phaenomena, because its way of working upon things Material would probably be more difficult to be Physically made out, than a Mechanical account of the Phaenomena. And, notwithstanding the Immateriality of a created Agent, we cannot conceive,

> how it should produce changes in a Body, without the help of Mechanical Principles, especially Local Motion (Boyle 1991, 153–54).

For Boyle, mechanism is simply the most explanatorily simple, clear, and comprehensive theory we have regarding the material world, whether or not we think material nature is all that there is (i.e. whether or not we endorse materialism).

Locke himself also frames his understanding of mechanism in terms of what he calls the 'corpuscularian hypothesis'.

> I have here instanced in the corpuscularian hypothesis, as that which is thought to go furthest in an intelligible explication of those qualities of bodies; and I fear the weakness of human understanding is scarce able to substitute another, which will afford us a fuller and clearer discovery of the necessary connexion and coexistence of the powers which are to be observed united in several sorts of [bodies]. (ECHU IV.iii.16; (Locke 1970))

There is a great deal to be said about both the doctrine of materialism and that of mechanism, as well as their development and influence in the seventeenth and eighteenth centuries. But here I focus on just one issue—the specific properties corpuscles were thought to have, and the explanatory role of these properties relative to all the other apparent characteristics of objects.

Notice two things about mechanism. First, it ultimately concerns unobservable, or at least, *unobserved* entities (corpuscles). This means that the explanation of observable phenomena depends on the existence and characteristics of unobserved phenomena. This, in and of itself, is a dramatically anti-Aristotelian move. The fundamental explanatory level of reality is one which is removed, and perhaps ineluctably so, from our direct apprehension in experience.

Second, the explanatorily relevant features of corpuscles are taken by mechanists to be their *geometric* properties—viz., size, shape, location, and state of motion. What are not included are those features which we might think of as tied to specific ways of sensing the world—e.g. their colors, tastes, or smells.[1] This bifurcation in explanatory role meant both that greater emphasis was placed on our *mathematical* understanding of the natural world, and that our purely sensory grasp of the natural world no longer played a significant role (per-

[1] One feature—solidity—may or may not occupy a special role, being the only proper sensible (i.e. sensory quality tied to a specific sense modality, in this case touch) that may also be essential for the mechanist. Locke seems especially concerned to see solidity as an explanatorily essential quality, despite it not being strictly geometric in nature.

haps no role at all) in telling us how and why the world appears to us as it does. To see this this shift to the characteristically modern version of the "primary/secondary" quality distinction at work, it helps to start with Galileo.

2 Locke's Inconsistent Triad

Locke appears to hold three claims that are not all compatible. First, he endorses what I called, in the discussion of materialism and mechanism, the "corpuscular hypothesis". This states that matter (or "body") fundamentally consists of only the mechanical properties of shape, size, motion, and solidity.

> Qualities thus considered in bodies are, First, such as are utterly inseparable from the body, in what state soever it be; and such as in all the alterations and changes it suffers, all the force can be used upon it, it constantly keeps; and such as sense constantly finds in every particle of matter which has bulk enough to be perceived; and the mind finds inseparable from every particle of matter, though less than to make itself singly be perceived by our senses: v.g. Take a grain of wheat, divide it into two parts; each part has still solidity, extension, figure, and mobility: divide it again, and it retains still the same qualities; and so divide it on, till the parts become insensible; they must retain still each of them all those qualities (ECHU II.viii.9; (Locke 1970)).

> Secondly, [there are qualities] which in truth are nothing in the objects themselves but powers to produce various sensations in us by their primary qualities, i.e. by the bulk, figure, texture, and motion of their insensible parts, as colours, sounds, tastes, &c. These I call secondary qualities (II.viii.10, 14, 23).

According to Locke (following people such as Galileo and Boyle) body consists only of mechanical qualities. All other other putative qualities, such as those of color or smell, are simply powers that the mechanical qualities have to produce sensory ideas in beings like ourselves.

Locke also holds that things have essences (or what he often calls "real essences").

> Essence may be taken for the very being of anything, whereby it is what it is. And thus the real internal, but generally (in substances) unknown constitution of things, whereon their discoverable qualities depend, may

> be called their essence. This is the proper original signification of the word, as is evident from the formation of it; essentia, in its primary notation, signifying properly, being. And in this sense it is still used, when we speak of the essence of particular things, without giving them any name. (ECHU III.iii.15)

In this Locke agrees with Descartes. The essence of thing determines what it is and is referred to in explaining all of its other properties, or at least its non-relational ones.

But Locke also seems to hold a third claim, that there is a kind of "gap" between the existence of the mechanical properties of a body and other properties it has, such as its "secondary" properties of color or smell.

> But the coherence and continuity of the parts of Matter; the production of Sensation in us of Colours and Sounds, etc. by impulse and motion; nay, the original Rules and Communication of Motion being such wherein we can discover no natural connexion with any Ideas we have, we cannot but ascribe them to the arbitrary Will and good Pleasure of the Wise Architect. (ECHU IV.iii.29)

Locke claims here that there is no clear connection between or derivation from mechanical properties such as size or position the other properties of bodies, such as the cohesion of their parts, the sensory ideas they prompt in us (i.e. ideas of color or smell), or the motion of bodies. Instead, the connection or derivation of this properites must be due to the **arbitrary** will of God.

In sum then Locke holds the following three claims:

1. *Boylean corpuscularianism*: Bodies fundamentally have only the mechanical qualities: shape, size, motion, and solidity.
2. *Essentialism*: The qualities of things are all explained by their real essences, i.e. their fundamental features, plus their spatial relations.
3. *Gappiness*: Not all of the features of bodies are explained by their shape, size, motion, and solidity.

The problem is that if is Locke ascribing a certain group of properties of bodies to God's "arbitrary Will and good Pleasure" then this undermines his essentialism, and specifically the position of Mechanism, that only mechanical properties are explanatorily relevant. If that is so then mechanism is doomed as a general explanatory claim. Contemporary scholar Margaret Wilson puts it this way:

> . . . at first thought it might seem that Locke could consistently hold that a body's powers to produce ideas flow naturally from its real essence, while also maintaining that the ideas themselves are arbitrarily annexed to whatever motions of matter habitually cause them. But of course this is not really the case. For it follows from Locke's account that a body has its powers to produce ideas only because of the divine acts of annexation. Therefore, . . . we find conflict with the official position that there is in reality an a priori conceptual connection between a body's real essence and its secondary qualities. (Wilson 1979, 147)

Locke's endorsement of Gappiness undermines his conception of mechanistic explanation through appeal to the essential features of bodies. But it does have one upside. It allows him to possibly avoid the substance dualism and problems of causal interaction confronted by Descartes. We see this in Locke's discussion of "thinking matter", as matter that has properties of thinking "superadded" to it by God.

> We have the ideas of matter and thinking, but possibly shall never be able to know whether any mere material being thinks or no; it being impossible for us, by the contemplation of our own ideas, without revelation, to discover whether Omnipotency has not given to some systems of matter, fitly disposed, a power to perceive and think, or else joined and fixed to matter, so disposed, a thinking immaterial substance: it being, in respect of our notions, not much more remote from our comprehension to conceive that GOD can, if he pleases, superadd to matter a faculty of thinking, than that he should superadd to it another substance with a faculty of thinking; since we know not wherein thinking consists, nor to what sort of substances the Almighty has been pleased to give that power, which cannot be in any created being, but merely by the good pleasure and bounty of the Creator. Whether Matter may not be made by God to think is more than man can know. (ECHU IV.iii.6)

Locke thus holds that God could have (and may indeed actually have) made it the case that matter (i.e. extended and impenetrable substance) is endowed with the property of thought, as "superadded" to it by God's act. Call this idea that there can be thinking matter the claim of "superaddition".

Superaddition: At least some properties of a substance are (or can be) explained by appeal to God's will rather than the essence of the substance

The difficulty is that Gappiness and Superaddition radically undermine Locke's otherwise more traditional conception of reality as consisting of substances with essences that explain their properties and which come to be known to us through experience, the knowledge of which is formalized through scientific theorizing. Leibniz gives a clear articulation of this problem, to which we turn in the next section.

3 Leibniz's Objection

According to Leibniz, the conception of substance and essence requires that all powers of objects are grounded in the nature of the objects themselves or in God's activity of miraculous intervention. There cannot be non-miraculous "superaddition" of properties to a substance that do not follow from its essence.

> one must above all take into account that the modifications which can come naturally or without miracle to a single subject must come to it from the limitations or variations of a real genus or of an original nature, constant and absolute. For this is how in philosophy we distinguish the modes of an absolute being from the being itself; … And every time we find some quality in a subject, we ought to think that, if we understood the nature of this subject and of this quality, we would understand how this quality could result from that nature. Thus in the order of nature (setting miracles aside) God does not arbitrarily give these or those qualities indifferently to substances; he never gives them any but those which are natural to them, that is to say, those that can be derived from their nature as explicable modifications. … This distinction between what is natural and explicable and what is inexplicable and miraculous removes all the difficulties: if we were to reject it, we would uphold something worse than occult qualities, and in doing so we would renounce philosophy and reason, and throw open refuges for ignorance and idleness through a hollow system, a system which admits not only that there are qualities we do not understand (of which there are only too many) but also that there are some qualities that the greatest mind could not understand, even if God provided him with every possible advantage, that is, qualities that would be either miraculous or without rhyme or reason.(Leibniz 1989, 304–5)

Leibniz hammers away at the point that the reason for accepting a substance-essence ontology is fundamentally one concerning *explanation*. The idea being that reality is, at least in

principle, intelligible, in the sense that the ultimate explanation of some property instantiation depends on appealing to the essence or nature of the substance that has that property. Leibniz points out that once this connection between substantial essence and property is rejected we no longer have any basis for construing reality as in principle intelligible to us (or to anyone really, apart from God). Here we see a fundamental difference between Leibniz's approach and Locke's. Leibniz see reality as, in principle, fundamentally rationally intelligible, while Locke either rejects its intelligibility or is at least deeply agnostic about it.[2]

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[2] See (Connolly 2015) for discussion of Locke's epistemic humility.