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## Materialism

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It is difficult to separate “materialism” as a diverse eighteenth-century philosophical movement from the many polemical arguments surrounding it throughout the century. Like its cognates “atheist,” “Hobbist” and “Spinozist,” “materialist” was often used more as a pejorative term and a pigeonhole than as a philosophical position. The polemical dimension is present both in period texts and, more surprisingly, in works of the history of philosophy up until the twentieth century: it is hard to separate mainstream scholarly assessment from the general tone of opprobrium in what became the received, mainstream visions of the subject, from Friedrich Lange’s Kantian *History of Materialism* (Lange 1892), which was devoted to tracing out the ultimate limitations and aporias of materialism, to other, post-Kantian and Hegelian histories in the nineteenth century but also well into the twentieth. To take an example, the *Lagarde et Michard*, the standard French literature high-school textbook for several generations in France until recently, describes Denis Diderot as “very material, and hence predisposed to materialism” (Lagarde and Michard 1960: IV, 196): “material” here means having a coarse, physical, bodily nature – which according to the authors, should give one a philosophical inclination towards materialism.<sup>1</sup> In contrast, for some of its most prominent and self-conscious practitioners, Julien Offray de La Mettrie and Diderot, it was the “most alluring philosophy”; for a later commentator, Auguste Comte, materialism sought to explain the higher in terms of the lower (Comte 1844: §77). More recently, particularly since the “identity theorists” of the 1960s and their influence on the philosophy of mind (Smart 1963; Armstrong 1978), we have become accustomed to think of materialism as concerning the relation of the mind to the brain, rather than a more general claim about the nature of physical reality. In fact, this polarity and diversity – between joyful, Epicurean and/or Spinozist proclamations of the radical potential of materialism, denials of its reductionist core, and more positivist praise of the same – is not new. It structured discussions of materialism in the eighteenth century as well.

The eighteenth century was the period when the term “materialism” was, if not quite invented (it first appears in a philosophical usage a few decades earlier) first used positively by thinkers to describe themselves. One can also see this as the period when broadly naturalistic concepts emerge in a form we would recognize today, namely, the programmatic sense in which knowledge coming from the investigation of nature (“science” is also a nascent term in this period, used with revolutionary overtones by

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thinkers such as Diderot, as we shall see) can modify central, foundational philosophical tenets on the soul or the mind, free will, happiness and so on.<sup>2</sup> The philosophical views that we recognize as having close affinities with materialism – notably sensationism (all mental experience stems from the senses) and atheism – became even more closely connected (although the examples of Condillac and Priestley show that the philosophical commitments were often separate as well). There were prior intimations of this naturalistic view, notably in Bacon and Hobbes. But with a few exceptions it is really in the eighteenth century that such a project emerges as an explanatory goal and a central ontological commitment.

That such a prominent doctrine should have fallen out of scholarly philosophical work on the Enlightenment (up until now there are no entries in the major anglophone philosophical reference works, aside from J. J. C. Smart's stimulating but ahistorical contributions) is surprising given its prominence in the period. One explanation of this might be found in the claim made by some scholars that unlike our contemporary, self-identified materialists who provide positive definitions of the term, in the eighteenth century the meaning of "materialism," like "atheism," was fixed by its opponents (Kors 1990). This is at least partly borne out in the way thinkers like Ralph Cudworth and Samuel Clarke, as well as Samuel Formey, Abraham Chaumeix and the Abbés Pluquet and Lelarge de Lignac in the eighteenth century (Pluquet 1757; Lelarge de Lignac 1760) all devoted extensive efforts to laying out descriptions, typologies and refutations of materialism, atheism and fatalism in various permutations. The Cambridge Platonist Henry More, who certainly did not self-identify as a materialist, introduced the term into English philosophical language in his 1668 *Divine Dialogues*: in the cast of characters, he describes the character Hylobares as "[a] young, witty, and well moralised Materialist" (More 1668: 5–6). Leibniz is usually credited with introducing the term into French, at least in mainstream usage, as it actually occurs in clandestine texts as early as the 1670s.<sup>3</sup> Cudworth, who was a great inventor of neologisms, coined the term "corporealism," which was effectively a synonym for "materialism": "All *Atheists* are mere *Corporealists*, that is, acknowledge no other *Substance* besides *Body* or *Matter* ... " (Cudworth 1678: bk. 1, ch. 4, 187).

But it was not wholly the opponents of materialism who set the terms in the later seventeenth century. That many of the doctrines that would be associated with materialism in the Enlightenment, often critically, were held by at least one seventeenth-century philosopher is evidenced by the anonymous treatise *Theophrastus redivivus* (1659), which used Lucretius, Pliny and Cicero (but also Averroes, Pomponazzi, Cardano and others) in a series of systematic atheist arguments: the gods do not exist, the world is eternal rather than created, religion is an invention, the soul is mortal, we should not fear death, and life should be lived according to Nature (Paganini 2001). The sensationist claim that "nothing is in the intellect that was not first in the senses" appears here, in order to weaken claims for God's existence, and the anonymous author pursues the Renaissance naturalistic interpretation of Aristotle's doctrine of the soul, in which the soul is the actuality of the organic body, i.e. a functional property of the body that cannot survive without it.

Still, the *Theophrastus* lacks the systematicity and more importantly the sense of a coherent, naturalistic and reductive project that we associate with eighteenth-century materialism. The first such systematic and positive type of materialism is found

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in texts such as Fontenelle's *Traité de la liberté de l'âme* (*Treatise on the Freedom of the Soul*, 1700), Collins' early debate with Clarke (1707–8), and other anonymous writings of the 1720s such as *L'Âme matérielle* (*The Material Soul*). But it was not until mid-century that a philosopher, La Mettrie, used the word to describe himself.<sup>4</sup> Consequently what we recognize today as “materialism” arose in the eighteenth century in a complex synergy between theological criticism, Renaissance Aristotelianism, the rise of the new sciences, debates concerning natural religion, the rise of empiricism, et al. Crucial in this regard – both in the constitution of a new matter theory (in which matter was endowed with higher properties ranging from sensitivity to intelligence and memory, all the way to panpsychism) and in the articulation of new explanatory and ontological targets for materialism – were, not so much physics, astronomy and mechanics as in the previous century, but the evolving life sciences, including medicine (Roger 1980; Reill 2005; Thomson 2008), which gave a novel cast to the forms of reductionist argument on offer in the period. To be sure, thinkers like d'Holbach argued for a reduction of all matter to physical matter and all causes to “physical causes” (d'Holbach 1770: I, ch. 11, 220), yet the most relevant sciences were natural history (a term which, in the eighteenth century, also covered much of what came to be called “biology”; see Smith's Chapter 29, in this volume) and medicine.

Materialism is a “discontinuous” tradition that is continuously reborn and rediscovered in different guises, given that different philosophical periods articulated forms of materialism on new bases (Mensing 2000: 513, 525; cf. van Fraassen 1996: 169). It was closely connected to changes in theology (working chiefly from Aristotelian and Averroist elements) in the sixteenth–seventeenth centuries and to natural history and emergent biology in the eighteenth century, when it took a form more recognizable to us (to which we might add its appeals to biochemistry in the nineteenth century, physics in the first half of the twentieth century and neuroscience ever since). If materialism was thus an ongoing, if intermittent, tradition I will nevertheless suggest that its distinctively eighteenth-century persona possessed three essential traits, some of which distinguish it from later versions familiar to us in philosophical discourse: it was a thoroughgoing naturalism, seeking to inscribe our knowledge of the mind (or soul), self, morals and beyond into a sphere compatible with experimental evidence; it was a particularly *embodied* set of theories, relying on (and conversely, nourishing) biomedical debates; yet it was also, frequently, more speculative than not, extending a kind of Lucretian ‘science-fiction’ approach to the understanding of Nature of the sort more commonly associated with Campanella or Cyrano de Bergerac. The two latter points are most novel: that materialism in the period was not necessarily either *physicalist* or *mechanist* (instead frequently taking the form of a *vital* materialism, influenced by but also in dialogue with the evolving life sciences), and that its speculative and occasionally *radical* character made it something very different than a modest philosophical facilitator of scientific progress.

Before examining some core materialist claims in more detail, I shall briefly survey its geographical outlay, its distinctive publication strategies and the methodological challenges it poses to the historian of philosophy, and its sources, in order to further specify the position.

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### A geography of materialist philosophy

Charting the appearance and dissemination of materialism in Europe in the early eighteenth century has much the same difficulties as charting the spread of a virus or contagious illness. A good initial place to look – as for many elements associated with the Enlightenment – is in Voltaire’s *Letters concerning the English Nation* or *Lettres philosophiques* (1733). Voltaire identified the wake of Hobbes and Bacon but also, the impact of Spinoza on English deism and the radical reception and transformation of Locke’s statements on thinking matter in the *Essay concerning Human Understanding* as the relevant English context for materialism (and one might argue, for the radical Enlightenment more broadly). The *English Letters* (as they were also known) first appeared in English translation in London, because the material was considered too politically dangerous to Voltaire and to the publisher to appear in France.<sup>5</sup> They are a love letter to deism, tolerance, Newtonian science, Lockean empiricism, thinking matter (which Voltaire deftly turns into a materialist thesis) and overall to the “English” way of allowing science and religion to coexist peacefully, which Voltaire quite legitimately felt France was lacking (see Oz-Salzberger’s article, Chapter 1 in this volume). In addition to what Voltaire had identified, works by the Irish exile John Toland, such as his *Letters to Serena* (1704, translated by the Baron d’Holbach in 1768), and by Anthony Collins, such as his *Philosophical Inquiry into Human Liberty* (1717; first translated by the Huguenot Pierre Des Maizeaux in 1720 in the notorious *Recueil de diverses pieces, sur la Philosophie, la Religion naturelle, l’Histoire, les Mathématiques, & c* [*Collection of Various Pieces on Philosophy, Natural Religion, Etc.*]<sup>6</sup>), had a major impact on “French materialism.” But materialism was not only this English context appropriated by French *philosophes*. Some authors also significantly borrowed from and transformed an *Epicurean* heritage, also calling on the network of clandestine writings (such as the *Treatise of the Three Impostors*, in Anderson 1997, trans. of Anon. 1999) and various appropriations of mainstream philosophy such as Descartes, including in a specifically medical context (as in Regius and Herman Boerhaave). There were also German materialists in the early decades of the century, less known and also less discussed in Europe, including Bucher, Lau, Hißmann and Sulzer.<sup>7</sup>

Some countries, such as Switzerland and the Netherlands, contributed significantly, often through thinkers who were dismayed at the use of their work, notably Albrecht von Haller, Charles Bonnet and earlier, Jerome (Hieronymus) Gaub in Leiden. Gaub, a student of Boerhaave’s who took over his Chair in Leiden, gave a lecture in 1747 which La Mettrie claimed to have attended (some months prior to finishing *L’Homme-machine*), entitled *De regimine mentis* (*On the Regimen of the Mind*; translated in Rather 1965). Here, Gaub laid the ground for a clinical perspective on the problem of mind-body interaction. La Mettrie spoke favourably about the ideas he heard there, and his enthusiasm makes sense, for Gaub had argued that the metaphysical distinction between mind and body was irrelevant for the physician (Gaub 1747, in Rather 1965: 70). Gaub also described Descartes, “the most ingenious philosopher of his age,” as having “yielded to physicians” as to the priority of medicine in these matters (74). Gaub though, like Haller, did not appreciate La Mettrie’s materialist appropriation of his ideas, and in 1763 included a short essay against him in a new edition of *De regimine mentis* (Rather 1965: 115–17), calling him “a little Frenchman”

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who produced a “repulsive offspring ... his mechanical man” (115). Bonnet sometimes spoke the same way about La Mettrie, but also wrote (in a nice example of how some thinkers who did not want to be considered materialists, were not so far off), “I do not believe in the materiality of the soul, but if I was a materialist I would not be ashamed to admit it” and “if someone did demonstrate that the soul is material, far from being alarmed, one should admire the power which gave matter the capacity to think” (*Analyse abrégée de l'Essai analytique sur les facultés de l'âme* [Shorter Analysis of the Analytical Essay on the Faculties of the Soul], §19, in Bonnet 1783: 34).

In the later eighteenth century, materialism returned to Britain with Joseph Priestley and his associates, including Erasmus Darwin. In the mid-century, David Hartley had published the much-discussed *Observations on Man* (republished and redacted by Priestley as a springboard for his own views), which contains an original Newton-inspired “physics” of the cerebral underpinnings of the association of ideas; but Hartley also emphatically denied that he was a materialist (presumably with regard to the soul and religious belief, although he did not specify why). Geography here is less relevant than the religious context, as from early modern forms of heterodoxy to Christian mortalism<sup>8</sup> in late seventeenth-century England, various forms of religious radicalism fueled materialist ideas, as did conservative theological typologies of possible materialist, atheist, “Epicurean” or “Spinozist” doctrines, conversely (Thomson 2008). But, as Hegel and Goethe observed about French materialism in the late eighteenth and early nineteenth centuries (Hegel 1986: 143; Goethe, *Poetry and Truth* XI, in Goethe 1887–1919), it was clear that the French were reacting against a church very different from their own (or that of the British); Priestley’s conviction that materialism and authentic Christianity went hand in glove (“by the help of the system of materialism, the Christian removes the very foundation of many doctrines, which have exceedingly debased and corrupted Christianity”; Priestley 1777: 49), would have been very hard to understand on the Continent (with the exception of the “Göttingen materialists” Meiners and Hißmann, who went out of their way to praise Priestley and to reject atheist materialism; Wunderlich 2012).

### Genres, formats and sources

Materialism appeared in diverse sorts of writings, including medical writings (Lamy 1677 in the seventeenth century, influencing La Mettrie; Le Camus 1753), philosophical writings penned by physicians (Gaultier 1714; La Mettrie 1987: *passim*), outgrowths of theological debates (Collins), experimental philosophical prose (Diderot, particularly the *Letter on the Blind* and *D’Alembert’s Dream*, 1749 and 1769), works of “natural philosophy” with a polemical intent (Toland’s *Letters to Serena*, 1704, Diderot’s *Elements of Physiology*, begun 1765, d’Holbach’s *System of Nature*, 1770, Priestley’s *Philosophical Disquisitions*, 1777, but also, earlier Diderot’s *Thoughts on the Interpretation of Nature*, 1753) or with materialist implications (Hartley’s *Observations on Man*, 1749), anonymous works (*The Material Soul*, from the mid-1720s, the *Letter from Thrasylbulus to Leucippus*, in circulation by the late 1730s, later attributed to Nicolas Fréret) and – perhaps most challenging for historians of philosophy accustomed to authors who put forth arguments and defend them – texts by non-materialists which

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contain full chapters of direct materialist import (typically descriptions of the relation between mental activity, cerebral processes and e.g. animal spirits, as in Malebranche and Willis [Wolfe and van Esveld, forthcoming], or later, Haller or Gaub, as noted above). Other distinctive features in the circulation (but also the content) of materialism include the role of dictionaries and encyclopedias, notably Pierre Bayle's *Dictionnaire*, as well as clandestine collections and periodicals such as the *Nouvelles libertés de penser* (*New Freedoms of Thought*) (published in Amsterdam officially in 1743, although earlier copies have been found), which included the text *Le philosophe*, Fontenelle's anonymous *Traité sur la liberté de l'âme* (an essay in neurological determinism) and other atheist essays, including one against Pascal and Locke on the afterlife, or the above-mentioned *Recueil de diverses pièces* (Amsterdam, 1720), which included the first French translation of Collins's essay against free will. It was frequently a collective enterprise: Voltaire, d'Holbach and Priestley among others, published not only their own works but also manuscripts by others.

It had various, acknowledged and unacknowledged sources, ranging from direct access to established traditions, to reinterpreting concepts from authors who did not have materialist commitments, to borrowings from handbooks of the history of philosophy (notably Johann Jakob Brucker's *Historia critica philosophiæ*, 1741–44, revised 1767 – see the Introduction to this volume) or the usage of older claims like the empiricist slogan “there is nothing in the intellect that was not first in the senses.” Regarding more well-known sources, there have been long debates as to whether Enlightenment materialism was primarily an outgrowth of Cartesianism (Vartanian 1953), in which the adage “give me matter and motion and I shall give you a world”<sup>9</sup> becomes the *attribution* of motion to matter (with further attributions following: sensitivity, intelligence and other organizational properties), or of Lockean empiricism, via Condillac and his thought experiment of the statue to which each sense is gradually superadded (to be discussed further below; see also Falkenstein, Parts I and II, Chapters 14 and 15 in this volume); more recently, attention has turned to the modern-Epicurean bases for materialism (Leddy and Lifschitz 2010; LoLordo 2011; and Ahnert, Chapter 12 in this volume). There is some truth in associating the rise of sensationism with Locke and Condillac and the rise of mechanistic explanations with Cartesianism broadly construed (including in the form of mechanistic physiology, although this frequently targeted Descartes as well). But materialism was not reducible to one or another consequence of a doctrine in natural philosophy or metaphysics, and was rather a ferment which grew out of many – sometimes surprising – influences.

As previously mentioned, Voltaire popularized the idea of thinking matter which he took from (and credited to) Locke in the *English Letters*. Now, Locke had never asserted that matter literally thinks, but rather, that it *could* think, without any contradiction being *implied in thinking so*, as Udo Thiel formulates it (Thiel 1998: 61). Locke considered that the “more probable Opinion” was that thought is “annexed” to an immaterial substance (Locke 1689: 2.27.25). Despite his close friendship in his late years with the radical deist Anthony Collins (who argued the materialist side against Samuel Clarke's dualism, and the determinist side against Clarke's libertarianism, in separate polemics), Locke was no closet materialist. However, as some apologists claimed already in the eighteenth century, by weakening a Cartesian orthodoxy *in the name of another theologically grounded position* (that nothing prevents

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God from being able to superadd further properties to matter, such as thought; Roche 1759: I, 85), and putting it side by side with classical empiricism, he facilitated the transition to materialism.

The Epicurean tradition is present, e.g. in the materialist appropriation or extension of Lucretius's *semina rerum* or atoms via Gassendi, as well as of Gassendi's elaboration of an Epicurean "material soul," which he described as "a very tenuous substance, just like the flower of matter [*flos totius materiae*] with a special disposition, condition and symmetry holding among the crasser mass of the parts of the body"<sup>10</sup> – a material soul, but with emergent properties, chiefly specified in chemical terms. This non-Cartesian, non-mechanist form of reductionism, inspired by Epicureanism but also by contemporary matter theory and medical theory, was further extended by the Epicurean physician Guillaume Lamy, by La Mettrie, who was undoubtedly one of the most radical and self-affirmed Epicureans of the Enlightenment (Wolfe 2010b), authoring an entire *System of Epicurus*, and by Diderot, who was fascinated with atomism from his earliest writings to the end of his life.<sup>11</sup> In this modern, post-Gassendist Epicureanism, atoms are no longer inanimate but *vitalized*, or living minima (Wolfe 2010a).

Another source is Spinoza and Spinozism. Jonathan Israel has argued controversially that much of what he calls the radical Enlightenment (which overlaps with materialism, although they are distinct: programs for natural religion, tolerance and even revolution need not include either a metaphysics of matter and/or a project to naturalize mind, soul or ethics; conversely, staunch materialists like La Mettrie were quite content to take no interest in political reform, viewing their ideas as the preserve of an élite) was characterized by an allegiance to Spinoza, and a commitment to Spinozist ideas (Israel 2001; see Thomson 2008 for criticism and Moreau 2000 for a different argument on how Spinozism could function as materialism in the period). One can object to this view, *inter alia*, that many actors in eighteenth-century radical thought were either not directly acquainted with Spinoza's works or more directly influenced by other figures such as Hobbes. But this is not really a definitive criticism: Spinozism was a lively intellectual construct, if often just a construct,<sup>12</sup> and this was sufficient to inspire new metaphysical projects, including ones which sought to provide a framework for emerging biology (Ibrahim 1990; Wolfe, forthcoming). A case in point is Diderot's brief *Encyclopédie* entry "spinosiste" where he unexpectedly combines Spinoza's metaphysics of substance with a new theory of biological development, epigenesis, according to which the embryo grows by the successive addition of layers of purely material substance. He distinguishes between "ancient Spinozists," who are substance monists and metaphysicians overall, and "modern Spinozists," for whom the key phenomenon is biological epigenesis, and who assert that matter is fundamentally *living* matter, while agreeing with "ancient Spinozists" as to their tenets (Diderot and d'Alembert 1751–80: XV, 474). The latter claim, to which I shall return below, is a distinctive and new characterization of materialism – as *vital materialism* – whether or not it really matches up with Spinoza's own intentions (see Smith, Chapter 29 in this volume).

Leibnizianism seems rather less familiar in this context, given its apparent distance from any form of materialism. Yet Leibnizian metaphysics and theories of generation had a great impact on eighteenth-century thought and are considered to be major

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influences in the formulation of Diderot's materialism, among others.<sup>13</sup> In a pattern familiar from the controversies over Cartesian physiology (when some of Descartes' disciples such as Regius steered his system towards materialism) or thinking matter (when Locke's skeptical approach was deliberately misread as an explicitly materialist credo), Leibniz's insistence that one not confuse or blend the physical and the metaphysical levels of his system – that mechanical science and monadic metaphysics were distinct (Leibniz 1978: IV, 434f., VII, 343; 1962: VI, 134f., 242f.) – was disregarded. Thus Leibniz's idea of the organism as a “machine of nature” was turned into a biological concept. For example, the Montpellier physician Théophile de Bordeu (one of the prominent members of the school known as “Montpellier vitalism,” associated with the Montpellier Faculty of Medicine, where the word “vitalist” was first used in the late eighteenth century; significantly, these medical vitalists hardly ever appealed to the existence of a vital force understood as existing apart from arrangements of material, organic components), named monads, along with Buffon's “organic molecules,” in his list of the main “hypotheses on the elements of bodies” (Bordeu 1775: 333–34).

An important conceptual point about materialism follows from these various elements and their lineages: the presence of an enduring, and often fertile, tension between a more *deflationary* project – sometimes tinted with skepticism, or appeals to remain within the bounds of experience – and a more overtly *metaphysical* project to replace previous systems with a more scientifically valid world picture (despite the occasionally *speculative* form materialism could take in the period, as in Diderot's *D'Alembert's Dream* or Erasmus Darwin's *Zoonomia*), both often in conjunction with the life sciences. I shall now sketch out this tension, which is one way of presenting core claims of eighteenth-century materialism while not denying their historical complexity.

### Core claims

Despite the diversity of sources, genres, backgrounds, geography and influences, three core materialist claims or common theoretical features of materialism can nonetheless be specified. These include shared ontological commitments concerning the nature of the physical world, claims about the reduction of soul or mind to brain and body, and an emphasis on the role of the life sciences and medicine in informing the nature of the ontology and the reduction (in that sense, despite an overall commitment to the causal closure of the space-time world, with deterministic implications and monistic metaphysical extensions, eighteenth-century materialism was rarely physicalist). As a comprehensive account of human behavior, materialism also comprised diverse ethical and social doctrines, from hedonism to utopian communism, which I will not focus on here, despite their import: one noteworthy feature of these theories is the way they waver on whether a doctrine of socio-political egalitarianism requires a materialist metaphysics to bolster the ultimate “sameness” or equality of all humans, or all living beings in some cases; another feature worthy of more attention is the way in which the consequences of hedonism can be presented as immoralism (La Mettrie at times, Sade definitely), social determinism (Hélvétius) or a critique of both of these (Diderot) (further moral dimensions as well as the importance of determinism are discussed in Harris' Chapter 13, in this volume).



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The core claims run as follows:

(1) Everything that exists is material, or the product of interaction between or relations between material entities. This often took the form of a “cosmological” thesis – i.e. concerning the constitution of the universe as a whole. For example d’Holbach declared “the universe, this vast sum of all that exists, offers us everywhere just matter and motion,” in the first section of his *Système de la nature* (*System of Nature*) (d’Holbach 1770: I, ch. 1, 44). The cosmological thesis was initially framed as an attribution of basic properties such as motion to matter. For instance, Toland rejected the strong distinction between matter and motion: “Matter is but Motion under a certain Consideration” (Toland 1704: C 4). The fifth of the *Letters to Serena* (ibid., 163f.) is explicitly entitled *Motion essential to Matter*, and in it Toland states that “All the Matter in Nature, every Part and Parcel of it, has bin ever in motion, and can never be otherwise” (167), and “there’s but one sort of Matter in the Universe” (174), in a ceaseless process of transformation. In addition – as La Mettrie and Diderot emphasized more dramatically – matter is not just in some sort of “intestine” motion (Toland speaks later on of its “autokinesy”), it is also fundamentally, inherently *active*: “Activity ought to enter into the Definition of Matter, it ought likewise to express the Essence thereof” (165), “action is essential to Matter” (160).<sup>14</sup> Contrary to the common accusation that materialists reduce the world, life and mind to a heap of dead, passive matter, Toland is explicit that “Matter neither ever was nor ever can be a sluggish, dead and inactive Lump, or in a state of absolute repose” (C 3); “I deny that Matter is or ever was an inactive dead Lump in absolute Repose, a lazy and unwieldy thing” (159).

However, it is not as if materialism progresses by simply adding further and further properties to Galilean or Cartesian extension like layers in a millefeuille. Indeed, active matter, or thinking, sensing, living matter was a consequence of criticisms of the Cartesian/Malebranchian notion of inert matter and theory of mechanism that went with it. As Diderot put it, reacting to the classic mechanist metaphor of the watch or clock in his unfinished *Elements of Physiology* (written during the later 1760s and 1770s), “What a difference there is, between a sensing, living watch and a golden, iron, silver or copper watch!” (Diderot 1975–: XVII, 335). The key property of living matter was organic sensitivity (see Gaukroger’s discussion of sensibility in Chapter 16 of this volume, pp. 000).

There are several ways to describe this increasing complexity in matter theory. One reading emphasizes the shift from substance dualism to a theory in which matter takes on some of the explanatory role that “soul” had previously (see Ahnert in Chapter 12 of this volume and Vartanian 1982; Wright 1991; Wolfe and van Esveld, forthcoming). But in addition to this metaphysical shift, there are also crucial interactions with medicine and the life sciences, notably via physicians-turned-materialist philosophers such as La Mettrie or Abraham Gaultier (unknown at the time), or Cabanis at the end of the century. The Montpellier vitalist physician Ménéuret de Chambaud, in his *Encyclopédie* entry “Mort,” described the separation of the soul from the body as a “theological dogma” which was both in contradiction with “the lights of reason” and not “based on any medical observation” (Ménéuret de Chambaud 1765a: 718b). In addition to medicine, physiology, natural history and other disciplines that partly cover the area that we associate now with “biology” (a term and a

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discipline that became defined in the late eighteenth century) all informed the understanding of matter, which was viewed as being composed of living molecules, and defined by its animate properties (“from the elephant to ... the sensing, living molecule, there is not a single point in all of nature that is not experiencing suffering or pleasure”; Diderot 1975–: XVII, 140). This will be further discussed in (3).

This core claim was closely connected with the next, that

(2) every mental phenomenon is just a corporeal (or sometimes just a “physical”) phenomenon or process, or reducible to it, or a consequence thereof. I have intentionally left the expression vague both because there are a wide range of interpretations of “just” (identity, reduction, complete causal explanation) which are materialist, and because many eighteenth-century authors were quite vague. The particularly corporeal dimension is nicely conveyed in the rather free rendering of Lucretius we find in *The Material Soul*: “The soul is to the body as scent is to incense,” or Diderot’s statement, in the *Elements of Physiology* that “the action of the soul on the body is the action of one part of the body on another, and the action of the body on the soul is again that of one part of the body on another” (Anon. 1725: 174; Diderot 1975–: XVII, 334–35). The form of materialism that stressed the importance of organic bodies in explaining mentality, with the status of the brain being that of an organ amenable to analysis like other bodily organs, gained further (if exaggerated) currency in the next century, with the biochemical reductionism of the German *Vulgärmaterialismus*, as in Carl Vogt’s assertion that knowledge of the nervous system fully explains mental life, namely, “thought is to the brain what bile is to the liver or urine to the kidneys.”<sup>15</sup> Here the thesis that brain states are necessary (and even necessary and sufficient conditions of mentality) is supplemented with a detailed medical or physiological account of the nerves, animal spirits or cerebral processes.

The fear that (1) would lead to reductionist forms of (2) (or, perish the thought, identity claims about mind and matter!) was central to early modern physico-theology, in particular to the Boyle Lectures which Robert Boyle had endowed in his will (the title of Richard Bentley’s second Boyle Lecture for 1692 is quite explicit: *Matter and Motion Cannot Think*). As Henry More put it, targeting Francis Glisson’s metaphysics of an “energetic substance,” “only those who deny God and all incorporeal substance, strive to seek the origin of motion and all life which gleams in the universe in matter itself” (More 1679: 607, cited in Henry 1987: 31). The same accusation, in much the same language, runs through eighteenth-century physico-theology, from John Ray’s *Wisdom of God* in the 1690s to Bernard Nieuwentijt’s *The religious philosopher, or, The right use of contemplating the works of the Creator* (1715; first English translation 1719), until William Paley’s *Natural Theology* of 1802 (see Antognazza, Chapter 5 in this volume, for an extended discussion of this tradition).

This is why Newton was so adamant that gravity should not be understood as a property of matter:

It is inconceivable that inanimate brute Matter should, without the Mediation of something else, which is not material, operate upon, and affect other Matter without mutual Contact, as it must be, if Gravitation in the Sense of *Epicurus*, be essential and inherent in it.<sup>16</sup>

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Thus he wrote to Bentley that he “desired you would not ascribe innate Gravity to me”:

That Gravity should be innate, inherent and essential to Matter, so that one Body may act upon another at a Distance thro’ a *Vacuum*, without the Mediation of any thing else ... is to me so great an Absurdity, that I believe no Man who has in philosophical Matters a competent Faculty of thinking, can ever fall into it.

(Ibid.)

But quickly, the issue shifted from the attribution of motion or gravity to matter, to a yet more grievous attribution: thought. No one saw or expressed this more clearly than Fontenelle, the long-time Secretary of the Académie des Sciences, in his 1752 *Théorie des tourbillons cartésiens* (*Theory of Cartesian Vortices*), late in his long career and life. Fontenelle reflected critically on what he saw as the arbitrariness of Newtonian attraction, and added that attributing attraction to matter in terms of God’s will (“wholly arbitrary”) was a small step away from granting it the power to think: “If we grant this arbitrariness, we destroy any philosophical proof of the spirituality of the soul. *God could just as well have granted thought to matter, as attraction*” (Fontenelle 1752: §3; 1829 ed., 71, emphasis mine).

The most celebrated discussion of matter and thought in the early eighteenth century was the pamphlet exchange known as the Clarke-Collins correspondence (Uzgalis 2003). Briefly, Clarke had sought to prove in his *Letter to Dodwell* that consciousness cannot be the property of a system of material parts. According to Clarke, a material thing was divisible. An individual consciousness must be indivisible (“indiscerptible”) and hence immaterial and immortal. Collins responded in his *Reply to Mr Clarke’s Defence* that a divisible system of matter taken as a whole may have a quality not equal to the sum of the qualities of the separate parts (Clarke 1738: III, 769): a rose is a divisible thing, yet its smell cannot be reduced to the sum of the powers of the parts<sup>17</sup> – and thinking might be like this, too. While consciousness, thought, or the rose’s smell may not be the properties of individual parts of these respective systems, they are properties of the whole.

For Clarke, if matter were conscious, then every particle of matter would have a distinct indivisible consciousness. A system of matter made up of such particles could not have an individual consciousness, but would have to be at best a cluster, bundle or “complex of consciousnesses” (O’Higgins 1970: 71). Collins replied that Clarke just assumed that thinking was an individual power. For Collins, *thinking was a mode of matter*: “human consciousness or thinking is a mode of some generical power in matter ... it has generation, succession and corruption like all other modes of matter” (in Clarke 1738: III, 807). In his *Answer to Mr Clarke’s 3d Defence*, Collins further insisted on a connection between the empiricist account of the origin of ideas in sensation, and the materialist account of how “ideas of sensation” originate in the process of “bodies operat[ing] upon us” (Clarke 1738: III, 863). Here, Collins added the other characteristic (and at the time quite new) materialist claim that thinking is a kind of motion in the brain (866).

Clarke was seen for the most part as having won the debate, but Collins’ position persisted. Hume’s discussion of substance in *A Treatise* (1739–40: 1.4.5) takes the

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position associated with Collins at least as seriously as that associated with Clarke, and his famous bundle theory of self (*ibid.*: 1.4.6) seems to show the plausibility of denying the unity of mind or soul – even if he is neutral as to the ontological questions that materialists were interested in (see Ainslie and Ware, Chapter 10 in this volume). Forty-five years after the Clarke-Collins debate Diderot and Maupertuis debated the status of the entity they called the “molecule,” namely, whether it possessed complex properties such as thought, memory and appetite or whether these were properties of the whole, the “organization” in their terms (Wolfe 2010a). Diderot argued the latter position, which was associated with Collins and taken up by Priestley a generation later. For Priestley, it was not the tiniest particles of matter which could think, but their organized whole: “an organized system, which requires a considerable mass of matter” (Priestley 1777: 89).

In addition to these metaphysical questions there were explorations of the relation between mental experience and its putative material base. The classical empiricists – Locke, Berkeley and Hume – distinguished the sources of knowledge or experience from ontological commitments of the sort described above (as do we today: Armstrong 1978). The claim (a) that all of our thoughts come from our sensations is indeed independent of the claim (b) that our body, which is the material basis of our sensations (and our capacity to sense), is the *cause* of our thoughts, or otherwise identical with them.

Locke’s bracketing off of ontological questions and scientific explanations from an analysis of ideas was one of the main things that distinguished classical empiricism from earlier forms of empiricism such as Hobbes’ (Locke 1689: 1.1.2, 2.21.73). But many of the texts in this period, whether by prominent figures such as Hartley or Condillac, or by anonymous (and sometimes known) authors such as Boulainvillier, recast anti-innatist and sensationist themes from Locke (and from medical discussions of sensation and the nervous system) as descriptions of brain and mind; Le Camus explicitly justifies his program for a “medicine of the mind” with reference to Locke’s doctrine of the association of ideas, which, he argues, is only missing a physiological basis (Le Camus 1753: 15). Indeed, even though Locke had been attacked by theologians earlier, it was clearly noted by Jansenist critics of the *Encyclopédie* such as Abraham-Joseph Chaumeix that materialists such as Diderot forced Locke’s claim (a), which was unproblematic, into his own claim (b), which was not (Chaumeix 1758–59: I, 238).

Sometimes these claims were given a metaphysical foundation as well. Beginning with Hartley and Condillac the functioning of ideas is treated more “physiologically” than in Locke. Condillac innovated by exploring the implications of Lockean sensationism with his celebrated thought experiment of the statue in the 1754 *Traité des sensations* (*Treatise on Sensations*), which builds on the 1746 *Essai sur l’origine des connaissances* (*Essay on the Origin of Human Knowledge*; see Falkenstein, Part II, Chapter 15 in this volume). Condillac has us imagine that we have stripped an animate being of all data except what is received through the senses. Once the statue possesses the five senses, it becomes an animal capable of self-preservation (1746 *Essai sur l’origine des connaissances*, in Condillac 1948: I, 222). The more the statue evolves, in a process of sensory intermodality, the more it moves from being passive to being active (1779 letter to Count Potocki, in Condillac 1948: II, 553).<sup>18</sup> This does not in and of itself offer an account of perception and mentality as identical to or directly caused by the brain,

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but it brought brain and mind closer than in Locke for Condillac's inheritors (see Gaukroger on sensibility in Chapter 16 of this volume). Condillac's statue experiment also brought to the fore another aspect of Locke that could be given a materialist spin. In his 1780 *Logique*, Condillac asserted that sensitivity is caused by the communication between sense organs and the brain, and – in a doctrine drawing on Berkeley (see Falkenstein, Part II, Chapter 15) and also held by Diderot – that all of our senses reduce to that of touch. This emphasis on touch and thereby the embodied nature of sensory information is more marked in authors such as Diderot and d'Holbach (as well as in more Epicurean writings such as those of La Mettrie but also the earlier *Âme matérielle*). For them, touch was a potential unifying nexus between physiology and experience, something far from Locke's intentions.

Hartley similarly viewed his project as extending Locke's account but in an enhanced form as a "Newtonian neuropsychology" centering on an analysis of mind (Smith 1987). This was explicitly not meant as a materialist reduction of soul ("I do not, by ascribing the performance of sensation to vibrations excited in the medullary substance, in the least presume to assert, or intimate, that Matter can be endowed with the power of sensation"; Hartley 1749: I, 33) but had both a general materialist outlook (I, 500) and a specifically materialist account of mind according to which small vibrations ("vibruncles") are impressed in the solid filaments of the nerves by external objects; these sensations are transmitted by aetherial vibration to the infinitesimal particles that make up the substance of the brain. By their differences in degree, kind and place, these vibrations represent different primary sensations, or "simple ideas" in the brain, which can become complex ideas through associations with other chains of vibrations (ibid.: I, 13–16).<sup>19</sup> In fact one might go so far as to say that the (often unreflective) interconnection of (1) and (2)<sup>20</sup> was central to and productive for eighteenth-century materialists insofar as over the course of the century more and more particular and scientifically informed analyses of matter were seen as providing more nuanced explanations of how corporeal phenomena give rise to mental processes.

In general when materialists appropriated empiricism they either further expanded the thinking-matter claim – i.e. towards pansychism – or tightened empirical focus on the *cerebral* level, so that an analysis of sensation and cognition included an account of material, cerebral substructure. Yet the two were not exclusive. Toland and Collins, for instance, pointed early on to the role of the brain, but without any appeal to experimental evidence (Toland 1704: IV, §7, 139; Collins, *Reflections on Mr Clarke's Second Defence*, in Clarke 1738: III, 818). And seventy years later, Priestley reiterated this claim, again as a conceptual point without empirical detail:

I rather think that the whole man is of some *uniform composition*, and that the property of *perception*, as well as the other powers that are termed *mental*, is the result (whether necessary or not) of such an organical structure as that of the brain.

(Priestley 1775: xx)

But from the early eighteenth century onwards, texts notably belonging to the clandestine manuscript tradition do embed the empiricist claim that the source of our ideas is the senses into more detailed accounts of the nerves and the animal spirits,

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thus disregarding the empiricist stricture against specifying what sort of material substructure enables processes such as the association of ideas. Thus the *Dissertation sur la formation du monde* (*Dissertation on the Formation of the World*, 1738), when it discusses thinking matter, insists that if sensations are the source of our ideas, it is because they are ultimately material: if the cause of our ideas is material (e.g. brain traces), and “the effect cannot be essentially superior to the cause producing it,” then “ideas are material” (ch. 7, in Stancati 2001: 127, 130). The *Essais sur la recherche de la vérité* (*Essays on the Search for Truth*, dated sometime before 1728), acknowledge that some “mechanical and indeed very plausible explanations of the sense organs” have already been given, but most philosophers have not known how to account for the “action of the sense organs” on a “bodiless entity,” the immaterial soul (pt. 2, in Mori and Mothu 2005: 235). In contrast, the author holds that “the sense organs genuinely act on the animal spirits ... pushing them along certain little channels rather than others” (ibid.); the “interrelation” between the various senses “is material or, which amounts to the same thing, is a mechanical action of the sense organs on the animal spirits” (236).

Crucially, knowledge about the brain was gradually presented as a legitimate source of knowledge (or knowledge constraint) about the mind. Hence the boundary between “mental” or “cognitive” states and “physical” states was often blurred. Minimally, knowledge of the brain was a constraint on knowledge of the “soul,” and the soul was not independent from the brain. This led to the second of the two tendencies described above – localizing thought to particular features and functions of the brain, not to generic features of matter or the body as a whole. For example, Diderot claimed that “Man’s key characteristics lie in his brain, not in his external constitution” (*Elements of Physiology*, in Diderot 1975–: XVII, 326) and described the brain as a highly plastic, modifiable entity:

The soft substance of the brain [is] a mass of sensitive and living wax, which can take on all sorts of shapes, losing none of those it received, and ceaselessly receiving new ones which it retains. There is the book. But where is the reader? The reader is the book itself. For it is a sensing, living, speaking book, which communicates by means of sounds and gestures the order of its sensations.

(Ibid.: XVII, 470)

This led to the naturalization of the “soul,” as just that material organ or part of us which thinks:

The soul is just a pointless term of which we have no idea and which a good mind should only use to refer to that part of us which thinks. Given the slightest principle of movement, animate bodies will have everything they need to move, feel, think, repent and in a word, behave in the physical realm as well as the moral realm which depends on it.

(La Mettrie 1748, in 1987: I, 98)

“Soul” for La Mettrie is the locus of mental activity, of which the brain is the physical substrate, not the metaphysical opposite of matter, or something that survives the body after death.<sup>21</sup>

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(3) In conjunction with (1) and (2), in fact guiding and motivating these positions, many philosophers were committed to a synergistic, anti-foundationalist form of philosophical *reductionism*, both at the explanatory and at the ontological levels. The word “reduction” needs to be tempered by “synergistic” and “anti-foundationalist,” however, insofar as the particular features of the ontology (1) were often populated by particular natural-philosophical and medical-experimental practice, and phenomenology and the analysis of the mental (2) often guided the ontology as well (as described above in (1)). In addition prior materialist traditions (like Epicureanism) or models that could be utilized to organize and present experimentally informed ideas (like Locke’s conjectures, Condillac’s sensationism and even those antithetical to materialism such as Leibniz’s monads) were all part of the ferment. For example Diderot sometimes suggested that “sensitivity or touch is common to all beings” and attributed sensitivity to the molecule, or to matter as a whole, even once identifying Aristotle’s entelechy and Leibniz’s monads with “sensitivity as a general property of matter.”<sup>22</sup> So although the end result was reduction, the process was far more open-ended, eclectic, and experimental.

Initially reduction was conceived in terms of the familiar scientific revolution program that causality – and by extension causal explanations – should be reduced to efficient causality alone, and final causes rejected. Explanations were accordingly mechanistic (and this endured amongst some thinkers such as d’Holbach, although he tended to incorporate the chemical properties of matter therein). But gradually the focus shifted to the “action and reaction” within living beings, e.g. in the vitalist medicine of the Montpellier School that was influential on authors such as Diderot, in which life and health were understood as depending on a “continuous antagonism of actions” (Ménuret de Chambaud 1765b: 435b). This process of organic chemical transformation was also described as a “circle of action” in the organism, which made it impossible to clearly demarcate causes from effects: “at any time, effects therein become causes, and causes in turn become effects” (La Caze 1755: 68), and it became a dominant non-mechanistic trope, which nicely exemplifies how the synergistic and open-ended nature of reduction became more pronounced with changes in natural history and medicine.

Diderot was exemplary of a non-mechanistic, indeed *anti*-mechanistic, materialism. That this was a dominant strand in those who took materialism as a positive position runs almost wholly contrary to the common understanding we have of “mechanistic materialism” as expressed classically by Friedrich Engels (Marx and Engels 1982: 278) and repeated in scholarship more generally. It is not that there was no such thing as mechanistic materialism, a term that could profitably describe thinkers such as Hobbes earlier on, and possibly Hartley (although his “Newtonian” vibratory properties of matter went beyond strict mechanism) and d’Holbach. Rather, much of what was novel about materialism in the period pertains to the ways in which it was *non*-mechanistic: embodied, or vital, without this conversely being at all identical with a more Romantic, anti-scientific attitude (Reill 2005; Kaitaro 2008; Wolfe 2012, forthcoming).

Consider for instance the biomedically and chemically motivated critiques of mechanist explanations from such materialist authors as Bernard Mandeville and Diderot. Mandeville expressed a skeptical attitude towards quantitative approaches in medicine, in his 1711 dialogue *Treatise of Hypochondriack and Hysterical Diseases* (revised 1730 ed., Mandeville 1711: see 175, 201). He grants that “All Fluids likewise

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are subject to the laws of Hydrostatics” (Mandeville 1711: 179), but if we do not know the exact nature of the elements of these entities, calculations are pointless (183). What physicians want to know and they lack is (a) the *causes* of diseases and (b) the properties (“virtues”) of each remedy in the *materia medica* (ibid.). A mathematical model in which the dose of the remedy is proportionate to the quantity of blood in the individual is not forthcoming, since temperaments or individual natures as encountered by the physician do not obey such laws (187). Mandeville the physician was deeply aware that individual cases cannot be explained by a uniform mechanism, and his attitude was shared by philosophers inspired by medical practitioners and experimental life scientists such as Abraham Trembley. Trembley’s experiments on the regenerative faculties of worms and freshwater polyps (or hydras) in the early 1740s<sup>23</sup> had immediate implications for the border between animal and plant kingdoms, traditional theories of generation, but also, in metaphysical terms, for the relation between body and soul and, in the eyes of observers such as Diderot, for the vision of the self-organizing potentialities of matter (which he extended speculatively, having characters in *D’Alembert’s Dream* imagine the possibility of “human polyps on Jupiter or Saturn!”; Diderot 1975–: XVII, 125).

Correspondingly, matter was not a metaphysical *extensa* to be assumed in theory, but instead open to experimental investigation into the particular properties of distinct types of living matter – the plasticity of the cerebellum or the regenerative properties of Trembley’s polyp or in Mandeville’s case, the particular illnesses of patients and their relation to individual constitutions – all of which served as evidence of the sorts of properties and powers possessed by matter. Diderot – whose matter theory centered on epigenetic, living, sensing, self-transforming matter – stated this point as a chemically motivated critique of mathematical abstraction, in his 1770 *Principes philosophiques sur la matière et le mouvement*:

You can practice geometry and metaphysics as much as you like; but I, who am a physicist and a chemist, who takes bodies in nature and not in my mind, I see them as existing, various, bearing properties and actions, as agitated in the universe as they are in the laboratory where if a spark is in the proximity of three combined molecules of saltpeter, carbon and sulfur, a necessary explosion will ensue.

(Diderot 1975–: XVII, 34)

More broadly, he opposed the novelty and conceptual significance of the life sciences to what he (incorrectly) judged to be the historical stagnation of mathematics, here in his *Pensées sur l’interprétation de la nature*:

We are on the verge of a great revolution in the sciences. Given the taste people seem to have for morals, *belles-lettres*, the history of nature and experimental physics, I dare say that before a hundred years, there will not be more than three great geometers remaining in Europe. The science will stop short where the Bernoullis, the Eulers, the Maupertuis, the Clairaut, the Fontaines and the d’Alemberts will have left it. ... We will not go beyond.

(Diderot 1753: §4, in 1975–: IX, 30–31)



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There are echoes here of Buffon's criticism, in the first discourse of his *Histoire naturelle* (1749), of our "over-reliance on mathematical sciences." Buffon, himself a trained mathematician before he moved into natural history, felt that mathematical truths were merely "definitional" and "demonstrative," and thereby "abstract, intellectual and arbitrary," "just abstractions of the mind with no reality" (Buffon 1749: I, 53).

What is notable in this attitude is the effort to conceptualize a new ontology for the emerging life sciences as part and parcel of the reduction. This was very different from both the mechanistic models of Life and the "animist" appeals to the soul as an explanatory or even genuine ontological principle (as in Georg-Ernest Stahl) in the late seventeenth and early eighteenth centuries, which either failed to account for specifically living, goal-directed features of organisms, or accounted for them in supernaturalistic terms. What I described above as reductionism with an embodied focus is also apparent here in the anti-mechanistic, anti-mathematical attempt to provide a successful reductionist model of explanation relying on natural history. Thinking matter in the French context was more likely to be embodied, *living* matter (Yolton 1991: 194), possessed of cognitive properties; it was a form of materialism frequently nourished by vitalist medical arguments, and conversely, some proclamations of vitalist physicians in the period (notably Bordeu, Ménéuret and Fouquet) have an unmistakably materialist content. Consequently, claims such as "Materialists make the ultimate principles matter and motion; vitalists, the soul or an irreducible life force" (Wellman 2003) should be taken with a few grains of salt.

There were a whole range of positions in between an extreme vitalism – in which the material substrate is indifferent to the claims about a vital force or anima – and an extreme materialism – in which the properties of the components exhaustively explain the properties of the whole. In the shared medical and natural-philosophical culture, agreements along these lines were far more important than ideological differences. The main explanatory target of materialism was biological reality; the materialist project was inseparably linked to the project of natural history and the experimental and eclectic attitude of the practitioners of materialist explanation made for many combinations of doctrines. Concepts such as the "circle of action" mentioned above, even if they were motivated by empirical practice (namely, the conviction that causal relations within a living organism could not be grasped strictly in accordance with mechanistic causality), were also rather vague (or alternatively flexible) by our contemporary standards. This was also the case with statements of reduction, such as this one from the eminent Dutch physician and professor of medicine Herman Boerhaave, who was both La Mettrie and Albrecht von Haller's teacher:

If our knowledge of the structure of the organs were exact, if the perceptible nature of the humors was thoroughly known, mechanics would show that various phenomena presented as mysterious and as a source of wonder, in fact derive from simple principles.

(Boerhaave 1703: 109)

That Boerhaave was more open-ended and vague than a twentieth-century physicalist is unsurprising though, given an intellectual context that lacks an idea of theory reduction, or any sense that the "explanatory adequacy of physics" should be the foundation

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on which materialism should build “its superstructure of ontological and cosmological doctrines” (Lewis 1966: 105). Although this should not be overstated, it points to a virtue of these theories: they drew on working experimental concepts and situated their arguments within experimental contexts, not solely within a theoretical account of how exemplary science works.

That said, d’Holbach was closer to this twentieth-century ideal of physicalism than most other thinkers of his century. In typically plain language, d’Holbach asserted that “*there are only physical causes*; moral causes [by which he means mental, affective, cognitive causes – CW] are physical causes which we have failed to understand” (d’Holbach 1770: I, ch. 1, 38, 40); “if we consult our experience, we will find that our minds are subject to the same physical laws as material bodies” (ibid.: I, ch. 11, 220). But such ontological uniformity would prove to be too crude for philosophers like Diderot to account for specific mental properties – here we can see how there was a reciprocal relation between (2) and (3) in addition – and would require more specific explanations, drawing on particular features of bodies and explanations particular to the life sciences. One implication of this tension between more physicalist and less experimental, and more experimental and organicist forms of reductionism was that unlike its later versions, materialism here is often an irreducibly *embodied* project, whether in Boerhaave’s sense that the mysteries of the body should be reductively explained in terms of organs and humors, or in the more familiar philosophical sense that the soul or mind should be accounted for in terms of the body or whole organism, as in La Mettrie’s description of the soul as “just that part of us which thinks” (La Mettrie 1748, in 1987: I, 98).

One should not understate, though, how speculative the use of experimental evidence and natural philosophy was, and how interested materialists were in turning it to surprising purposes; they were indeed often as motivated by the radical ends that the concepts gave rise to as by any empirical evidence. A case in point is the appeal to epigenesis in the evolving matter theory of the period. Consider Collins’s usage of the epigenetic theory as a way to challenge the idea of an immaterial, immortal soul:

That the Matter of which an Egg consists, doth intirely constitute the young one, and that the Action of Sensation began under a particular Disposition of the Parts by Motion, without the Addition of an Immaterial and Immortal Soul, as the Powers of Vegetation, Gravitation, of producing the Sensation of Heat, Cold, Red, Blue, Yellow, are performed without the Addition of an Immaterial and Immortal Soul.<sup>24</sup>

This could be seen as contentious, and empirically is based on nothing more than the observation of an egg, but it is a neat instance of a materialist thinkers moving from an empirical claim, itself connected to shifts in theories of generation (here, epigenesis) to the deflation of any hypothesis concerning immaterial souls – and potentially, to a monist metaphysics of living matter.

Consequently it should be strongly stressed that materialism was not anti-metaphysical, but rather anti-foundationalist. And at least some of its advocates self-consciously made use of highly speculative concepts (or appropriations of purportedly empirical evidence), from epigenesis and spontaneous generation to the polyp,

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monstrous births and other illustrations of a kind of Lucretian chaos at the heart of biological life, which were sometimes connected to metaphysics, as in the above case of the “modern Spinozists” described in Diderot’s *Encyclopédie* article “Spinosiste.” Although this is an idiosyncratic invocation of Spinoza, it is in keeping both with the way in which materialists took over and altered older concepts which might not seem amenable to materialism (or were positively hostile) and the partially speculative nature of the enterprise.

Discussions of epigenesis often connected apparently empirically based accounts of the *self-organization* of matter with a concept, epigenesis, which was in fact less a biological theory than a part of a revised metaphysics of matter. If Cudworth and Bentley had feared the idea that matter could *think*, by the mid-eighteenth century the fear is primarily directed towards *living*, self-subsisting, self-organizing matter. Kant, in the 1786 *Metaphysische Anfangsgründe der Naturwissenschaft* (*Metaphysical Foundations of Natural Science*), and subsequently, argued at length against this view, which he called hylozoism, and sought to eliminate its possibility from our concepts of nature; he viewed it as “the death of all philosophy of nature.”<sup>25</sup>

A passage from Diderot’s *D’Alembert’s Dream* makes evident how speculative (as well as potentially radical) such concepts were:

Do you see this egg? With this you can overthrow all the schools of theology, all the churches of the world. What is this egg? An unsensing mass, prior to the introduction of the seed [*germe*]; and after the seed has been introduced, what is it then? Still an unsensing mass, for the seed itself is merely an inert, crude fluid. How will this mass develop into a different [level of] organisation, to sensitivity and life? By means of heat. And what will produce the heat? Motion.

(Diderot 1975–: XVII, 103–4)

The attack on theology is a familiar materialist motif, but what is more unusual here is the expansion of the concept of matter to include, not just sensitivity, thought and life, but self-organization, to the extent that it can fully account for the emergence of genuine individuals. This was meant as a challenge to all and any orthodoxy. The dumbest matter has the power of self-organization and can give rise to all complexities of mind without recourse to external authority, as Kant feared.

This autopoietic character of matter in much of the period’s discussions was often missed by the Romantics, who ironically shared Engels’ later vision of “mechanistic materialism” as a bugbear. Consider Goethe’s reaction to d’Holbach’s *System of Nature*:

I recollect particularly the *Système de la Nature*, which we laid hold of with curiosity. We could not understand how such a book could be dangerous. It seemed to us so gloomy, so Cimmerian, so deathly [*so grau, so cimmericisch, so totenhaft*], that we could hardly endure its presence, and shuddered before it as before an apparition. ... But how vacant and desolate our souls grew in this sad atheistic twilight [*tristen atheistischen Halbnacht*]! – in which the earth vanished with all its forms of beauty, and the heaven with all its stars. Only

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matter remained, moved from eternity hither and thither, right and left, with  
no other power, on all sides producing the endless phenomena of existence.  
(*Poetry and Truth* XI, in Goethe 1887–1919: 69–70)

Goethe is describing a reaction that was also common in Coleridge and other authors who were deeply invested in the philosophy of nature: that materialism was a dehumanizing form of reduction that stripped Nature of life and meaning (a criticism also reminiscent of the more recent charge that materialism is “disastrous” when applied to the inner life; Hill 1968). Goethe missed the point that the stress on living, self-organized matter and the criticisms of mechanism in French materialism (and differently, in Collins and others) were meant to supersede the dichotomy of inert matter/active thought.

Similarly Diderot’s epigenetic point was not strictly that a commitment to understanding biology entails atheism, again as many of the critics had it, but rather an anti-essentialism. D’Holbach clearly granted that he did not know the origin of our species: “From whence comes man? From which initial origin? Was the first man the effect of a random encounter of atoms? ... I know not. I would have no better an answer to the question, from whence came the first stones, the first trees, the first lions, the first elephants, the first ants, the first acorns?” (d’Holbach 1772: I, §42). It was rather a commitment to anti-foundationalism which Diderot saw as underlined and furthered by the open-ended investigation of matter which showed its potentially endless self-organizing properties. Goethe was correct that the materialist rejected the foundational character of mind (as in Cudworth’s conviction that mind is “senior to the world”; Cudworth 1678: bk. 1, ch. 4, 729, 736–37; bk. 1, ch. 5, 853), but the materialist also rejected ultimate knowledge of essences (à la Locke), or of the beginning of the universe, and of the ultimate nature of matter. As the *Dissertation on the Formation of the World* put it, “isn’t it in vain that we seek to define the original form of matter?” (ch. 2, in Stancati 2001: 96). A variety of texts, from Meslier’s *Mémoire* (written in the 1720s but unknown until a generation later) to the *Encyclopédie* article “Matière,” speak out against “first principles.” Émile Littré commented in his nineteenth-century medical dictionary that ancient materialism was a metaphysics which sought to explain the origin of the world, whereas modern materialism forgoes any speculation on the nature or origin of matter (Littré and Robin 1863: 908), although as we have seen in Toland, Deschamps or Diderot this did not imply an aversion to speculation or metaphysics. Yet it was definitely anti-foundationalist.

There were other notable doctrines in this deliberately eclectic combination (which was often directed against the systems of the previous century). It was known to be “a fundamental principle for this kind of philosophers [sc. materialists, CW] that animals are barely different from humans” (Chaumeix 1758–59: I, 200). Building on suggestions made earlier by Spinoza and Hume (that animals can feel, and then by extension, that their cognitive states differ from ours only by degree), and stimulated also by anatomical and anthropological observations on “orang-utans” (the catch-all eighteenth-century term for primates), materialists such as La Mettrie asserted that “from animals to man, the transition is not violent” (La Mettrie 1748, in 1987: I, 78). La Mettrie represented a characteristically extreme form of this view when he claimed that an operation on an orang-utan’s larynx would allow it to go to school

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with human children and developmentally progress as they do. Others who accepted that the difference between animals and humans was for the most part one of degree, not of kind, were more skeptical. Some seventy years prior to La Mettrie's reflections on speaking apes, in a 1674 report to the Académie des sciences, Fontenelle had already commented on a proverb he attributed to tribal peoples ("monkeys could speak if they wanted to"), that this might be true, but if "monkeys do not articulate sounds and establish a language amongst themselves," it is not (as La Mettrie was to suggest later on) "due to a defect in their organs" but rather "because they are deficient in intellect [*esprit*]" (cited in Boullier 1737: II, 213n).

### Conclusion

Materialism spanned several conflicting positions, sometimes in the same author: (i) a robust naturalistic project to *identify* (rather than *locate*, localization being more specific to nineteenth-century neuroscience) mental functions with particular bodily and/or cerebral organs or organ systems, which was sometimes presented as a more experimentally founded outgrowth of empiricist investigations into the origins of knowledge in sensation; (ii) a speculative, sometimes programmatic attempt to go beyond the limitations of mechanistic empirical science, itself building on the transformations in matter theory, physics, medicine, etc. (as in the above example of the integration of Spinozism and epigenesis); and (iii) a more skeptical project to demystify metaphysical systems, insisting on the finite and provisional character of our knowledge, even if its extension of empiricism and exploration of hedonistic ethics also led to its anti-skeptical descriptions of our relation as living agents to the physical world surrounding us.

As noted, materialism was not necessarily committed to one particular definition of matter – if it had been, it would then be much easier to refute, notably with appeals to further developments in physics. Indeed, the way in which materialism was more speculative, or conversely more skeptical than what we might imagine as the philosophical facilitator for scientific progress, goes well with its radicalism – which was sometimes presented as flowing from a materialist metaphysics, sometimes not (from the Deist-type desire to reform religion and metaphysics [Collins, Toland], projects for social reform [Meslier and Helvétius, d'Holbach and Priestley] to attacks on the sanctity of norms and values [La Mettrie]).

But the more surprising implication is (iv) that the relation of materialism to experimental science is less self-evident than we might expect. While some scholars, going back to Lange, view materialism as re-emerging due to Renaissance interest in science, it was at least as much a partial product of the revived interest in Greek texts, as concerned with religion and ethics as it was with "science" and the attendant problems of the latter disciplines (Mijuskovic 1974: 13n). Materialism in this period was an emancipatory project, at least as far back as the *Treatise of the Three Impostors* – and this is a crucial difference from later forms of the doctrine, which tend to either just reduce to scientism (in the nineteenth century) or focus on metaphysical rather than ethical, social and political issues (in the twentieth century).

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Indeed, contrary to the forms of materialism we encounter in the nineteenth and twentieth centuries, materialism here does not view its role as being a handmaiden or underlabourer of science. That would amount to “passing [one’s] life observing insects” (La Mettrie, *L’Homme-plante*, in 1987: I, 300). One can also see this in the speculative character of many of the life science examples (epigenesis, not to mention spontaneous generation), sometimes for want of experimental evidence. As Jacques Chouillet noted, “if we say that materialism is a useful hypothesis, notably in biology, where it leads to better results than the reverse hypothesis, that is fine”; if on the contrary, we say that, e.g. Diderot’s materialism is experimentally proven, or based on the experimental method, “we run into grave objections: neither the shift from inert to active sensitivity, nor spontaneous generation belong to the experimental method” (Chouillet 1984: 52–53).

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### Notes

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- 1 All translations are my own unless otherwise indicated.
- 2 This claim may seem overstated given the existence of earlier forms of naturalism such as Averroism. I am using “naturalism,” though, in the restricted sense above, with a frequently medical emphasis, as we shall see; this is different from earlier monistic arguments that the world or the universe are wholly natural, as in Epicurus, Lucretius and Spinoza, although these were common to eighteenth-century materialist discussions as well.
- 3 Bloch 1995 is the basic source here, to which one can add Benítez 1998: 355 (where he signals an earlier usage of the term in French, in Friedrich Spanheim’s 1676 *L’Impie convaincu*). In 1698, the royal police discovered at the home of one Bernard de Fourcroy an anonymous manuscript entitled *La croyance des matérialistes* (*The Creed of the Materialists*, Adam 1967: 34).
- 4 See Bloch’s classic 1978 paper “Sur les premières apparitions du mot ‘matérialiste,’” reprinted in Bloch 1998.
- 5 The chapter on Locke had circulated in clandestine form separately, under the title “Lettre sur Locke” or “Lettre sur l’âme,” from 1728 onwards.
- 6 Des Maizeaux 1720: I, 241–350; Collins’s text was retranslated by the blind philosopher Pierre Lefèvre de Beauvray under the title *Paradoxes métaphysiques sur le principe des actions humaines* (at “Eleutheropolis,” 1754), with additional annotations defending materialism and determinism.
- 7 See Thiel and Wunderlich’s recent work, notably in Klemme *et al.*’s (2013) edited volume.
- 8 The belief that Christians are truly dead until the bodily resurrection. As Mandeville put it, “Nor is it clashing with Christianity to affirm ... that Man is wholly mortal. ... The Resurrection of the same person ... must necessarily include the Restitution of Consciousness” (Mandeville 1711: 51).
- 9 Something Descartes does not say, but which sounds like a radicalization of various passages in *Le monde* (esp. chs. 6–7). Authors including Formey, Voltaire, Maupertuis and Kant credit it to Descartes. Diderot cites the formulation in the article “Chaos” (*Encyclopédie* III, Diderot and d’Alembert 1751–80: 158b), and d’Holbach gives variations on it in the *System of Nature* (the first chapter of which is an extended commentary on the theme).
- 10 Gassendi, *Syntagma philosophicum* II: *Physica*, §I, iv, 8, in Gassendi 1658: I, 337a.

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- 11 One indication: Diderot's 1769 experimental philosophical dialogue *D'Alembert's Dream*, which he valued highest of his works together with an essay on probabilities, was first entitled *Democritus's Dream* (Nageon 1821: 213).
- 12 We do encounter actual Spinozists in the less-known corners of this century, e.g. figures such as the radical Benedictine monk Dom Deschamps, who authored a then-unpublished treatise of Spinozist metaphysics in the 1760s, centering on "the Whole" and its relations which he presented to (a rather startled) Diderot on one visit. Deschamps criticized anti-metaphysical materialists of his day such as d'Holbach as grasping the "branches" of the system of nature, not its "roots" (Deschamps 1993: 166, 83–84).
- 13 See (with some reservations) the essays on this topic in Belaval 1976.
- 14 Toland assures the reader that it is the all-powerful God himself who, in his perfection, created matter as active (and not merely extended) (Toland 1704: 234–35).
- 15 Vogt 1847: XIII, 323 (a lecture from 1845); the original formulation is actually from Cabanis 1802: 151 (the lectures forming the basis of the latter publication were given in the late 1790s).
- 16 Newton to Bentley, 25 February 1693, letter 3 in Newton 1756: 25, also in 1958: 302. He adds that "Gravity must be caused by an Agent acting constantly according to certain Laws; but whether this Agent be material or immaterial, I have left to the Consideration of my Readers." (For a more detailed treatment of Newton and Newtonianism in this context see Schliesser, Chapter 2 of this volume.)
- 17 Collins, in Clarke 1738: III, 770 (this controverts Clarke, letter to Dodwell, in Clarke 1738: III, 759). For further discussion on the divisibility of matter here, see Holden 2004: esp. 120–21.
- 18 Neither Locke nor Condillac have a vision of the mind as inherently passive as is sometimes claimed of empiricism (see Taylor 1964: 92).
- 19 Hartley's way of "fleshing out" Lockean associationism influenced, through Priestley, figures such as Erasmus Darwin (the grandfather of Charles), who wrote in his philosophico-naturalist poem *The Temple of Nature* (1803) that "in thick swarms Associations spring / Thoughts join to thoughts, to motions motions cling" (canto 1, ll. 276–77, in Darwin 1803: 25).
- 20 The *Encyclopédie* combined (1) and (2) and defined materialists as "those who argue that that the human soul is composed of matter" (Anon., "Matérialistes," 1765, in Diderot and d'Alembert 1751–80: X, 188). The entry on "Materialists (Atheists)" in the revolutionary-era *Encyclopédie méthodique* distinguished between variants of (1) and (2), but observed that they are often collapsed: "materialists argue either that man's soul is matter, or that matter is eternal and is God; or that God is just a universal soul distributed throughout matter which moves and arranges it, either to produce beings or to create the various arrangements we see throughout the universe" (Nageon 1794: III, 208).
- 21 The reduction of "soul" to a psychological definition here prefigures Bonnet's reworking of the concept in his 1755 *Essai de psychologie* (subtitled *Considerations on the Operations of the Soul*) and his 1760 *Essai analytique sur les facultés de l'âme*; Bonnet ends up using *âme* and *esprit* interchangeably. For more on the shift from "soul" to "mind" overall, see Ahnert in Chapter 12 of this volume; the extent to which this process is strictly one of naturalization remains open to discussion.
- 22 *Éléments de physiologie*, in Diderot 1975: XVII, 308; "Leibnitzianisme," 1765, in Diderot and d'Alembert 1751–80: IX, 371.
- 23 Trembley, Bonnet (who was his cousin) and the prominent naturalist Réaumur conducted such experiments notably by cutting the polyp into sections lengthwise, revealing the creature's remarkable regenerative features. One major motivation for the experiments was the nature of the polyp: animal or plant? Trembley determined that the polyp moved like an animal, yet upon dissection regenerated into a wholly new body, like a plant. Réaumur was excited by the results and immediately announced them to the Paris Académie des sciences. By the time Trembley's discoveries appeared in print in the *Philosophical Transactions of the Royal Society*, most of the scientific community was already familiar with them, and they were replicated on other organisms. Scientific support and wide confirmation of his results led to Trembley's election to the Royal Society in 1743, with full publication in Trembley 1744.

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- 24 Collins, *Reply to Mr Clarke's Defence of his Letter to Mr Dodwell*, in Clarke 1738: III, 768.  
25 *Metaphysische Anfangsgründe* III.3, in Kant 1786: Ak IV, 544. Prior to the first *Critique*, in a 1773 letter to Marcus Herz, Kant already insisted that in his anthropology lectures he would avoid “eternally futile inquiries as to the manner in which bodily organs are connected with thought” (Ak X, 145, discussed in Huneman 2008: ch. 6), as opposed to what he would call pragmatic anthropology

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