

‘Procedes Huc’: Voltaire, Newton, and Locke in *Lettres Philosophiques*

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Abstract In *Lettres philosophiques*, Letter XIII is devoted to Locke, as are Letters XIV–XVII to Newton. The ordering of these letters is not adequately explained by comparing the dates of birth or death of the two thinkers. For the Letter on Locke not only precedes but also ‘frames’ those on Newton, in the sense that it provides the reader with a guide through the philosophical intricacies of Letters XIV–XVII. This works in two ways. On the one hand, in order to defend Newton against his detractors Voltaire broadly adopts Locke’s perspective on the relation among words, ideas and things. On the other hand, he subtly and misleadingly grafts Locke’s epistemology onto the *Principia*, though it differs from Newton’s epistemology in significant respects. For Locke, unlike Newton, holds that we can identify fixed, permanent limits concerning what kind of thing humanity can know of matter and the universe. Voltaire presents Newton’s ideas as though they respected Locke’s limits. However, we can glimpse Voltaire’s own attitude in the final words of Letter XV: ‘Procedes huc, et non ibis amplius’: Voltaire agrees more closely with Locke than Newton concerning the limits of epistemology.

Keywords Voltaire · *Lettres philosophiques* · Locke · Newton · Epistemology · Natural philosophy

Introduction

Within *Lettres philosophiques* (1734) a central series of Letters (XII–XVII) is devoted to three famous English thinkers, referred to by a modern commentator as ‘the [...] triumvirate of *novatores*: Bacon, Newton, Locke’ (Tornelli 1971:

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221).¹ In Letter XII, on Bacon, Voltaire grants the author of the *Novum Organum* the title ‘père de la philosophie expérimentale’ (Voltaire 1961: 34), but worries about his superstitious tendencies (1961: 36). Nevertheless, he notes admiringly that Bacon had postulated ‘cette attraction nouvelle dont M. Newton passe pour l’inventeur’. Voltaire cites Bacon as follows: ‘Il faut chercher, dit Bacon, s’il n’y aurait point une espèce de force magnétique qui opère entre la terre et les choses pesantes, entre la lune et l’océan, entre les planètes, etc.’ (1961: 35–36). This plants a seed in the reader’s mind: experimental philosophy (associated with scientific progress) leads to the discovery of attraction. But it is above all in Letter XIII, ‘Sur M. Locke’, that Voltaire predisposes the reader to accept Newton’s discovery. He does so in two particularly important ways. First, he uses Locke’s views on words, ideas and things to buttress the case he makes for Newtonian as opposed to Cartesian physics. Second, he attributes to Newton a key aspect of Locke’s epistemology: the assertion that there exist insuperable limits to what natural philosophers can ever discover concerning the universe. This second use of Locke, however, is tendentious, indeed misleading; for (as we will see below) Newton does not agree with Locke concerning the existence of such limits. In brief, when we attend closely to the relevant passages of *Lettres philosophiques*, we infer that Voltaire’s own epistemology in the 1730s is closer to Locke’s than Newton’s. Like Locke, Voltaire insists that some secrets concerning the universe must remain forever beyond the grasp of mere humans, and so known only to God. Below, I will focus on Letters XIII–XV to show how Voltaire uses Locke and Newton to make his case in the manner I have just described.

Letter XIII: Voltaire on Locke

Towards the beginning of Letter XIII, Voltaire offers the following summary of Locke’s *An Essay Concerning Human Understanding*:

Locke, après avoir ruiné les idées innées, après avoir bien renoncé à la vanité de croire qu’on pense toujours, établit que toutes nos idées nous viennent par les sens, examine nos idées simples et celles qui son composées, suit l’esprit de l’homme dans toutes ses opérations, fait voir combien les langues que les hommes parlent sont imparfaites, et quel abus nous faisons des termes à tous moments. Il vient enfin à considérer l’étendue ou plutôt le néant des connaissances humaines. C’est dans ce chapitre qu’il ose avancer modestement ces paroles: ‘Nous ne serons jamais peut-être capables de connaître si un être purement matériel pense ou non.’ (1961: 39)

This summary will be especially important for Voltaire’s discussion, in Letters XIV and XV, of whether motion is better explained by impulsion (the Cartesian view) or

¹ Tornelli does not propose to re-affirm the founding role of such thinkers; rather, he explores their significance for ‘the self-conscious and manifest attitude of the Anglo-French Enlightenment towards the past’, in a period when philosophy ‘partially becomes the servant of science’ (221; 243).

attraction (the Newtonian view). Two themes picked out by Voltaire in the passage quoted will prove especially relevant: first, Locke's analysis of various abuses of language; second, Locke's insistence on the existence of fixed, indeed divinely ordained limits to the progress of natural philosophy. As a prelude to seeing how Voltaire uses these ideas, let us refer back to the relevant passages within *An Essay concerning Human Understanding*.

When Voltaire writes that Locke 'fait voir combien les langues que les hommes parlent sont imparfaites, et quel abus nous faisons des termes à tous moments' (1961: 39), he clearly alludes to Locke's chapter 'Of the Abuse of Words' (Locke 2004: 437–452). Here, Locke asserts that, strictly speaking, words do not stand for 'things themselves', but are 'the signs of our ideas only' (2004: 444). But 'men would not be thought to talk barely of their own imagination, but of things as really they are'; and so 'they often suppose the words to stand also for the reality of things' (2004: 365). Locke is suggesting that we should avoid naïve assumptions that our words refer directly and reliably to the real essence of things in the world. Matters are not helped by the fact that words can and are often learned in the first instance, especially by children, as mere sounds, without being linked to ideas. If this is not remedied in later life, then 'some, not only children, but men, speak several words, no otherwise than parrots do' (2004: 36). Locke's common-sense recommendation is to establish 'a constant connexion between the sound and the idea; and a designation, that the one stand for the other: without which application of them, they are nothing but so much insignificant noise' (2004: 366).

So much for the abuse of language. Now let us move on to the second Lockean theme which Voltaire will echo in the Letters on Newton: the theme of philosophical 'modesty', connected with Locke's conviction that our knowledge of the real essence of things is and must remain partial and approximate. We have seen that Voltaire writes, towards the end of his summary, 'C'est dans ce chapitre [que Locke] ose avancer modestement ces paroles: "Nous ne serons jamais peut-être capables de connaître si un être purement matériel pense ou non"' (Voltaire 1961: 39). The adverb 'modestement' is heavy with philosophical implications, which begin to emerge if we follow Voltaire's reference to its source. The phrase 'l'étendue ou plutôt le néant des connaissances humaines' clearly alludes to Locke's chapter 'Of the Extent of Human Knowledge' (Locke 2004: 478–498). There we find the statement which (as we have seen) Voltaire describes as 'modest': 'We have ideas of matter and thinking, but possibly shall never be able to know whether any mere material being thinks or no' (Locke 2004: 480).² Read in context, Locke's statement concerning the 'thinking matter' thesis can be seen to form part of the general case he makes that there are permanent, fixed limits to human knowledge. In these particular lines, Locke prudently softens his statement concerning the soul by using the word 'possibly'; elsewhere, however, he asserts without a trace of nuance that there are many things about the universe that we cannot know, be it now or—

² In *Letters Concerning the English Nation*, Locke's words are given as follows: 'We shall, perhaps, never be capable of knowing, whether a Being, purely material, thinks or not' (Voltaire 2009: 57).

vitality—at any point in the future.³ Furthermore, Locke asserts that God has ensured that this is the case (2004: 275).

In order to understand Locke's claim in context, it will be useful to recall the importance of the distinction (familiar to corpuscularian thinkers) between primary and secondary qualities of 'bodies' or, as Locke also calls them, 'things themselves'. The chapter 'On the Extent of Human Knowledge' to which Voltaire alludes emphasizes with particular force that there is an absolute limit to what we can ever know of primary qualities; and for Locke this, in turn, limits our knowledge of the universe as such. But it is important to note that the same theme is woven through all four books of the *Essay*. Locke most often uses gold to illustrate this idea. Children and the vulgar, he contends, think of the colour yellow as belonging to gold, or somehow part of the (real) essence of the thing gold. But for Locke, colours are secondary, not primary qualities. Primary qualities are those of which we can be certain that they belong to things, and for Locke they are extremely limited in number: 'Thus I call original or primary qualities of body, which I think we may observe to produce simple ideas in us, viz. solidity, extension, figure, motion, or rest, and number' (2004: 135). These qualities give rise to human perceptions of secondary qualities such as colour. Philosophers should take care not to confuse the two: 'Yellowness is not actually in gold; but is a power in gold to produce that idea in us by our eyes, when placed in a due light' (2004: 273). Locke characterises his resignation to the idea of epistemological limits as a kind of natural-philosophical 'modesty': 'I think not only that it becomes the modesty of philosophy not to pronounce magisterially, where we want that evidence that can produce knowledge; but also, that it is of use to us to discern how far our knowledge does reach' (Locke 2004: 481).⁴ But modesty of the philosophical kind is surely in the eye of the beholder; Locke's own takes the form of an absolute, seemingly prescient (and arguably dogmatic) insistence that there is a line in natural philosophy that will never be crossed. Note, in the following passage, his uncompromising use of 'incurable' and '[not] discoverable':

Besides this ignorance of the primary qualities of the insensible parts of bodies, on which depend all their secondary qualities, there is yet another and more incurable part of ignorance [...]; and that is, that there is no discoverable connexion between any secondary quality, and those primary qualities that it depends on. (Locke 2004: 484)

But whilst insisting on such limits, Locke also has a consolation to offer, and it is a metaphysical one. Such knowledge of bodies as may be had from the senses and disciplined reflection is reliable and sufficient to human needs; for 'though we

³ I write 'prudently' because to question the immateriality of the soul was still a radical and potentially dangerous move in Locke's time. It is not unreasonable to suppose that, given free reign, he might have omitted the word 'possibly' in the quotation above, not in order to embrace materialism, but simply to assert, without qualification, that we do not know, and never can discover, the nature of the soul.

⁴ Philosophical modesty becomes a leitmotif in Voltaire's writing. For instance, in the *Traité de métaphysique* of 1737, he will state as a general principle (à propos of speculations concerning the soul): 'Je n'avance pas davantage dans ces ténèbres; je m'arrête où la lumière de mon flambeau me manque: c'est assez pour moi que je voie jusqu'où je peux aller' (Voltaire 1961: 186).

cannot, by the faculties we have, attain to a perfect knowledge of things; yet they will serve us well enough for those ends above-mentioned [our business in this life, and how we will be judged by God], which are our great concernment. (2004: 275).⁵ Here, the words ‘we cannot, by the faculties we have’ rule out significant future progress in natural philosophy. Even with the aid of microscopes or telescopes, it seems, we will never cross the divinely ordained limit that keeps us at a distance from the real essence of material things. But that limit also keeps us safe. Imagining what would happen if any given man’s eyes were ‘1000, or 100,000 times more acute than it is now by the best microscope’, Locke speculates ‘he could not endure bright sunshine, or so much as open daylight’; and certainly he would encounter problems ‘if he could not see things he was to avoid, at a convenient distance’ (2004: 274). If we had eyes to see microscopically, we might penetrate, through our super-sight, to the real essence of bodies, but would then doubtless fall into a hole or be run over by a carriage—a case of seeing certain things as they really are, but also of not seeing the wood for the trees. If we now return to *Lettres philosophiques*, we can see that when Voltaire portrays Locke as a modest philosopher, he alludes, as does Locke himself, to the role which the notion of permanent, insuperable limits to human knowledge plays within his epistemology.⁶ Letter XIII opens with an extended comparison between Locke and a list of famous predecessors, from Anaxagoras via Plato to the Scholastics and Descartes (Voltaire 1961: 37–38). Voltaire writes that whilst ‘Tant de raisonneurs avaient fait le roman de l’âme, un sage [=Locke] est venu qui en a fait *modestement* l’histoire’ (1961: 38; emphasis added). Locke’s agnosticism concerning the soul’s immateriality is used by Voltaire, as we saw above, to illustrate the ‘modesty’ of the English thinker’s approach. But at the most general level, the philosophical ‘modesty’ which the *philosophe* praises in Locke consists in the assertion that human knowledge of the universe, now and forever, can extend (to so speak) ‘thus far and no further’, and that this is for the good of humanity.

A Frenchman Arriving in London

By recalling Locke’s epistemology immediately before embarking on his discussion of Newton, Voltaire implicitly offers that epistemology as a frame for what follows. Locke’s views may, then, be uppermost in our minds as we read the opening of Letter XIV:

⁵ The idea of sufficiently reliable knowledge of bodies is linked to Locke’s distinction between degrees of knowledge. ‘Intuitive’, ‘demonstrative’, and ‘sensitive’ knowledge are all possible; but sensitive knowledge, whilst sufficient for our earthly existence, leaves us confronted with a gap between the nominal and real essences of things (with real essences remaining beyond our reach). This is discussed throughout Book IV, where the degrees of knowledge are named in Chapter II (2004: 471–478).

⁶ Voltaire was not alone in recommending Lockean ‘modesty’ during this period. Heilbron indicates a ‘general line’ of anti-Cartesian argument, ‘called “modest” by its friends and “pyrrhonic” by its enemies’ (1982: 49). Heilbron links this trend to the following ‘Lockean element’: ‘[our ideas] at best correspond to, but do not reach, the ultimate nature of things, in particular we have no notion of the essence of matter’ (1982: 48).

Un Français qui arrive à Londres trouve les choses bien changées en philosophie comme dans tout le reste. Il a laissé le monde plein; il le trouve vide. À Paris, on voit l'univers composé de tourbillons de matière subtile; à Londres, on ne voit rien de cela. Chez nous, c'est la pression de la lune qui cause le flux de la mer; chez les Anglais, c'est la mer qui gravite vers la lune. (Voltaire 1961: 54)

Voltaire skilfully alternates Cartesian and Newtonian vocabulary here. Cartesians argued there could be no empty space in the universe, whilst Newtonians did not; Cartesians argued that the planets were pushed or 'impelled' around their orbits by vortices of subtle matter, which Newtonians denied; and so on.

J.B. Shank comments that this passage 'clarifies the Newtonian/Cartesian debate' (2008: 316). However, many readers may find themselves confused, and this may happen precisely because of Voltaire's careful use of natural-philosophical terms. Voltaire's Frenchman finds 'les choses' changed, it seems, in two distinct but complementary domains: 'la philosophie' on the one hand, and 'tout le reste' on the other. 'La Philosophie' is clearly to be understood as natural philosophy.⁷ But what is 'tout le reste'? The most logical answer, I contend, is: things in themselves (the objects of natural philosophy). So far, so good. But now Voltaire proceeds to provide us with examples of 'choses changées' observed by his Frenchman: a plenum here, a vacuum there; vortices here, no vortices there; and so on. And it is not clear which changed thing belongs to which category. The blank statement 'Il a laissé le monde plein; il le trouve vide' makes no distinction between the *idea* of a plenum and an *actual* plenum, the *idea* of a vacuum and an *actual* vacuum.⁸ Two assertions thus jostle with each other to occupy the same sentence. The first assertion is simply that the Frenchman hears Cartesian views expressed here, Newtonian views there. The second assertion is that the Frenchman discovers the Universe to be, in point of fact, a plenum here but a vacuum there. This latter assertion makes no sense (the universe, being one, cannot differ from itself). But the comical effect of the passage surely depends on the fact that both assertions are in play: if we remove the words 'et tout le reste', all humour evaporates, along with Voltaire's carefully crafted ambiguity. To put this another way: if we smile, it is because we feel ourselves, along with Voltaire's travelling Frenchman, entering a realm where words, ideas and things become hopelessly indistinct; and this is the case, it is not in spite but on account of Voltaire's use of natural-philosophical terms.⁹

At this point, in case we have failed to remember Locke, Voltaire reminds us that his *Essay* is relevant to the debate: 'L'essence même des choses a totalement changé

⁷ The *Dictionnaire* of the Académie française gives the following, primary definition, in all editions from 1694 to 1798: 'Science qui consiste à connaître les choses par leurs causes et par leurs effets.' The equivalent term 'philosophie naturelle' also exists in the period.

⁸ Similarly, the statement 'À Paris, on voit l'univers composé de tourbillons de matière subtile; à Londres, on ne voit rien de cela' does not inform the reader whether 'seeing' is performed by the faculty of understanding, or by the eyes (which might supposedly observe the effects of vortices).

⁹ To suggest more precise explanations of 'tout le reste' (such as manners and customs, the treatment of smallpox) is simply to devise narrower classes of 'things', or phenomena, to be analysed. There is no escape from Voltaire's carefully constructed muddle.

[...]. Descartes assure que l'âme est la même chose que la pensée, et Locke lui prouve assez bien le contraire' (1961: 54). This fresh allusion to Locke (where we might expect Newton) suggests that exposure to his epistemology would do the Cartesians good; after all, Locke proves his point 'assez bien'. But the allusion also reminds us of Locke's analysis of language and its abuses. The latter point seems particularly pertinent; for we have seen that the first paragraph of Letter XIV exemplifies how muddled we become if we fail to use words in such a manner as to distinguish ideas of things from things themselves. Read through a Lockean lens, it seems that the Cartesians and Newtonians who so bemuse 'a Frenchman arriving in London' may not use words any more meaningfully than parrots, as one side calls out 'impulsion' and the other 'attraction'.¹⁰ For who can say which side, if either, does anything other than produce, to use Locke's term once again, 'insignificant noise'?

Fontenelle's Eulogy of Newton

Voltaire abandons his bemused Frenchman after the first page of Letter XIV. In the remainder of Letters XIV and XV, he devotes himself to showing how the seemingly hopeless stand-off between Cartesians and Newtonians might be resolved if all accept to follow Locke's guidance in key respects. Voltaire begins this task by evoking the reaction of British readers to Fontenelle's *Eloge de M. Newton* (1728) and its English translation (1729):

On attendait en Angleterre le jugement de M. de Fontenelle comme une déclaration solennelle de la supériorité de la philosophie anglaise; mais quand on a vu qu'il comparait Descartes à Newton, toute la Société royale de Londres s'est soulevée. Plusieurs même (et ceux-là ne sont pas les plus philosophes) ont été choqués de cette comparaison seulement parce que Descartes était français. (1961: 55)¹¹

Voltaire here derides all (English) readers who judge Fontenelle's Eulogy according to national bias. But this does not amount to a defence of Fontenelle's Eulogy. Indeed, Voltaire proceeds to offer a critique of Fontenelle to the effect that, like the vulgar, the Academician reacts with a (non-reflecting) French-Cartesian bias to the word 'attraction', and that this prevents him from affording Newton's discoveries a fair hearing.

Voltaire prepares this critique of Fontenelle as follows. First, he remarks that Newton himself feared the word 'attraction' might mislead his readers: 'Newton avait bien prévu, après avoir démontré l'existence de ce principe, qu'on se

¹⁰ Incidentally, by contrast with humans who speak 'no otherwise than parrots', Locke mentions the anecdote, recorded by Sir William Temple, of a 'rational parrot' who, it was claimed, conversed intelligently with a Prince of Orange in Brazil (2004: 300–302).

¹¹ Fontenelle, who became permanent secretary to the Académie des sciences in 1697, invented and assumed the role of writing eulogies for deceased members. (Newton had been appointed a member in 1699.) Shank argues that Fontenelle used the *Éloges* 'to exert a decisive role in shaping the public discourse of science in France and throughout the Republic of Letters' (Shank 2008: 61).

révolterait contre ce seul nom [attraction]’. Voltaire no doubt expects his readers to know that the word in question reminded Newton’s contemporaries of the ‘occult qualities’ of Aristotelian physics.¹² To avoid this, he explains, ‘[Newton] précautionne le lecteur même, il l’avertit de ne la pas confondre avec les qualités occultes des anciens, et de se contenter de connaître qu’il y a dans tous les corps une force centrale qui agit d’un bout de l’univers à l’autre [...] suivant les lois immuables de la mécanique’ (1961: 64–65). It seems, however, that Newton hoped too much of his early readers—including even Fontenelle. For along with Saurin, the great Academician (long disposed to Cartesian physics) turns a deaf ear to Newton’s plea not to confuse ‘attraction’ with occult qualities:

Il est étonnant, qu’après les protestations solennelles de ce grand philosophe, M. Saurin et M. de Fontenelle, qui eux-mêmes méritent ce nom [de grand philosophe], lui aient reproché nettement les chimères du péripatétisme: M. Saurin dans les mémoires de l’Académie de 1709, et M. de Fontenelle dans l’éloge même de M. Newton. (1961: 65)

Consequently, as he is distracted by a word (‘attraction’) that reminds him of the peripatetics, Fontenelle fails to engage with Newton’s ideas as such. It would seem that even Academicians sometimes fail to remember that words are ‘signs of ideas only’, and so speak, it might seem, ‘no otherwise than parrots’.

The reader can decide to take, or not to take, Voltaire’s argument on trust. But in case we are curious to assess the matter first hand, we can follow up Voltaire’s stated sources: the 1709 *Mémoires* of the Académie for Saurin, and the *Éloge de Newton* for Fontenelle. Here it is appropriate to focus on Fontenelle rather than Saurin. In the *Éloge*, then, we find the following passage:

M. Neuton pose toujours l’action de la Pesanteur réciproque dans tous les Corps, et proportionnelle seulement à leurs masses, et par-là il semble déterminer la Pesanteur à être réellement une attraction. Il n’emploie à chaque moment que ce mot pour exprimer la force active des Corps, force, à la vérité, inconnuë, et qu’il ne prétend pas définir, mais si elle pouvait agir aussi par impulsion, pourquoi ce terme plus clair n’aurait-il pas été préféré? (Fontenelle 1728: 17)

In this extract, where Fontenelle is preoccupied by Newton’s choice of word, he seems to miss the point that if Newton had used ‘impulsion’, he would implicitly have subscribed to Cartesian vortices and the plenum.¹³

Elsewhere in the Eulogy, Fontenelle persists in linking Newtonian attraction to occult qualities simply on the grounds that Newton uses the word ‘attraction’:

¹² Aristotelians were capable of asserting that amber attracts straw, or the lodestone iron, because mysterious affinities exist between those pairs of things. As occult qualities were capable of being named but not analysed, they were discredited in the eyes of seventeenth-century adherents of the new mechanical physics, who saw that they gave rise to circular arguments (Heilbron 1982: 11–22). For detailed background, see Grant (1981) and Hamou (2002).

¹³ Fontenelle’s question ‘why not use the term “impulsion”?’ seems utterly disingenuous. For only several pages further on, he notes that Newton uses the phenomenon of resistance in order to argue against vortices—and therefore against ‘impulsion’ in the Cartesian sense (1728: 21–22).

‘L’Attraction et le Vuide, bannis de la Phisique par Descartes, et bannis pour jamais selon les apparences, y reviennent ramenés par M. Neuton, armés d’une force toute nouvelle dont on ne les croyoit pas capables, et seulement peut-être un peu déguisés’ (Fontenelle 1728: 23). The phrase ‘seulement peut-être un peu déguisés’ suggests, somewhat sarcastically, an enduring link between Newton and Aristotelian scholasticism, and so serves as the ‘sting in the tail’ of Fontenelle’s sentence. In Letter XV Voltaire recognizably reproduces Fontenelle’s wording, but having removed the sting. What Fontenelle had intended sarcastically thus becomes laudatory: ‘Enfin, pour mieux trancher encore, s’il est possible, toute difficulté, [Newton] prouve ou du moins rend fort probable, et même par des expériences, que le plein est impossible, et il nous ramène le vide, qu’Aristote et Descartes avaient banni du monde’ (1961: 60). Similarly, Fontenelle’s question, cited above, ‘pourquoi ce terme plus clair [impulsion] n’aurait-il pas été préféré?’, is incorporated into Letter XV in the most telling of ways: ‘Presque tous les Français, savants et autres, ont répété ce reproche. On entend dire partout: “Pourquoi Newton ne s’est-il pas servi du mot d’impulsion, que l’on comprend si bien, plutôt que du terme d’attraction, que l’on ne comprend pas?”’ (1961: 65). In Voltaire’s version, Fontenelle’s original question is repeated unreflectingly by one and all; and there is no apparent distinction between the ‘savants’ (who move in the same circles as Saurin and Fontenelle) and the ‘autres’. We might say, in brief, that in both passages Voltaire rewrites Fontenelle in such a manner as to render him the *arroseeur arrosé*.

In the second half of Letter XV, Voltaire invents a series of speeches showing how Newton might have answered a Fontenelle or a Saurin. Thus, Newton ‘aurait pu répondre à ces critiques: [...] “J’ai découvert une nouvelle propriété de la matière, un des secrets du Créateur, j’en ai calculé, j’en ai démontré les effets: peut-on me chicaner sur le nom que je lui donne?”’ (1961: 65–66). The fact, emphasized by Voltaire, that Newton is attacked on account of a word (‘le nom’) rather than an idea suggests, once again, that Cartesians (including Fontenelle) fall into an abuse of language. Voltaire-Newton continues his defence by reasserting that, whatever word is used for it, attraction is ‘une chose réelle’, for the reason that ‘on en démontre les effets et qu’on en calcule les proportions’ (1961: 66). (Thus, beyond any wrangles over words, Newton has experimental philosophy and mathematics on his side.) By extension, claims Voltaire-Newton, Cartesian vortices could justifiably be named ‘une qualité occulte’, for ‘on n’a jamais prouvé leur existence’ (1961: 66). The whole of this argument has been given support in advance by Voltaire’s appeal to Locke in Letter XIII. Seen through that frame, strict attention is to be paid to words and their relation (or non-relation) to ideas on the one hand and things (phenomena and bodies) on the other. As Voltaire-Newton speaks towards the end of Letter XV, the obscurity created by the opening of Letter XIV is finally dispelled, and the result is entirely to Newton’s advantage.¹⁴

¹⁴ In an irony that may have been intended by Voltaire but is more probably accidental, Fontenelle himself insists on the importance of distinguishing words from things in natural philosophy. Heilbron refers to a passage where he praises Du Hamel’s veiled disapproval of the Scholastics’ using ‘des mots, qui n’ont point d’autre mérite que d’avoir longtemps passé pour des choses’ (Heilbron 1982: 17).

Newton and Lockean Modesty

Voltaire-Newton's final words in Chapter XV are: 'La cause de cette cause est dans le sein de Dieu' (Voltaire 1961: 66), where 'cette cause' refers to attraction. The metaphor of God's bosom suggests that an absolute limit has been reached: the reality of attraction has been proven by its effects, both empirically and mathematically, but God conceals the actual cause, now and forever. We will never know, for instance, if attraction, as a cause, is the effect of a material cause beyond itself, or if it results from God's direct action in the universe. It seems, then, that Newton (as 'voiced' by Voltaire) subscribes to Locke's notion of philosophical modesty: 'thus far and no further'. That such modesty is a kind of wisdom is suggested by the Latin tag which Voltaire adds to close Chapter XV: '*Procedes huc, et non ibis amplius*'.¹⁵ But now it is not Locke's but God's voice we hear, or rather an echo of God's address to Job in the Latin of the Vulgate: 'et dixi: Usque huc venies et non procedes amplius; et hic confringes tumentes fluctus tuos.'¹⁶ In Christian tradition Job, of course, is a figure of virtue made to suffer and doubt in a contest between God and Satan; terrible trials are visited on Job, but his enduring piety is rewarded in the end. The Book of Job may be read as a meditation on Providence, but also on the bounds which God has set to human understanding. By using this allusion as a coda to Newton's imagined speech on the impossibility of knowing the 'cause of the cause', Voltaire underlines the idea of a limit to all human knowledge: when it comes to understanding the world and of its Creator, humanity can advance 'thus far and no further'.¹⁷ By the same token, 'Procedes huc...' reminds the reader, no doubt, of Locke's philosophical modesty which Voltaire had exposed (as we saw above) in Letter XIII.¹⁸

Now, though Newton may pay lip service to modesty in the Lockean style, he does not in fact share his notion of limits or the epistemology which it entails. In *Newton on the Continent*, Henry Guerlac discusses a Latin slogan which the future author of the *Principia* wrote at the head of the notebook he entitled 'Philosophical

¹⁵ On the subject of Newton's modesty, it has been reported that he said, towards the end of his life: 'I know not what I may seem to the world, but as to myself, I seem to have been only like a boy playing on the sea-shore and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.' However, Simon Schaffer throws doubt on the veracity of this 'obiter dictum' as well as (implicitly) on the notion of a modest Newton (Schaffer 2009: 243).

¹⁶ Job 38, v. 11. In the Authorized Version, the passage is given as follows: 'And said, Hitherto shalt thou come, but no further; and here shall thy proud waves be stayed?' In context, 'And said' is clearly to be read as 'And [where wast thou when] I said [...]?', where 'thou' is Job. In other words, God asks Job rhetorically where he was at the moment of creation, or more precisely at the moment when God 'shut up the sea with doors' (38.8) and addressed it with the words: 'Hitherto shalt thou come [etc.]'.

¹⁷ In *Letters concerning the English Nation*, the quotation from Job is given as 'Procedes huc, & non amplius', and is followed by an English translation: 'Hither thou shalt go, and no farther' (Voltaire 2009: 75). Incidentally, I take it as read that Voltaire is writing in a deistic vein throughout.

¹⁸ In another context, it would be interesting to consider Locke's epistemology of limits in relation to the 'corpuscular' hypothesis mentioned favourably in Book IV of the *Essay* (Locke 486). The question of how far the small number of primary qualities posited by corpuscularian natural philosophers (Heilbron 1982: 22–35) supports Locke's epistemological limits is a thorny one, however, and remains beyond the scope of the present article.

Questions': 'Amicus Plato amicus Aristoteles magis amica veritas' (1981: 17–28). As Guerlac shows, this slogan suggests that with each generation, human knowledge should progress in spite of deference to illustrious forebears; this in turn suggests that it need never find a limit short of the perfection of all knowledge.¹⁹ It is admittedly the case that, for a range of reasons that do not need to be stated here, Newton had to present his radically new ideas as no threat to mainstream religion, which more readily accommodated some discoveries than others.²⁰ But precisely for that reason we should arm ourselves with caution when Newton sounds epistemologically modest. To take a well-known example, we can refer to the General Scholium which Newton added to the *Principia* in 1713. Towards the beginning of that text he presents his discoveries as providing support to the conventional proof of God from design:

This most beautiful System of the Sun, Planets and Comets, could only proceed from the counsel and dominion of an intelligent and powerful being. [...] And lest the systems of the fixed Stars should, by their gravity, fall on each other mutually, he hath placed those Systems at immense distances one from another. (Newton 1957: 208)²¹

We also find a nod in the direction of Locke and others (especially corpuscularians) who insist that the primary qualities of things are forever hidden from human inquiry: 'In bodies we see only their figures and colours, we hear only the sounds, we touch only their outward surfaces, we smell only the smells and taste the savors, but their inward substances are not to be known either by our senses or by any reflex act of our minds' (Newton 1957: 210). Finally, that Newton knows his limits is suggested by his statement 'I frame no hypotheses' ('hypotheses non fingo'), meaning that whilst he has demonstrated the principle of attraction, he will not recklessly guess at its cause (1957: 210).

However, such professions of modesty surely perform a specific rhetorical function, which is to mitigate the bolder statements contained in the General Scholium. These include a passage where Newton describes God's relation, not only to living creatures but also to space, time and 'all things':

God is the same God, always and everywhere. He is omnipresent, not *virtually* only, but also *substantially*; for virtue cannot subsist without substance. In him are all things contained and moved; yet neither affects the other: God suffers nothing from the motion of bodies; bodies find no resistance from the omnipresence of God. It is allowed by all that the supreme God exists

¹⁹ Guerlac further suggests, following Richard S. Westfall, that Newton's source for his version of the slogan (with its significant mention of Aristotle) was 'English physician, natural philosopher, and original Fellow of the Royal Society, Walter Charleton (1620–1707)' (1981: 26–27).

²⁰ For a nuanced account of this topic, see Hedley Brooke's ground-breaking study (1991). Voltaire was obviously aware of Newton's caution; later in the 1730s, for instance, he remarks of a famous passage in the *Opticks* (concerning God's being 'in' space): '[Newton] craint les disputes' (Voltaire 1830: 35).

²¹ The General Scholium, as printed in this volume, corresponds to Andrew Motte's (1729) translation of the original Latin text.

necessarily; and by the same necessity he exists *always* and *everywhere*.
(Newton 1957: 209)

Aware that his treatment of God conflates what others strive to separate (i.e. physics and metaphysics), Newton adds: ‘And thus much concerning God; to discourse of whom from the appearances of things, does certainly belong to natural philosophy’ (1957: 209). Indeed, Edward Grant argues that, by the time Newton finished the *Principia* he had come to believe in God as ‘an incorporeal aether “who could move bodies without offering resistance to them in turn,” as the General Scholium would declare’.²² More recently, though on different grounds, Philippe Hamou also suggests that Newton had effectively, but discreetly, made God an object of natural philosophy.²³ As for the famous ‘hypotheses non fingo’, Hamou shows that it is to be understood as a claim to be observing the post-Baconian methods of natural-philosophical inquiry approved by a number of thinkers including Boyle (2002: 144). And if we remain in doubt as to whether Newton defies Locke’s limits concerning what is discoverable by the human mind, we can note, finally, that he writes ‘hitherto’ and ‘not yet’ into his closing summation in the General Scholium: ‘Hitherto we have explain’d the phaenomena of the heavens and of our sea, by the power of Gravity, but have not yet assign’d the cause of this power’, before raising the hypothesis of a ‘certain most subtle spirit, which pervades and lies hid in all gross bodies’.

The boldness of such lines within the General Scholium belies the ‘philosophical modesty’ implied by earlier passages. Nor do we need to venture far into the main body of the *Principia* to find Newton transgressing Locke’s notion of limits. Whilst Locke insists that ‘sensible knowledge’, by its nature, poses an obstacle that cannot be removed to our knowledge of things themselves, Newton writes: ‘Sic vice locorum & motuum absolutorum relativis utimur; nec incommode in rebus humanis: in philosophicis autem abstrahendum est a sensibus’ (1687: 7). The passage is extended slightly in Andrew Motte’s 1729 translation:

And so instead of absolute places and motions, we use relative ones; and that without any inconvenience in common affairs: but in philosophical disquisitions, we ought to abstract from our senses, and consider things themselves, distinct from what are only sensible measures of them.²⁴

‘Abstracting from our senses’ leads, in Newton but emphatically not in Locke, to understanding ‘things themselves’, i.e. the bodies of the universe and (in this passage) their relation to space. Even these few extracts from Newton suggest that,

²² Grant argues that Newton’s private and public writing show his belief that ‘God is omnipresent [in infinite space] because He is actually a three-dimensional, extended being. [...] Newton had even made God’s literal omnipresence the foundation of his physics, the basis for the maintenance of its mathematical laws and therefore of lawful cosmic operation’ (1981: 254).

²³ Citing the *Opticks* and the *Principia* to show that Newton’s inductive epistemology, precisely, envisaged a step-by-step progress from cause to effect as far as the (divine) ‘first cause’, Hamou concludes: ‘Au regard de cette “analyse” inductive, les espoirs de Newton sont donc immenses, puisqu’il semble qu’elle doit conduire à terme à une forme de théisme expérimental’ (2002: 146).

²⁴ This passage is cited and discussed in Iliffe (2007: 94).

when Voltaire associates him with philosophical modesty à la Locke, then, he misleads the reader.

Conclusion

Overall, I have argued that Voltaire effectively grafts Locke's epistemology of limits onto Newton's own, more ambitious epistemology. This is significant because Voltaire knew his subject too well not to be aware of the difference between Newton's and Locke's tendencies. It is *en connaissance de cause*, then, that Voltaire contains Newton within Locke's epistemological limits. It should be noted that there are surely differences, too, between Voltaire and Locke. But on the subject of what can be discovered by the human mind, Voltaire was far closer to Locke than Newton. Perhaps we might say, with all due caution, that epistemological limits apply, for Voltaire, not to 'things themselves' but to things *in so far as they are related to God*. The last lines of the *Éléments de la Philosophie de Newton* express Voltaire's own position. Commenting that we remain 'au bord d'un océan immense' (might we think once again of Job here), Voltaire exclaims: 'Que de choses restent à découvrir! mais aussi que de choses sont à jamais hors de la sphère de nos connaissances!'.²⁵ His emphasis is firmly on the permanence of certain limits, expressed by 'à jamais'. And this position, reminiscent of Locke, is already expressed in *Lettres philosophiques*, in the tag 'Procedes huc et non amplius'.

By the 1750 s Newtonian physics had won the day.²⁶ It is perhaps on account of this that in a new, 1756 edition of *Lettres philosophiques* Voltaire no longer conceals his disapproval of the metaphysical (as opposed to the physico-mathematical) aspects of Newton's *Principia*:

Bien des gens, en lisant le peu de métaphysique que Newton a mis à la fin de ses *Principes mathématiques*, y ont trouvé quelque chose d'aussi obscur que l'Apocalypse. Les métaphysiciens et les théologiens ressemblent assez à cette espèce de gladiateurs qu'on faisait combattre les yeux couverts d'un bandeau. Mais quand Newton travailla les yeux ouverts à ses mathématiques, sa vue porta aux bornes du monde. (Voltaire 1961: 79)²⁷

When Voltaire refers to 'le peu de métaphysique' which Newton had placed 'à la fin de ses *Principes mathématiques*', he can only mean parts of the General Scholium. Voltaire, we can infer, is wary of passages in the Scholium such as the one we have already cited: 'God is the same God, always and everywhere. He is omnipresent, not

²⁵ *Éléments de la Philosophie de Newton*, p. 234.

²⁶ In the (1751) 'Discours préliminaire' of the *Encyclopédie*, D'Alembert confidently declares of Newton: 'Sa théorie du monde (car je ne veux pas dire son système) est aujourd'hui si généralement reçue, qu'on commence à disputer à l'auteur l'honneur de l'invention' (1751: xxvi-xxvii).

²⁷ Locke, by contrast, had remained discreet to the end. He speaks of the 'incomparable Mr Newton' in the 'Epistle to the Reader' that serves as a preface to his *Essay*; and Woolhouse notes that he uses the same phrase in correspondence with Bishop Stillingfleet (Locke 2004: xi; 135). But textual evidence suggests that, having read the *Principia* shortly before publishing his *Essay*, Locke was not fully persuaded.

virtually only, but also *substantially*; for virtue cannot subsist without substance. In him are all things contained and moved; yet neither affects the other' (Newton 1957: 209). This is to speculate about God's relation to space and time, and His relation to matter. It is this tendency in Newton that Voltaire calls 'obscure' (1961: 79), for it is not based in empirical science or mathematics. To speak as though it were possible to describe God's relation to the universe would be to render God Himself an object of natural philosophy. Voltaire, certainly, refused to contemplate the possibility that even a mind such as Newton's could reach that far. If 'Procedes huc' had not existed, Voltaire would have had to invent it.

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