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# Locke's Primary Qualities

ROBERT A. WILSON\*

## I. INTRODUCTION

IN CHAPTER VIII OF BOOK II of *An Essay Concerning Human Understanding*,<sup>1</sup> John Locke provides various putative lists of primary qualities. Insofar as they have considered the variation across Locke's lists at all, commentators have usually been content simply either to consider a self-consciously abbreviated list (e.g., "Size, Shape, etc.") or a composite list as *the* list of Lockean primary qualities, truncating such a composite list only by omitting supposedly co-referential terms. Doing the latter with minimal judgment about what terms are co-referential gives us the following list of eleven qualities (in the order in which they appear in this chapter of the *Essay*): solidity, extension, figure, mobility, motion or rest, number, bulk, texture, motion, size, and situation.<sup>2</sup>

Perhaps surprisingly given the attention to the primary/secondary distinction since Locke, Locke's primary qualities themselves have received little more than passing mention in the bulk of the subsequent literature. In particular, no discussion both offers an interpretation of Locke's conception of primary qualities *and* makes sense of Locke's various lists as lists of primary qualities.<sup>3</sup> A central motivation for this paper is the idea that these two tasks are crucial, mutually constraining components in understanding Locke's view of primary qualities.

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<sup>1</sup> First published in 1690, the *Essay* went through three further editions during Locke's lifetime: 1694, 1695, and 1700. Unless otherwise noted, throughout the paper I refer to the fourth edition of the *Essay*. I have relied largely on the standard edition of the *Essay*, edited by P. H. Nidditch (Oxford: Oxford University Press, 1975), and have turned to the original editions where necessary.

<sup>2</sup> Cf. this composite list to those in John Yolton, *Locke and the Compass of Human Understanding* (Cambridge: Cambridge University Press, 1970), 25; Peter Alexander, *Ideas, Qualities, and Corpuscles: Locke and Boyle on the External World* (hereafter *IQC*) (Cambridge: Cambridge University Press, 1985), 134; and Edwin McCann, "Locke's Philosophy of Body," in V. C. Chappell, ed., *The Cambridge Companion to Locke* (New York: Cambridge University Press, 1994), 60. The "minimal judgment" in my composite list concerns motion and its variants, and it would be longer were one to distinguish between motion, motion of parts, and motion of (observable) bodies; see also section 6 below on motion.

<sup>3</sup> Inattention to Locke's various putative lists of primary qualities in II.viii is particularly pervasive in the literature that discusses Locke's view of the distinction between primary and secondary qualities. Recent examples include Samuel C. Rickless, "Locke on Primary and Secondary Qualities," *Pacific Philosophical Quarterly* 78 (1997): 297–319; and Lisa Downing, "The Status of Mechanism in Locke's *Essay*," *Philosophical Review* 107 (1998): 381–414.

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The most radical and interesting exception to the general trend of operating with a more or less composite list of primary qualities is Peter Alexander's interpretation of Locke in chapter 6 of his *Ideas, Qualities and Corpuscles*.<sup>4</sup> Alexander holds that for Locke there are only *three* primary qualities: size, shape, and mobility. Some of the properties that feature in Locke's lists (bulk, extension, figure, and motion/rest) simply refer to these properties. Others (solidity, texture, situation, number, and motion of parts) are not primary qualities at all. Alexander's view of what is and is not a Lockean primary quality is governed by an overarching corpuscularian interpretation of Locke, and by Alexander's view of the nature of Locke's debt to Boyle in particular. According to Alexander, primary qualities are qualities that the most fundamental things—single corpuscles—have in and of themselves, and that are to be invoked in providing non-occult explanations for the observable properties possessed by observable bodies. Given this understanding of corpuscularianism and of the notion of a primary quality, *texture* and *number* and *motion* of parts are not primary qualities because they are not properties that single corpuscles can have, being instead properties of clusters of corpuscles; likewise, *situation* is not a primary quality, since although it is a property of single corpuscles, it is a relational property, and so not a property they have in and of themselves.<sup>5</sup>

While Alexander's assumption that there is more systematicity in Locke's putative lists of primary qualities than others have found is surely correct, his claim that, for Locke, there are only three primary qualities requires the problematic move of dismissing or reinterpreting many of these lists. I shall argue that there are strong grounds to hold that both solidity and texture are primary qualities for Locke and, in fact, that *all* of the qualities named in Locke's putative lists of primary qualities in II.viii are primary qualities for Locke. While my interpretation generates a list of primary qualities similar to that given by simple composition, developing it will reveal both nuances of Locke's discussion in II.viii and the sophistication of his view of primary qualities, neither of which has been fully appreciated.

The general corpuscularian background to Locke's views, and why Locke's discussion of primary and secondary qualities should be viewed against this background, have been amply discussed by others.<sup>6</sup> Less has been said, however, about the reason and order to Locke's various lists of primary qualities in II.viii. After offering my own interpretation of the nature of Locke's primary qualities (section 2), I shall consider the lists themselves (section 3). I shall then discuss solidity

<sup>4</sup> Cambridge: Cambridge University Press, 1985.

<sup>5</sup> Most striking about this interpretation is that *solidity* is not a primary quality since, according to Alexander, it is not a quality at all. See section 4 below for a discussion of Locke's view of solidity.

<sup>6</sup> For example, see Maurice Mandelbaum, *Philosophy, Science, and Sense Perception* (Baltimore: Johns Hopkins University Press, 1964); E. M. Curley, "Locke, Boyle, and the Distinction Between Primary and Secondary Qualities," *Philosophical Review* 81 (1972): 438–64; F. J. O'Toole, "Qualities and Powers in the Corpuscular Philosophy of Robert Boyle," *Journal of the History of Philosophy*, 12 (1974): 295–315; Alexander, *IQC*, *passim*, and "Boyle and Locke on Primary and Secondary Qualities," *Ratio* 16 (1974): 51–67 (reprinted in I. Tipton, ed., *Locke on Human Understanding* [Oxford: Oxford University Press, 1977]); A. D. Smith, "Of Primary and Secondary Qualities," *Philosophical Review* 99 (1990): 221–54; and Lisa Downing, "Are Corpuscles Unobservable in Principle for Locke?," *Journal of the History of Philosophy*, 30 (1992): 33–52.

(section 4), texture (section 5), and motion (section 6) in particular as primary qualities in light of sections 2 and 3 and with an eye to some of the broader issues in Locke's philosophy that this interpretation raises.

## 2. WHAT ARE PRIMARY QUALITIES?

Locke's conception of a primary quality is given at viii.9, following the introduction at viii.8 of the distinction between *qualities*, which are in bodies, and *ideas*, which are in the mind. In the fourth edition, this section reads in full:<sup>7</sup>

Qualities thus considered in Bodies are, [1] First, such as are utterly inseparable from the Body, in what estate soever it be; [2] such as in all the alterations and changes it suffers, all the force can be used upon it, it constantly keeps; [3] and such as Sense constantly finds in every particle of Matter, which has bulk enough to be perceived, [4] and the Mind finds inseparable from every particle of Matter, though less than to make it self singly be perceived by our Senses. *v.g.* Take a grain of Wheat, divide it into two parts, each part still has [A] *Solidity, Extension, Figure, and Mobility*; divide it again, and it retains still the same qualities; and so divide it on, till the parts become insensible, they must retain still each of them all those qualities. For division (which is all that a Mill, or Pestel, or any other Body, does upon another, in reducing it to insensible parts) can never take away either [B] *Solidity, Extension, Figure, or Mobility* from any Body, but only makes two, or more distinct separate masses of Matter, of that which was but one before, all which distinct masses, reckon'd as so many distinct Bodies, after division make a certain Number. [i] These I call *original* or *primary Qualities* of Body, which I think we may observe to produce simple *Ideas* in us, *viz.* [C] *Solidity, Extension, Figure, Motion or Rest, and Number.*

Here we have both Locke's full, initial, four-fold characterization of primary qualities, [1]–[4], and the first three putative lists of primary qualities, [A]–[C].<sup>8</sup>

Alexander<sup>9</sup> has argued that the third of these lists [C] is a list of simple *ideas* caused by primary qualities, with the "These" (labeled [i]) in the final sentence above referring not forward to this list but back to the preceding, shorter list of primary qualities [B], and "viz." referring back to "Ideas." This is one plausible reading of II.viii.9 as it appears in the fourth edition of the *Essay*. However, this reading becomes strained when we turn to the first three editions of the *Essay*, where viii.9 simply reads:

Concerning [ii] these *Qualities*, we may, I think, observe [iii] these *primary* ones in Bodies, that produce simple *Ideas* in us, *viz.*, [D] *Solidity, Extension, Motion or Rest, Number and Figure.*

with viii.10 beginning "[iv] These, which I call *original* or *primary Qualities* of Body, are wholly inseparable from it; and . . ." continuing with the same characterization of primary qualities as that given in viii.9 in the fourth edition, from "in what estate soever" on.

In the passage indented immediately above, "these *Qualities*" [ii] obviously refers back to the mention of qualities in bodies in viii.8. Since there is no preceding list of primary qualities, "these *primary* ones" [iii] can only refer to a list that

<sup>7</sup> I present this familiar passage in full since we will have occasion to draw on nearly all parts of it. All bracketed numbers and letters in this passage and the one that follows are mine.

<sup>8</sup> For a recent interpretation of this passage that rejects the claim that [1]–[4] provide criteria for determining what the primary qualities are, see Downing, "The Status of Mechanism in Locke's *Essay*."

<sup>9</sup> *IQC*, 138.

follows its occurrence, and the strongest candidate for its referent is surely the list that completes the sentence, [D], thus making this the first list of primary qualities in the *Essay*. Moreover, since [D] is identical to [C] (save for the shift in the position of “figure”), and the fourth and earlier editions share a common completion to viii.9 (from “produce simple *Ideas* in us, *viz.* . . .”), it is likely that [D] simply *became* [C] between the third and fourth editions. That [D] and thus [C] are lists of primary qualities, not of ideas produced by primary qualities as Alexander claims, is further confirmed by noticing that the “These” [iv] beginning viii.10 in the first three editions is most plausibly taken as referring back to [D], rather than forward across the following four-fold characterization of primary qualities to the list that features in Locke’s discussion of the grain of wheat.

Although I have no overarching, tidy story to tell about Locke’s use of “number” throughout II.viii, I think it is clear why it does (and does not) appear at viii.9. I have just argued that all three lists at viii.9 are lists of primary qualities, and thus that “number” names a primary quality; also, we have just seen that “number” occurs on the very first list of primary qualities in the first three editions of the *Essay*. Why then does it *not* occur in the two lists that appear in Locke’s discussion of the grain of wheat example? “Number” is absent from these lists for pragmatic or contextual reasons. After introducing those lists, Locke points out that division begins with *one* to make “two, or more distinct separate masses of matter” (loc. cit.), these collectively making “a certain Number.” This makes clear that division preserves number, and so treats number on a par with solidity, extension, figure, and mobility. Just as when we divide a grain of wheat what remains has (some or other) solidity, extension, figure, and mobility, so too does it have (some or other) number.<sup>10</sup> Looking back to Locke’s four-fold characterization of primary qualities [1]–[4] at the beginning of viii.9, the determinable number is as “inseparable,” constant, found by sense perception in all observable bodies, and its absence might be thought as inconceivable in insensible bodies, as are the determinables of any of the other primary qualities. But Locke’s illustrative discussion here is cast in terms of the qualities that *each part* of a divided grain of wheat would possess following division, and when Locke poses the implicit question “What remains?” it would be at best pragmatically odd to include “number” in one’s answer, as provided by his two lists.<sup>11</sup>

Precisely how we understand Locke’s four-fold characterization of primary qualities itself is crucial for understanding what primary qualities are. Some commentators have supposed that Locke is to be understood as making a conceptual point about body, or, as McCann puts it, a point about “what we mean by the word ‘body.’”<sup>12</sup> Alexander also holds this view. He says,

Of the four clauses in this definition [at II.viii.9], the first, second and fourth appear to go together and to make a conceptual point about matter, or body, as such. The primary

<sup>10</sup> The “some or other” indicates that we are here dealing with determinables, each of which can take more determinate forms. In the case of number, the determinable is number of *entities*, a determinate of which is number of *parts*.

<sup>11</sup> This reading would also make sense of the way in which Locke introduces his first mention of “number” in viii.9, just prior to his third list of primary qualities in that section.

<sup>12</sup> “Locke’s Philosophy of Body,” 61. Cf. also Jonathan Bennett, *Locke, Berkeley, Hume: Central Themes* (Oxford: Oxford University Press, 1971), 90.

qualities are just those that anything considered alone, must have if it is to be counted as a body.<sup>13</sup>

On this view, which I shall refer to as the *conceptual point interpretation* of viii.9, clause [3], “and such as Sense constantly finds in every particle of Matter, which has bulk enough to be perceived” becomes an empirical, supplementary claim less central to the conception of primary qualities than the other clauses [1], [2], and [4]. These clauses, in making a conceptual point about body *per se*, lead us naturally to focus on the properties that a single corpuscle, as an extreme type of body, would or even must have. As Alexander continues, “[t]hose qualities that we cannot conceive of a material corpuscle as lacking are the primary qualities.”<sup>14</sup> On the conceptual point interpretation, Locke’s four-fold characterization is somewhat redundant (clauses [1], [2], and [4]), with clause [3] viewed as secondary or even anomalous.

Central to the conceptual point interpretation is a characterization of primary qualities in terms of what can or cannot be conceived, or in terms of what our common sense words mean. This is how Locke’s talk of the “utter inseparability” of the primary qualities from body is to be understood: as McCann puts it, when Locke says “that the mind finds the primary qualities ‘inseparable’ from body no matter what state it is in, he is appealing to the commonsense meaning of the term ‘body.’”<sup>15</sup> While our grasp of the meaning of “body” reflects our common sense experience, on this interpretation one can determine what the primary qualities are a priori by reflection on what properties all bodies whatsoever must have, since this is expressed in the meaning of “body.”

A *prima facie* puzzle for a proponent of this interpretation, especially one viewing Locke through the lens of corpuscularianism, as does Alexander, is that it not only gives common sense experience a restricted role to play in understanding what the primary qualities are, but it accords *no* role for *experimental*, empirical inquiry here. Surely a part of Locke’s commitment to corpuscularianism, as well as his empiricism, is some deference to experimental inquiry, and if corpuscularianism underwrites the notion of a primary quality, one would expect there to be some role for experimental inquiry in telling us what the primary qualities are.<sup>16</sup>

A second problem facing the conceptual point interpretation is that although Locke views a body as something that is solid and extended (see below), he nowhere attempts to show how that concept itself implies his full list of primary

<sup>13</sup> *IQC*, 119.

<sup>14</sup> *loc. cit.*

<sup>15</sup> “Locke’s Philosophy of Body,” 65. Cf. also Downing, “The Status of Mechanism in Locke’s *Essay*,” esp. 404–5, which seems to me strangely close to this view.

<sup>16</sup> This objection has somewhat less force against McCann’s version of the conceptual point interpretation. While McCann defends the claim that Locke was a corpuscularian committed more generally to the mechanical philosophy, he sees Locke as giving a “philosophical argument” (“Locke’s Philosophy of Body,” 61) for the distinction between primary and secondary qualities, rather than basing the distinction on corpuscularianism itself. Still, it seems to me that McCann’s view does ascribe common sense *experience* a more restricted role in Locke’s account of the primary qualities than it actually has, for reasons that I hope my alternative interpretation of Locke below will make clear.

qualities.<sup>17</sup> Such a conceptual derivation of the ultimate properties of material things would be out of keeping with Locke's general scepticism about mere appeals to words. In making *reflection* on our ordinary experience and thus concept of body so central to determining what the primary qualities are, the conceptual point interpretation invites precisely the sort of dispute over words that is one of Locke's objects of criticism throughout the *Essay*, particularly with regard to the occultism of peripatetic and (to a lesser extent) spagyric systems of physical explanation.

I want to suggest an alternative interpretation (ultimately, a pair of interpretations) that not only sits better with Locke's general corpuscularian and empiricist commitments but that also reveals a complexity to Locke's four-fold characterization of primary qualities at viii.9.<sup>18</sup> In his first two clauses Locke states that a body's primary qualities are "utterly inseparable" from that body and that that body "constantly keeps" however much it changes. A natural reading of this would be to view Locke as making a pair of *metaphysical* claims about the relationships that hold in the world between any given body and some of its qualities: these qualities can never be removed from individual bodies (clause [1]), and subsequently are found constantly in bodies (clause [2]), no matter what is done to them, or whatever forms they take. While it is clear that when Locke uses "separability" and "inseparability" he is sometimes making a conceptual point, particularly when he is explicitly talking about *ideas*, he uses both notions in a broader sense, a sense which includes what we might call *conceptual* (in)separability and *physical* (in)separability.<sup>19</sup>

For example, in his discussion of extension and body in II.xiii.11–4, while Locke says that "[s]olidity is so inseparable an *Idea* from Body . . ." (II.xiii.11), he continues by explicitly distinguishing between actual or real separation and mental separation, separation in one's mind (II.xiii.13), illustrating what he means in terms of *division*. This is, of course, precisely the operation he invokes in the grain of wheat example at viii.9, and his remarks there about division and what a mill or pestle can do to a body make it clear that he has in mind here actual, physical division. Thus, when Locke says that primary qualities are "utterly inseparable"

<sup>17</sup> One might cite Locke's discussion of the grain of wheat in II.viii.9 here, which suggests a thought experiment that proceeds a priori, but I shall propose an alternative interpretation of that discussion in a moment.

<sup>18</sup> As referees for the Journal have pointed out, aspects of this interpretation are prefigured in two earlier papers: Arnold Davidson and Norbert Hornstein, "The Primary/Secondary Quality Distinction: Berkeley, Locke, and the Foundations of Corpuscularian Science," *Dialogue* 23 (1984): 281–303; and Margaret Atherton, "Ideas in the Mind, Qualities in Bodies': Some Distinctive Features of Locke's Account of Primary and Secondary Qualities," in P. D. Cummins and G. Zoeller, eds., *Minds, Ideas, and Objects: Essays on the Theory of Representation in Modern Philosophy* (Atascadero, CA: Ridgeview Press, 1992). Both papers focus on the distinction between primary and secondary qualities (rather than on primary qualities per se). Davidson and Hornstein aim to show, in part, that Berkeley's objections to Locke's way of drawing the distinction run deeper than has sometimes been claimed, while Atherton's chief goal is to undermine the view that the corpuscularian theory underpins the primary/secondary distinction, especially the version of that view defended by Alexander. I shall comment further on these interpretations vis-à-vis my own where appropriate below.

<sup>19</sup> X and Y are *conceptually* separable just if they co-occur and either can be conceived in the absence of the other; X and Y are *physically* separable just if they co-occur and there is a physical process by which either can exist without the other. Neither of these concepts strictly entails the other.

from body, I take him to be implying that they are *at least* physically inseparable; whether he thinks they are also conceptually inseparable seems to me more contestable.

To develop this alternative interpretation further and to probe deeper into the relationship between the initial and final pair of clauses in the four-fold characterization, let me raise two questions and introduce some clarifying terminology. I shall say that a property ascribed to body is *truly* universal just if it is a property that all bodies whatsoever possess; and that a property so ascribed is *quasi*-universal if it is a property that all *sensible* bodies possess. Ultimately, Locke does hold that primary qualities are truly universal. But why? More explicitly:

1. Is the true universality of primary qualities presumed in Locke's talk of inseparability and constancy in clauses [1] and [2]?
2. What is the relationship between clauses [1] and [2], on the one hand, and clauses [3] and [4], on the other?

The default view of viii.9, I think, and the view implicit in the conceptual point interpretation, is that clauses [1] and [2] themselves assert the true universality of primary qualities. On the conceptual point interpretation, this is an a priori point that follows from the meaning of "body," where separability is understood as conceptual separability. Subsequently, clauses [3] and [4] add little of substance to Locke's characterization of primary qualities, with clause [4] simply re-expressing clause [1].

On the interpretation I am offering, by contrast, clauses [3] and [4] play a crucial role in *justifying* the view that primary qualities are "inseparable" from body, and, moreover, clause [4] itself depends on clause [3] in a way that suggests that they represent a two-step criterion for determining whether something *is* a primary quality. This in effect shifts the focus from clauses [1] and [2] to clauses [3] and [4] in how we read Locke's four-fold characterization of primary qualities. It also, as I shall argue, sheds some light on the relationship between Locke's empiricism, corpuscularianism, and rationalism. There are two ways to develop this interpretation, which (for a reason that will soon be apparent) I shall refer to as the *transdictive inference* interpretation, depending on what one says in response to the first question above about clauses [1] and [2] themselves.

If clauses [1] and [2] claim that primary qualities are truly universal and thus are constant across all changes in all bodies, then we can conclude that (at least) every *observable* body has primary qualities, and this explains why sense finds these qualities in every observable particle of matter (clause [3]). On this interpretation, clauses [1] and [2] themselves assert truly universal claims about bodies, including observable and unobservable bodies (and thus corpuscles), with clauses [3] and [4] making the corresponding epistemological points about Sense and the Mind, respectively. Yet clause [4] is not independent of clause [3], since in postulating what properties insensible bodies have, the Mind turns to what Sense finds in all sensible bodies.<sup>20</sup>

The suggestion is that the fourth of Locke's characterizations of primary qualities follows from his third via what Mandelbaum calls a transdictive inference of

<sup>20</sup> Since nobody actually senses all sensible objects, this claim about them is based on an inductive extrapolation from what Sense finds in all actually sensed objects.



the sort that is closer to the surface in Newton's *Principia*.<sup>21</sup> Rule III of *Principia* reads:

The qualities of bodies, which admit neither intensification nor remission of degrees, and which are found to belong to all bodies within the reach of our experiments, are to be esteemed the universal qualities of all bodies whatsoever.<sup>22</sup>

Newton's expression of this inference from sensible bodies to all bodies becomes more explicit in the explanation that follows his initial statement of Rule III in which he discusses the qualities of extension, hardness, impenetrability, mobility, and inertia:

We no other way know the extension of bodies than by our senses, nor do these reach it in all bodies; but because we perceive extension in all that are sensible, therefore we ascribe it universally to all others also. That abundance of bodies are hard, we learn by experience; and because the hardness of the whole arises from the hardness of the parts, we therefore justly infer the hardness of the undivided particles not only of the bodies we feel but of all others.<sup>23</sup>

And so on for each of the other three qualities listed.<sup>24</sup>

Locke's fourth clause, then, is to be understood as linked to the third by an inference, viz., that whatever qualities are universal among *sensible* bodies, i.e., are quasi-universal, are thus qualities that all insensible bodies have, and thus are qualities that *all* matter has, i.e., are truly universal. This inference is motivated in part by the desire to steer clear of occult qualities and to avoid the scholastic error of taking every designation to be the name of a real quality in the object itself, desires that Locke clearly had. Thus, clause [3] is not only the basis for clause [4], which itself makes a claim only about insensible particles of matter (*not* matter or body *per se*); it is also the ultimate justification for claiming that the primary qualities are truly universal. This interpretation thus ascribes sense experience a crucial role in determining what the primary qualities are for Locke.<sup>25</sup>

Having gone this far, however, we might give a more radical spin to the transductive inference interpretation, one that sees observability lurking in clauses [1] and [2] themselves. Take Locke's talk of the inseparability and constancy of the primary qualities of *a given body* in clauses [1] and [2] not so much as an

<sup>21</sup> M. Mandelbaum, *Philosophy, Science, and Sense Perception*, ch. 2. Mandelbaum notes (61–2) that his use of “transdiction,” introduced in his discussion of Newton and Boyle, is itself borrowed from a commentary that D. C. Williams gave at Harvard in 1958. Although Mandelbaum argues that a similar transductive inference is at work in Boyle, he is more circumspect in attributing such an inference to Locke, which is somewhat surprising in light of Mandelbaum's overall view of Locke and the corpuscularian tradition. See esp. 87–8 of Mandelbaum's discussion.

<sup>22</sup> *Principia*, 398. Motte translation 1729, edited by F. Cajori in two volumes (Berkeley, CA: University of California Press, 1934). Also quoted in Mandelbaum, *Philosophy, Science, and Sense Perception*, 81–2.

<sup>23</sup> *Principia*, 399; also quoted in Mandelbaum, *Philosophy, Science, and Sense Perception*, 82.

<sup>24</sup> Cf. Davidson and Hornstein, “The Primary/Secondary Quality Distinction: Berkeley, Locke, and the Foundations of Corpuscularian Science,” 288–9, where they also cite Newton's Rule III and Mandelbaum's discussion of it. I suspect that Mandelbaum's highly stimulating discussion of Boyle is at least a partial common cause of our discussions.

<sup>25</sup> Cf. Davidson and Hornstein, “The Primary/Secondary Quality Distinction Berkeley, Locke, and the Foundations of Corpuscularian Science,” 298–9. Atherton, in “Ideas in the Mind, Qualities in Bodies’: Some Distinctive Features of Locke's Account of Primary and Secondary Qualities,” takes this to suggest that Locke's chief interest in II.viii is in our *ideas* of primary qualities, not in primary qualities themselves; see esp. 114–5.

expository convenience but, rather, as indicating that he has in mind here *only* everyday observable bodies, not postulated bodies too small to see with the naked eye: these observable objects have primary qualities inseparably and constantly. Such a view gains some support by reflecting on Locke's use of "body." Strictly speaking, since Locke takes the meaning of "body" to be "something that is solid and extended, whose parts are separable and movable different ways" (II.xiii.11), this implies that corpuscles are *not* bodies, since corpuscles do not have parts. While I think that Locke's considered view is that corpuscles, as the smallest parts of physical objects, *are* themselves bodies, a number of his references to bodies, especially in II.viii, make no sense if this is what he means by "body" in those cases. For example, in his summarizing lists of primary qualities at viii.23 and viii.26, he attributes the primary qualities to the "solid parts" of bodies, but again, corpuscles themselves do not have solid parts. These attributions do make sense, however, if Locke has in mind just everyday physical objects as bodies.<sup>26</sup>

If this is the correct way to understand clauses [1] and [2] in II.viii.9, i.e., with "body" referring there only to everyday physical objects, then the connection to the point about observability in clause [3] is tighter. If Locke is saying that any given observable body's primary qualities are inseparable from *it*, and constant for *it*, then the universal observability of primary qualities in bodies large enough to be perceived follows readily. On this interpretation, clauses [1] and [2] are intended to make universal claims only about everyday bodies; clause [3] follows from it directly; and clause [4] extends this universality to unobservable bodies, such as corpuscles. Thus Locke moves from asserting the quasi-universality of the primary qualities (clauses [1]–[3]) to asserting their postulated true universality (those clauses plus clause [4]).

Both versions of the transductive inference interpretation provide a natural way to understand Locke's discussion of the grain of wheat at II.viii.9. Locke begins by making a claim about what one observes when one actually divides a grain of wheat once, and then again and again, and then invites the reader to extrapolate from one's observations in these cases to cases involving insensible parts. Since we do not see these parts of bodies, we must use our Minds to go where Sense does not, but we do so by using what Sense (helped by inductive extrapolation) has found to be quasi-universal. Locke's thought experiment does not simply appeal to the putative conceptual truth that bodies retain their primary qualities throughout any changes made to them; rather, it exemplifies the transductive in-

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<sup>26</sup> At the risk of being too pedantic for some readers, let me make my reasoning here more explicit in case it is too cryptic for others. II.viii.23 begins: "The *Qualities* then that are in *Bodies* rightly considered, are of *Three Sorts*. *First*, The *Bulk*, *Figure*, *Number*, *Situation*, and *Motion*, or *Rest* of their solid Parts"; viii.26 begins: "To conclude, beside those before mentioned *primary Qualities* in Bodies, viz. Bulk, Figure, Extension, Number, and Motion of their solid Parts . . ." Since the "their" in each of these must refer back to "Bodies," both of these statements imply that bodies have solid parts. The shift between a wider, more encompassing and a narrower sense of "body" by Locke is no more serious than that which occurs when we talk both of a person's body being injured because her arm is broken (wider sense) and of a person's body not suffering damage because he was shot in the leg (narrower sense). The important point, both in this case and in Locke's, is to know *which* of these senses is invoked when it matters for one's overall meaning.

ference from observable to unobservable cases, which is at the core of the alternative interpretation of viii.9 that I am advancing.<sup>27</sup>

The crucial notion of inseparability and its relationship to the ascription of true universality to a quality are treated differently by each of the three interpretations I have now discussed. The conceptual point interpretation takes the inseparability mentioned in clause [1] as conceptual inseparability, and thus views clause [1] itself as implying the true universality of the primary qualities; on this interpretation, clause [4] provides a crucial test case for thinking about what the primary qualities are. By contrast, on the transductive inference interpretation, the notion of inseparability includes at least physical inseparability: there are some qualities of bodies, primary qualities, which cannot be (physically) separated from bodies. On the first version of this interpretation, “bodies” here refers to both everyday, observable bodies and unobservable bodies (such as corpuscles), and so given just clauses [1] and [2] the primary qualities are truly universal, with clauses [3] and [4] justifying this attribution. “Utterly inseparable” here would naturally be understood to encompass both physical and conceptual inseparability. On the second, more radical interpretation, “bodies” refers *only* to everyday bodies, and so primary qualities are quasi-universal, given just clauses [1] and [2]. Given that, “utterly inseparable” in clause [1] should be understood as meaning just physically inseparable, with conceptual inseparability being invoked (if at all) *only* in clause [4].<sup>28</sup> But on either version of the transductive inference interpretation, the characterizations of primary qualities given in clauses [1] and [2] in themselves neither tell us how to pick out what the primary qualities are, nor resolve disputes about which qualities are primary. Here clause [3], and hence sense experience, is integral to understanding *what* the primary qualities are.

The basic proposal common to the pair of interpretations I have introduced is that in clauses [3] and [4] Locke is, in effect, offering a two-step rule for determining what the primary qualities are: first, identify those qualities that are to be found universally in sensible bodies, i.e., identify quasi-universal qualities; and, second, infer that those very same qualities are also present in insensible bodies, and thus in all bodies whatsoever. Common sense will, of course, play some role in the first step, based as it is on our everyday sense experience, but it must be supplemented by experimental inquiry, since it is not always clear to the unaided senses

<sup>27</sup> Cf. Atherton, “‘Ideas in the Mind, Qualities in Bodies’: Some Distinctive Features of Locke’s Account of Primary and Secondary Qualities,” 114, who also takes this to undermine Alexander’s version of what I am calling the conceptual point interpretation. While Davidson and Hornstein in some places (e.g., “The Primary/Secondary Quality Distinction: Berkeley, Locke, and the Foundations of Corpuscularian Science,” 298–9) emphasize this sort of relationship between clauses [3] and [4], in others they are closer to the conceptual point interpretation. For example, they say that “primary qualities are those qualities without which the notion of matter is inconceivable. To use modern terminology, they are part of the very concept of matter” (285); they also understand “utterly inseparable” in clause [1] as meaning “essential to our very concept of body” (290), and so seem to read clauses [1] and [4] as saying much the same thing. I find these aspects of their interpretation problematic, and in tension with the transductive inference interpretation that they seem also to offer.

<sup>28</sup> The parenthetical “if at all” here should be taken seriously. Contrary to what is often assumed (e.g., in the conceptual point interpretation), clause [4] does *not* itself make a claim about all matter, but only about what the mind finds inseparable from every *insensible* particle of Matter. If we take this clause at face value, then it needs to be combined with one of the other clauses if a claim about *all* matter is to be made.

what qualities any given body really has, let alone what all of them have. It may help to contrast this interpretation of Locke with interpretations that make Locke either more of a realist or more of a rationalist with respect to primary qualities than does this mixed empiricist-realist interpretation.

For those approaching Locke's view of primary qualities via the corpuscularian hypothesis, it has been more common to think of what I am calling quasi-universality as simply providing an evidential clue to primariness, with some independent criterion for being a primary quality assumed. In the hands of Armstrong<sup>29</sup> and Mackie<sup>30</sup>, for example, this independent criterion is that primary qualities are those posited in physical science as ultimate and irreducible properties of things, in terms of which everything else is to be understood. On this view, science will uncover those properties of matter that can be used to explain *all* physical phenomena. In the science of Locke's day, these properties were solidity, extension, figure, texture, etc., but since then they have included properties like mass and charge (in classical mechanics), and spin, charm, and "color" (in quantum mechanics). Thus, our list of primary qualities can change in quite radical ways as our best theories of the physical world change. On the view I am defending here, by contrast, scientific developments may represent an abandonment of the notion of primary qualities, since not only may the foundational properties of physical things fail to be quasi-universal, but they may turn out to be quite occult to common sense; indeed, I would argue, this is precisely what has happened in at least the case of quantum mechanics.<sup>31</sup>

Alternatively, the focus in the conceptual point interpretation on our common sense concept of body, as well as on the properties that single corpuscles must have because of that concept, are misplaced; neither focus will itself lead us to a list of primary qualities. Indeed, since single corpuscles are not detected by the senses, trying to determine their qualities directly by pure reason would, for an empiricist like Locke, be hapless, involving the kind of transgression of sensation and reflection that Locke so often warns us against. Individual corpuscles, as material entities, are postulated as having primary qualities, but it is the quasi-universality of the primary qualities, determined by common sense as modified by experimental inquiry, that serves as the basis for making this further, and epistemically less secure, attribution. Locke does think that primary qualities are manifest in common sense experience, and that the meanings of our words are a reflection of that experience, but, as I have argued, he has a more subtle view of the relationship between sense experience and our reflection on it than is suggested by the conceptual point interpretation as it has been developed thus far.<sup>32</sup>

<sup>29</sup> D. M. Armstrong, *A Materialist Theory of the Mind* (London: Routledge and Kegan Paul, 1968), ch. 12.

<sup>30</sup> J. L. Mackie, *Problems from Locke* (Oxford: Oxford University Press, 1976), 25.

<sup>31</sup> Cf. also A. D. Smith, "Of Primary and Secondary Qualities," 249–53 and Margaret D. Wilson, "History of Philosophy in Philosophy Today; and the Case of the Sensible Qualities," *Philosophical Review* 101 (1992): 191–243, esp. 232–3 and 235–6.

<sup>32</sup> As this final qualification suggests, I am not saying that there is no room or place in Locke's view of primary qualities for some sort of a priori, conceptual claim about primary qualities. But such a claim does not have the central place in Locke's view of the primary qualities that extant versions of the conceptual point interpretation ascribe to it.

## 3. EXPLORING LOCKE'S LISTS

One striking thing about Locke's lists of primary qualities in II.viii is that through the four editions of the *Essay* published during his lifetime few changes were made to any of them, and there was no attempt to trim, systematize, or consolidate his lists. Since II.viii contains the only sustained, continuous discussion of primary qualities in the *Essay*, my discussion in the present section will focus on it, though I shall at times appeal to other parts of the *Essay* where appropriate. In the eight pages from II.viii.9, where his first list appears, until the end of that chapter we find twenty-six putative lists of primary qualities, which are summarized in my Appendix.

The most frequently occurring term on these lists is "figure," which can be found on all but one of Locke's lists. But if one were to equate bulk, extension, and size, and treat "mobility," "motion or rest," and "motion" as referring essentially to the same property,<sup>33</sup> both of which are often assumed, then there would be two qualities, which I shall refer to as bulk and motion, referred to on *every* list. The one list missing "figure," that at viii.10, occurs in a context in which a preceding reference is made to "the same primary Qualities," where this seems clearly to refer to the preceding list also at viii.10, a list which does include "figure." Given these three assumptions—that "bulk," "extension," and "size" are co-referential, that "mobility," "motion or rest," and "motion" are co-referential, and that "figure" is missing from the second list at viii.10 only by inadvertent omission<sup>34</sup>—bulk (size, extension), figure, and motion would be referred to on *every* list. If we were to use this core set of properties as a guide to what qualities Locke *really* thought were primary, then we would have Alexander's list of primary qualities.

Such a view of Locke's lists would, of course, leave remaining puzzles. To note three of these: the references to remaining qualities—solidity, number, texture, and situation—would need to be explained, as would Locke's use of three different names for each of two qualities, bulk and motion, as well as the variation across the lists. While I think that something like this proto-interpretation of Locke's lists is the basis for a more complete understanding of the reason and order in them, there is a minor and a major problem that it faces.

The minor problem is that the summarizing list at viii.26 contains two terms, "bulk" and "extension," that refer to the same quality, which would seem a strange mistake for Locke to leave through four editions. Moreover, while "bulk" and

<sup>33</sup> In saying this, I do not mean to be overlooking the fact that neither of these triplets in fact name the same property. I shall further discuss bulk, size, and extension later in this section, and motion and its variants in section 6 below.

<sup>34</sup> In full, viii.10 reads: "2dly, Such *Qualities*, which in truth are nothing in the Objects themselves, but Powers to produce various Sensations in us by their *primary Qualities*, *i.e.*, by the Bulk, Figure, Texture, and Motion of their insensible parts, as Colours, Sounds, Tastes, *etc.* These I call *secondary Qualities*. To these might be added a third sort which are allowed to be barely Powers though they are as much real *Qualities* in the Subject, as those which I to comply with the common way of speaking call *Qualities*, but for distinction *secondary Qualities*. For the power in Fire to produce a new Colour, or consistency in Wax or Clay by its primary Qualities, is as much a quality in Fire, as the power it has to produce in me a new *Idea* or Sensation of warmth or burning, which I felt not before, by the same primary Qualities, *viz.*, The Bulk, Texture, and Motion of its insensible parts." On the inadvertence of the omission of "figure" in the final list here, note that since this passage was introduced only in the fourth edition of the *Essay* Locke himself had little opportunity to correct any minor mistake in it.

“size” have roughly the same meaning and are seldom discussed by Locke in the *Essay* more generally, both are distinct from “extension,” which Locke probes and explores in many places throughout Book II (e.g., II.iv.5; II.xiii.11–6; 26, II.xxiii.24; II.xxix.16).

The more significant problem is that this view of Locke's lists implies that solidity is not a primary quality. The only occurrences of “solidity” in II.viii in a list of primary qualities are at viii.9 and viii.22, the former of these being where Locke introduces and characterizes the notion of primary qualities, and where “solidity” occurs in all three lists there. All four of these lists are prominently placed, and it seems unlikely that “solidity” would appear in such prominent places in II.viii throughout all editions of the *Essay* if it were not a primary quality. Despite the additional appearance of “number” in the third of the lists at viii.9, and the shuffling and modification of viii.9 and viii.10 between the third and fourth editions, Locke's listing of solidity here does not alter. Failure to remove it hardly looks like an oversight, at least by Locke's own lights.

I want to suggest a variation on the above view that not only explains these occurrences of “solidity” but that also makes a start on resolving the puzzles that I listed above. As I have said, while “bulk,” and “size” are, roughly, interchangeable for Locke *qua* names of primary qualities, neither should simply be equated with extension. Locke's at-times-scornful dismissal of the Cartesian equation of body with extension, and his related distinction between the “extension of body” and the “extension of space,” drawn in terms of the relation of each to solidity at II.iv.5, both reflect his dissatisfaction with the purely geometrical notion of extension associated with Descartes; they also, I think, indicate the centrality of what we might call *solid extension* to Locke's account of body, something Locke made most explicit in the fourth edition of the *Essay* at II.xiii.11–4 in his discussion of the distinctness of the ideas of body and extension.<sup>35</sup> In departing from a conception of extension purely in terms of distances between geometrical points, Locke takes seriously the idea that physical bodies are not simply bounded figures but are *containers of physical matter*. For Locke, “bulk” and “size” each mean something like volume, and I want to suggest that Locke takes this not simply as a three-dimensional extensive magnitude but one that indexes solidity via the idea of *matter that fills space* (cf. II.iv.2). As the *Oxford English Dictionary* indicates, in the late seventeenth century, “bulk” had the connotation of a three-dimensional magnitude as well as something that contained a certain quantity of matter, and the nowadays more common “size” has retained this connection between extension and solidity. (This is reflected in the fact that adjectives of size, such as large, big, huge, and massive, can be used to describe a physical thing's extension or the quantity of matter it contains, or both.) Locke's appeal to what I am calling solid extension is thus not anachronistic, and it makes a direct link between the undisputed primary quality bulk and solidity.

Thus, to attribute the determinable bulk to a physical thing is to ascribe to it an extensive magnitude that is filled, to some extent or other, by matter, i.e., a volume that is solid to some extent. My suggestion, in effect, is to interpret “bulk”

<sup>35</sup> There, recall, Locke says that we mean “by *Body* something that is solid and extended, whose parts are separable and movable different ways” (II.xiii.11; cf. also III.x.15 on matter and body).

and “size” each as meaning something like extension *and* solidity, solid extension. If this expresses how Locke conceives of the relationship between bulk, size, solidity, and extension, then not only are bulk, figure, and motion referred to on every list of primary qualities but, via the symmetry of equivalence, solidity and extension themselves are also referred to on every list, subsumable under “bulk.”<sup>36</sup>

This interpretation also makes Locke’s slip at viii.26 less glaring and thus easier to understand, since extension is merely a component of bulk, not strictly identical to it. It also implies that the virtual absence of “solidity” and “extension” from Locke’s lists after their prominent introduction at viii.9 is due to their being replaced by their abbreviations, “bulk” and “size.”<sup>37</sup>

There are, I think, broader textual reasons to accept this interpretation of Locke. It would explain why within II.viii “solidity” only appears with “extension,” and (again with the exception at viii.26) appears with neither “bulk” nor “size.” This pattern of co-occurrence and exclusion is also repeated in the relatively few places in the *Essay* outside of II.viii where one finds what seem likely to be lists of primary qualities. For example, those at II.x.6 and II.xxiii.3 include only “solidity” and “extension”; those at II.xxi.3 and II.xxi.73 include only “bulk”; and those at IV.iii.13 and IV.iv.12 include only “size.” Furthermore, both “solidity” and “extension,” as well as “solid” and “extended,” not only occur frequently throughout the *Essay*, but they occur frequently together,<sup>38</sup> and they *never* co-occur together with either “bulk” or “size.” These patterns of co-occurrence and exclusion derive in part from Locke’s conception of body in terms of solid extension, and the interpretation I am proposing makes sense of them.

Let us turn now to consider the remaining qualities apparently referred to on Locke’s lists: texture, situation, and number. Again, I shall focus not only on what Locke takes each of these qualities to be, but also on why their occurrence varies across his twenty-six putative lists of primary qualities.<sup>39</sup>

For Locke, “texture” means something like *arrangement* or *structure* of parts. Following Alexander, I think that Locke picks up this use of “texture” directly from Boyle, where it is more prominent.<sup>40</sup> Given the assumption of

<sup>36</sup> The single counter-instance to this generalization is the list at viii.12, which has “extension” but neither “solidity” nor “bulk.” A strong, independent case, however, can be made for viewing viii.12 as an incomplete (and thus *merely* putative) list of primary qualities. Given that that putative list is intended as a list of those primary qualities of “Bodies of an observable bigness, [which] may be perceived at a distance *by the sight*” the omission of solidity (as well as texture) from viii.12 should be expected. Solidity is not so perceived, being perceived instead by touch, according to Locke; texture is also not perceived at a distance by sight. I thus exclude this list from further consideration.

<sup>37</sup> Later in this section I shall return to discuss, in more positive terms, Locke’s occasional use of “solidity” in his lists in II.viii.

<sup>38</sup> See, for example, II.xv.2; II.xxiii.2, 22, 26, 29–30; II.xxxi.2; III.i.10; III.vi.21, 29, 33; and III.x.15, 32.

<sup>39</sup> Since I have little more of substance to say about number, let me simply note that by number Locke means the determinable number of entities, and suggest that all nine occurrences of “number” on Locke’s lists (at viii.9, 12, 13, 16, 17, 18, 22, 23, and 26) *might* be argued to refer to the determinate number of *parts* of bodies each time (being mentioned in conjunction with a reference to “motion of parts” in all cases but three: at viii.9, viii.12, and viii.22).

<sup>40</sup> For Boyle on texture, see for example *The Origin of Forms and Qualities According to the Corpuscular Philosophy*, reprinted in M. A. Stewart, *Selected Philosophical Papers of Robert Boyle* (Indianapolis: Hackett, 1991), esp. 24–53, as well as *The Sceptical Chemist*, Everyman edition, M. M. Pattison Muir, ed., 33 ff.

corpuscularianism, texture is a property not of single corpuscles but of collections of them, and so of things that are composed of corpuscles. "Texture" can be found on seven lists—at viii.10 (twice), 14, 18, 23, and 24 (twice)—and I think there is a fairly simple regularity to Locke's use of it. Texture is mentioned only when Locke is directly discussing primary qualities as causes of changes in our sensations (10 [twice], 14, 18) or our ideas (23, 24 [twice]). When Locke first introduces texture as a primary quality (i.e., in viii.14 in the first three editions, and in viii.10 in the fourth edition), it is precisely in the context of introducing primary qualities *as* the causal basis for powers that give rise to sensations. At viii.23 Locke talks of the texture (and other primary qualities) of other bodies as causally responsible for change in our senses, and at viii.24 there is an interesting parallel appeal to the texture both of the "insensible parts of my Eyes, or Hands" and that of the "insensible Parts of the Wax." Despite the diverse things that textures are predicated of—bodies themselves (viii.23), the insensible parts of a body attributed a given quality (viii.10), the insensible parts of a perceiver (viii.24), the insensible parts of a third object (viii.24)—in each case there is a common, explicit appeal to texture as a quality causally responsible for changes in our sensations and ideas.<sup>41</sup>

Situation (or location) is something of an anomaly, since reference to it occurs on only one list in II.viii, and rarely throughout the rest of the *Essay*,<sup>42</sup> and there may be some temptation simply to dismiss its lonely occurrence at viii.23. However, as a relational, positional property, situation might be thought either necessary for texture, or even as akin to texture itself. For Locke, a thing's situation is its location with respect to other things (II.xiii.10), while its texture is the arrangement of its parts with respect to one another. Thus, at least if we are fixed on ordinary, everyday objects, it would be natural to conceive of a thing's texture as a determinate *form* of situation: the location of its parts with respect to one another. Although Locke did not probe the relationship between texture and situation, let alone explicitly hold that either texture or situation can be analyzed in terms of the other, there does seem to be a special affinity between the two. Given this, it may be less misleading to treat situation together with texture, rather than dismiss it altogether as a primary quality for Locke.

My argument concerning Locke's use of "texture" sets the scene for returning to consider Locke's explicit use of "solidity" in his lists, for I want to suggest a complementary picture to his use of "texture." Since single corpuscles do not have texture, texture is not a completely universal property of matter, so Locke omits "texture" from his lists when he is emphasizing this feature of primary quali-

<sup>41</sup> Conversely, texture is missing from lists associated with other characterizations of primary qualities, such as their being inseparable from body (viii.9), or being properties of a body's insensible parts (e.g., viii.15, 18). This is because texture is a property that is almost but not completely universal, in that it is possessed by all bodies whatsoever *except* single corpuscles. The same is true of number and motion of parts, which are not possessed by bodies without parts. For further discussion of this point, see section 5 below.

<sup>42</sup> The only place that I can find it in a list of primary qualities is at II.xxiii.9, where it features in a list almost identical word for word to that at II.viii.23: cf. ". . . such are the Bulk, Figure, Number, Situation and Motion of the parts of Bodies" to ". . . Bulk, Figure, Number, Situation, and Motion, or Rest of their solid Parts." Cf. also Alexander, *IQC*, 135–6, who argues against situation's being a primary quality; and II.iv.4 and II.xxxi.6, where Locke also uses "situation."



ties. Locke lists “solidity” explicitly among the primary qualities precisely when he is focusing on primary qualities as truly universal or catholic properties of matter. As Locke says at II.iv.1, solidity “seems the *Idea* most intimately connected with, and essential to Body,” and given that, it would be appropriate to refer explicitly to solidity just when concentrating on the universal nature of the primary qualities. This is precisely what Locke does at viii.9 when he introduces his first three lists of primary qualities, all of which contain “solidity,” and at viii.22 when he is summarizing the preceding eight sections by referring to primary qualities as *always* in bodies. Moreover, of the three times that Locke refers explicitly to the “solid parts” of bodies in his lists, two of them (viii.23 and viii.26) clearly represent a summary of what he has been saying about primary qualities,<sup>43</sup> and it is in just such cases that one would expect him to rely on the characterization of primary qualities that he uses in introducing them at II.viii.9.<sup>44</sup>

It may be time to take stock. I have proposed a view of Locke’s lists that takes them *all* to be naming primary qualities; that sees bulk (itself encompassing solidity and extension), figure, and motion as referred to on all of Locke’s lists; that hypothesizes that texture is referred to only when Locke is directly and explicitly talking about primary qualities as the causal basis for changes in our sensations or ideas; and that claims that solidity is explicitly referred to only when Locke is emphasizing the catholic nature of the primary qualities. In passing, I have suggested that there are only two lists of primary qualities that are anomalous in some way, each occurring just once (there being only four such single-instanced lists) and each featuring a relatively minor anomaly: at viii.10 “figure” has been inadvertently omitted (see also n. 34 above); and at viii.26 “extension” need not have been included, having been subsumed under “bulk” in that list already.

This view of Locke’s lists implies that Locke’s primary qualities are: bulk (or size), figure (or shape), solidity, extension, texture and situation, number, and motion (or mobility). Together with the interpretation given in section 2, it offers a reading of Locke that sees much more reason and order in what he says at II.viii than has usually been ascribed, one that takes Locke’s twenty-six putative lists of primary qualities at face value as lists of primary qualities. In the next three sections I turn to discuss solidity, texture, and motion, three of Locke’s primary qualities seldom discussed in detail. Doing so will serve to buttress the argument of the paper thus far, reveal some of the further complexities to Locke’s view of primary qualities, and raise some more general issues about Locke’s metaphysics and epistemology.

<sup>43</sup> The remaining instance of “solid parts” in Locke’s lists is at viii.16 in his oft-quoted rhetorical question, “Why is Whiteness and Coldness in Snow, and Pain not, when it produces the one and the other *Idea* in us; and can do neither, but by the Bulk, Figure, Number, and Motion of its solid Parts?”

<sup>44</sup> Given my interpretation of “bulk” as an abbreviated way of referring to solidity and extension, this would also make explicable the minor redundancy of predicating a list of primary qualities that already includes “bulk” of the “solid parts” of matter: solidity gets an explicit mention, although already implicitly mentioned, for emphasis.

## 4. SOLIDITY AS A PRIMARY QUALITY

A number of commentators have recognized that, for Locke, there is something special about solidity.<sup>45</sup> I concur, although I do not think that anyone has identified precisely what this is because they have not attended sufficiently to Locke's short but rich chapter "Of Solidity," at II.iv, which provides the key to understanding what he means by "solidity" in II.viii.<sup>46</sup>

For Locke, solidity exemplifies those simple ideas which "are most material to our present Purpose, or are in themselves less apt to be taken notice of, though they are very frequently the Ingredients of our complex *Ideas*" (II.iv.2). Locke seems to think of solidity as an idea we receive by just one sense, that of touch, including what we would now call the sense of *kinesthesia*, our sense of bodily position and orientation.<sup>47</sup> Here is a passage from II.iv.1, a snippet of which I cited earlier:

This of all other, seems the *Idea* most intimately connected with, and essential to Body, so as no where else to be found or imagin'd, but only in matter: and though our Senses take no notice of it, but in masses of matter, of a bulk sufficient to cause a Sensation in us; Yet the Mind, having once got this *Idea* from such grosser sensible Bodies, traces it farther; and considers it, as well as Figure, in the minutest Particle of Matter, that can exist; and finds it inseparably inherent in Body, where-ever, or however modified.

Locke is here saying that the idea of solidity originates in the sense of touch, with solidity being (universally, I think) detected in "masses of matter, of a bulk sufficient to cause a Sensation in us," and the idea of solidity then being extrapolated from sensible bodies to insensible bodies, including "the minutest Particle of Matter."<sup>48</sup>

This might well be interpreted as an instance of the two-step rule that I introduced in the section 2: we find solidity universally in sensible bodies, and then make a transductive inference from sensible bodies to insensible bodies, including corpuscles, and thus conclude that it is "inseparably inherent in Body." Note, however, that the idea that one gets from the sense of touch is decidedly *not* one

<sup>45</sup> For example, see Alexander, *IQC*, 132–3ff.; Bennett, *Locke, Berkeley, Hume*, ch. 4; and Mackie, *Problems from Locke*, esp. 24–6. Cf. also C. J. F. Williams, "Are Primary Qualities Qualities?," *Philosophical Quarterly* 19 (1969): 310–23.

<sup>46</sup> A short conversation with Hugh Chandler and a longer one with David Shwayder have prompted me to attend to II.iv more carefully and to think that the question of just what solidity is for Locke deserves more consideration than it has usually received.

<sup>47</sup> I construe Locke's sense of touch in this perhaps puzzling way because of Locke's initial explanation of why solidity is the idea received most constantly from sensation: "Whether we move, or rest, in what Posture soever we are, we always feel something under us, that supports us, and hinders our farther sinking downwards . . ." (iv.1) Clearly Locke has in mind not just our active touching of objects but also the way in which objects, such as the ground, chairs, and beds, impact on our sense of our own bodies.

<sup>48</sup> Here Locke begins with talk of the *idea* of solidity, but by halfway through the passage he has made a shift to talk of the *property* of solidity, since he talks of "it" as being the cause of sensations in us. This is an instance of Locke's notorious idea-quality shift, which I am generally ignoring in this paper. For a recent, startling treatment of the shift, see Jonathan Bennett, "Ideas and Qualities in Locke's *Essay*," *History of Philosophy Quarterly* 13 (1996): 73–88. Cf. also Atherton, "Ideas in the Mind, Qualities in Bodies': Some Distinctive Features of Locke's Account of Primary and Secondary Qualities," 114–5, who takes this passage as further support for her claim that Locke is chiefly interested in our ideas of primary qualities, not primary qualities themselves.

of *absolute solidity*, supposing this to be the idea of completing filling the space within one's boundaries. Solidity is "That which thus hinders the approach of two Bodies, when they are moving one towards another" (II.iv.1), the principle instances of which involve *our* bodies and so the sense of touch. While Locke thinks it relatively harmless to call this property of bodies *impenetrability*, he uses "solidity" in order to connote "something more positive," namely, the idea of *filling space* (II.iv.2), saying that "This *Idea* of it the Bodies, which we ordinarily handle, sufficiently furnish us with" (loc. cit.). That is, our ordinary experience suffices for this simple idea of solidity, including the notion of filling space. If that is so, then the relevant notion of "filling space" is not, again, an *absolute* notion, of *completely* filling the space within one's boundaries, but one of filling it sufficiently to give rise to our ordinary experiences of and interactions with objects. We might call this, the idea of filling space *simpliciter*, *experiential solidity* to evoke its connection to experience.

Given this, then the transductive inference to the property that insensible bodies have is either also to experiential solidity, or to the related (but different) property of absolute solidity. But if, as I have argued, part of the point of the very idea of primary qualities is that despite being properties of insensible bodies they avoid occultness by also being qualities that we find in some form in our ordinary experience, then the latter of these options is not available. This is because absolute solidity is at best a special kind of experiential solidity, i.e., not simply filling space but doing so *completely*, one that would be rarely if ever encountered in our common sense experience. In fact, I would suggest that absolute solidity could well be regarded by Locke himself as a form of abstraction that one has reason to be sceptical about, or at least cautious about uncritically endorsing.

Although the notion of experiential solidity might seem problematically vague, I now want to defend the idea that this vagueness reflects an imprecision in Locke's own thinking about solidity. In one of the rare moments of irony in the *Essay*, Locke says

If any one asks me, *What this Solidity is*, I send him to his senses to inform him: Let him put a Flint, or a Foot-ball between his Hands; and then endeavour to join them, and he will know. If he thinks this not a sufficient Explication of Solidity, what it is, and wherein it consists; I promise to tell him, what it is, and wherein it consists, when he tells me what thinking is, or wherein it consists, or explain to me, what Extension or Motion is, which, perhaps, seems much easier. The simple *Ideas* we have are such, as experience teaches them us; but if beyond that, we endeavour, by Words, to make them clearer in the Mind, we shall succeed no better, than if we went about to clear up the Darkness of a blind Man's mind, by talking; and to discourse into him the *Ideas* of Light and Colours. (II.iv.6)<sup>49</sup>

The notion of solidity that one would get from the experience Locke describes at the beginning of the above passage is one of *incompressibility*, the sort of resistance that keeps bodies out of one another's place that Locke mentions elsewhere in II.iv, including at the end of iv.4 in discussing hardness and softness. Although I take Locke himself to equate this to the impenetrability he has already mentioned,

<sup>49</sup> Cf. also Locke's more ominous-sounding (and, for that matter, more Kantian-sounding) statements about the "Boundaries of our Thought" (II.xxiii.29) and how when we "dive farther [beyond sensation and reflection] into the Nature of Things, we fall presently into Darkness and Obscurity, Perplexedness and Difficulties" (II.xxiii.32).

on at least a corpuscular view the two are distinct, since an object could penetrate an incompressible body (say, a football) by pushing through the spaces between its corpuscles, just as an impenetrable body could be compressed if, despite having corpuscles packed as cohesively as possible around its surface, or even throughout its greater part, it remained hollow in the middle.<sup>50</sup>

What is the relationship between Lockean solidity and indivisibility? Locke makes it clear (e.g., II.xxiii.31) that he considers the idea of finite bodies being infinitely divisible to be an absurdity, and this is in part because the notion of extension associated with that of body is distinct from that associated with the notion of space.<sup>51</sup> The former is “nothing but the cohesion or continuity of solid, separable, moveable Parts” while the latter is of “the continuity of unsolid, inseparable, and immoveable Parts” (II.iv.5). This is to say that the notion of extension relevant for thinking about bodies is not the purely geometrical notion typically associated with Descartes, but a more corpuscular notion that goes together with the notion of solidity, a point to which I appealed in section 3 in defending my interpretation of bulk as solid extension.

If finite bodies are not infinitely divisible, then this might suggest that Locke is committed to some bodies being absolutely indivisible, this in turn entailing that such bodies, corpuscles, are absolutely solid. Yet if we take the idea of absolute solidity to be that of completely filling space within one's boundaries, this does not entail indivisibility—since a great force might make two where there was previously one, even one without previous existing parts; nor does indivisibility entail absolute solidity, for the same reason that impenetrability does not entail it. Locke nowhere characterizes *any* bodies, including corpuscles, as being (absolutely) indivisible, and I suspect to do so would involve another of those transgressions of sensation and reflection that Locke warns us against.

The suggestion that Locke's notion of solidity is that of experiential solidity fits with two related claims central to my general interpretation of Locke's view of primary qualities: that quasi-universality is the key to understanding what primary qualities are, and that Locke's primary qualities should be understood with his overarching empiricism in mind. As the name “experiential solidity” is meant to evoke, experiential solidity is derived from sense experience, speaking to the second of these points, and since it is so derived one can understand it as quasi-universal and then extrapolated as a property of all matter whatsoever. While absolute solidity is a more precise notion of solidity, having perhaps a simple

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<sup>50</sup> This is not, by the way, to ignore Locke's distinction between solidity and hardness, drawn at iv.4. By “hardness” Locke means something like *malleability*, the ease with which a body's figure can be changed. Hardness is *merely* a property of sensible bulks, being a name “that we give to things, only in relation to the Constitutions of our own Bodies” (loc. cit.), whereas solidity is a property of them *and* of the corpuscles that constitute them.

<sup>51</sup> Although Leibniz lampooned this view in his discussion of II.iv in *The New Essays on Human Understanding* (P. Remnant and J. Bennett, eds., 2nd edition [Cambridge: Cambridge University Press, 1996], 127), this may be one place where Leibniz was (uncharacteristically) uncharitable to Locke. Descartes's notion of extension is clearly more mathematical than is Locke's, as exemplified by Descartes's endorsement of the infinite divisibility of extension and thus matter, and his scepticism about atoms because they were claimed to be indivisible. See also Daniel Garber, *Descartes' Metaphysical Physics* (Chicago: University of Chicago Press, 1992), 120–7, for discussion.

definition, it is a notion antithetical to both of these aspects of Locke's view of primary qualities.<sup>52</sup>

But is solidity, so characterized, quasi-universal? One thing that our sense experience tells us, one might think, is that not everything is solid; in fact, solidity is quite a special type of property possessed only by a limited number of physical objects, let alone physical stuffs, such as liquids or gases. This should seem a particularly acute problem for my interpretation of Locke, given that it emphasizes both the primacy of sense experience in determining what the primary qualities are *and* denies that objects have experiential solidity simply *in virtue of* being made up of (absolutely) solid parts.

There is certainly a vernacular sense in which some physical objects are solid while others, as well as liquids and gases, are not. And one might even take Locke's example of the football at the end of his chapter on solidity that we have discussed above to suggest that he held the view that not every observable material thing that causes the idea of solidity is *really* solid. I take the evidence from II.iv that I have already discussed—particularly the passage at II.iv.1 in which something like Newton's Rule III is stated with respect to solidity—to be definitive here on the ubiquity of solidity among material things, although there is further evidence if needed. Earlier in II.iv.1, Locke says that

There is no *Idea*, which we receive more constantly from Sensation, than *Solidity*. . . and the Bodies which we daily handle, make us perceive, that whilst they remain between them, they do by an insurmountable Force, hinder the approach of the parts of our Hands that press them.

For Locke, solidity is at least a common property among material things that we encounter in everyday experience, which makes less plausible the idea that Locke held a restrictive view of what solidity is. Moreover, since there are a number of places elsewhere in the *Essay* (e.g., II.xiii.11–4, III.x.15) where Locke continues to appeal to the intimate connection between body and solidity, Locke himself does not seem to adopt a conception of solidity that would be problematic for the claim that solidity is a quasi-universal quality. Every physical object we encounter in everyday experience fills space to some extent or other. On the interpretation I am offering, that is just to say that solidity is a quasi-universal quality, and the basis for the view that solidity is (via the transductive inference) a truly universal quality.

Finally, let me close this discussion of solidity by returning briefly to justify my earlier claim that experiential solidity, like the other primary qualities, is a determinable rather than a determinate property. Determinate properties can be thought of as *ways* that objects instantiate the corresponding determinables.<sup>53</sup>

<sup>52</sup> As the existence of II.iv testifies, Locke recognized that the notion of solidity stood in need of some conceptual clarification, but if what I have argued here is correct it follows that Locke's attempts to offer that clarification fell short in ways that raise some larger questions about his theory of ideas and its relation to his metaphysics. Not only is solidity not a simple idea of one sense, as many have recognized, but it begins to look as though it is at best a simple idea acquired by both sensation *and* reflection, if not indeed a *complex* idea. See also section 6 below, where I discuss some related, general issues concerning Locke's epistemology and metaphysics.

<sup>53</sup> See Stephen Yablo, "Mental Causation," *Philosophical Review* 101 (1992): 245–80, esp. 252.

Just as having a particular extension, shape, and motion are ways of instantiating the corresponding determinables, so too is filling space to some specific extent a way of instantiating experiential solidity.<sup>54</sup> Bodies can fill space in a variety of ways and to various extents, and each solid body has solidity in some particular way. What is special about solidity and its connection to bodies is not that all bodies are made of corpuscles and corpuscles are absolutely solid, but that solidity is the determinable primary quality that is most obviously attributed quasi-universally among bodies, and that is (together with shape) most readily transdictively extended to “the minutest Particle of Matter, that can exist” (iv.1).

#### 5. TEXTURE AS A PRIMARY QUALITY

I have used my somewhat extended discussion of solidity both to illustrate and support the transdictive inference interpretation of Locke's view of primary qualities, as well as to make some clarifying points about Locke's conception of solidity itself, particularly in the context of corpuscularianism. With texture, discussion can be much briefer and directed principally to elucidating why texture is a primary quality on that interpretation.

A body's texture is the way in which that body's parts, including its corpuscles, are structured or arranged, and I have suggested that Locke explicitly includes texture in his list of primary qualities in II.viii only when discussing primary qualities as the causes of changes in our sensations or ideas. Although, as Alexander has argued, “texture” is a technical term for Locke in referring to the arrangements of corpuscles, it is important to see that this technical use of “texture” itself is a natural extension of its application to the arrangement of the parts of an everyday object, and in this respect it is just like the terms of the other primary qualities, including solidity. Precisely because we know that two observable objects can differ in their properties because of how the stuff of which they are composed is arranged, it is plausible to infer that the same is true of bodies that are insensible. If this is the correct way to view the relationship between the application of “texture” to ordinary objects and to corpuscles, then texture conforms to the general interpretation I have offered of Locke's primary qualities: we extrapolate from our everyday experience to claim the true universality of texture via its hypothesized quasi-universality.

On this interpretation, texture is first and foremost a property of observable bodies, such as the leaves of trees and bodies of air, to take two examples from Boyle that feature in the *Oxford English Dictionary*.<sup>55</sup> For corpuscularians, an object's texture is ultimately a function of the texture of its corpuscles, but despite the latter, technical use of “texture,” according to which textures are *postulated*, we should not forget that the textures of everyday objects are observed. Indeed, the

<sup>54</sup> Although, as Davidson and Hornstein note (“The Primary/Secondary Quality Distinction: Berkeley, Locke, and the Foundations of Corpuscularian Science,” 282), Locke viewed solidity as a qualitative, non-mathematizable quality, one way of quantifying it, and thus of distinguishing the extent to which a given body fills space, is through the notion of *density*. This is not to claim that Locke had such a notion, any more than his commitment to a “massy” corpuscularianism implied that he had the notion of *mass*; in both cases, though, I think Locke has made some interesting conceptual progress toward each of these later articulated notions.

<sup>55</sup> As quoted by Alexander, *IQC*, 170.

writings of Boyle himself, even at their most philosophical, are peppered with reports of the observable differences between chemical substances due to the differing textures of those substances. In the latter half of the seventeenth century, microscopes were beginning to reveal increasing details about these textures, something that impressed both Locke and Boyle and that played a role in corpuscularian views more generally.<sup>56</sup> As we gain perceptual access to smaller and smaller complex things there is little reason to think that they lose their texture, even if the texture itself is not observed, and thus texture is physically inseparable and so constant in all physical objects.

If corpuscularianism is true, then texture has at least quasi-universality, for every observable object, and at least most unobservable objects, have parts that are arranged in some way or other. But is texture *truly* universal, i.e., is it also a property that a single corpuscle has? To argue that texture is not truly universal because corpuscles, lacking parts, lack an arrangement of parts, is tempting but, I believe, too quick. For, following up on a point that I made briefly in section 3 in discussing texture and situation, there is a sense in which even individual corpuscles have some arrangement—something like their situation—where we view this property as a determinable of texture, in much the way in which we might view number and motion as determinables, respectively, of number of parts and motion of parts. Things without parts cannot have the latter of these determinable-determinate pairs, but they can have the former of them. The point is that although, strictly speaking, single corpuscles lack each of the primary qualities that apply only to multitudes of corpuscles—texture, motion of parts, and number of parts—when we extrapolate from the observed to the observable and then to the unobservable we ascribe determinables of these very qualities to *every* object whatsoever.

Yet suppose that we were to speak strictly and thus were to grant that texture (along with number of parts and motion of parts) is not truly universal but merely nearly so. How seriously would this impugn Locke's conception of primary qualities? Locke does think that primary qualities have true and not mere quasi-universality, but this is because, in accord with his transdictive inference, the properties that are quasi-universal are also ascribed to unobservables, including corpuscles, and so are truly universal. Locke does not seem to have considered even the possibility, let alone the actuality, of these two criteria coming apart, although his at times cautious endorsement of corpuscularianism and his scepticism about its explanatory reach (e.g., IV. iii. 10–6) suggest that his conception of a primary quality does not rest on what properties single corpuscles have or must have. If it turned out that corpuscular hypotheses were false, either in particular cases or more generally, on the transdictive inference interpretation there would still be a foundation for the idea of a primary quality because of the connection between that idea and common sense experience. This connection does not turn on a conceptual point about our idea of body but, rather, on Locke's reliance on quasi-univer-

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<sup>56</sup> For more on microscopy and the rise of atomism more generally, see C. Meinel, "Early Seventeenth-Century Atomism: Theory, Epistemology, and the Insufficiency of Experiment," *Isis* 79 (1988): 68–103, esp. 81ff.; and Catherine Wilson, *The Invisible World* (Princeton: Princeton University Press, 1995).

salinity in demarcating the class of primary qualities and in identifying particular qualities as primary. Such a view also explains why our a posteriori, justified beliefs about the metaphysics of the world are, for Locke at least, *beliefs* and not *knowledge*: they do not represent the perception of the agreement or disagreement of ideas that Locke takes (IV.i.2) to constitute knowledge, as they would if they were conceptually derived, but have the lower epistemic status of something that is the product of a merely probable inference.

#### 6. MOBILITY, MOTION, AND MOTION OR REST

Given my general project both of making sense of Locke's lists and of articulating his conception of a primary quality, the most problematic of the putative Lockean primary qualities is the cluster of properties that Locke refers to with "motion" and its cognates. I have already noted (n. 33) that "mobility," "motion or rest," and "motion" do not name the same property. Mobility is a dispositional property; motion or rest is an exhaustive state that anything with mobility is in; and motion is a component of motion or rest. In addition, we have just seen that "motion of parts" names a distinct, albeit related, property. Locke *did* write as though he equated these properties, most frequently using "motion" to refer to "the" corresponding primary quality. If my interpretation of Locke is correct, it is easy to see why properties in this cluster should be thought by him to be primary qualities. We observe bodies moving and we observe them at rest, and thus take this power to be moved to be quasi-universal and thus truly universal. What problems there are here, I want to suggest, lie in Locke, rather than in my interpretation of him, and they raise some interesting questions about Locke's broader metaphysics and epistemology. I shall offer a brief comment on my interpretation, and then some remarks about the questions and problems it raises.

Motion, in the sense of the state of moving, is not itself quasi-universal, and could not plausibly have been thought to be by Locke. It is important to my overall interpretation, then, that despite the high frequency of "motion" alone on Locke's lists (21 of the 26 lists), it is motion or rest, or mobility, which is in fact the primary quality for Locke. But why think, especially in light of the infrequent occurrence of "mobility" in Locke's lists (just twice in his first two lists at viii.9) and "motion or rest" (just three occurrences: at viii.9, 22, and 23), that it is these notions rather than simply "motion" which names a primary quality for Locke?

One reason is that Locke seems to use "motion" as shorthand for "motion or rest" in much of II.viii. A second reason is that every occurrence of "mobility" or "motion or rest" in II.viii is prominently placed: either in Locke's introduction of the notion of primary qualities (three times, at viii.9, being on all such lists at viii.9), or in his summary of the section (twice, at viii.22 and 23, the former of which emphasizes primary qualities as being *always* in bodies). A final reason is that although Locke recognizes that corpuscles are themselves not always in motion (e.g., II.viii.23), much of his discussion in II.viii is cast in terms of changes in objects or effects on our senses and is particularly concerned to point to properties of the insensible parts of bodies, including corpuscles, as the causes of these changes and effects. In that context, it is not surprising to see motion alone appear on Locke's lists, since it is motion, and motion of the parts more particularly,



that is typically the *efficient* cause here. In sum, the use of “motion or rest” seems self-conscious, and the prevalent use of “motion” by itself can be understood once we recognize the explanatory context of much of II.viii.

But what should we make of the apparent equation of the disposition mobility and the state motion or rest? The short answer is “not too much”: Locke is simply not as sensitive to the distinction between a power (mobility) and a state (motion, or motion or rest) as, by our own lights, he perhaps should be. A longer answer, however, one highlighting some larger issues concerning primary qualities, also seems to me worth sketching.

The distinction between qualities (properties) and powers (dispositions) was not clearly drawn or understood in any one systematic way by Locke. Recall that at II.viii.8 in introducing the distinction between ideas and qualities, Locke says that “the Power to produce any *Idea* in our mind, I call *Quality* of the Subject wherein that power is.” This seems to say, fairly plainly, that qualities *are* powers; moreover, they are powers to produce ideas. Throughout much of the rest of II.viii (see esp. viii.10, 23–6), however, Locke contrasts primary qualities with secondary qualities and what came after Locke to be called “tertiary qualities” in terms of the notion of powers: the latter pair of qualities are, but primary qualities are not, powers. How can qualities be powers but primary and secondary qualities be distinguished in terms of their respective status as powers?

One natural response here is that while all qualities are powers, only primary qualities are more than *merely* powers, a thought seemingly in keeping with Locke’s talk of secondary qualities as “nothing in the Objects themselves, but Powers . . .” (viii.10). There are at least three problems facing the position that this response reinforces. First, qualities in general would be understood in terms of powers (to produce ideas in minds), which would seem to call into question their status as properties *in objects* by making them extrinsic: a thing could lose its power to produce particular ideas in minds because of a change not in the object but in the minds it affects. This is a general problem for dispositional accounts of properties, such as the Lockean-inspired “causal theory of properties.”<sup>57</sup> Second, the idea of power includes in it “some kind of relation” (II.xxi.3), the idea of relation is a complex idea that involves a comparing mind (II.xxv), and relations themselves, not being particulars, do not have an independent existence for Locke (III.iii.1). Thus, analyzing qualities in terms of powers makes all qualities mind-dependent, which undermines this as a way of demarcating primary from secondary qualities. Third, as II.xxi.1–3 makes clear, the idea of power is conceived by Locke as a simple idea, but so too is that of quality, which makes it puzzling how one could be analyzed in terms of the other, given Locke’s epistemology.

As my “short answer” above should suggest, my aim in raising these problems and issues is not so much to imply that Locke’s apparent equation of motion (or rest) and mobility belies deep confusions in the *Essay* as to highlight some of the complexities that the short answer itself leaves unaddressed. I have indicated why I think that some of these complexities represent difficulties, both for Locke and

<sup>57</sup> For example, see Sydney Shoemaker, “Identity, Properties, and Causality,” and “Causality and Properties,” both reprinted in his *Identity, Cause, and Mind* (Cambridge: Cambridge University Press, 1984).

for Lockeans, difficulties not so much for Locke's view of primary qualities, which I have sought to clarify and defend in this paper, but for broader issues in Locke's metaphysics and epistemology. If my interpretation of Locke on primary qualities is correct, then clearly these issues warrant further exploration.

#### 7. CONCLUSION

It is important to the two-fold aim of this paper that each of the eight properties identified at the end of section 3 as a primary quality—size (or bulk), shape (or figure), solidity, extension, texture and situation, number, and motion (or mobility)—could plausibly be thought to be physically inseparable, constant, quasi-universal, and thus via the transductive inference, truly universal properties of bodies. That this is *not* true of any of the properties that Locke considers (and that are commonly considered) secondary qualities—colors, sounds, tastes, smells, and (felt) temperature—suggests that there is a natural way to demarcate primary qualities from secondary qualities on my interpretation of the former.<sup>58</sup> Locke, of course, thinks of secondary qualities not simply as distinct from primary qualities but as *secondary* in a number of respects, but it is not my concern here to discuss Locke's secondary qualities. My suspicion, however, is that Locke's conception of a secondary quality is not as robust as I have been arguing his conception of a primary quality is, which is one reason why he characterizes secondary qualities (and thus the primary/secondary distinction) in various, non-equivalent ways.

The transductive inference interpretation not only acknowledges Locke's debt to Boyle's earlier corpuscularianism but also recognizes Locke's affinity with Newton's roughly contemporary view of the relationship between the macroscopic world and an atomistic metaphysics. Locke's primary qualities are just what we find on his putative lists of primary qualities in II.viii of the *Essay*, and the key to understanding his underlying conception of a primary quality lies in a particular way of reading the four-fold characterization of primary qualities at II.viii.9, one informed by what Locke has already said about solidity in II.iv. I have developed and defended this view both by focusing on the details of II.viii itself and by stepping back to consider broader features of Locke's metaphysics and epistemology, some of which, as I indicated at the end of the previous section, I find *prima facie* problematic.

The interpretation of Locke's primary qualities defended makes the primary qualities themselves a motley mixture of qualities proper (bulk, figure, and, more arguably, number), relations (texture), and powers (solidity, mobility). One might wonder whether Locke could really have meant to subsume all of these as primary qualities. In one sense, no, Locke did not intend to subsume a motley metaphysical crew under the heading "primary qualities," but this is largely because Locke was not attuned, for various reasons, to some of the metaphysical distinctions that may matter for us.

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<sup>58</sup> That is, these qualities lack one or more of the properties mentioned in Locke's four-fold characterization of primary qualities. Locke places most emphasis, especially in viii.14–21, on their physical separability (through division) and inconstancy, but they all, with the possible exception of temperature, also lack quasi-universality and thus true universality.

There are further complications for us in considering whether Locke's primary qualities are unified that derive from two general features of Locke's *Essay*. First, Locke's development of the "new ways of ideas" provided an overarching framework for philosophical investigation, one of whose legacies is that the question of whether Locke means X or the idea of X when he discusses "X" remains our constant companion; this legacy is manifest most obviously in our understanding of Locke's discussion of substance, but it is also a factor in interpreting his view of primary qualities. Second, the substantial metaphysics in the *Essay* often uneasily straddles the Aristotelian-scholastic tradition to which Locke was deeply indebted in many ways, and the more recently revived corpuscularian tradition to which he expressed a direct allegiance. Locke's problems with the relationships between qualities, powers, and relations are one side-effect of this dual affinity. At the end of section 2, I pointed out that the conception of primary qualities that we find in Locke has been undermined, rather than modified, by scientific developments since Locke's time. An ultimate defense of *Locke's* conception of primary qualities might also be thought problematic because of the enemy within: Locke's broader innovations, concerns, and circumstances.

Central to my interpretation is the idea that Locke's notion of a primary quality is anchored both in his common sense empiricism and in his corpuscularianism, something that may be brought out further by clarifying the sense in which the primary qualities of sensible bodies do and do not hold "in virtue of" the primary qualities of insensible corpuscles. It is part of the corpuscularian hypothesis that larger material objects, and thus sensible objects, have the properties they do in virtue of the properties of the smaller material things and thus ultimately the corpuscles that physically constitute them. This is an ontological thesis, and the interpretation I have offered is intended to be compatible with it. What my interpretation denies, however, is the corresponding epistemological thesis. Rather, the *ascribed* universality of primary qualities is derived from their quasi-universality, which in turn is derived from their universality among actually sensed objects. Observed bodies have their primary qualities ultimately *because* of the primary qualities of their corpuscles, but such qualities are ascribed to corpuscles *because* those qualities are encountered universally in everyday experience.

Although I have minimized discussion of the distinction between primary and secondary qualities in the substance of this paper in order to focus on Locke's primary qualities themselves, it may be a useful way of concluding to bring out the ways in which the interpretation offered of Locke's primary qualities sits between two more or less diametrically opposed perspectives on Locke's primary/secondary distinction.

On the one hand are those, such as Bennett and McCann, who hold that Locke's distinction is one that can be made essentially without any reference to speculative corpuscularian metaphysics, one that appeals primarily to our common sense experience of qualities in the world. A consequence of this view is that one can determine what the primary qualities are a priori, i.e., by armchair reflection on our concept of body. While it should be clear that I disagree with this aspect of the interpretation, I have argued that common sense experience does play an important role in determining what primary qualities are. But it is such experience as

modified and informed by experimental inquiry, and particularly the *experiential* aspect of common sense experience, rather than our *conceptual* reflections on it, that determines what is a primary quality for Locke.

On the other hand are those, such as Alexander and Curley, who consider the corpuscularian world view both to motivate and to underpin Locke's primary/secondary distinction, and thus his view of primary qualities. Although I have expressed my general sympathies with this perspective, I have argued against thinking of Locke's primary qualities as properties that a single corpuscle has. Part of what drives my resistance here has been a respect for two broader features of Locke's philosophical views that derive from his corpuscularian commitments: first, his concern to avoid positing occult qualities and entities; and, second, his diagnosis of significant philosophical and metaphysical extravagance stemming from various errors related to the abuse of language, and its correction by a focus on sense experience itself. The second of these points makes it unlikely that Locke's primary qualities could simply fall out directly from our conception of body; rather, they will be determined at least in part empirically, and most likely experimentally. The first, however, implies that this empiricist commitment is not a complete passing of the torch from philosopher to scientist in determining what the primary qualities are, since at least some of the relevant experiences are those of common sense. It is a failing of corpuscularianism, not a modification of it, for science and common sense to have come apart as significantly as they have in twentieth-century physics and chemistry. But that, I suspect, is a thesis whose development and defense warrant their own paper.<sup>59</sup>

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<sup>59</sup> I have benefited from feedback on earlier versions of this paper presented at philosophy colloquia at the University of Illinois, Urbana-Champaign in November 1998 and at the University of Alberta in April 1999. Thanks to Hugh Chandler, Steve Wagner, Jennifer Welchman, and Bob Wengert for specific questions and comments; to Patrick Maher and Robert McKim for detailed written comments; and to David Shwayder for more general discussion of Locke. The paper owes much to Peter Alexander's writings on Locke, and I would also like to thank Professor Alexander for brief correspondence on a draft. I am also indebted to the detailed comments of a number of referees from the Journal.

## APPENDIX

## LOCKE'S LISTS OF PRIMARY QUALITIES: II.VIII.9-26

**Key:** B=Bulk; E=Extension; F=Figure; M=Motion; MoR=Motion or Rest; Mb=Mobility; N=Number; Sit=Situation; Siz=Size; So=Solidity; T=Texture.

- 9: Primary and Secondary Qualities [9-10]  
**So, E, F, Mb**  
**So, E, F, or Mb**  
**So, E, F, MoR, N**
- 10: **B, F, T, M** of their insensible parts  
**B, T, M** of its insensible parts
- 12: How Primary Qualities produce their Ideas [11-2]  
**E, F, N, M** of Bodies of an observable bigness
- 13: How Secondary Qualities [13-4]  
**B, F, or M**  
**M and F, B and N** of such Particles
- 14: **B, F, T, M** of parts
- 15: Ideas of Primary Qualities are resemblances; of secondary not [15-22]  
**B, F, M** of the insensible parts in the Bodies themselves
- 16: **B, F, N, M** of its solid parts
- 17: **B, N, F, M** of the parts  
**B, F, M** of parts
- 18: **B, F, T, M** of its Parts  
**M, Siz, F** of its Particles  
**Siz, M, F** of its insensible parts  
**Siz, F, N, M** of its parts
- 22: **So, E, F, N, MoR**
- 23: Three sorts of Qualities in Bodies  
**B, F, N, Sit, MoR** of their solid Parts  
**B, F, T, M** of another Body
- 24: The 1st are Resemblances. The 2d. thought Resemblances, but are not. The 3d. neither are nor are thought so [24-5]  
**B, F, T, or M** of some of the insensible parts of my Eyes  
**B, F, T, or M** of the insensible Parts of the Wax
- 25: **B, F, or M**  
**B, F, or M** of parts  
**B, F, M**
- 26: Secondary Qualities two-fold; First, Immediately perceivable; Secondly, Mediate-ly perceivable  
**B, F, E, N, M** of their solid Parts

Qualities are given in the order in which they occur within each list. Unless otherwise noted, each list ends with a conjunction, and where it is possible to continue the sentence in which a list appears in a relatively meaningful way, I have done so. Bracketed numbers following a marginal heading indicate the section or sections to which the heading applies.