

# LOCKE ON THE EPISTEMOLOGICAL STATUS OF SCIENTIFIC LAWS

SILVIO SENO CHIBENI  
State University of Campinas

## Abstract

*This article aims to defend Locke against Quine's charge, made in his famous "two dogmas" paper, that Locke's theory of knowledge is badly flawed, not only for assuming the dogmas, but also for adopting an "intolerably restrictive" version of the dogma of reductionism. It is shown here that, in his analysis of the epistemological status of scientific laws, Locke has effectively transcended the narrow idea-empiricism which underlies this version of reductionism. First, in order to escape idealism, he introduced the notion of "sensitive knowledge of the particular existence of finite beings without us," broadening thus his initial definition of knowledge in terms of the "perception of the agreement or disagreement of ideas" — a definition compatible with Quine's interpretation. Secondly, after showing that we can have virtually no a priori knowledge of universal truths about substances, Locke extended the notion of "sensitive knowledge" to the particular propositions of "coexistence" in substances, appealing to the notion of "probability" for treating their inductive generalizations and, in particular, the phenomenological laws of science. Finally, acknowledging the essential presence of hypothetical, non-phenomenological laws in science, he anticipated much of the contemporary views on their role and nature, including, remarkably, a mild version of the epistemological holism championed by Quine.*

## 1. Introduction

In his famous 1951 paper, Quine submitted that "modern empiricism has been conditioned in large part by two dogmas." The first would be the analytic-synthetic distinction; the second, the dogma of *reductionism*: "the belief that each meaningful statement is

equivalent to some logical construct upon terms which refer to immediate experience” (1980, p. 20; see also p. 38). Quine endeavoured to show that the dogmas are untenable and, in fact, equivalent. I shall not examine these claims here. My goal is, rather, to rebut a specific charge made by Quine on Locke and Hume (but I shall leave Hume out of the present discussion), that they would have not only adopted the dogmas, but also an “intolerably restrictive version” of the dogma of reductionism. According to Quine, Lockean and Humean empiricism includes the view that the empirical reduction of the propositions about the natural world should proceed on a “term-by-term” basis (p. 38) basis. Such a reduction is deemed “impossible” by Quine, who adds that later empiricists have dispensed with it in two main steps.

First, Bentham, Frege and Russell would have promoted “an important reorientation in semantics [...] whereby the primary vehicle of meaning came to be seen no longer in the term, but in the statement” (Quine 1980, p. 39).<sup>1</sup> Carnap’s *Aufbau* is regarded as the most elaborate attempt to implement this new form of reductionism. The acknowledgement of its failure has led Carnap himself to substitute the weaker ideal of empirical confirmation for the apparently unattainable empirical translation of the statements. However, Quine argues, the dogma of reductionism survived in a new guise: “the supposition that each statement, taken in isolation from its fellows, can admit of [empirical] confirmation or infirmation at all” (p. 41).

The final, decisive step in the evolution of empiricism is, Quine submits, the complete abandonment of the dogma, in favour of a holistic semantics and epistemology: it is entire scientific theories, or even to the whole of science, that would be the bearers of meaning and empirical contents. I shall now contend that this Quinean account of empiricism is not quite fair to history, since it ignores the fact that Locke himself went far beyond the narrow idea-empiricism which marks the beginning of his epistemological theory in the *Essay*.<sup>2</sup>

## 2. Idea-Empiricism, or “The Way of Ideas”

In the first book of the *Essay* Locke deploys a battery of arguments against the view that some of our knowledge is innate. In book II, he lays the foundations of his version of empiricism, by arguing that all ideas — and therefore all knowledge, since the ideas are the “materials of knowledge” — derives ultimately from *experience*, which can be either of sensation or of reflection.<sup>3</sup> After dedicating a whole book to the study of words (book III), Locke finally passes, in book IV, to the issue of knowledge properly considered, that is, propositional knowledge. Right at the beginning the following definition of knowledge is offered:

*Knowledge* then seems to me to be nothing but *the perception of the connexion of and agreement, or disagreement and repugnancy of any of our Ideas*. In this alone it consists. Where this Perception is, there is Knowledge, and where it is not, there, though we may fancy, guess, or believe, yet we always come short of Knowledge. (IV i 2)

This form of empiricism — “concept-empiricism,” or “the way of ideas,” in the expressions of Michael Ayers and Stillingfleet, respectively<sup>4</sup> — is entirely compatible with Quine’s interpretation of Locke’s position: it is the concepts, or ideas, that are, individually, connected to experience. Knowledge proper results from an *intellectual* operation upon ideas, namely, the perception of their “agreement” or “disagreement.”<sup>5</sup>

Locke submits that there are four sorts of agreement or disagreement of ideas (IV i 3): 1) Identity, or diversity; 2) Relation; 3) Coexistence, or necessary connection; and 4) Real existence. In the first “the Mind clearly and infallibly perceives each *Idea* to agree with it self, and to be what it is; and all distinct *Ideas* to disagree, *i.e.*, the one not to be the other: And this it does without pains, labour, or deduction; but at first view, by its natural power of Perception and Distinction” (IV i 4). Examples given by Locke in this same paragraph are the propositions ‘White is white’, ‘White is not red’ and ‘Round is not square’.

The second sort of knowledge consists in “*the Perception of the*

*Relation between any two Ideas, of what kind soever, whether Substances, Modes, or any other*” (IV i 5). A recurring example in the *Essay* is the agreement of the “Equality to two right [Angles] to [...] the three Angles of a Triangle” (IV i 2). Locke acknowledges that this kind of agreement or disagreement in fact includes the first and the third, but he thinks those are “so peculiar [...] that they deserve well to be considered as distinct Heads, and not under Relation in general” (IV i 7).

Coexistence, or necessary connection, the third sort of agreement or disagreement of ideas, “belongs particularly to Substances” (IV i 6). Locke’s favourite example of (putative) knowledge of this sort is the proposition ‘Gold is fixed’.<sup>6</sup> I shall return to this example below. Notice, for now, that the two expressions Locke uses to designate this sort of knowledge carry different connotations: whereas ‘necessary connection’ appears to imply that it is *a priori*, ‘coexistence’ seems more apt for some kind of *a posteriori* knowledge. The rest of this article helps, I hope, to shed some light on this point, as I identify two distinct classes of propositions within Locke’s single class.

Finally, the fourth sort of knowledge — real existence — represents Locke’s first violation of idea-empiricism, as it will be explained in the following section.

### 3. Knowledge of Real Existence: a First Departure from the Way of Ideas

On the face of it, knowledge of real existence is not a kind of agreement or disagreement of *ideas*. Notwithstanding, Locke artificially tries to force it into the mould of his initial definition of knowledge: “The fourth and last sort, is that of *actual real Existence* agreeing to any *Idea*” (IV i 7). It is clear from the general examination of the *Essay* that what led Locke to such an effective broadening of his concept of knowledge is the desire to avoid a position at odds with common sense, namely, idealism.<sup>7</sup>

According to Locke, we can know that three kinds of things exist: the self, God, and the material bodies actually present to the

senses. The knowledge a man has of his own existence, *qua* thinking being, is “intuitive” (IV ix). Our knowledge of the existence of God is “demonstrative” (IV x). Intuition and demonstration, let us recall, are the first two “degrees” of knowledge, as Locke proposes in chapter IV xi, “Of the degrees of our knowledge.” The reasons he offers for these being different *degrees* of knowledge are untenable, but I need not explore this point here. What matters is that both intuition and demonstration are *a priori* — that is, operations of the mind on its own ideas — and that Locke effectively assumes throughout book IV that demonstrative knowledge does indeed amount to certainty (as intuitive knowledge does, of course).

The third case of existential knowledge, however, requires a qualitative change in the cognitive process — the mind endeavours now to reach beyond the domain of its own ideas — with an accompanying lowering of epistemic assurance. In the same chapter on the degrees of knowledge, Locke introduces the third degree of knowledge in these careful words:

*Sensitive Knowledge of particular Existence.* These two, (*viz.*), Intuition and Demonstration, are the degrees of our Knowledge; whatever comes short of one of these, with what assurance soever embraced, is but Faith, or Opinion, but not Knowledge, at least in all general Truths. There is, indeed, another *Perception* of the Mind, employ'd about *the particular existence of finite Beings* without us; which, going beyond bare probability, and yet not reaching perfectly to either of the foregoing degrees of certainty, passes under the name of Knowledge. (IV ii 14)

Notice that Locke acknowledges that we do not strictly *know* the existence of bodies; we just have an assurance that “*passes under* the name of Knowledge.” This is a mild concession to scepticism, motivated, undoubtedly, by Locke’s awareness of the fact that the arguments he had for the existence of bodies are plausibility arguments.<sup>8</sup> It seems to me that these arguments, found in IV xi, are at bottom *abductive* arguments; but I shall not argue this point here. Whatever the case may be, the important thing to be remarked now is that Locke’s sensitive knowledge of existence represents a

violation of idea-empiricism, in that it requires a complex appraisal of the particular circumstances in which certain perceptions *occur*. In sections 5 and 6, below, I shall argue that two other violations of that doctrine are imposed on Locke by his attempt to rescue the propositions expressing the natural laws from the sceptical analysis that I summarize in the following section.

#### 4. Phenomenological Laws: a Blockage in the Way of Ideas

The *Essay* does not contain a specific section on the epistemological status of scientific laws. However, the implications of Locke's theory for this issue are clear. They derive from the analysis of the knowledge of universal propositions of coexistence, which is undertaken in several chapters of book IV (specially iii, vi, xii and xvi).

We have already seen that, for Locke, knowledge results, *ideally*, from the perception of the agreement or disagreement of ideas. This knowledge will be universal if, and only if, the ideas perceived to agree or disagree are abstract, general ideas:

For what is known of such general *Ideas*, will be true of every particular thing, in whom that Essence, *i.e.* that abstract *Idea*, is to be found: and what is once known of such *Ideas*, will be perpetually, and for ever true. So that as to all general Knowledge, we must search and find it only in our Minds, and 'tis only the examining of our own *Ideas*, that furnisheth us with that. (IV iii 31)

Locke maintained an invariable position about this central point throughout the whole book (see e.g. IV vi 13 and xii 7).

In chapter IV vi, entitled "Of Universal Propositions, their Truth and Certainty," Locke observes that "because *we cannot be certain of the Truth of any general Proposition, unless we know the precise bounds and extent of the species its Terms stand for*, it is necessary we should know the Essence of each *Species*, which is that which constitutes and bounds it" (IV vi 4). Now, in the case of simple ideas and modes, in which the nominal and the real essences coincide (III iii 18), the species can be known in a precise and complete

way.<sup>9</sup> The truth of universal propositions about them can, thus, be clearly determined, if there is perception of the agreement or disagreement of the ideas. This is what happens in all the propositions of identity and diversity (e.g. ‘Nothing is square and round’), as well as in many propositions expressing relations in general (excepted those of coexistence, or necessary connection), such are, paradigmatically, the propositions of mathematics.

Serious difficulties arise, however, in the case of substances, “wherein a real Essence, distinct from the nominal, is supposed to constitute, determine, and bound the Species” (IV vi 4). But then no proposition of coexistence of species of substances can be known, if taken to refer to their real essences — “the internal constitutions, and true nature of things” (III xxiii 32) —, for these are completely unknowable, as Locke insists in several passages of the *Essay*.<sup>10</sup>

Our only hope of getting some universal knowledge of coexistence in substances is, thus, to refer to their nominal essences, i.e., certain collections of simple ideas that *we* take as constituting the complex ideas of that sort of thing. In forming such complex ideas we usually take a hint from experience — the experience of the customary “togetherness” of certain sets of simple ideas — but their precise contours are freely established by ourselves. Nominal essences are, therefore, capable of complete determinateness and clarity. Unfortunately, a new kind of obstacle arises in the way of the universal knowledge of substances, when their nominal essences are taken for the basis of the analysis: we can discover almost nothing about the connections of a given idea with the ideas of substances:

On the other side, the *Names of Substances*, when made use of as they should be, for the *Ideas* men have in their Minds, though they carry a clear and determinate signification with them, *will not yet serve us to make many universal Propositions, of whose Truth we can be certain*. Not because in this use of them we are uncertain what Things are signified by them, but because the complex *Ideas* they stand for, are such Combinations of simple ones, as carry not with them any discoverable connexion or repugnancy, but with a very

few other *Ideas*. (IV vi 6)

Locke justifies the thesis that “connexion between simple ideas in substances is for the most part unknown” (IV iii 10) through an examination of three cases, which cover all the possibilities. The cases are marked off by the distinction between primary and secondary qualities:<sup>11</sup>

a) *Connections between ideas of primary qualities*. These are the only connections of simple ideas that Locke regards as conceivable by the human mind. But in the whole *Essay* he gives only these two examples of known connections of this kind: “Figure necessarily supposes Extension; receiving or communicating Motion by impulse, supposes Solidity” (IV iii 14).<sup>12</sup>

b) *Connections between ideas of primary qualities and ideas of secondary qualities*. Locke considers these connections not only unknowable, but even unconceivable (see e.g. IV iii 12, vi 14). However, given that in the metaphysical framework he adopts all secondary qualities are supposed to “flow from” the particular primary qualities of the microscopic constituents of bodies (II viii, xxiii 3, xxxi 13; IV iii 11, vi 19), Locke is led to attribute this kind of connections to “arbitrary Determination of that All-wise Agent, who has made them to be, and to operate as they do, in a way wholly above our weak Understandings to conceive” (IV iii 28, 29).

c) *Connections between ideas of secondary qualities*. These are *a fortiori* unknowable and unconceivable, because: 1) We lack senses sufficiently acute to discover the primary qualities of the minute parts of bodies, which are, as just remarked, the “root” from which the secondary qualities “spring from” (IV iii 11; see also 25); and 2) We are utterly incapable to discover, and even to conceive, any connection between ideas of primary and secondary qualities in general (IV iii 12, 28). Therefore, “amongst all the *secondary Qualities* of Substances, and the Powers relating to them, there cannot any two be named, whose necessary co-existence, or repugnance to coexist, can certainly be known; unless in those of the same sense, which necessarily exclude one another” (IV vi 10; see also 7).

Locke’s favourite example to illustrate these points is the universal proposition ‘Gold is fixed’ (see e.g. II xxiii 10; IV vi 8, 9, 46ff,

xii 9). We can never attain certainty about it: if we take the word 'gold' to stand for a species defined by nature by means of a real essence, it is clear that, not knowing this essence, we are not able not even to decide what particular objects are, or are not, gold, let alone to know that all gold is fixed. If, on the other hand, we take 'gold' to denote a species determined by a nominal essence — a complex idea of a body of a certain yellow colour, malleable, fusible and heavy to a high degree, say — the only other qualities we are entitled to attribute to gold, in a certain and universal way, are those whose ideas have a perceivable necessary connection with the ideas forming the nominal essence. But, from what has just been established, these are only those referring to the same sense. Thus, we can be certain that no gold is blue, for instance. That gold is fixed we cannot know, however, since we are unable to discover any connection between the idea of fixedness and the ideas forming the nominal essence of gold. If we try to overcome this difficulty by modifying the nominal essence to include fixedness, 'Gold is fixed' becomes certain, but merely "verbal": it does not teach us anything "instructive" about the world. Furthermore, we will remain ignorant about other putative properties of gold, such as solubility in *aqua regia* and ductility. It is clear that the difficulty will never be completely removed by such a kind of manoeuvre.

Summing up: Our universal knowledge of coexistence, or necessary connection, in substances is "very narrow, and scarce any at all" (IV iii 10), including only: 1) The propositions expressing the couple of cases of connections between primary qualities; 2) Propositions such as 'No gold is blue', which depend on the "repugnancy" of ideas belonging to a same sense; and 3) Trifling propositions, which "[teach] but the signification of Words" (IV viii 7), such as 'Lead is a metal', 'All gold is fusible' and 'Every man is an Animal' (IV viii 4, 5 e 6) — it being presupposed, in these examples, that what is predicated of the subject is part of its nominal essence. All "instructive" (IV iii 26) universal propositions — which include, importantly, *the whole class of phenomenological laws of science* — lie, therefore, out of the realm of knowledge properly considered, i.e., certain knowledge, obtainable through the analysis of ideas:

[T]herefore we cannot with Certainty affirm, That *all Men sleep by intervals*; That *no Man can be nourished by Wood or Stones*; That *all Men will be poisoned by Hemlock*: because these *Ideas* have no connexion nor repugnancy with this our nominal Essence of *Man*, with this abstract *Idea* that Name stands for. (IV vi 15)

This sceptical conclusion, Locke realizes, is particularly worrisome, since it concerns a “weighty and considerable part [...] of Humane Science” (IV iii 10). Locke could not rest content with that, and, pressed by common sense, violated for a second time his idea-empiricism, as it will be shown in the following section.

### 5. Circumventing the Blockage: Sensitive Knowledge of Coexistence in Substances

It is common to attribute to Hume the thesis that knowledge of general propositions about the natural world is not possible, due to a limitation of the inductive inferences, the so-called problem of induction.<sup>13</sup> In truth, as we saw in the preceding section, Locke has arrived at a similar conclusion through an entirely different approach. The trouble with those propositions would derive, according to his analysis, from impediments in the *a priori* perception of certain connections between ideas.<sup>14</sup> After showing that these impediments are insurmountable, Locke went on, and sought to explore an alternative epistemological route, namely, that of *a posteriori*, *direct experience of particular* coexistence in substances. “*Experience here must teach me, what Reason cannot*” (IV xii 9). This is a clear step in the direction of common sense epistemology, as well as of earlier forms of empiricism, such as that of Gassendi.<sup>15</sup>

With the exception of the hesitating treatment of “knowledge” of real existence of bodies, the role Locke had attributed to experience in the *Essay* up to this point was that of source of ideas. But from now he ascribes it a second, all-important, role: that of source of direct *propositional* knowledge. This new modality of knowledge is called “sensitive knowledge of coexistence” by Locke (IV iii 29), who thereby extends the meaning of the expression formerly intro-

duced to designate knowledge of real existence of material beings, as we saw in section 3. In both cases idea-empiricism is violated. But now the rupture with this doctrine is more striking, since sensitive knowledge of particular coexistence in substances is regarded by Locke as *certain* knowledge, not just something that “passes under the name of Knowledge.”<sup>16</sup> By overlooking this point, Roger Woolhouse was led to conclude, in sharp contrast to what I endeavour to show in the sequel, that Locke had “little interest in what became known as Hume’s problem of induction” (1994, p. 155).

But although this new approach help Locke to break the epistemological stalemate associated with idea-empiricism, it brings a new problem: is there a legitimate way of going beyond particular knowledge of coexistence in substances, to reach *general* knowledge, which, as Locke remarked, is the “most sought after” by the mind (IV vi 2)? This is the problem of induction. On its satisfactory solution depends the epistemic legitimacy of countless propositions relevant not only for our daily life, but also for science, since all the so-called *phenomenological scientific laws* — such as Boyle’s law — fall under this head.

Locke has not anticipated Hume’s refined analysis of this issue, of course; but nevertheless he arrived at a similar conclusion, namely, that the problem is indeed insoluble, unless we are prepared to lessen our epistemological standards. Locke correctly realised that experience cannot afford certainty but on what has *effectively* been experimented. Let me quote some passages in which Locke elaborates on this point.

In paragraph 14 of chapter iii of book IV, Locke remarks, after summarizing his conclusion that our knowledge of substances obtained by the way of ideas is “very narrow”:

Our Knowledge in all these Enquiries, reaches very little farther than our Experience. [...] [A]nd we are left only to the assistance of our Senses, to make known to us what Qualities they contain. For of all the Qualities that are *co-existent* in any Subject, without this dependence and evident connexion of their *Ideas* one with another, we cannot know certainly any two to *co-exist*, any further

than Experience, by our Senses, informs us. Thus though we see the yellow Colour, and, upon trial, find the Weight, Malleableness, Fusibility, and Fixedness, that are united in a piece of Gold; yet, because no one of these *Ideas* has any evident *dependence*, or necessary connexion with the other, we cannot certainly know, that where any four of these are, the fifth will be there also, how highly probable soever it may be: Because the highest Probability, amounts not to Certainty; without which there can be no true Knowledge. For this *co-existence* can be no farther known, than it is perceived; and it cannot be perceived but either in particular Subjects, by the observation of our Senses, or in general, by the necessary *connexion* of the *Ideas* themselves. (IV iii 14)

And in paragraph 28 of the same chapter we read:

For wherever we want [*a discoverable Connexion* between those *Ideas* which we have], we are utterly incapable of universal and certain Knowledge; and are [...] left only to Observation and Experiment: which, how narrow and confined it is, how far from general Knowledge, we need not be told. (IV iii 28)

Another explicit statement of the insolubility of the problem of induction is found in this passage about our ignorance of “properties and ways of operation” of bodies:

nor can we be assured about them any farther, than some few Trials we make, are able to reach. But whether they will succeed again another time, we cannot be certain. This hinders our certain Knowledge of universal Truths concerning natural Bodies: and our reason carries us herein very little beyond particular matter of Fact. (IV iii 25)

The moral is, in Locke’s own words, the impossibility of a “*scientific Philosophy*,” or of “*scientific Knowledge*” (IV iii 26), or yet of “a perfect *Science* of natural Bodies”:

The Things that, as far as our Observation reaches, we constantly find to proceed regularly, we may conclude, do act by a Law set them; but yet by a Law, that we know not: whereby, though Causes

work steadily, and Effects constantly flow from them, yet their *Connexions* and *Dependencies* being not discoverable in our *Ideas*, we can have but an experimental Knowledge of them. [...] But as to a perfect *Science* of natural Bodies, (not to mention spiritual beings,) we are, I think, so far from being capable of any such thing, that I conclude it lost labour to seek after it. (IV iii 29)

Given such a clear set of statements, the general failure of the literature on the problem of induction to acknowledge the pioneering work of Locke is rather puzzling.<sup>17</sup> But Locke definitely did not have “a mind to be a sceptic” (IV ii 1). We have already seen that, and how, he eschewed scepticism about the existence of bodies and about coexistence in particular substances. Now he is prepared to relax once again his previously proposed epistemological tenets in order to move in the direction of common sense. In the chapter on the “Improvement of Knowledge” (IV xii), he resumes his thesis about the impotence of experience to provide universal knowledge about substances, and then tries to reassure his reader that he does not thereby intend “to dis-esteem, or *dissuade the Study of Nature*,” but only to warn that “we should not be too forwardly possessed with the Opinion, or Expectation of Knowledge, where it is not to be had; or by ways that will not attain it” (12).

Locke’s compromise solution for the present conflict between the results of stern epistemological analysis and the common view of science as affording certain knowledge about the world is, once again, to lower the epistemological standards: *to substitute probability for knowledge*. This proposal is developed at length in chapters xiv, xv and xvi of book IV, where we find an original — if rough, by our current standards — study of the “Degrees of Assent” inferior to knowledge. The exam of these intriguing chapters lies beyond the scope of the present article. I just observe that in the proposed gradation Locke seeks to secure the highest possible position to the phenomenological natural laws of science. Thus, he submits that

The first therefore, and *highest degree of Probability*, is, when the general consent of all Men, in all Ages, as far as it can be known, concurs with a Man’s constant and never-failing Experience in

like cases, to confirm the Truth of any particular matter of Fact attested by fair Witnesses: such are all the stated Constitutions and Properties of Bodies, and the regular proceedings of Causes and Effects in the ordinary course of Nature. This we call an Argument from the nature of Things themselves. For what our own and other Men's constant Observation has found always to be after the same manner, that we with reason conclude to be the Effects of steady and regular Causes; though they come not within the reach of our Knowledge. Thus, That Fire warmed a Man, made Lead fluid, and changed the colour or consistency in Wood or Charcoal: that Iron sunk in Water, and swam in Quicksilver: these and the like Propositions about particular facts, being agreeable to our constant Experience, as often as we have to do with these matters; and being generally spoke of (when mentioned by others,) as things found constantly to be so, and therefore not so much as controverted by anybody — we are put past doubt, that a relation affirming any such thing to have been, *or any prediction that it will happen again* in the same manner, is very true. These *Probabilities* rise so near to *Certainty*, that they govern our Thoughts as absolutely, and influence all our Actions as fully, as the most evident demonstration: and in what concerns us, we make little or no difference between them and certain Knowledge: our Belief thus grounded, rises to *Assurance*. (IV xvi 6) (The italics in the crucial expression '*or any prediction that it will happen again*' are mine.)

Attributing probabilities in the highest degree (short of absolute certainty) to well-attested phenomenological laws is, thus, Locke's way out for the riddle of induction. But that is not the end of the story. Deeply acquainted with the science of his days, Locke knew that in science *not all laws are phenomenological*. Accounting for non-phenomenological laws was, then, the final challenge he had to meet in the epistemological analysis of science.

## 6. Non-Phenomenological Laws: the Way of Hypotheses

Most scientific theories include *non*-phenomenological laws, namely, those purporting to describe the unobservable causal mecha-

nisms responsible for the appearance of the phenomena and their subsumption to phenomenological laws. As is well known, it is through the postulation of such mechanisms that science is ordinarily thought to *explain* the phenomena. Ever since Antiquity this has been regarded as one of the main desiderata of science. Locke could not, therefore, leave non-phenomenological, explanatory propositions out of his account of scientific knowledge. The very fact that these propositions are introduced as *hypotheses*, and not as inductive generalizations, indicates already that their epistemological status differ from those of the phenomenological laws.

In Locke's time, natural philosophers were deeply engaged in developing new explanatory hypotheses and theories for hosts of natural phenomena. Locke himself has participated directly in the debates on the epistemological status of these theories (as his election for the Royal Society in 1668 indicates). In his influential discussion on the distinction between primary and secondary qualities he made explicit appeal to one of the most important hypotheses of the new natural philosophy, namely, the "corpuscularian Hypothesis" (II viii, IV iii 16). It is true that the epistemological issues raised by scientific hypotheses were far from assuming, in Locke's philosophy, the same importance they had in Descartes's or Boyle's, for instance. But Locke did not fail to make some interesting remarks on this issue, both in the *Essay* and in a short unpublished manuscript to be mentioned presently.<sup>18</sup>

In the chapter on the degrees of assent (IV xvi), Locke proposes that "that the Propositions we receive upon inducements of *Probability* are of *two sorts*; either concerning some particular Existence, or, as it is usually termed, matter of fact, which, falling under Observation, is capable of humane Testimony; or else concerning Things, which being beyond the discovery of our Senses, are not capable of any such Testimony" (5). These classes encompass, respectively, the phenomenological and the non-phenomenological laws.

In chapter xii of book 4 there is a specific paragraph on "the true use of Hypotheses," which is worth quoting in full:

Not that we may not, to explain any *Phaenomena* of Nature, make

use of any probable *Hypotheses* whatsoever: *Hypotheses*, if they are well made, are at least great helps to the Memory, and often direct us to new discoveries. But my Meaning is, that we should *not take up any one too hastily* (which the Mind, that would always penetrate into the Causes of Things, and have Principles to rest on, is very apt to do,) till we have very well examined Particulars, and made several Experiments, in that thing which we would explain by our Hypothesis, and see whether it will agree to them all; whether our Principles will carry us quite through, and not be as inconsistent with one *Phaenomenon* of Nature, as they seem to accommodate, and explain another. And at least that we take care that the Name of *Principles* deceive us not, nor impose on us, by making us receive that for an unquestionable Truth, which is really at best but a very doubtful conjecture, such as are most (I had almost said all) of the *Hypotheses* in Natural Philosophy. (IV xii 13)

Thus, Locke warns against attributing too much epistemic assurance to hypotheses, points out their heuristic role, sets forth as acceptance conditions their being subjected to tests and having a broad scope, and, finally, underlines their irredeemably conjectural character — a set of remarks that would fit perfectly in any contemporary text of philosophy of science. But as regards our present purpose, the most interesting trait of this account is its complete departure from idea-empiricism. Hypotheses are not taken by Locke as constructed out of ideas in a piecemeal process, but proposed entire and complete as propositions (often motivated by analogies; IV xvi 12). Nor does Locke require them to be translated or reduced to ideas for the sake of philosophical analysis. Last, but not least, their meaningfulness and epistemic legitimacy derive, according to Locke, from their eventual ability to instantiate the above-mentioned theoretical virtues, and not from *a priori* perception of connections between ideas.

Furthermore, in a two-page manuscript dated from 1694, entitled “Method,” Locke makes several points about the evaluation of hypotheses that are even more interesting and contemporary-looking.<sup>19</sup> First, Locke submits that a certain amount of tolerance may prove essential in the initial stages of development of a hypothesis. He then proposes that it should not be evaluated in isola-

tion from alternative hypotheses. Finally, he adds — surprisingly, to readers influenced by Quine’s remarks on Lockean empiricism — that, in fact, it is *whole systems of hypotheses* that should be the locus of epistemological evaluation:

But to shew which side has the best pretence to truth & follows the two whole systems [of hypotheses] must be set by one another & considered entirely & then see which is most consistent in all its parts; which least clogd with incoherences or absurdities & which freest from begd principles & unintelligible notions. This is the fairest way to search after Truth & the surest not to mistake on which side she is. (“Method,” *apud* Farr 1991, p. 71.)

I cannot refrain from conjecturing that, had Quine read this, and pondered on the points I indicated in the rest of this article, he would perhaps have formed a better opinion about the great 17th-century philosopher.

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### Keywords

Locke, Quine, reductionism, idea-empiricism, epistemological holism, scientific laws, induction, scientific hypotheses.

Silvio Seno Chibeni  
Departamento de Filosofia — Unicamp — Brazil  
web: <http://www.unicamp.br/~chibeni>  
e-mail: [chibeni@unicamp.br](mailto:chibeni@unicamp.br)

### Resumo

*Este artigo objetiva defender Locke contra a acusação de Quine, feita em seu famoso artigo sobre os "dois dogmas," de que a teoria do conhecimento de Locke tem graves falhas, não apenas por assumir os dogmas, mas também por adotar uma versão "intoleravelmente restritiva" do dogma do reducionismo. Mostramos aqui que, em sua análise do status epistemológico das leis científicas, Locke foi efetivamente além do estreito empirismo de idéias que subjaz a sua versão do reducionismo. Isso foi feito em três estágios. Primeiro, para escapar do idealismo, ele introduziu a noção de "conhecimento sensível da existência particular de seres finitos fora de nós," ampliando assim sua definição inicial de conhecimento em termos de "percepção do acordo ou desacordo das idéias — uma definição compatível com a interpretação de Quine. Em segundo lugar, depois de mostrar que virtualmente não podemos ter nenhum conheci-*

mento a priori de verdades universais sobre substâncias, Locke estendeu a noção de “conhecimento sensível” a proposições particulares de “coexistência” em substâncias, apelando para a noção de “probabilidade” para tratar de suas generalizações indutivas e, em particular, das leis fenomenológicas da ciência. Finalmente, reconhecendo a presença essencial de leis hipotéticas e não-fenomenológicas na ciência, Locke antecipou muito das concepções contemporâneas sobre seu papel e natureza, inclusive, notadamente, uma versão branda do holismo epistemológico defendido por Quine.

### Palavras-chave

Locke, Quine, reducionismo, empirismo de idéias, holismo epistemológico, leis científicas, indução, hipóteses científicas.

### Notes

<sup>1</sup> Hans Aarsleff has remarked that this position was anticipated in the 18th century by Condillac and Diderot (Aarsleff 1994, pp. 275–7).

<sup>2</sup> It seems clear that, even leaving aside my case for Locke, Quine’s epistemological holism had important predecessors. Quine alludes to Duhem; but at least one of Duhem’s contemporaries, Henri Poincaré, could have been mentioned too (see Poincaré 1968; 1st. ed. 1902). And in a well-known popular book, Einstein and Infeld (1971; 1<sup>st</sup> ed. 1938) wrote, commenting on the epistemological status of Newton’s law of mechanics: “It is really the whole system of guesses which is to be either proved or disproved by experiment. No one of the assumptions can be isolated for separate testing” (pp. 30–1).

<sup>3</sup> “All Ideas come from Sensation or Reflection. Let us then suppose the Mind to be, as we say, white Paper, void of all Characters, without any Ideas; How comes it to be furnished? Whence comes it by that vast store, which the busy and boundless Fancy of Man has painted on it, with an almost endless variety? Whence has it all the materials of Reason and Knowledge? To this I answer, in one word, From Experience: In that, all our knowledge is founded; and from that it ultimately derives it self. Our Observation employ’d either, about external, sensible Objects; or about the internal Operations of our Minds, perceived and reflected on by our selves, is that,

which supplies our Understandings with all the materials of thinking. These two are the Fountains of Knowledge, from whence all the *Ideas* we have, or can naturally have, do spring.” (II i 2.)

<sup>4</sup> Ayers 1991, p. 14. The expression “the way of ideas” was introduced by Edward Stillingfleet, the Bishop of Worcester, in his famous series of objections to the *Essay*. For the relevant passages of the controversy, see volume IV of Locke’s *Works*, pp. 128–31.

<sup>5</sup> This point is made explicit in a long note added by Locke to IV i 2 in the 5th edition of the *Essay*, incorporating material from the polemic with Stillingfleet: “Knowledge is an *internal* perception of [men’s] minds” (my italics). Quoted from the Appendix of Wozzley’s edition of the *Essay*, p. 457.

<sup>6</sup> “Thus when we pronounce concerning *Gold*, that it is fixed, our Knowledge of this Truth amounts to no more but this, that fixedness, or a power to remain in the Fire unconsumed, is an *Idea*, that always accompanies, and is join’d with that particular sort of Yellowness, Weight, Fusibility, Malleableness, and Solubility in *Aqua Regia*, which make our complex *Idea*, signified by the word *Gold*” (IV i 6).

<sup>7</sup> Although seemingly trivial, the views expressed in this paragraph have been hotly debated in the Locke literature (see e.g. Yolton 1970, Wozzley 1972 and Soles 1985). Entering this controversy here would divert me from my main objective.

<sup>8</sup> Another concession Locke makes to scepticism at this point is his admission that this sort of “knowledge” reaches, at most, the material objects *actually present* to the senses (IV xi 9).

<sup>9</sup> Locke follows the tradition in taking the real essence as “the very being of any thing, whereby it is, what it is” (III iii 15). The characteristically Lockean notion of nominal essence of a species, on the other hand, is just an abstract idea referred to by a general term (III iii 15; IV iv 17, vi 4). “The measure and boundary of each Sort, or *Species*, whereby it is constituted that particular Sort, and distinguished from others, is that we call its *Essence*, which is nothing but that *abstract Idea to which the Name is annexed*: so that everything contained in that *Idea*, is essential to that Sort.” (III vi 2; see also II xxxi 6, where the distinction of the two kinds of essences is first introduced.)

<sup>10</sup> “[In this case] the extent of the general Word is very uncertain: because not knowing this real *Essence*, we cannot know what is, or what is not of that *Species*; and consequently what may, or may not with certainty be af-

firmed of it (IV vi 4). See also III iii 17, vi 6, 9 and 19; IV vi 4, 5, 8 and 15.

<sup>11</sup> This distinction, which pervades the metaphysical background of the *Essay*, was rapidly becoming an essential part of the scientific worldview, and would remain so until the beginning of the 20th century. Its first systematic exposition was made in chapter viii of book II of the *Essay*, although it can be traced back to Boyle and Galileo, amongst others. Primary qualities are defined by Locke as those “utterly inseparable from the Body, in what state soever it be” (II viii 9). The list of such properties is finite: extension, solidity, figure, movement or rest, bulk, number and texture. Secondary qualities, on the other hand, are “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, Tasts, etc.” (*ibid.*, 10.)

<sup>12</sup> IV iii 14. Notice that Locke calls solidity “That which [...] hinders the approach of two Bodies, when they are moving one towards the other” (II iv 1). In the chapter on “Maxims” there is a passing reference to another proposition which could perhaps count as a third example of known connection of ideas of primary qualities: “*That two Bodies cannot be in the same place*” (IV vii 5).

<sup>13</sup> For an original, persuasive critique of the usual identification of Hume’s problem with the problem of induction, see Monteiro 2001.

<sup>14</sup> Notice that Hume has, apparently, benefited from Locke’s analysis, since he *assumes* from the beginning that our knowledge of the propositions of the class in dispute does not belong to the scope of “relations of ideas,” being, rather, “matter of fact,” to be decided exclusively by an appeal to experience. This was, at the time, a far from trivial epistemological point.

<sup>15</sup> Michael Ayers has called attention to the important fact that Locke himself had espoused this ordinary form empiricism in the *Draft A* of the *Essay*, dated from 1671 (Ayers 1991, pp. 14ff). It is worth noticing that in *Draft A* there is a rough anticipation of idea-empiricism, in paragraph 2; but in the ensuing discussion Locke effectively restricts its application to arithmetic. Locke *does not even try* to apply this criterion of knowledge to the physical world — as he would do in the *Essay*. His later leaning towards idea-empiricism is also understandable from the standpoint of the analysis of knowledge expounded in *Draft A*, since it was already clear to

Locke at the time that the “way of ideas” is “the only ground of certainty,” as Stillingfleet was to point out much later. (It should be remarked that Stillingfleet strongly *disagreed* with this approach, since he feared that it could “overthrow the mysteries of our faith”; see Locke’s *Works*, vol. IV, p. 128.)

<sup>16</sup> Locke is explicit on this point in several passages of the *Essay*. In IV xii 9, for instance, resuming the case of the fixedness of gold, Locke asserts: “Here again for assurance, I must apply my self to *Experience*; as far as that reaches, I may have certain Knowledge, but no further.” Similar statements can be found in IV iii 16 and xvi 6. A curious example of this sort of knowledge is given in IV vii 5: “If I my self see a Man walk on the Ice, it is past *Probability*, ’tis Knowledge.”

<sup>17</sup> See e.g. Russell 1945, Smart 1968, Goodman 1983, Popper 1972a and 1972b, Hacking 1975 and the papers collected in Swinburne 1974. Two exceptions are Milton 1987 and Jolley 1999; but their brief remarks on Locke are far from doing full justice to his contributions.

<sup>18</sup> A detailed analysis of Locke’s stance with respect to the hypotheses of natural philosophy can be found in Farr 1987. Pioneering defences of the view that Locke took hypotheses seriously were presented in Mandelbaum 1964 and Laudan 1967. For the contrary, traditional view, see Yost 1951 and Yolton 1970.

<sup>19</sup> This manuscript, held in the Bodleian Library, was transcribed in full and thoroughly analysed by James Farr in his 1987. The relevant portion of the manuscript had previously been quoted and commented in Soles 1985. It is quite puzzling that 19th-century publications of the manuscript have passed virtually unnoticed by Locke scholars.