Leibniz and Locke and the Debate over Species

I. Introduction

In the ‘debate’ over species in the *Nouveaux essays* the striking issue arises of whether Leibniz’s counter-arguments against Locke’s workmanship of the understanding thesis (hereafter ‘workmanship thesis’) constitute a viable response to Locke. Locke’s workmanship thesis is that nature does not come neatly divided into pre-formed species, rather, species are the result of how we create our general terms. His most formidable argument on behalf of this thesis rests on the realists’ bedrock assumption that nature produces many things alike. The problem, however, is that nature produces too many similarities. And since similarities on their own do not classify, we must select those which we take to be important enough to constitute the meanings of our species terms. This selection process is not something that nature can do; only we can decide which qualities count as differentiae.

Susanna Goodin, in her article “Locke and Leibniz and the Debate over Species”, argues that Leibniz’s criticisms of Locke’s position are inadequate as a refutation of Locke’s thesis, and if Leibniz were to buttress his criticisms by appeal to his own metaphysical commitments, he could do so only at the expense of so radically altering the nature of the debate that Locke’s original concerns would not even arise. I will argue, however, that Leibniz has an argument within the *Nouveaux essays* which provides him with a mechanistically respectable counterproposal to Locke’s workmanship thesis and which demonstrates the explanatory superiority of natural kind realism.

II. Leibniz’s Essences, Mechanism and Species Individuation
What Leibniz is doing in the debate over species is temporarily shelving his metaphysics and tugging on Locke’s empiricist and corpuscularian sensibilities in order to show that there is room for species realism in the new science. To see this, however, it will be informative to point out that there is another species realist within the corpuscularian tradition with whom Leibniz thinks Locke would be familiar, namely, Robert Boyle.

In NE III Leibniz endorses a version of Boyle’s corpuscular essentialism: “both kinds of bodies, animate bodies as well as lifeless structures, will fall into species according to their inner constitutions.” [p. 318] So, while he defends substantial forms, he, like Boyle, also thinks that there are corpuscular species forms, i.e., deep-structures that ground the properties of bodies and sort them into recognizable species. As Boyle put it in the *Origine of Formes and Qualities*,

For the Form of a Natural Body, being according to us, but an Essential Modification, and, as it were, the Stamp of its Matter, or such a convention of the Bigness, Shape, Motion (or Rest,) Scituation and Contexture, (together with the thence resulting Qualities) of the small parts that compose the Body, as is necessary to constitute and denominate such a particular Body….(2000, *Works*, 353; 1991, 69)

Leibniz, it seems, follows Boyle in emphasizing the causal-explanatory relationship between the inner constitutions, the specific properties and the species membership of bodies. By their lights, careful attention to the observable features will yield insights into nature’s classifications: “generality consists in the resemblance of singular things to one another, and this resemblance is a reality.” [p. 292]
Locke, on the other hand, argues that similarities, even at the micro-structural level, neither account for species membership nor ground the properties of bodies in the way Boyle’s and Leibniz’s theories claim they do. According to Locke, real essences in the sense of deep-structure, are not essences by nature, but only by being the supposed causal ground of the observable properties by appeal to which we sort bodies into species.\(^9\) How we sort things is by deciding what observable features to include in our definitions of general terms. So, even if we did have access to the deep structures of bodies, we still would not have any basis for classifying them. Rather, the same questions of what to include into our definitions of species terms would arise again at this micro-level.\(^{10}\)

In fact, Locke argues, similarity in deep structure is no guarantee of similarity in observable qualities.\(^{11}\) Even if we knew what the physical arrangements of matter are, we would still be in the dark about their relationship to the observable qualities. Leibniz, on the other hand, thinks that we can acquire knowledge of the rules of the consequence or coexistence of the properties of bodies:

no matter what rules men make to govern how things are to be named and what entitlements go with the names, provided that the system is orderly (i.e. interconnected and intelligible)\(^{12}\) it will be founded in reality, and men will be able to imagine only such species as have already been made or distinguished by nature. [p. 309]

Within the corpuscular natural philosophy, the role of the real essences, or species forms, is to ground and explain the properties of bodies, regardless of our abilities to conceive of how they do that. Given this explanatory role for real essences, there is reason to think that if we are
careful enough in deriving our general terms, they will track the joints in nature, and we will not form abstract ideas that do not correspond to natural cleavages.

Part of the problem is that both Leibniz and Locke have different accounts of the meanings of species terms. For Locke, the meaning of our species terms consists of the set of observable qualities that we include in our definitions of the species. For Leibniz,\textsuperscript{13} since species are constituted by similarities in deep-structure, the meanings of general terms is affixed to the deep-structure of the paradigmatic parcel of matter to which we refer with natural kind terms.\textsuperscript{14} Thus, Leibniz argues, given that Locke holds that nature does make several things alike\textsuperscript{15} and our sorting practice is based on noting these similarities, then what reason does Locke have for denying that generality \textit{just is} this natural resemblance relation?

III. Goodin and Leibnizian Metaphysics

And this question sets up our problem nicely. As Goodin argues, on pain of promiscuous realism, Leibniz cannot accept that just any resemblance is sufficient to determine species membership. Promiscuous realism, is the view that there are equally legitimate ways of carving up the world into kinds, and since all the species we end up with are really out there, there is no single carving that is any better than the others.\textsuperscript{16}

Goodin, of course, is correct. Leibniz cannot accept that just any carving is as good as any other; there must be some natural justification for classifying Socrates as a \textit{human being} rather than as a \textit{white thing}. Thus, Goodin argues, if not just any commonality will do, then the appropriate species distinction must be among specific properties only. But since an object possesses its specific internal structure regardless of our knowledge of it, then the specific
properties and non-specific accidents will be naturally distinguished by the character of the observable qualities themselves. However, the difference between these specific properties and non-specific accidents is not obviously inherent in the qualities themselves. Moreover, Leibniz himself asserts that certain specific properties of one species may be a non-specific accident in another. It seems then that experience alone is insufficient to tell us what the specific properties are.

Thus, Goodin concludes,

Leibniz has no way of explaining how we are to know, through the study of objects out in nature, which properties are the essential properties, that is, which properties are necessarily connected to each other and thus form a species boundary. More to the point than just our inability to determine which properties are in fact the necessary ones is the problem of how nature itself must be in order to have necessarily connected properties. If Leibniz’s theory of essences and species is to triumph over Locke’s, Leibniz must have an account of necessity that allows him to make the claim that certain properties are essential and that this necessity is independent of humanly determined requirements for species membership. [GH p. 171]

But, Goodin continues, Leibniz can only defend his account of necessity and essences by dipping into his idiosyncratic metaphysics, and thereby fail to meet Locke on his own terms.

And Goodin appears to be right; it is not clear that Leibniz can answer this particular challenge without begging the question against Locke. What I am arguing, however, is that Leibniz is offering Locke a different kind of response in the *Nouveaux essays*, i.e., a
metaphysically neutral counterproposal which addresses Locke’s challenge at the level of the mechanical science—not the deep metaphysics.

Leibniz meets Locke on his own terms by challenging both of Locke’s premises that resemblances do not classify and that no knowledge of the rules of, and coexistence of, the observable properties is possible. His argument takes the form of an empirical induction that we can identify some properties as essential without appealing to anything more abstruse than the corpuscular natural philosophy. That is, Leibniz envisions the science as a careful Boylean would: the essential properties of bodies are grounded in the corpuscular forms, and these properties guide our judgments about differentiae: “It is true that we cannot define a species in terms of something which is unknown to us [e.g., real essences or corpuscular forms]; but the outer features serve in place of it…. ” [p. 311] The observable macro-properties are our window to the unobservable micro-properties.

IV. The Induction Step

Leibniz’s argument is that there is room in corpuscularianism for species forms, and that if there are specific differences and if we are rational enough in our methods, we can get a carving that tracks some of the joints in nature. This is a defeasible account of natural species because it is an empirical account. As he put it,

If the ideas we combine are compatible, then the limits we assign to species are always ‘exactly conformable’ to nature; and if we are careful to combine ideas which actually occur together, our notions are also conformable to experience. If we regard them as
only provisional with reference to actual bodies, and as subject to experiments which have been or will be made to discover more about them, and if we have recourse to those who are expert when fine points arise about whatever it is that the name is generally understood to stand for, then we shan’t be doing anything wrong. Thus, although nature can furnish more perfect and convenient ideas, it will not give the lie to any ideas we have which are sound and natural even if they are not the soundest and most natural. [pp. 322-3]

Leibniz is insisting that there are natural species—and probably more than anyone imagines—and that our carvings can be grounded in nature's cleavages. And these carvings, along with the evidence in favor of them, will be the best empirical evidence of natural species that we could possibly hope for.

The observable properties that constitute differentiae would be those that pass certain tests. For example, “…when the specific differentiae are positive and mutually opposed, the genus is bound to select from amongst them.” [p. 323] If we have a clump of matter where some of the properties are mutually opposed to each other in the same circumstances, then we have empirical evidence that we have two species in the same clump, e.g., jade or porphyry.18

Another test would be long-term stability of properties. The laws of nature can help us determine which properties cluster together under any and all circumstances, and we may thereby distinguish the accidental from the essential. If a given object possesses a property regardless of the conditions of observation and after various physical alterations, then we have evidence that this property is non-accidental. Indeed, this is a non-biological application of Leibniz’s assertions that essences, genera and species depend on possibilities: “So it is not within
our discretion to put our ideas together as we see fit, unless the combination is justified either by reason, showing its possibility, or by experience, showing its actuality and hence its possibility.” [p. 294]^{19}

These tests will provide privileged classifications by identifying the properties that are the most stable in the long run. Of these more durable properties, some will enter more readily into our causal descriptions and causal laws than others, and thus are better candidates for differentiae.^{20}

A similar account holds for non-biological cases as well. Information gathered over the long run about the geological conditions, strata, local context, etc., in which we find gold will provide us with empirical reasons for thinking gold and iron pyrite to be of different species independently of chemical and physical differences.^{21}

Thus, the realist has a theoretical explanation of these empirical facts that eludes Locke entirely. Why do we notice all of these similarities in nature? According to Locke, it is simply because nature produces things alike. For Leibniz, however, these similarities are explained by—and constitute the empirical evidence of—the truth of corpuscular essentialism. Nature produces things according to corpuscular forms, and we can recognize the boundaries of forms by producing rigorous natural histories.^{22} And “the more features we accumulate, the less provisional is the definition.” [p. 324]

V. Explaining the Phenomena

So in reply to Locke’s and Goodin’s arguments, Leibniz might ask “What would count as empirical evidence of natural kinds?” The answer is that, first, the corpuscular natural
philosophy of Boyle, which Locke takes to be the best possible explanatory theory, posits entities that could play this role, i.e., real essences (or, as Boyle terms them, species forms). Secondly, since these real essences are beyond our ken, but are themselves the causal grounds of the observable properties, then inductive evidence of specific properties among them would be inductive evidence of species essences. Thus, Leibniz responds to the challenge by offering a research programme based on the empirical induction that if we observe certain clusters of properties constantly together regardless of context, and if, even after extensive experimentation certain properties remain within a given sample, and if certain properties enter readily into our causal laws, and if these laws are predictive and explanatory, etc., and if these experiments in the long run yield an elite minority of naturally privileged properties then a plausible explanation of these phenomena is that there are natural species.

This is a reply to Locke’s argument because it focuses on the need to explain the phenomena while also producing a list of defeasible rules for the coexistence of qualities. After all, the role of the real essences in Locke’s mind was to cause and explain the nominal essences. And if the antecedents of Leibniz’s conditional are satisfied, then he can deny the premise that resemblances do not classify; something explains the resemblances, and the corpuscular theory hypothesizes an entity that can do it.

The way Leibniz avoids promiscuous realism is founded in the way the laws of nature guide our scientific practices.

…the nominal definition is also real, not in itself (since it does not show us a priori the possibility of this body, and its mode of origin) but through experience, in that we find
that there is a body in which these qualities occur together. Otherwise we could doubt whether such a weight was compatible with so much malleability…. [p. 294]

The laws of nature determine the compatibility of properties and thus help constrain our species definitions by providing empirical evidence that some properties are members of homeostatic clusters of properties.

So, if our system of identifying differentiae is orderly and intelligible, then it will not only be founded in nature’s joints, but “men will be able to imagine only such species as have already been made and distinguished by nature.” [p. 310] That is, the elite properties will guide our definitions because they will be part of our laws; they will be the necessary conditions that help us describe the natural order.25

Rather than begging the question against Locke, Leibniz is proposing an empirical research programme as an alternative to the ‘too many similarities’ problem. He is also showing that there is logical space in the mechanical philosophy to bridge the theoretical gap between observable similarities and corpuscular forms. Moreover, he is providing an argument that our choices of specific differences can be guided by the joints in nature. Finally, he is offering an empirical method of determining whether there are species forms.

Nevertheless, Locke could still argue that after the careful Leibnizian has finished his research he would still have to select which properties to include in the definitions of species.26 However, if Leibniz is right about forms, then it still would not follow that those choices cannot reflect natural specific differences. If there are structural forms, then the laws of nature can provide us with empirical evidence that there are privileged cleavages. They would also explain why our accounts of species and nominal essences via abstraction coincide, and how we could
acquire good empirically-grounded reasons for thinking that our taxonomies mirror nature. According to Leibniz, we can empirically determine which properties are naturally privileged because the species essences—through the homeostatic clusters of properties they ground—do in fact constitute part of the observable properties, which constitute our best guides to the cleavages in nature. For Locke, however, natural resemblances among individuals are explanatorily empty and mysterious and fail to ground our taxonomies.

Locke would undoubtedly argue that finding a chemical or physical property in one mass of stuff that another lacks is interesting, but it is not a differentiating property until we make it one. Nevertheless, Leibniz would argue, any theory that informs our taxonomical practice is going to have to explain both the data and our practice. And on this point Leibniz has the dialectical upper hand: the observable similarities and the similar causal behaviours of bodies, e.g., why gold melts at a different temperature than lead, can be explained by corpuscular forms. By Locke’s lights, this would constitute ‘experimental knowledge’ [IV.iii.29], of the connexions of the properties of bodies, not a scientia. But even the experimental data needs to be explained, and Leibniz is offering an inference to the best explanation of the data which postulates a nomological\textsuperscript{27} relation between the real and nominal essences which would explain our observations.\textsuperscript{28} And what makes it the best explanation is the theoretical commitment Locke has to the explanatory superiority of the new science of mechanism. This is not an attempt at a scientia, it is merely a hypothetico-deductive stance.\textsuperscript{29} But even so, it is an explanatorily powerful account. And if there is a choice between a philosophy of science that explains our practice and observations and one that cannot, all other things being equal, the former is preferable.
This shows that there is an explanatory gap to be filled; if the real essences (*qua* theoretical posits) are the grounds of the properties of bodies, and we can produce a list of the durable properties of a certain sample, and find those same clusters of durable properties in other samples, then this needs explaining. The inference that it is the same type of real essence in each sample that explains the similarities in properties is a plausible inference to the best explanation.\(^3^0\) This is a Boylean point in Lockean terminology: nominal essences supervene on real essences.\(^3^1\) For this reason, if we discover clusters of elite properties, we have reasons for inferring that they are each part of a network of connected properties that distinguish the kind.\(^3^2\)

Leibniz, of course, is aware of the rhetorical force this kind of inference would have for Locke. In IV.ii.14, Locke, recognizing that his strict definition of knowledge precludes sensitive knowledge, nevertheless allows it to pass as *knowledge* because of the strength of the inductive evidence, which is greater than ‘bare probability’. He argues that, with regard to external objects, “we are provided with an Evidence, that puts us past doubting.” The question is, what possible sort of evidence is required to justifiably believe these external bodies exist? Locke’s answer is that the evidence of the senses is all we have, and is thus the best possible evidence. By examining our ideas in the allegedly veridical circumstances and comparing them with the same ideas in memory, we notice a stark contrast in vivacity, which gives us reasons to infer that the cause in the more vivid case was not something internal to us. Locke here is endorsing an inference to the best explanation within his epistemology, and Leibniz recognized it:

I maintain that the study of the degrees of probability would be very valuable and is still lacking, and that is a serious shortcoming in our treatises on logic. For when one cannot absolutely settle a question one could still establish the degree of likelihood on the
evidence, and so one can judge rationally which side is the most plausible. ...But probability or likelihood...must be drawn from the nature of things; and...at a time when Copernicus was almost alone in his opinion, it was still incomparably more likely than that of all the rest of the human race. [pp. 372-3]

Locke admits ‘sensitive knowledge’ as knowledge because the evidence, like Copernicus’s, makes it more than a probability. The effect known is the idea of an external body, whose cause is inferred from the evidence of that effect. By parity of reasoning Locke ought to take the inference from the evidence of the similarity of observable qualities as contributing to the probability of a judgment about the structural similarity of their internal causes. If we acquire justified beliefs about elite clusters of properties, then, given the theory or real essences, we should thereby have inerentially justified beliefs about the structural similarities of the bodies. And, given the Boylean account of species forms, there is a theoretical explanation of why we would discover these clusters of similarities.

This corpuscular account also explains how abstraction yields nominal essences that match essential corpuscular forms in nature. Thus, from the assumption that nature produces many things alike, it does not follow that nature cannot classify or that we must arbitrarily choose which properties to include within our general terms.

VI. Conclusion

The explanatory power of Leibniz’s programme lends initial plausibility to his denial of Locke’s premise. And Leibniz can block Locke’s argument if he has an argument for the view that not
all natural similarities are equal. And he has an argument for that conclusion if the mechanical science yields evidence that some properties are more stable and non-trivial, i.e., law-like, explanatory, causally relevant etc., than others. So, although this is not the refutation Goodin envisions, by arguing that there is a corpuscularian account of classification that is an alternative to the workmanship thesis, Leibniz is attempting to meet Locke’s challenge at the level of the scientific evidence without begging the question. This account of Leibniz’s arguments explains how he can rise to the occasion when substantive metaphysics is at stake.

Bibliography


Leibniz, G.W. German Academy of Sciences (ed.), G.W. Leibniz: Samtliche Schriften und Briefe (Darmstadt, 1923-). References are to Series VI, Volume 6.


1 While there was no debate between Leibniz and Locke, Leibniz does intentionally structure the Nouveaux essays as a debate, hoping to draw Locke into a correspondence. For a general discussion of the Nouveaux essays, see Nicholas Jolley’s Leibniz and Locke: A Study of the New Essays on Human Understanding, Oxford: Clarendon Press, 1984.

2 In fact, the nature of the debate seems to have been somewhat elusive even to Leibniz, who in NE III.iii announces his confusion over Locke’s arguments: “I confess, sir, that I have seldom had so poor a grasp of the force of your argument as I do now, and this distresses me.” In Nouveaux essays, III.iii, p. 292-3, he claims that he cannot understand how Locke’s conclusion that classification is the workmanship of the understanding follows from his premises. Moreover on p. 327 he attributes to Locke a rather un-Lockean third mode of distinguishing differentiae.
References to Leibniz’s *Nouveaux essais sur l’entendement humain* are to Series VI, volume 6 of the Academy edition and to the Remnant and Bennett translation. The pagination of Remnant and Bennett is identical with that of the Academy text; one page number thus serves for both.

3 See III.i.17 and III.iv.39.

4 There is a further set of arguments that I will pass over here, those having to do with real essences referring to sorts. There is some ambiguity in Locke’s position over the possibility of re-identifying some object independently of sortal considerations. Since this issue is not currently our focus, I will leave those arguments out of the present paper.


6 As Henry Allison has recently argued, Leibniz’s best arguments against Locke’s workmanship of the understanding thesis is deeply grounded in the metaphysics of the *Monadology*. See his “The Critique of Judgement as a ‘True Apology’ for Leibniz”, p. 291, forthcoming.

7 In other words, there is logical space within the corpuscular natural philosophy for a species realism based on the deep structures of bodies. One such realist was Robert Boyle. Contrary to current orthodoxy, in the *Origin of Forms and Qualities*, Boyle espouses a realist doctrine of species grounded in corpuscular forms. And while I don’t have the space here to defend a broader relationship of influence between Leibniz and Boyle, it seems that in Boyle’s account of classification, Leibniz sees room for species realism, but fails to see such in Locke. Indeed, Leibniz is familiar with Boyle’s scientific and philosophical works on mechanism, and even holds up Boyle as a true defender of the mechanical philosophy. Leibniz visited Boyle in London and there are at least four references to Boyle in the NE. In a letter to Henry Oldenburg in 1675, Leibniz emphasizes the influence of Boyle on his work: “I esteem [Boyle] as highly as the virtue and learning of man can be esteemed...” (Loemker, pp. 165-6)


9 These structural forms are similar to the ones found in Boyle’s theory of classification in *The Origin of Forms and Qualities*. Moreover, you would expect a substantial form realist like Leibniz to have corpuscular forms at the scientific level that would be well-founded in the metaphysics. Specifically how they are to be fleshed out at the scientific and monadological levels would be the topic of another paper.

10 See III.vi.6.

11 Again, see III.i.17 and III.iv.39.

12 In the French, the parenthetical begins with “ou” rather than “i.e.”, which, however, does not seem to affect the meaning.

13 “So you do see sir, that the name ‘gold’, for instance, signifies not merely what the speaker knows of gold, e.g. something yellow and very heavy, but also what he does not know, which may be known about gold by someone else, namely: a body endowed with an inner constitution from which flow its color and weight, and which also generates other properties which he acknowledges to be better known by those who are expert.” (p. 354) J.L. Mackie argues that it was Locke who anticipated the Kripke-Putnam causal theory of reference. See J.L. Mackie, *Problems From Locke*. Oxford: Clarendon Press. See especially pp. 72-102. However, as P. Kyle Stanford has convincingly argued in “Reference and Natural Kind Terms: The Real Essence of Lock’s View”, Locke only anticipated this tradition long enough to refute it. It is Boyle in his works on corpuscular forms who anticipates this view. I argue elsewhere that Boyle’s account of natural kinds is more in line with that of Leibniz than Locke. Moreover, as P. Kyle Stanford argues, a common misreading of Locke’s arguments takes Locke’s nescience on real
essences to be merely empirical. This easy misreading may explain, in part, why Leibniz has such a difficulty separating out the empirical implications of Locke’s arguments and the deeper metaphysical ones. For the argument that Leibniz, not Locke, anticipates the Kripke-Putnam causal theory of reference, see Jolley, pp. 151-4.


15 III.iii.13.


17 Leibniz here points to the division of linguistic labor. How the ‘experts’ are to decide what counts as sufficient or necessary components of general terms must be quite complex and thus seems only partially elucidated here.

18 As Leibniz put it, “…whole books have been devoted to ‘the unsuccessfulness of experiments.’ The point is that people mistakenly take those bodies to be homogeneous or uniform, whereas really they are more mixed than they are thought to be. When dealing with heterogeneous bodies, one is not surprised to find differences between individual samples…” [p. 305] Mixed bodies, then, will produce different experimental effects than homogeneous bodies, and will thus be experimentally divisible into lower species.

19 See, for example, NE p. 292-4. On p. 309 we read “However, no matter what rules men make to govern how things are to be named and what entitlements go with names… men will be able to imagine only such species as have already been made or distinguished by nature—nature which even encompasses possibilities.” On p. 323 he says “[essences] are possibilities [inherent] in resemblances.”

20 See, for example, NE p. 311. Since a biological interpretation of ‘species being founded in possibilities’ concerns origins, in the long run, we can take note of successes in breeding and group individuals together based on the stability of the resulting properties. When two individuals are crossed and they produce a living offspring, they have a stronger claim to be naturally related than two individuals incapable of producing any offspring at all. This, of course, is not a sufficient condition for species membership, but a bit of strong evidence that the individuals are more closely related—and therefore to be grouped more closely together—than others who cannot successfully breed. This is Leibniz’s point with the spaniel and the mastiff being closer than either is to an elephant. “[The more deeply we study how species are generated, and the more thoroughly our rankings follow the necessary conditions of generation, the nearer we shall come to the natural order.” [p. 310] And again, “My point was that if this theory [of pollination] is proved to be true, and if we learned more about how plants are generated, I have no doubt that the differences we observed amongst them would provide a foundation for very natural divisions.” [NE p. 310]

21 It is this kind of test Leibniz has in mind when he says that “…species that are too alike are seldom found together.” [p. 321] We do not consistently find iron pyrite in the same contexts and conditions as we do gold.

22 As he put it: since “generality consists in the resemblance of singular things to one another…[t]hen why not look for the essence of genera and species [in the natural resemblance of things]?” [p. 292] For Leibniz and Boyle, these natural resemblances are explained by corpuscular forms. In other words, Leibniz is suggesting that there is a current story about the mechanical relationship between corpuscular structures and nominal essences that ought to make Locke understand how species and corpuscular essences relate.

23 These kinds of laws and law-like behavior are what Leibniz is referring to when he claims that experiments will show us what properties are possible, composible and actual.

24 These would be the durable and causally relevant properties enumerated above which explain and ground resemblance relations, etc. For more on this see David Lewis’ “New Work for a Theory of Universals”, *Australasian Journal of Philosophy* 61 (1983), pp. 343-377. See also, David Armstrong, *Universals and Scientific Realism*. (Cambridge: Cambridge University Press, 1978).

25 The law-like behavior instanced in generation does just this: “…the more deeply we study how species are generated, and the more thoroughly our rankings follow the necessary conditions of generation, the nearer we shall come to the natural order.” [p. 310] Moreover, the property whiteness in snow, milk, paper and Socrates does not exhibit the same law-like behavior in each particular white thing. The whiteness will also fail to explain the behavior of these items in a uniform way. Conversely, the property of rationality (one might assume) will be the same in each instance of Socrates, Plato, Aristotle, etc., and will explain the same behaviors in a uniform way. Thus, there is an empirical basis for claiming that the whiteness of Socrates, Plato, Aristotle, etc., is not as good of a candidate for a species difference as rationality.

26 Nicholas Jolley and Kyle Stanford have pointed out this Lockean response to me in conversation.

As Leibniz put this point in NE III.vi., p. 310, “…if we had the acuity of some of the higher Spirits, and knew things well enough, perhaps we would find for each species a fixed set of attributes which were common to all the individuals of that species and which a single living organism always retained no matter what changes or metamorphoses it might go through…but lacking such knowledge, we avail ourselves of the attributes which appear to us the most convenient for distinguishing and comparing things and, in short, for recognizing species or sorts; and those attributes always have their foundation in reality.”

There has been some discussion in the literature of the major difference between Locke and Leibniz in the Nouveaux essays as being rooted to some extent in differing epistemologies; see, for example, Margaret Wilson’s “Leibniz and Locke on ‘First Truths’”, *Journal of the History of Ideas*, vol. 28, pp. 347-66. Leibniz point here is that even Locke’s ‘experimental knowledge’ provides us with data that needs to be explained: why do we discover homeostatic clusters of properties; why do we find specific properties behaving in a law-like manner in certain bodies, etc?

On this view, then all and only samples exhibiting the same properties will be classified together.

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See NE pp. 294-5.

“[Simple ideas] only appear simple. So when they occur there are other things going on which are connected with them…and these accompanying circumstances provide something that can be explained and subjected to analysis.” [NE p. 299]

Elsewhere he says “For it seems to me that, in the case of propositions which we have learned from experience alone and not by the analysis and connection of ideas, we rightly attain to certainty…but not to necessity.” [NE, p. 406]

And even though Locke would still insist that the arbitrariness will resurface within Leibniz’s proposed remedy (e.g., the scientists, even in the long run, will still have to make decisions about what kinds of experiments to do to eliminate what properties, and which properties are the most relevant to our interests, and finally, what counts as a definition of the species that results), Leibniz can still challenge the premise that those decisions are inherently arbitrary. If there are natural kinds, then they can guide our meta-scientific practices and meta-scientific reasoning as well; and there is a way that we could come to possess reasons for thinking that nature comes divided up into kinds (this hypothetico-deductive confirmation process seems to be the effect of his ‘tests’). And as long as Leibniz has arguments for denying Locke’s premise, Locke is not at liberty to appeal to his own arbitrariness conclusion as a reply to those arguments. In this way, the debate resembles the reliabilist replies to skeptical arguments; if our belief forming mechanism are reliable, then they can be used to help us determine that fact. In a similar way Leibniz is arguing that, contra Locke, if the science is well-founded, then we ought to be able to discover it. And when faced with a powerful skeptical argument that does not admit of a straightforward refutation, sometimes the only possible dialectically adequate procedure is to have a reply at each level of the debate.