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Structuralism, Anti-Structuralism and Objectivity

Derk Pereboom

Structuralist theories describe the entities in their domains solely in terms of relations. At the same time, they purport to be complete theories of the entities in their domains. For example, a standard variety of structuralism about mental entities, external-relations functionalism, aims to provide a complete theory of the mental by specifying solely the relations mental states have to sensory inputs, behavioral outputs, and other mental states. Since their inception, structuralist theories have been controversial precisely because they claim to be complete while yet specifying entities solely in terms of relations. What recommends structuralism is that it satisfies a certain ideal of objectivity, and structuralists often at least implicitly claim that for non-structuralist theories this ideal is beyond reach. However, the link between structure and objectivity is not transparent, and requires investigation.

We can illuminate the contours of this debate by way of a historical inquiry, beginning with Descartes's reaction to the medieval Aristotelian theory of matter. In Thomas Aquinas's Aristotelian conception, matter has two metaphysical components; first, the form of quantity, that is, three-dimensional spatial extension, and second, that which is extended in matter, which in the Aristotelian view is known as prime matter (*prima materia*).¹ In Aquinas's position, prime matter in itself is not extended; in fact, in itself it has no forms at all. This has the consequence that in itself it is not intelligible, since things are intelligible only by way of form. Moreover, prime matter is pure potentiality, and thus in itself it is not actual; matter is made actual by form.

For the seventeenth century modern philosophers, prime matter is an unattractive theoretical posit. A key concern is its unknowability and unintelligibility. In his response, Descartes proposes that matter is just extension in three dimensions, endorsing the intelligible component of Aquinas's theory, and deleting its unintelligible element, prime matter. Since space is also defined as extension in three dimensions, matter and space are identical by definition. As we shall now see, we can understand Descartes's proposal as a structuralist conception of matter, arguably the first structuralist theory to be advanced. Yet it is Leibniz who first saw that Descartes's theory is a structuralist one, and it is in response to Leibniz that Kant formulates the long-standing core objection to structuralism, one that is reiterated throughout the history of philosophy from Kant to Derrida.

Leibniz and the Demand for Absolutely Intrinsic Properties

Structuralist theories specify entities solely in terms of relational or equivalently, extrinsic properties. What this characterization leaves out are intrinsic properties or non-relational properties.² Leibniz contends that a theory of the physical that does not include intrinsic properties of a certain fundamental sort is in an important sense incomplete, and an examination of Descartes's conception of matter that reveals why this is so.³ Leibniz argues that the Cartesian theory is unsatisfying for the reason that extension is in an important sense an extrinsic property, and that any ultimately real thing cannot feature only properties that are extrinsic in this way, but must possess intrinsic properties, in a contrasting sense, as well; "there is no denomination so extrinsic that it does not have an intrinsic denomination at its basis. This is itself one of my principal doctrines (*kyriai doxai*)."⁴

First of all, Leibniz's formulation of this doctrine—let's call it his Intrinsicness Principle—indicates that in his conception properties can be more and less extrinsic. Extrinsic properties might have intrinsic aspects. For example, *being wise* is an extrinsic property of Sophie since it involves a relation to a comparison class. But *being wise* also includes an intrinsic aspect—having a certain type and level of intelligence. *Being wise* is plausibly a complex property that has at least one extrinsic and one intrinsic aspect, and thus it is not a maximally extrinsic property of hers. This suggests the notion of a property so thoroughly extrinsic that it lacks any intrinsic aspect:

P is a *purely extrinsic property* of X just in case P is an extrinsic property of X and P has no intrinsic aspects.

Being one of a plurality and *being to the left of* are candidates for purely extrinsic properties.

Now to Leibniz's objection to Descartes one might initially reply that properties like *having such and such an extension* and *being spherical* are paradigmatically intrinsic properties of things. But Leibniz has in mind that a sphere's extension is not intrinsic to it in a more fundamental sense.⁵ First, he maintains that there remains a respect in which the extension of a thing is extrinsic:

Nor do I think that extension can be conceived in itself, but I consider it an analyzable and relative concept, for it can be resolved into plurality, continuity, and coexistence or the existence of parts at one and the same time.⁶

Leibniz is proposing that the extension of the sphere can be analyzed as, or

reduces to, the plurality, continuity, and coexistence of parts of the sphere. Properties of each of these three types are plausibly purely extrinsic properties of these parts; being one of a collection of more than one thing, being continuous with other things, and coexisting with other things are all excellent candidates for purely extrinsic properties of whatever has them. So it may be that P is an intrinsic property of X, while P is not in a sense fundamentally intrinsic to X, or, as James van Cleve points out, in Kant's terminology, not *absolutely* intrinsic to X.⁷ This is so when X's having P can be analyzed as, or reduces to, X's parts having properties Q, R, S ... , and these properties are purely extrinsic properties of these parts. We can specify, then, that

P is an *absolutely intrinsic* property of X just in case P is an intrinsic property of X, and X's having P does not reduce to parts of X having purely extrinsic properties.

By contrast, also in Kant's terminology,

P is a *comparatively* (or a *relatively*) *intrinsic* property of X just in case P is an intrinsic property of X, and X's having P reduces to parts of X having purely extrinsic properties.⁸

Thus the extension of a sphere, if Leibniz's claim about the reduction of the property of extension is correct, is only a comparatively intrinsic property of it. At this point one might object that the Cartesian sphere's extension does not reduce to parts of the sphere having purely extrinsic properties, for the reason that the parts have an intrinsic property that serves as the foundation for the extrinsic properties. But in Descartes's conception of matter, these parts consist just in extension, for the extension of each of these parts reduces in the same way as the extension of the original body: to the plurality, continuity, and coexistence of their parts. Moreover, the extension of the parts of these parts is subject to the same reduction, and so on to infinity. In such a protracted analysis of the extension of the sphere, nothing other than purely extrinsic properties of parts is to be encountered. Thus, on the Cartesian theory, matter features only purely relational, that is, structural properties.

To this structuralist conception Leibniz objects that it is implausible that material things feature only purely extrinsic properties:

But it would appear from this that something must always be assumed which is continuous or diffused, such as the white in milk, the color, ductility, and weight in gold, and resistance in matter. For by itself, continuity (for extension is nothing but

simultaneous continuity) no more constitutes substance than does multitude or number, where something is necessary to be numbered, repeated, and continued.⁹

Leibniz's concern is the one that has historically been compelling. It can be formulated this way: for any substantial entity, there must be some absolutely intrinsic property that confers on it its substantive character—one might call a property of this sort a *substantial absolutely intrinsic property*.¹⁰

In this last passage Leibniz represents the absolutely intrinsic property of a material thing as that which has extension, or more specifically, as that which is continuous in matter. His positive proposal is to attribute force to matter as the missing intrinsic property. The passage continues: "So I believe that our thinking is completed and ended in the concept of force rather than in that of extension. And we need seek no other concept of power or force than that it is the attribute from which change arises, and whose subject is substance itself."¹¹ To preclude the outcome that matter has only purely extrinsic and comparatively intrinsic properties, Leibniz requires a property that withstands reduction to purely extrinsic properties. But can force have this role? Consider gravitational force, for instance. Plausibly, the gravitational force exerted by a sphere on another body is a function of the gravitational force exerted by its parts, but this force is not obviously reducible to purely extrinsic properties of its parts. Accordingly, there may be properties of type T that are intrinsic to material thing X, and while X has P by virtue of its parts having certain properties, X has P by virtue of its parts having properties precisely of type T itself, and these properties are intrinsic to these parts. These parts have these properties by virtue of their parts having intrinsic properties of type T, *ad infinitum*. If force satisfies these conditions, then a material thing's having force will be an absolutely intrinsic property of it.

It is important to note, as the above reasoning shows, that force can be an absolutely intrinsic property even if there are no fundamental material entities due to the fact that material things are composed of more basic entities to infinity, and thus no fundamental entity has force. This possibility is accommodated by the notion of an absolutely intrinsic property as we have defined it above. The Leibnizian Intrinsicness Principle, which now might be formulated as follows,

(Intrinsicness Principle, first pass) Any substantial entity must have at least one substantial absolutely intrinsic property,

does not depend for its plausibility on there being a fundamental material.¹²

It is also important to note that Leibniz maintains that force in matter is not an absolutely intrinsic property of a *material substance*. For him, material or physical force is *derivative force*, and he suggests that it is the phenomenal

appearance of a non-physical *primitive* force, an intrinsic property of a non-physical monad. Primitive force is a law-governed tendency of a monad to pass from one perception to another.¹³ For Leibniz, the underlying ground of primitive force is found in the representational states of the monad, and it is these non-physical representational states that ultimately supply the missing absolutely intrinsic properties. This account features no absolutely intrinsic physical properties. In Leibniz's mature conception, this is arguably part of the explanation for why physical things are not real or substantial in the fundamental sense, and are rather only well-founded phenomena (*phenomena bene fundata*). The fact that physical derivative force has a foundation in absolutely intrinsic properties of a monad allows physical things to be real or substantial in this lower-grade sense.

For what reason did Leibniz advocate this mentalist or idealist position? Kant's diagnosis of Leibniz on this issue—read 'absolutely intrinsic' for 'intrinsic'—is compelling:

As object of pure understanding, on the other hand, every substance must have intrinsic determinations and powers which pertain to its intrinsic reality. But what intrinsic accidents can I entertain in thought, save only those which my inner sense presents to me? They must be something which is either itself a *thinking* or analogous to thinking. For this reason Leibniz, regarding substances as noumena, took away from them, by the manner in which he conceived them, whatever might signify extrinsic relation, including also, therefore, *composition*, and so made them all, even the constituents of matter, simple subjects with powers of representation—in a word, MONADS.¹⁴

On Kant's suggestion, the only absolutely intrinsic properties *we can conceive* are mental, and that this is the source of Leibnizian idealism.

Kant's Claim of Ignorance

Kant denies that we have knowledge or cognition (*Erkenntnis*) of any absolutely intrinsic properties of material things:¹⁵

All that we cognize in matter is nothing but relations (*lauter Verhältnisse*). What we call the intrinsic determinations of it are intrinsic only in a comparative sense (*nur komparativ innerlich*), but among these relations some are self-subsistent and permanent, and through these we are given a determinate object.¹⁶

In material things we cognize comparatively intrinsic properties, but no absolutely intrinsic properties. This is not merely an epistemic claim. Kant contends that all properties of matter, *substantia phaenomenon*, even its apparently intrinsic properties reduce to those that are purely intrinsic: "It is quite otherwise with a *substantia phaenomenon* in space; its intrinsic determinations are nothing but mere relations, and it itself is entirely made up of mere relations" (but this is consistent with some of these relations being "self-subsistent and permanent").¹⁷ Kant is thus a structuralist about matter—for him there are no absolutely intrinsic physical properties. In the subsequent sentence, Kant mentions force as a feature of matter: "We are acquainted with substance in space only through forces which are active in this and that space, either bringing objects to it (attraction), or preventing them penetrating into it (repulsion and impenetrability)," so for him force is in the last analysis an extrinsic property of material things.¹⁸ In Kant's conception, force is ultimately an extrinsic property because it is a relation among material items, or, more abstractly, spatial points. The section on dynamics in Kant's *Metaphysical Foundations of Natural Science* specifies there are two kinds of force, attractive and repulsive. Attractive force is by definition the cause by which two points approach one another, and repulsive force is by definition the cause by which two points recede from another.¹⁹

Kant admits that there is something unintuitive about his view that all of the properties of matter are relational: "It is certainly startling to hear that a thing is to be taken as consisting wholly of relations."²⁰ However, this apparent implausibility can be explained away: "Such a thing is, however, mere appearance, and cannot be thought through pure categories: what it itself consists in is the mere relation of something in general to the senses."²¹ Because matter is only appearance, it need not have any physical absolutely intrinsic properties. If matter were not merely appearance, but a thing in itself, then it would possess such absolutely intrinsic properties. In making these claims, Kant indicates that he does not fundamentally reject the Leibnizian doctrine that intrinsic properties must ground extrinsic properties. If he did, he would not sense the need to explain the plausibility of matter's having only purely extrinsic and comparatively intrinsic properties by declaring that it is only appearance. What Kant accepts is that the extrinsic properties of mind-independently real substantial entities—things in themselves—must be grounded in absolutely intrinsic properties. This suggests a revised statement of the Intrinsicness Principle:

(Intrinsicness Principle, Kantian version) Any mind-independently real substantial entity must have at least one substantial absolutely intrinsic property,

which I think best captures the metaphysical intuition that drives anti-structuralist

positions in the history of philosophy and of science.

Let us now turn to the link between structuralism and objectivity. Kant supposes that the marks of a true science include human rational agreement in methodology and results.²² Here is a characterization of the sort of intersubjective accessibility that would facilitate this type of agreement:

X is rationally intersubjectively accessible just in case X's existence and defining properties (or essence) can be known either directly through intuitions and observations available to any subject with a reasonably powerful cognitive and sensory apparatus, or indirectly through deduction, induction, or abduction from such intuitions and observations, together with background conditions.

In the philosophical tradition, this sort of rational intersubjective accessibility is a paradigmatic kind of objectivity. Kant is in effect arguing that for us, no substantial absolutely intrinsic properties are rationally intersubjectively accessible, and thus no theory of such properties is objective in this sense.

Arguing for Ignorance about Absolutely Intrinsic Properties

But why should we think that we lack knowledge of which substantial absolutely intrinsic properties are actual, and that this ignorance is irremediable? Kant gives us an indication of why he thinks we lack such knowledge, but his suggestions are unconvincing. As I shall now contend, we need to go beyond Kant for the most plausible argument for the kind of ignorance at issue.

Rae Langton has developed an influential interpretation of Kant's argument for such ignorance, which has been extensively discussed and revised by Van Cleve.²³ Langton and Van Cleve cast it as an argument for ignorance about all intrinsic properties, but it should rather be construed as targeting solely knowledge of absolutely intrinsic properties.²⁴ The argument begins with the premise that human knowledge depends on sensibility, and sensibility is receptive. We can have knowledge of an object only in so far as it causes us to be in some state. Furthermore, we can know that an object has some property only if from the fact that it causes us to be in that state we can *deduce* that it has the property. However, if the property in question is absolutely intrinsic, we cannot make the deduction. We cannot deduce what absolutely intrinsic properties objects have from the effects they have on us, since there will always be alternative possibilities for those properties that cannot be ruled out. Thus for any absolutely intrinsic property of an object, we cannot know that the object has it.²⁵

Van Cleve's objection to this argument (or the one that concludes ignorance

of all intrinsic properties) is that the deducibility condition on knowledge it presupposes is too strict and therefore implausible.²⁶ To know that an object has a property, it is not required that the possibility of all other options be ruled out, and this requirement is presupposed by the claim that the object's having the property be deducible from what we know. He suggests that the requirement be counterfactual rather than deductive; for example, it might be sensitivity: if object A didn't have property F, we wouldn't believe that it was F; or safety: we would believe that A is F only if it were F. Supposing the deductive requirement, we would know little, including, for example, the relations that physical objects have to one another, since we are unable to deduce these relations from their effects on us. In addition, it is not clear from the relevant texts that this argument is what Kant had in mind.

The argument for ignorance about absolutely intrinsic categorical properties animated by deducibility condition on knowledge assumes that knowledge of such properties would be inferential. Kant also entertains the possibility that knowledge of such properties would be immediate. But in his view we cannot have immediate knowledge, that is, intuition, of such properties, and this limitation issues in another argument for ignorance about absolutely intrinsic properties:

If the complaints—that we have no insight whatsoever into the intrinsic [properties] of things (*das Innere der Dinge*)—are to mean that we do not conceive by pure understanding what the things that appear to us may be in themselves, they are entirely illegitimate and unreasonable. For what is demanded is that we should be able to know things, and therefore to intuit them, without senses, and therefore that we should have a faculty of knowledge altogether different from the human, and this not only in degree but also in intuition and kind—and thus that we should be not humans but beings of whom we are unable to say whether they are even possible, much less how they are constituted. (A277/B333)

Here Kant identifies absence of insight into things in themselves with absence of insight into the intrinsic [properties] of things. We have reason to suppose that Kant means these properties to be absolutely and not just comparatively intrinsic (since we can have knowledge of the comparatively intrinsic properties through observation and analysis of appearances). This argument for ignorance hinges on the claim that we have no intuition, that is, immediate or direct representation of absolutely intrinsic properties.²⁷

However, it is plausible that a sound argument for ignorance of absolutely intrinsic properties cite only our inability to intuit them? Kant himself maintains

that we can have knowledge of unobservable properties of physical things, even though we lack intuition of these properties: “from the perception of the attracted iron filings we know of the existence of a magnetic matter pervading all bodies, although the constitution of our organs cuts us off from all immediate perception of this medium.”²⁸ Clearly, we can have knowledge of categorical and intrinsic physical properties, for example, of the intrinsic structural properties that water has, even though we do not intuit them—we lack direct acquaintance with them. However, as Alyssa Ney asks, why could science then not determine the intrinsic properties that ultimately ground the physical world?²⁹

The property *being* H_2O is an intrinsic property of water, and we know that water has it. We possess this knowledge, despite our lack of intuition or direct acquaintance with this property, due to the fact that we conceived a model for the unobserved basis for explanations involving water that has been experimentally and theoretically confirmed. In principle, could we acquire knowledge of absolutely intrinsic properties in just this way? We might imagine: physics provides a model for the fundamental particles in which their absolutely intrinsic property is X. The model turns out to be so explanatorily impressive that it yields abductive knowledge (knowledge from best explanation) that X is actually instantiated.

But even given this abductive model, it is still plausible that we currently lack knowledge of which absolutely intrinsic properties are actual. We have conceived different candidates for such properties that have not been abductively ruled out, and it is clearly open that we have not yet conceived all of the viable candidates. Which candidates for absolutely intrinsic properties have we conceived? Aristotelians propose prime matter, Locke suggests perfect solidity,³⁰ and Leibniz develops a model in which the absolute intrinsic properties are mental properties of immaterial entities. It would seem far from certain that any candidate that has been proposed is actually instantiated, and it might well be that there are possibilities for such properties that we do not understand that are also relevant alternatives.

Thus we have come to an argument for ignorance about absolutely intrinsic properties from the premise that there are a plurality of options in the running for such properties, only some of which we now understand, more than one of which is a candidate for the best explanation of the relevant phenomena, and none of which now decisively wins out. The conclusion does not claim permanent ignorance, but a kind that is potentially remediable. Correlatively, even though no conception of which absolutely intrinsic properties are actually instantiated currently commands intersubjective rational agreement, it is not ruled out that there is one that might, which would thus be objective in this sense. This contrasts with Kant’s view, according to which no such conception could ever yield intersubjective rational agreement for us, and thus about such properties there is no objective theory in this sense.

Twentieth-Century Structuralism and Anti-Structuralism

The twentieth century witnessed the development of structuralist theories in various fields. In the 1920's, a highly general structuralist account of reality was set out by Rudolf Carnap, a member of the Vienna Circle of logical positivists, in his *The Logical Construction of the World* (*Der Logische Aufbau der Welt*, 1928).³¹ The initial phase of Carnap's account aims to demonstrate that the phenomenal language we commonly use to describe our experiential world is translatable into a phenomenal language that features no monadic (non-relational) predicates and only one kind of relation: recollected phenomenal similarity in some respect.³² This canonical phenomenal language is in turn claimed to be translatable into a physical language that features no monadic but only relational predicates. In the final phase, the conjunction of all the sentences in this relational physical language is converted into a Ramsey sentence, in which the referring terms are replaced by existentially quantified variables, and the relational predicates are also replaced by variables.³³ The particular content of the physical relational predicates is discarded, leaving only descriptions that abstract away from this content. The intended consequence is a complete description of the world in a logical language of relations—a purely structural language.

In Carnap's scheme, what has become of the absolutely intrinsic properties, about which metaphysicians conflict? Any sentences with terms for such intrinsic properties will be translated into purely structural sentences, with the aim of eliminating these terms. Certain contemporary functionalist projects about the mental are similar. According to one kind of external-relations functionalism, the content of phenomenal experience is expressed as relations among sensory inputs, behavioral outputs, and other mental states, eliminating phenomenal terminology.

The logical positivists aimed to set out an account of the world that is objective in the sense of rational intersubjective accessibility, and Carnap's structuralism is one such attempt. Here again is our characterization which is in fact loosely based on Herbert Feigl's:³⁴

X is rationally intersubjectively accessible just in case X's existence and defining properties (or essence) can be known either directly through intuitions and observations available to any subject with a reasonably powerful cognitive and sensory apparatus, or indirectly through deduction, induction, or abduction from such intuitions and observations and background conditions.

In the *Aufbau*, what makes the physical a prime candidate for objectivity in this sense is that the canonical physical language is purely relational or structural. It

is so at least partly because it eliminates terms for absolutely intrinsic properties, which defy rational intersubjective accessibility.

A crucial question for Carnap is whether the ordinary phenomenal language of experience can in fact be translated without loss of content into physical-structural or logical-structural sentences. This issue has been a focus of disagreement. But a further concern is whether such structural sentences can completely describe entities that are objective in a different sense, that of being metaphysically objectively real:

*X is metaphysically objectively real just in case X's existence, and X's essential nature, are independent of how X is perceived or conceptualized.*³⁵

Something's being objectively real in this way does not require that it be rationally intersubjectively accessible. Thomas Nagel argues that there may be metaphysically objectively real things that we cannot conceive.³⁶ In addition, our notion of intersubjective accessibility does not demand that intersubjectively accessible things be metaphysically objectively real. Kant maintained, for instance, that physical things are intersubjectively accessible but not objectively real in the metaphysical sense just defined.

Carnap intended to set metaphysics aside, and with it the metaphysical notion of the objectively real. The only significant notion of objectivity is a kind of intersubjective accessibility, and insofar as the physical is a notion of objectivity, it is characterized in such terms, and not as metaphysical objective reality. Here one Kantian theme is continued in Carnap. Kant maintained that because the physical features no absolutely intrinsic properties, it cannot be mind-independently objectively real. Still, it can be objective in the sense that our theorizing about it potentially achieves general rational agreement. However, since the post-positivist renaissance of metaphysics, philosophers have generally assumed that physicalism is a thesis about what is metaphysically objectively real, not merely a claim about what is objective in the sense of rational intersubjective accessibility. However, then the question about the reality and nature of absolutely intrinsic properties surfaces again, since they might be required for metaphysical objective reality, and this issue can no longer be set aside as it was by the logical positivists.

Carnap held that structuralism extends to all of the sciences by virtue of the doctrine of the unity of science. Famously, Ferdinand de Saussure developed a structuralist conception of language, and Claude Lévi-Strauss advocated structuralist theories in sociology and anthropology.³⁷ But beginning in the 1960's, structuralism met with the post-structuralist reaction. It is interesting to note that Jacques Derrida's central criticism of Lévi-Strauss's structuralism is that a structural

description presupposes what he calls a center that is not itself structural but is rather inner or intrinsic. Even though structuralists try to theorize without such a center, the sense that it is required is inescapable. Here Derrida is expressing the Leibnizian/Kantian intuition that we have set out.³⁸ But furthermore, a defining feature of Derrida's position is a denial of Kant's optimism about the possibility of achieving scientific knowledge given ignorance of the absolutely intrinsic properties. Kant endorses the view that the sciences can be successful and purely structural, while Derrida claims that our ignorance of intrinsic properties will constrain the success of any attempt at systematic knowledge. For any purely structural system—a text, in Derrida's vocabulary—any attempt to fix an interpretation of it, which involves consideration only of structural relations (*les différences*), will result in deferring such an attempt to consideration of yet further relations. But even the entire system of structural relations will not fix a particular interpretation. As a result, interpretation, and scientific endeavor more generally, face a limit, which gives rise to Derrida's deconstructive proposal, according to which any claim to a single privileged interpretation of a text can be undermined.³⁹

Thus Kant and Derrida concur in accepting the Leibnizian Intrinsicness Principle, and the claim of ignorance of absolutely intrinsic properties. But they differ on the implications of this ignorance. Kant maintains that human scientific theory can advance unaffected, since he holds that a complete science of empirical phenomena can be developed without knowledge of the underlying absolutely intrinsic properties. Such ignorance is compatible with a body of scientific knowledge that is objective in the sense of rational intersubjective accessibility. But Derrida is not similarly optimistic about the degree to which scientific knowledge can proceed impervious to our ignorance of these underlying properties.

Thus, despite differing with Carnap on the truth of the Intrinsicness Principle, Kant and Carnap concur that the sciences of the world of experience can be complete and purely structural. And even though Derrida agrees with Kant on the truth of the Intrinsicness Principle and on our ignorance of absolutely intrinsic properties, he denies that the sciences can be complete and at the same time structural and objective as specified by the criterion of rational intersubjective accessibility. Our ignorance of these non-structural intrinsic properties will render the sciences incomplete, and will also preclude objectivity in this sense.⁴⁰

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Notes

¹ Thomas Aquinas, *Summa Theologiae* (London: Blackfriars, 1963 -) vol.1, q 115, a. 1, ad. 2; q. 54, a. 3.

² There is a considerable literature on how to characterize intrinsic and extrinsic properties more exactly. For comprehensive discussions, see Lloyd Humberstone, "Intrinsic/Extrinsic," *Synthese* 105 (1996), pp. 205-67; Brian Weatherson, "Intrinsic and Extrinsic Properties," *Stanford Encyclopedia of Philosophy*.

³ The material in this section is a revision of the account I set out in Derk Pereboom, "Kant's Amphiboly," *Archiv für Geschichte der Philosophie*, 73 (1991), pp. 50-70.

⁴ Leibniz to deVolder, April 1702, G. W. Leibniz, *Philosophical Papers and Letters*, ed. L. E. Loemker (Dordrecht: D. Reidel, 1969), (hereafter: Loemker), pp. 526-7 = Leibniz, Gottfried Wilhelm, G. W. Leibniz, *Die philosophisch-en Schriften*, ed. C. I. Gerhard, 7 vols., Hildesheim: Olms, 1965 (hereafter: Gerhardt) II, p. 240.

⁵ Alyssa Ney makes this point in "Physicalism and Our Knowledge of Intrinsic Properties," *Australasian Journal of Philosophy* 85 (2007), pp. 41-60, p. 50. She also suggests that the next move to make is to define a more fundamental notion of intrinsic property.

⁶ Leibniz to De Volder, April 1699, Loemker, p. 516 = Gerhardt II, pp. 169-70.

⁷ Immanuel Kant, *Critique of Pure Reason*, A277/B333; the translations of passages from the *Critique of Pure Reason* are indebted to the translations by Norman Kemp Smith (London: Macmillan, 1929) and by Paul Guyer and Allen Wood (Cambridge: Cambridge University Press, 1987); James van Cleve, "Inner States and Outer Relations: Kant and the Case for Monadism," in *Doing Philosophy Historically*, ed. Peter H. Hare, (Buffalo: Prometheus Books, 1988), pp. 231-47

⁸ James van Cleve, in his "Inner States and Outer Relations," p. 235, proposes alternative definitions of the notions of comparatively and absolutely intrinsic properties, in accord with Kim's notion of loneliness. First of all:

P is a *monadic* property of X =df it is possible for something x to have P even if no individual *distinct* from x [i.e., not identical with x] exists; and, P is *nonrelational* = df it is possible for

something x to have P even if no individual *discrete* from x [i.e., having no part in common with x] exists.

He then specifies absolutely intrinsic properties as nonrelational and monadic, and comparatively intrinsic properties as nonrelational but not monadic. Absolutely intrinsic properties of X are intrinsic properties of X that X could have if it had no parts, or if the parts it has failed to exist, while comparatively intrinsic properties of X are any other intrinsic properties of X. I question whether this is the best set of definitions for explicating Leibniz's principal doctrine, since it has the upshot that every absolutely intrinsic property must be such that it can be possessed by a simple, i.e. partless entity. This is to add a condition that should be controversial, and not demanded by the core notion.

⁹ Leibniz to De Volder, April 1699, Loemker, p. 516 = Gerhardt II, p. 170, cf. G. W. Leibniz, *Specimen Dynamicum*, Loemker, pp. 435-52 = G. W. Leibniz, *Mathematische Schriften*, ed. C. I. Gerhardt (Berlin and Halle, 1849-56), VI, pp. 234-54.

¹⁰ For ease of exposition, in what follows I will drop the 'substantial.'

¹¹ Cf. G. W. Leibniz, *Specimen Dynamicum*, Loemker, p. 445 = G. W. Leibniz, *Mathematische Schriften*, VI, p. 246.

¹² G. W. Leibniz, "On Nature Itself," Loemker, pp. 498-508 = Gerhardt IV, pp. 504-16; Jonathan Schaffer, "Is there a Fundamental Level?" *Noûs* 37 (2003), pp. 498-517.

¹³ G. W. Leibniz, Gerhardt II, p. 275.

¹⁴ Immanuel Kant, *Critique of Pure Reason*, A265-6/B321-2; cf. A274/B330, A283-4/B339-40.

¹⁵ This historical material is a revision of the account I develop in Derk Pereboom, "Kant's Amphiboly." A more complete account is featured in Chapters 5 and 6 of my *Consciousness and the Prospects of Physicalism* (New York: Oxford University Press, 2011).

¹⁶ Immanuel Kant, *Critique of Pure Reason*, A285/B341. In a similar vein, David Armstrong writes "If we look at the properties of physical objects that physicists are prepared to allow them such as mass, electric charge, or momentum, these show a distressing tendency to dissolve into relations that one object has to another, *A Materialist Theory of Mind* (London: Routledge, 1968), pp. 74-5.

¹⁷ Immanuel Kant, *Critique of Pure Reason*, A265/B321, cf. *Metaphysical Foundations of Natural Science*, tr. Michael Friedman (Cambridge: Cambridge University Press, 2004), Ak IV, p. 543. See Thomas Holden's exposition of Kant's position, and also of Roger Boscovich's similar theory, in *The Architecture of Matter* (Oxford: Oxford University Press, 2004), pp. 236-63.

¹⁸ Immanuel Kant, *Critique of Pure Reason*, A265/B321.

¹⁹ Immanuel Kant, *Metaphysical Foundations of Natural Science*, Ak IV, pp. 498-91.

²⁰ Immanuel Kant, *Critique of Pure Reason*, A285/B341.

²¹ Immanuel Kant, *Critique of Pure Reason*, A285/B341.

²² Immanuel Kant, *Critique of Pure Reason*, Bvii-xv.

²³ Rae Langton, *Kantian Humility* (Oxford, Oxford University Press, 1998); for interpretations of this material in Kant, see James Van Cleve, "Inner States and Outer Relations: Kant and the Case for Monadism;" and Derk Pereboom, "Is Kant's Transcendental Philosophy Inconsistent?" *History of Philosophy Quarterly* 8 (1991), pp. 357-71, and "Kant's Amphiboly."

²⁴ On my reading, Langton and Van Cleve's is not the conclusion Kant had in mind, nor would he endorse it, given that we have knowledge of shapes and sizes of bodies, which in his view are intrinsic—albeit merely comparatively intrinsic—properties of them.

²⁵ James Van Cleve, "Receptivity and our Knowledge of Intrinsic Properties," *Philosophy and Phenomenological Research* 65 (2002), pp. 218-37, at p. 220 and p. 226.

²⁶ One might question whether Kant affirms a deducibility condition on knowledge at all. Arguably the discussion of empirical idealism in the Fourth Paralogism in A indicates that he does; *Critique of Pure Reason*, A366-A380. At the same time, he seems to allow for empirical knowledge justified by abductive argument, e.g. B274.

²⁷ For a further discussion of my interpretation, see Derk Pereboom, "Is Kant's Transcendental Philosophy Inconsistent?" esp. pp. 363-4. For a nuanced view of the philosophical issues involved, see Alyssa Ney, "Physicalism and Our Knowledge of Intrinsic Properties."

²⁸ Immanuel Kant, *Critique of Pure Reason*, A225-6/B273-4.

²⁹ Alyssa Ney, "Physicalism and Our Knowledge of Intrinsic Properties," p. 57.

³⁰ John Locke, *An Essay Concerning Human Understanding*, ed. P. H. Nidditch, Oxford: Oxford University Press, 1975, II, iv. Michael Ayers reports that Locke and Newton jointly proposed the solidity hypothesis, in his *Locke* (London: Routledge, 1991), v. 2, Ontology, p. 59.

³¹ Rudolf Carnap, *The Logical Structure of the World*, tr. Rolf George (Berkeley and Los Angeles: University of California Press, 1967).

³² David Chalmers discussed Carnap's project in his presentation on structuralism at the Australian National University, November 2005.

³³ Here is James Ladyman's characterization of the Ramsey sentence:

Ramsey's method allows the elimination of theoretical terms from a theory by replacing them with existentially quantified predicate variables... If one replaces the conjunction of assertions of a first-order theory with its Ramsey sentence, the observational consequences of the theory are carried over, but direct reference to unobservables is eliminated. If we formalize a theory in a first-order language: $\exists[(O_1, \dots, O_n; T_1, \dots, T_m)$, where the Os are the observational terms and the Ts are the theoretical terms, then the corresponding Ramsey sentence is $\exists t_1, \dots, t_m \exists [(O_1, \dots, O_n; t_1, \dots, t_m)$. Thus the Ramsey sentence only asserts that there are some objects, properties and relations that have certain logical features, satisfying certain implicit definitions. (James Ladyman, "Structural Realism," *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta.)
URL = <http://plato.stanford.edu/entries/structural-realism>

Ramsey's exposition of 1929 can be found in his "Theories," in Frank P. Ramsey, *The Foundations of Mathematics and Other Logical Essays*, ed. R. B. Braithwaite (Paterson: Littlefield and Adams, 2001), pp. 212-36.)

³⁴ Herbert Feigl, *The 'Mental' and the 'Physical'* (Minneapolis: University of Minnesota Press, 1967), pp. 66-8.

³⁵ Andrew Chignell points out that Kant distinguishes these two notions of objectivity in the *Critique of Pure Reason*, in the section entitled The Canon of Pure Reason, A795/B823 – A831/B859; “Belief in Kant,” *Philosophical Review* 116 (2007), pp. 323-61, at pp. 336-7.

³⁶ Thomas Nagel, *The View from Nowhere*, pp. 13-27.

³⁷ Ferdinand de Saussure, *Écrits de linguistique générale*, edition prepared by Simon Bouquet and Rudolf Engler, (Paris: Gallimard, 2002); translated as *Writings in General Linguistics* (Oxford: Oxford University Press, 2006); Claude Lévi-Strauss, *Les structures élémentaires de la parenté*, 1949; translated as *The Elementary Structures of Kinship* (Boston: Beacon Press, 1969).

³⁸ Jacques Derrida, “Structure, Sign, and Play in the Discourse of the Human Sciences,” in his *Writing and Difference*, tr. Alan Bass (Chicago: University of Chicago Press, 1978), pp. 278-93; originally *L’écriture and la différence*,” (Paris: Editions du Seuil, 1967).

³⁹ Jacques Derrida, *Of Grammatology*, tr. Gayatri C. Spivak (Baltimore: Johns Hopkins University Press, 1976, 1998); cf. Jonathan Culler, *On Deconstruction: Theory and Criticism after Structuralism* (Ithaca: Cornell University Press, 1982, 2007).

⁴⁰ Thanks to David Chalmers, Nico Silins, Daniel Stoljar, Alyssa Ney, Louis deRosset, Tyler Doggett, to audiences at Australian National University in November 2005, at the American Philosophical Association Meetings in Vancouver in April 2009, and at SUNY Brockport in November 2009, and the members of the 2009-10 Mellon Faculty seminar at Cornell University, for valuable commentary and discussion. Special thanks are due to Camille Robcis, whose presentation in the Mellon Seminar on structuralism in Lévi-Strauss and on Derrida’s reaction to it inspired the thoughts at the end of this article.