Descartes and Galileo:
Copernicanism and the Metaphysical Foundations of Physics

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As is well known, Galileo's condemnation for defending the Copernican system caused Descartes to abandon his own plans to publish his own physics and cosmology in *Le Monde*, eventuating, instead, in the *Discourse on Method* and then the *Meditations on First Philosophy*. This paper explores how Descartes metaphysics of God and the soul (as first suggested in the *Discourse* and then fully developed in the *Meditations*) is a response to this situation: in particular, Descartes tries to show how the methodological ideal of Galileo's new mathematical science of nature – including Copernicanism as an essential ingredient – is grounded, in a sense, in his new metaphysics of God and the soul.

The Role of the Passions in Descartes

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On the surface, there is good reason for thinking that Descartes views the passions as giving us information about what is good. For instance, Descartes says to Elizabeth that, "all our passions represent to us the goods to whose pursuit they impel us as being much greater than they really are" (letter of 15 September 1645, CSMK III: 267), and in *The Passions of the Soul* he says, "…the passions almost always cause the goods they represent, as well as the evils, to appear much greater and more important than they are" (CSM I: 377, a. 138). These quotations and other texts seem to indicate that Descartes sees the passions as representing things as good or evil in an exaggerated manner, and he thinks we need to use the faculty of reason to correct for this exaggeration. If Descartes thinks that the passions do represent objects as good or evil then it would seem that their purpose is to provide us with some data, albeit defeasible and unreliable data, about what things are good and evil.

Given the picture of the passions that these passages seem to paint, we might expect that the passions play a similar role in giving us information about good and evil to the role that Descartes thinks sense perceptions play in giving us information about the contingent qualities of existing things. Sense perception gives us data about how the world is, but that data needs to be checked on the basis of reason and experience, and sometimes we will judge that our sense perceptions are inaccurate. Sense perception may represent the oar to me as broken, but on the basis of reason and experience, I judge that it is not broken. If I had accepted the testimony of my senses without relying on reason, I would have made a mistake. Nevertheless, without the testimony of my senses, I would not know anything about the existing things around me. I would not even know that there was an oar. So, sense perception provides essential data which contributes to my knowledge of the world around me, but it needs to be checked by reason in order to avoid error. Similarly we might think that the passions provide essential data about which things are good or bad and, since they tend to exaggerate, they need to be checked by reason. As persuasive as this sounds, I want to argue that this is not how Descartes understands the role of the passions.

I think the passions are not usually the source of data about what is good or bad for us. These data are primarily provided by other faculties, reason, sense perception, and the appetites, particularly sensations of pain and pleasure, aided by memory and inference from experience. The purpose of the passions is not to show us what objects are good and bad for the mind-body union, and they will be unreliable if we treat them as a source of such information. It belongs to the faculties of sense perception and the appetites, guided by reason, to inform us of what is good or bad for the mind-body union. The purpose of the passions is to make us *want* the things that are good for us, and we must rely on other faculties and learn to master our passions if we are to guard against also wanting some things that are not good for us. Thus, I conclude that the passions, according to Descartes, are not and ought not to be a significant source of data about the good.

The Significance of the Newtonian refutation of Spinoza

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In this paper I discuss the philosophic and historical significance of Colin MacLaurin's brief but stinging attack on Spinoza's metaphysics in his posthumously published, *An Account of Sir Isaac Newton's Philosophical Discoveries* (London, 1748). The main point of the paper is to illustrate how Newton's challenge to the independent authority of philosophic reflection was perceived at the start of the 18th century. In his *Account*, MacLaurin argues from the (perceived) empirical inadequacy of the consequences of Spinoza's doctrines to the claim that the Cartesian method of inspecting "true" ideas (MacLaurin cites *Ethics* Ip8s2 and *The Treatise on the Emendation of the Intellect*) leads to absurdity even in the context of an otherwise coherent system. Incidentally, the mere existence of MacLaurin's treatment undermines a widely accepted historiographic myth that members of the Scottish Enlightenment (Hume, Adam Smith, Reid, etc) only knew and thought of Spinoza through Bayle's treatment of Spinoza (cf. Kemp Smith). For MacLaurin was the most influential and widely read Scottish Newtonian of the first half of the 18th century. This paper follows, thus, the recent trend to re-integrate the history of philosophy with science in the early modern period (e.g., Hatfield, Garber, Friedman) as well as contribute to a better understanding of the background assumptions necessary to recover a proper interpretation of Hume's reception of Newton (and Spinoza).

The paper is divided in two main sections, and a brief postscript. First, I analyze the nature and context of MacLaurin's arguments against several elements of Spinoza's system. MacLaurin's criticism offers a series of inferences to the best explanation which all rely on the empirical success of Newton's physics. (MacLaurin is explicit that he is using his refutation of Spinoza – and related criticisms of Leibniz -- to undermine Cartesian philosophy in a very broad sense.) In so doing, MacLaurin aims to show what he perceives to be the absurdity and bankruptcy of a) a philosophical and foundational methodology accepted not just by Rationalist followers of Descartes but also by their Empiricist critics, that is, the inspecting of ideas as 'objects' of the mind; b) the metaphysical position that the physical universe can be best compared to a machine in which some general quantity is conserved (in Spinoza the proportion between rest and motion). Second, in order to make the full implications of MacLaurin's treatment (of a and b) clear, MacLaurin's writings have to be understood in light of two contexts: 1) MacLaurin's debate with Berkeley over Berkeley's criticism of the lack of proper foundations to Newton's mathematical physics; 2) MacLaurin's attempt to dismiss the Spinozistic attack on final causes in order to defend the legitimacy of natural religion (probably most familiar to the reader through the character Cleanthes in Hume's *Dialogues*). For MacLaurin, both Berkeley and Spinoza privilege illegitimately first principles and norms of enquiry beyond those implicated in the practice of experimental philosophy. Finally, I offer some reflections on the price of rejecting the MacLaurin reading of Spinoza for contemporary scholarship on Spinoza—much of which (mistakenly) tends to ascribe to Spinoza a form of scientific naturalism.

Causality and Temporality in Spinoza's Philosophy

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Arguably no error receives as much criticism in Spinoza's *Ethics* as the idea that there are final causes in Nature. However, the contemporary scholarly consensus seems to be that we shouldn't see Spinoza's rejection of ends as *comprehensive*. The typical case for letting in exceptions rests upon, first, Spinoza's discussion of ends in the first Appendix of the *Ethics*, and, secondly, on his doctrine of the conatus (striving). Indeed, it is this doctrine that has been seized upon most frequently by scholars who wish to argue that Spinoza does in the end admit of some kind of teleology, and hence that the mechanistic metaphysical principles he lays out in the first two Parts of the *Ethics* leave room for significant exceptions.[1]

However, I think that despite this consensus Spinoza's criticism of teleology must be seen as *uncompromisingly* comprehensive, and that the arguments for exceptions ultimately do not meet with success. In particular, as I show in this essay, several good reasons to doubt the accuracy of teleological interpretations of the conatus doctrine emerge once one makes salient a number of crucial but to my knowledge rather neglected features of that doctrine. Given that the conatus is a universal characteristic pertaining to "each thing [*unaquaeque res*]" (3p6; II/146), and hence a fundamental element of Spinoza's metaphysics, furnishing this new interpretation of the conatus doctrine will shed a new light on his metaphysics more generally.

To demonstrate my main thesis, I show first that the consequences of Spinoza's *identification of striving with the "actual essence*" of each thing rule out teleological readings of the conatus doctrine. I demonstrate that for Spinoza the conatus is an *efficiently*-causal mechanism explicable entirely in terms of effects necessarily *following* from a thing's essence. This necessary efficiently-causal efficacy of the essence—which leads Spinoza to identify "essence" with "power [*potentia*]" (3p7dem; II/146)—is precisely the conatus of each thing. That is, to assert as Spinoza does, that all things strive means that all things give rise to effects necessitated by their essential natures. In short, Spinoza's conatus doctrine must be seen as building directly on his idea of what constitutes an "efficient cause": it is the manner in which he conceives of efficient causes—as necessarily giving rise to their particular effects—that allows him to establish that each thing strives.

Given Spinoza's well-known claim that the conatus is nothing other than what we ordinarily identify as "will" and "desire" (3p9s; II/147), this proposed reconception of the nature of striving will have immediate repercussions for one's understanding of his *moral* philosophy. By arming ourselves with a more adequate understanding of the conatus doctrine—one that approaches striving from the perspective of Spinoza's conception of the efficiently-causal nature of essence—we will be able to see that striving does not (as has been suggested) require *prior*

[1] This is the position espoused perhaps most prominently by Don Garrett, who goes so far as to say that the conatus doctrine implies "the acceptance of teleology for all singular things" ("Teleology in Spinoza and Early Modern Rationalism" in Gennaro, R.J. and C. Huenemann, eds. (1999). *New Essays on the Rationalists* (Oxford), 314). For Garrett, the sheer number of claims in which Spinoza refers to "striving" constitutes evidence that Spinoza is "a committed teleologist": "Each of these claims seems intended to license teleological predictions and explanations" (ibid 313-314). Also cf. for example Martin Lin's "Teleology and Human Action in Spinoza" (forthcoming), especially p. 2 of the manuscript, and Alan Gabbey's "Spinoza's natural science and methodology" (in Garrett, D. (1996). *The Cambridge Companion to Spinoza* (Cambridge), 163-164).

normative judgments on the part of the striving individual, judgements that would guide its striving in relation to some intended end. In fact, as I show, for Spinoza striving caused by ideas with a normative content is only a *special case* of striving, one that involves causation by *inadequate* ideas.

Focusing upon this inessential contribution to striving by inadequate ideas brings us finally to a more substantial difficulty with attempts to read teleology into the conatus, the difficulty with which this paper will be most concerned – namely the apparently inextricable connection between teleology and a particular form of *temporality*. As used by proponents of teleological readings of the conatus doctrine, the "ends" allegedly at issue in striving are *future* ends. For Spinoza, however, an idea whose content is caught up in the realm of "tempus"—the kind of temporality that is characterized by a future and a past—is essentially an *inadequate* idea. Given that striving plays such a central explanatory role in Spinoza's metaphysics and moral philosophy, teleological interpretations of the conatus would then seem to be committed to viewing Spinoza's own explanations of Nature in terms of the conatus as *essentially inadequate*. The challenge put by this paper to proponents of teleological readings of the conatus doctrine is then to show how the conception of an "end" could be dissociated from this – to all appearances decisively damning – temporal dimension.

The Historical Roots of Kant's Concept of Experience

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The locutions "Erfahrung," "mögliche Erfahrung," and "möglichkeit der Erfahrung" all belong to the conceptual kernel of Kant's first *Critique*. Like any good empiricist, Kant tells us that all knowledge begins with experience (*Erfahrung*) (B1). Yet, to the extent that the knowledge we gain through experience is *objective*, and thus extends in validity beyond any particular moment of perception, it must embody rational laws that hold for all *possible experience* (*mögliche Erfahrung*). Indeed, Kant goes so far as to equate objectivity of such laws with their holding necessarily for all possible experience. Finally, according to Kant's view, the objectivity of these laws is underwritten by synthetic *a priori* principles, which are peculiar in that their proofs rest entirely on their relation to the *possibility of experience* (*möglichkeit der Erfahrung*) (B294). Thus, as it turns out, the fundamental question of the *Critique*, namely, how synthetic *a priori* judgments are possible, is answered in precisely these terms: "The *possibility of experience* is therefore that which gives all our cognitions *a priori* objective reality" (A 156/ B 195; Kant's emphasis).

An immediate problem for any reader of the *Critique* is that the centrality of these concepts is matched in degree by their obscurity. Kant neither explains the source of this notion of experience, nor does he take any time to tell us why, in blatant contradiction to the usage of the British empiricists, experience can be *defined* as a product of the understanding. In Hume's *Enquiry*, for instance, the term "experience" refers merely to the immediate deliverances of perception, reflection and memory without any addition from the understanding. Thus, according to Hume, our belief about, for instance, the causal connection between two events arises from an addition we make *to* experience, not from experience itself. For Kant, however, *Erfahrung* contains both the Humean experience of conjunction and the belief that events are causally connected, and *both* in Kant's view *consist in judgments* that employ categories and principles of the understanding (note that Kant's judgments of perception do not even amount to the Humean experience of conjunction). As for modal concepts of "possible experience" and "possibility of experience," these also evidently have no equivalents in those texts from the British tradition that Kant was familiar with, and he explains them even less than he does "experience."

The above indicates one of two things; either the complex Kantian conception of experience is a discovery of the critical philosophy, or it stems from sources that commentators have yet to fully explore. The former seems unlikely since the *Nachlass* shows that Kant employed the concept in this way perhaps as early as 1763-4, but definitely prior to 1769. In this paper I argue that Kant's concept of experience is in fact informed by two traditions other than British empiricism, both of which treat this notion explicitly and at length, and have something to say about the related modal locutions. I will first discuss the tradition initiated by Leibniz and Christian Wolff. This tradition dominated German school philosophy throughout most of Kant's life, and formed the basis of the books from which he lectured (particularly of notable are Baumgarten's *Metaphysica* and Meier's *Auszug zur Vernunftlehre*). Indeed, it is fair to say that the terminological framework developed specifically by Christian Wolff formed the matrix for *all* philosophical discussion in German during Kant's lifetime. In the first part of the paper, I examine the fifth chapter of Wolff's German logic (which was far more influential than his longer Latin logic), which is entitled "Of Experience, and how principles are discovered through

it." Here I am interested in answering two questions: i) To what extent is Kant's view of "experience" as composed of judgments that employ categories already present in Wolff? ii) How specifically does Wolff account for the objective laws of all possible experience in terms of the conditions that make such experience possible?

In the second part of this paper I examine two works stemming from what has been referred to as the Thomasian-pietistic tradition, namely, Adolph Hoffmann's *Vernunftlehre*, and the related logic textbook written by his student, Christian August Crusius. As textual evidence shows, Kant read the works of Crusius for nearly a decade during his pre-Critical period (these works were still in Kant's personal library when he died), and Kant mentions him by name while discussing the possibility of experience in the *Prolegomena*. In reading these works we discover that i) Kant's distinction between judgments of perception and judgments of experience, ii) his linkage between "objective reality" and the possibility of experience, and iii) his claim that "experience" requires the subsumption of perceptions under "material" rational principles, are each anticipated in these works.

In the conclusion of this paper I sketch out the possibilities for gaining a deeper understanding of Kant's notion of experience through the comparison between the teleological/metaphysical theories of the possibility of knowledge that underlies both of these traditions.

Reflection in Locke and Hume

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Both Locke and Hume attempt to investigate the mind by looking within themselves to observe its operations. Neither is as clear as one would like about how such introspection operates.

In the first part of this paper, I examine Locke's account of this issue in the *Essay*. He uses 'reflection' as the name for inner observation, and models its operation on sensation. Just as seeing an external object, such as an apple, involves the perception of an idea of an apple, so also in reflection: observing a mental operation, such as the compounding of ideas, involves the perception of an idea of compounding. Moreover, Locke famously thinks that we can have *sensitive knowledge* of the apple when we perceive the agreement between our idea of it and the actually existing apple itself – though of course how exactly this perception of agreement occurs is left obscure. I think that Locke also believes that we can have *reflective knowledge* that is structurally similar to sensitive knowledge: We can know the existence of our compounding by perceiving the agreement between the idea and the mental operation itself. I argue that reflective knowledge differs from sensitive knowledge in that Locke has the resources to explain how we can perceive the agreement of our reflective ideas with our mental operations.

The crucial point is that Locke has a second account of our observation of our mental states, one based on *consciousness* rather than reflection. There has been extensive debate in the secondary literature about what exactly Locke means by 'consciousness'. Some have suggested that he equates it with reflection, while others have suggested that it is simply another name for perception. I suggest that neither option is correct. Consciousness is not reflection because Locke says that young children do not reflect on their minds but that we are all (presumably including children) conscious of our mental operations. 'Consciousness' is not a synonym for 'perception' because then the claim that we are all conscious of our mental operation would create an untenable regress of perceptions of perceptions of perceptions... Instead, I argue that, for Locke, consciousness is a special kind of awareness that is a constituent of all our perceptions. In perceiving an idea of sensation or reflection we are simultaneously *conscious of ourselves* as the ones perceiving.

Thus Locke has two ways to account for our introspective knowledge. When we have an idea of reflection of a mental operation we are aware of it *as an object*; whenever we engage in a mental operation, we are conscious of ourselves *as a subject*. In reflective knowledge, I argue, we can perceive the agreement of an idea of reflection to its object in part because the object is a mental operation of which we are conscious. I suggest that Locke endorses an incorrigibility thesis for reflection because of this dual access to mental contents.

In the second part of the paper, I investigate Hume's account of introspection in the *Treatise*. He seems to differ from Locke in two fundamental ways. First, where Locke analogizes introspection to *sensation*, Hume treats it as a form of inwardly directed *thought*. Thus we do not have impressions of the mind's constituents (namely, for Hume, perceptions, either impressions or ideas); instead we have ideas of them. Hume calls ideas that have other perceptions as their objects *secondary ideas*.

Second, unlike Locke, Hume has only one way to account for introspective knowledge. In the Appendix to the *Treatise*, he equate consciousness and reflection, rather than following Locke by saying that reflection (like sensation) is conscious. In some passages, however, Hume

does seem to endorse something like Locke's view: "For since all actions and sensations of the mind are known to us by consciousness, they must necessarily appear in every particular what they are, and be what they appear" (*Treatise* 1.4.2.7). He even seems to endorse an incorrigibility thesis here, despite arguing in the personal identity section that we *mistake* our diverse perceptions for one continuing mind.

I attempt to resolve these tensions by suggesting that Hume, despite his anti-Lockian commitments, does end up modeling his account of introspection on his account of sensation. We believe in the independent existence of sensory objects only because of appropriate associations of our ideas of them. So also with reflection. We believe in the independent existence of our introspective objects only because of appropriate associations of our secondary ideas of them. The vulgar normally remind blind to the mediation of their experiences by perceptions and their associations, and thus they believe themselves to have immediate access to the objective world. Philosophers reflect on the mind to reveal its perceptual structures, but they normally remind blind to the mediation of their introspective experiences by secondary ideas and their associations. *Philosophers are normally vulgar with respect to the mind*. I suggest that passages where Hume seems to endorse the incorrigibility thesis about introspection are cases where he has chosen not to challenge this philosophical vulgarity. But his considered position gives the same epistemic verdict for sensation and introspection. Each cannot be given an ultimate justification, but must be relied upon nonetheless.

Hume on Space, Time and Mathematics

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Hume's discussion of space, time, and mathematics has appeared to most commentators as one of the weakest parts of the *Treatise*. Flew and Fogelin suggest that Hume commits embarrassing mathematical blunders, and even Kemp Smith takes Hume here not to be at his best. I argue that Hume's views are very powerful and coherent in the context of traditional empiricism: he formulates a deep insight into the limitations of our sensory cognition of the continuum that challenges the practice of early modern mathematics.

Hume argues that the assumed infinite divisibility of space and time is impossible and absurd. The most notorious argument (T 1.2.2) traces back to Zeno's metrical paradox of extension. If any finite interval of space (or time) is infinitely divisible, it must consist of an infinite number of ultimate parts. But these ultimate parts, when added together, must then result in an extension that is infinitely great. From the point of view of modern mathematics there is an obvious objection to this argument: for, if we divide a finite interval into an infinite sequence of *decreasing* finite parts, their sum when added together (as a limit) can still be finite (as 1/2 + 1/4 + 1/8 + . . . approaches 1 as its limit).

Yet Hume's notions of "part" and "divisible" are not those of pure mathematics. Hume's parts, wholes, divisions, and additions are those which we can phenomenologically apprehend as sensory impressions or images. Hume's first positive conclusion is that, if we undertake perceptible divisions of our sensible ideas, the imagination always reaches *minimum* (simple) ideas that cannot be subdivided without annihilation: Hume thus interprets "divisible" and "consisting of parts" in terms of a very strict empiricist model. Ideas or impressions consist of parts if and only if we can sensibly distinguish them as such through sensibly apprehended divisions – "part" means "perceptible part" and "division" means "perceptible separation of a perceptible whole into perceptible parts."

A perceptible part of some extended whole can be either a perceptible part greater than a sensible minimum or an indivisible minimum. In either case, the parts are always sensibly apprehensible images into which an extended whole can be finitely divided. If a whole can be divided in a given context into parts, each of which can be further divided, then the parts are themselves composed of ultimate minima, and they could be perceived as such only by proceeding with divisions to reach the minima. We are not separately aware of the minima before we have undertaken the divisions. Hume thus acknowledges the *appearance* of continuity in our sensible apprehension of (homogeneous) extension. The ultimate indivisible parts can be discovered to be such only when, in a particular context, one actually undertakes separations and divisions.

Nevertheless, as I argue, despite the contextual relativity, ultimate minima all have the same "size" — that of one indivisible single unit. If an infinite number of *these* were to be added together, we *would* have an infinite sum of units – precisely as Hume contends. Hume commits no simple mathematical blunder here, and his views on arithmetic and geometry confirm this.

For Hume arithmetic provides the model for the enumeration of indivisible parts, namely, a one-to-one correspondence of discrete units. Precisely because it deals with discrete quantity, arithmetic, unlike geometry, can successfully apply this method in its demonstrations of equality and proportions of quantity. The unextended minima composing extension, just like arithmetical

units, are indivisible and have no parts. In the entire appearance, however, they are presented as confused or "confounded," with one another, and this results in the appearance of continuity. We can have an image of each of the minima only by embarking on successive acts of division of the complex extension: the minimum is the unit that appears just before another attempted division would annihilate it. Determining the total number of minima comprising a given whole of extension is therefore impossible.

Hume thus achieves a coherent view of geometry, algebra, and arithmetic that reverses the conception of the early modern mathematical tradition – on which geometry (continuous quantity) is capable of greater exactness and certainty than algebra and arithmetic (discrete quantity): in general, we can only *approximate* an exact continuous magnitude by a never-ending sequence of discrete numbers. For Hume, there is no exact continuous quantity independent of discrete quantity: extension consists of a finite number of discrete indivisible units whose sum, if we could attain it, would give its exact magnitude. Yet, because of the "confounding" of these units in any given sensory field, this sum, for us, is inaccessible; and the best we can do is use algebra and arithmetic to form ever-more precise (but never completely precise) approximations.