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Hume's Foundational Project in the *Treatise*

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Abstract: In the Introduction to the *Treatise* Hume very enthusiastically announces his project to provide a secure and solid foundation for the sciences by grounding them on his science of man. And Hume indicates in the *Abstract* that he carries out this project in the *Treatise*. But most interpreters do not believe that Hume's project comes to fruition. In this paper, I offer a general reading of what I call Hume's 'foundational project' in the *Treatise*, but I focus especially on Book 1. I argue that in Book 1 much of Hume's logic is put in the service of the other sciences, in particular, mathematics and natural philosophy. I concentrate on Hume's negative thesis that many of the ideas central to the sciences are ideas that we cannot form. For Hume, this negative thesis has implications for the sciences, as many of the texts I discuss make evident. I consider and criticize different proposals for understanding these implications: the Criterion of Meaning and the 'Inconceivability Principle'. I introduce what I call Hume's 'No Reason to Believe' Principle, which I argue captures more adequately the link Hume envisions between his logic, in particular his examination of ideas, and the other sciences.

Introduction

Hume opens the Introduction to the *Treatise* remarking on the failures of previous philosophical systems and lamenting that the whole intellectual scene has 'drawn disgrace upon philosophy itself' (T Intro. 1).[1] He immediately identifies the core problem with the sciences as their 'weak foundation' (T Intro. 2) and quickly announces his grand ambition: to establish a 'compleat system of the sciences, built on a foundation almost entirely new, and the only one upon which they can stand with any security' (T Intro. 6). Although the ambition is indeed bold, there is nothing strikingly novel about the very idea of a foundation for the sciences. The early modern period is marked by such sweeping visions; this is, after all, Descartes' master plan, and it is also the way Locke describes his project in the Epistle to the *Essay*. But Hume promises an 'almost entirely new' foundation, and that is his *science of man:* '[t]here is no question of importance whose decision is not compriz'd in the science of man; and there is none which can be decided with any certainty, before we become acquainted with that science' (T Intro. 6).[2] Hume concludes: 'the science of man is the only solid foundation for the other sciences' (T Intro. 7).

Following Hume's language in the Introduction, I shall throughout this paper refer to the 'foundational' intention, ambition, or project. Broadly speaking, there are in the literature two kinds of responses to Hume's foundational intention. On

the one hand, many interpreters, perhaps most, do not take it seriously. John Passmore recognizes the foundational intention when he announces at the beginning of his book: 'Hume's main object, then, in Book 1 of the *Treatise* is to show that the moral sciences can be established on a secure footing.'[3] According to Passmore, however, not even Hume himself takes the project seriously in the *Treatise*.[4] Passmore suggests that Hume considers the project more earnestly after the first *Enquiry*.[5]

Today many interpreters share Passmore's attitude toward the foundational intention Hume announces in the *Treatise* more or less explicitly. In his Introduction to the *Treatise,* David Norton merely mentions in passing the foundational ambition; he offers no explanation about what this project might involve.[6] In her paper, 'The Inquiry in the Treatise', Janet Broughton characterizes Hume's positive project in the *Treatise* as a 'careful empirical study of the human mind'.[7] She acknowledges that Hume had 'different ambitions': 'Once we have discovered the principles of human nature, we will be in a position to make "changes and improvements" . . . in the other sciences, by clarifying the ideas we use in them and by making our reasoning more cogent'.[8] The suggestion, however, is that Hume does not pursue these ambitions in the *Treatise*. Don Garrett emphasizes Hume's 'cognitive psychology'.[9] At the beginning of his book, Garrett acknowledges that Hume's philosophy is meant to address the various special disciplines, but this discussion takes up a mere paragraph at the end of his book.[10] David Owen suggests that 'a substantial part of the development of his new science that may well affect the hard sciences is an examination of our powers of reasoning'.[11] Hume's examination of our powers of reason 'may well affect the hard sciences', but the implication, once again, is that Hume does not show us how the hard sciences are affected in the *Treatise*.

On the other hand, interpreters who take seriously Hume's foundational project place his criterion of meaning at the center of this project. Most famous among these interpreters were the logical positivists, but as Michael Williams has recently noted, this 'critical' aspect of Hume's work has fallen into serious disrepute. Williams finds this unfortunate because, as he points out, Hume is not just engaged in a *descriptive* science of mind; there is, indeed, a critical, *normative* dimension to his work.[12] Today, interpreters who acknowledge the 'critical' aspect of Hume's work still identify it with the criterion of meaning. Alexander Rosenberg places this criterion at the core of Hume's philosophy of science, and more recently William Edward Morris has defended the criterion of meaning against criticisms by post-positivist philosophers insisting on its central role in Hume's 'reform of the sciences'.[13] I shall discuss their views in this paper.

Although I agree with Williams that '[a] satisfactory account of Hume, if there is one, would do justice to the skeptical, naturalist and critical aspects of Hume's philosophy', the present paper does not pretend to meet Williams's formidable challenge.[14] Indeed, it does not even discuss the skeptical aspect of Hume's work. The focus of this paper is the 'critical' or foundational aspect. Some of the

questions I address are: Does Hume carry out his foundational intention in the *Treatise*? If so, what is the nature of this project? How is the science of man foundational to the other sciences? How central is Hume's criterion of meaning to the foundational project?

The paper starts generally and narrows its focus as it progresses. I offer first a general reading of Hume's foundational project in the *Treatise*, where I identify what *Hume* calls logic and the study of the passions as the two *foundational* aspects of Hume's science of man. The paper then focuses on Book 1. I argue that in Book 1, Hume develops his logic, or the study of the nature of our ideas and the operations involved in reasoning, and that much of this logic is put in the service of the other sciences, in particular, mathematics and natural philosophy. I concentrate then only on the aspect of Hume's logic that is concerned with the examination of our ideas.[15] I call attention the following methodological feature: Hume appeals to our *ideas*, for instance, the ideas of space, time, geometrical figures, and necessity to adjudicate on questions within natural philosophy and mathematics concerning space, time, the status of geometry, and necessity in nature. This 'move' from ideas to objects, or from discourse of ideas to discourse concerning the objects of the ideas within the sciences, is the central focus of this paper. However, I concentrate only on the negative aspect of this move: Hume's criticism and ultimate rejection of ideas that have an important place in the sciences.

Hume's examination of the nature of ideas central to the sciences most often leads him to conclude that the ideas scientists pretend to reason with are ones that we are unable to form, that the objects scientists posit in their theories are inconceivable. But what follows from these claims? What are the consequences for the sciences? This is the question I seek to answer in this paper. I consider and criticize two proposals for understanding these implications: the criterion of meaning and the 'inconceivability principle'. I then introduce what I call Hume's 'no reason to believe' principle. Hume first articulates this principle at the end of *Treatise* 1.3 in the form of a corollary to his conclusions concerning the presence of necessity in nature. Hume maintains that 'we can never have reason to believe that any object exists, of which we cannot form an idea' (T 1.3.14.36). I interpret this principle against the background of Hume's foundational project which conceives of experience as its ultimate authority. For Hume, only experience can give us reason to believe in the existence of objects. When experience is not a possible source for a putative idea, we are never justified in positing the object of the idea in our theories. I defend the view that this normative principle captures the link Hume envisions between his logic, in particular his criticism of ideas, and the other sciences.

At the end of the paper, I comment on what I take to be the import of Hume's positive characterization of ideas. I contrast briefly my reading with recent interpretations that relate Hume's positive characterization of some ideas to his skepticism. I also outline the foundational consequences of the aspect of Hume's logic that concerns itself with the examination of the operations of reasoning.

1. The Foundational Project in the *Treatise*

A few years after completing the first two books of the *Treatise* Hume writes, anonymously, an *Abstract* where he describes and assesses the accomplishments of the *Treatise*. The *Abstract* offers powerful reasons for taking the foundational project very seriously. In its Preface, Hume asserts that if his philosophy were received '*we must alter from the foundation the greatest part of the sciences*' (emphasis in original) (Pref. 2). And in the *Abstract* itself he concludes: 'This Treatise therefore of human nature seems intended for a system of the sciences' (Abs. 3). According to Hume himself, according to his considered opinion, the *Treatise* does carry out the intention announced in its Introduction.

In the Advertisement to the first two Books, or volumes of the *Treatise*, Hume indicates that his '*design in the present work is sufficiently explain'd in the* introduction'. And he continues:

> *The reader must only observe, that all the subjects I have there plann'd out to my self, are not treated of in the two volumes. . . . If I have the good fortune to meet with success, I shall proceed to the examination of* morals, politics, and criticism; *which will compleat this Treatise of* human nature. (T Adv.)

Although the explanation of his design in the Introduction is hardly *sufficient*, Hume's Advertisement is certainly not misleading. In the Introduction, Hume explains that *all* sciences are related to human nature, and thus to his science of man. Some sciences, however, enjoy a 'close and intimate' relation to human nature. These are '*Logic, Morals, Criticism,* and *Politics*' (T Intro. 5). Morals, criticism and politics are to be discussed *later* and '*compleat* [the] *Treatise* of human nature' (T Adv.). This leaves out logic.

In the *Abstract,* Hume indicates that the project of founding the sciences has already 'finished what regards to logic', and has already 'laid the foundation of the other parts in [the] account of the passions' (Abs. 3). This suggests that Book 1 takes up logic and Book 2 is about the passions. But what does Hume mean by *logic*? In *Treatise* 1.3.15, after putting forward his rules for judging causes and effects, Hume remarks: 'Here is all the LOGIC I think proper to employ in my reasoning' (T 1.3.15.11). It is not clear whether 'logic' here stands for the rules for proper reasoning or whether Hume is referring to his work in Book 1 thus far. What is clear is that Hume is not here providing a *definition* of 'logic'. Indeed, in the Introduction, we find another, more general characterization of the subject of logic: 'The sole end of logic is to explain the principles and operations of our reasoning faculty, and the nature of our ideas' (T Intro. 5). In the *Abstract*, we find exactly the same characterization of logic (Abs. 3). Given this account of the purpose of logic, it seems evident that by 'logic' Hume means more than *rules for reasoning*. Logic for Hume is the general study of the nature of our ideas and of the principles and operations involved in reasoning. Described this way, Book 1 does seem to be about logic.

Of course, what Hume means by 'logic' is quite different from what we mean by that term. Hume's logic traces *causal* connections between the elements of the

mind or perceptions; it explains operations of the mind in terms of principles of *association* of ideas; it describes how the mind works, including how it reasons causally in terms of how the mind is *naturally* led to consider one idea and then another. And this is why David Owen in his work *Hume's Reason* remarks that 'Hume's re-establishment of logic, in this sense, in terms of his new science of human nature, will occupy Book I of the *Treatise*, entitled "Of the Understanding" '.[16] Hume's logic is an empirical *science of cognition.*

At this point, there are some crucial questions for distinguishing between the foundational interpretation and what we might call, borrowing Hume's phrase in the first *Enquiry*, the 'mental geography' interpretation (EHU 1.13)[17]: is Hume just or mainly doing logic or science of cognition in Book 1, or is his logic playing a foundational role with respect to the other sciences? Is Hume's logic one of the many sciences, or does it have a special role or position among them? Is Hume deploying his logic to reform the sciences in Book 1?

The Introduction mentions the sciences that are intimately connected to human nature, but it also discusses other sciences that are less related to Hume's science of man:

> *Even Mathematics, Natural Philosophy, and Natural Religion,* are in some measure dependent on the science of Man; since they lie under the cognizance of men, and are judged of by their powers and faculties. 'Tis impossible to tell what changes and improvements we might make in these sciences were we thoroughly acquainted with the extent and force of human understanding, and cou'd explain the nature of the ideas we employ, and of the operations we perform in our reasoning. (T Intro. 4)

Mathematics, natural philosophy, and natural religion are 'in some measure dependent' on the science of man because to do science, scientists must *employ ideas and engage in reasoning*. Now, the study of our ideas and the nature of reasoning is precisely how Hume characterizes the purpose of logic in the Introduction (T Intro. 5) and in the *Abstract* (Abs. 3). Thus what Hume is saying in the passage just quoted is that mathematics, natural philosophy, and natural religion depend on the *logic* that will be developed in Book 1. Mathematics, natural philosophy, and natural religion are, then, in 'some measure' dependent on the science of man, but the *dependence* lies at a fundamental level: they are dependent on the study of logic, without which scientists cannot understand the nature of *their* ideas and the operations involved in *their* reasoning. This is why Hume can confidently maintain in the Introduction that '[t]here is no question of importance whose decision is not compriz'd in the science of man; and there is none which can be decided with any certainty, before we become acquainted with that science' (T Intro. 6).

We saw earlier in the passage from the *Abstract* where Hume mentions the passions that he considers his work on the passions or Book 2 as the 'foundation' for the subjects he intends to discuss in Book 3, namely morals and politics in general. Book 2 is meant as the foundation of Book 3.[18] Is Book 1 meant as the foundation of mathematics, natural philosophy, and natural religion? And does

Hume carry out this foundational work in Book 1? Consider only some of the subjects Hume examines in Book 1. He discusses the infinite divisibility of space and time, the existence of a vacuum, and the role it plays in Newtonian philosophy. He examines the ideas central to geometry and characterizes his accomplishment in this area as having questioned 'the foundation of mathematics' (T 1.4.2.22). In his treatment of causal reasoning, one of the key questions becomes 'one of the most sublime questions in philosophy, viz. *that concerning the power and efficacy of causes*; where all the sciences seem so much interested' (T 1.3.14.2). And he closes the subject of causation with rules for judging causes and effects, rules 'to direct our judgment, in philosophy' (T 1.3.15.11).[19]

But even Hume's logic itself is much easier to make sense of against the background of the foundational project. From the standpoint of a science of cognition or mental geography, it is rather challenging to understand the specific ideas Hume is most concerned to examine, the distinctions and classifications he draws within the mind, and his attitude toward these classifications. Why is he so concerned with the idea of a vacuum? What is the role of *fictions* in Hume's logic? And why are his remarks concerning the products of the imagination or fictions often so negative? A *descriptive* science of cognition merely *distinguishes* the different elements of the mind, such as the ideas derived from the senses from the products of the imagination. But Hume demotes some of these elements and elevates others.[20]

If Hume's logic is indeed meant as the foundation of mathematics, natural philosophy, and natural religion, and if his account of the passions is meant as the foundation of morals, criticism, and politics, then we have at least a general answer to one fundamental question: what is Hume's *foundational* science of man? It is logic and a science of the passions. In Book 3, Hume characterizes 'human nature' as composed of 'two principal parts . . . the affections and understanding' (T 3.2.2.14). These two principal parts of human nature are the foundational ones I have identified here. The understanding or logic is the foundation of mathematics and natural philosophy. And Hume seems to be carrying out this foundational work *as he carries out* the work of developing his logic in Book 1. The affections or the science of the passions in Book 2 is the foundation of morals and politics, subjects which are broached in Book 2, but are discussed, in the *Treatise*, mostly in Book 3. In the remainder of the paper, I concentrate on Book 1, on the relation between Hume's logic and mathematics and natural philosophy.

2. Hume's Logic, Mathematics, and Natural Philosophy

I have suggested that in Book 1, Hume aims to provide a foundation for mathematics and natural philosophy by doing logic, by examining 'the nature of the ideas we employ, and [. . .] the operations we perform in our reasonings' (T Intro. 4). In the texts we consider in this section I focus only on Hume's examination of the nature of *ideas*, as opposed to his examination of the operations of reasoning. And my purpose in this section is simply to call

attention to a crucial methodological feature of Book 1: Hume employs his examination of *the nature of our ideas* to draw implications for the sciences. I do *not* attempt here to understand the nature of this move, or of the implications Hume is drawing from his examination of ideas; this is a task I take up in the following sections where I narrow my focus once more and consider in particular the consequences of Hume's *rejection of ideas* central to the sciences. The texts I present next are organized by topic.

The Infinite Divisibility of Extension

Already in the very first paragraph of *Treatise* 1.2.1 Hume announces that he aims to examine the doctrine of the infinite divisibility of extension by starting with 'the ideas of space and time'. *Treatise* 1.2.1 examines the *ideas* of space and time, and *Treatise* 1.2.2 discusses the infinite divisibility of space and time themselves by appealing to the results of *Treatise* 1.2.1. Consider the following passage from *Treatise* 1.2.2:

> If therefore any finite extension be infinitely divisible, it can be no contradiction to suppose, that a finite extension contains an infinite number of parts: And *vice versa*, if it be a contradiction to suppose, that a finite extension contains an infinite number of parts, no finite extension can be infinitely divisible. But that this latter supposition is absurd, I easily convince myself by the consideration of my clear ideas. I first take the least idea I can form of a part of extension, and being certain that there is nothing more minute than this idea, I conclude, that whatever I discover by its means must be a real quality of extension. . . . Upon the whole, I conclude, that the idea of an infinite number of parts is individually the same idea with that of an infinite extension; that no finite extension is capable of containing an infinite number of parts; and consequently that no finite extension is infinitely divisible. (my underlining) (T 1.2.2.2)

The subject at the beginning of the passage is *finite extension*. To adjudicate on the question of whether it is infinitely divisible Hume switches to a discussion of *ideas*. After considering the nature of our ideas, Hume concludes: 'consequently that no finite extension is divisible' Hume is clearly employing the results of his examination of the idea of extension to adjudicate on the question of the divisibility of extension itself.[21] The same basic strategy of appealing to the *idea* is apparent in Hume's discussion of mathematical points. Consider the following passage:

> Here, therefore, I must ask, *What is our idea of a simple and indivisible point?* No wonder if my answer appear somewhat new, since the question itself has scarce ever yet been thought of. We are wont to dispute concerning the nature of mathematical points, but seldom concerning the nature of their ideas. (my underlining) (T 1.2.3.14)

In this passage, Hume seems to suggest that his call to examine the *idea* constitutes a new argumentative tool by which to assess disputes concerning the object of the idea.

Geometry

Although in his discussion of geometry he concerns himself mostly with ideas, Hume does not just *examine* our ideas of equality, right lines, etc., from the standpoint of his logic or science of cognition, but he deploys his examination of these ideas to challenge mathematicians, and ultimately, to shake the whole foundation of geometry.[22] Consider Hume's concluding remarks about geometry:

> [T]he ideas which are most essential to geometry, *viz.* those of equality and inequality, or a right line and a plane surface, are far from being exact and determinate, according to our common method of conceiving them. . . . As the ultimate standard of these figures is deriv'd from nothing but the senses and imagination, 'tis absurd to talk of perfection beyond what these faculties can judge of; since the true perfection of any thing consists in its conformity to its standard. (T 1.2.4.29)

And because the ideas of geometry are not absolutely perfect, geometry is characterized as an 'art':

> . . . geometry, or the *art*, by which we fix the proportions of figures; tho' it much excels both in universality and exactness, the loose judgments of the senses and imagination; yet never attains a perfect precision and exactness. Its first principles are still drawn from the general appearance of the objects. (T 1.3.1.4)

Hume's examination of the *ideas* of geometry leads him to assess and finally reject fundamental tenets of geometry, indeed, to reconceptualize the whole domain of geometry.

Vacuum

In *Treatise* 1.2.3 Hume argues that the idea of space or extension is the idea of a disposition of colored or solid points, and he concludes in the following section: 'tis impossible to conceive [. . .] a vacuum' (T 1.2.4.2). He brings these two claims together at the outset of *Treatise* 1.2.5: 'If it is true that *the idea of space or extension is nothing but the idea of visible or tangible points distributed in a certain order*, it follows, that we can form no idea of a vacuum, or space, where there is nothing visible or tangible' (T 1.2.5.1). These passages are about *ideas*, but toward the end of *Treatise* 1.2.5 Hume explicitly extends his results about ideas to the domain of metaphysics and mechanics: 'After this chain of reasoning and explication of my principles, I am now prepar'd to answer all the objections that have been offer'd, whether deriv'd from metaphysics or mechanics' (T 1.2.5.22). And a few lines later, he explicitly draws one important implication:

> If the *Newtonian* philosophy be rightly understood, it will be found to mean no more. A vacuum is asserted: That is, bodies are said to be plac'd after such a manner, as to receive bodies betwixt them, without impulsion or penetration. (T 1.2.5.26-App.2)

Hume concludes his examination of the *idea* of vacuum by assessing the role of *the vacuum* within Newtonian philosophy.

Duration

In order to clarify the *idea* of duration, Hume examines its origin in experience. He points out that 'time in its first appearance to the mind is always conjoin'd with a succession of changeable objects' (T 1.2.3.9). And: '[W]herever we have no successive perceptions, we have no notion of time' (T 1.2.3.7). Having shown from the standpoint of his logic that the *idea* of time is essentially derived from the experience of succession or changing objects, Hume proceeds to extend his results to the debates concerning time itself:

> I know there are some who pretend, that the idea of duration is applicable in a proper sense to objects, which are perfectly unchangeable; and this I take to be the common opinion of philosophers as well as of the vulgar. But to be convinc'd of its falsehood we need but reflect on the foregoing conclusion, that the idea of duration is always deriv'd from a succession of changeable objects, and can never be convey'd to the mind by any thing stedfast and unchangeable. For it inevitably follows from thence, that since the idea of duration cannot be deriv'd from such an object, it can never in any propriety or exactness be apply'd to it, nor can any thing unchangeable be ever said to have duration. Ideas always represent the objects or impressions, from which they are deriv'd, and can never without a fiction represent or be apply'd to any other. (my underlining) (T 1.2.3.11)

Hume is not just concerned with the *idea* of time but also with the ascriptions of temporal properties to objects.

Necessary Connection

Finally, Hume examines the *idea* of necessary connection, but his primary concern is actually *necessity itself*, in particular the question of whether there is necessity in nature, independent of the mind. At the beginning of *Treatise* 1.3.14 Hume identifies his targets: 'There are some, who maintain, that bodies operate by their substantial form; others, by their accidents or qualities; several, by their matter and form . . . the supposition of an efficacy in any of the known qualities of matter is entirely without foundation' (T 1.3.14.7). He continues:

> . . . at last [. . .] philosophers [have been obliged] to conclude, that the ultimate force and efficacy of nature is perfectly unknown to us, and that 'tis in vain we search for it in all the known qualities of matter. . . . For some of them, as the *Cartesians* in particular, having establish'd it as a principle, that we are perfectly acquainted with the nature of matter, have very naturally inferr'd, that it is endow'd with no efficacy, and that it is impossible for it of itself to communicate motion, or produce any of those effects, which we ascribe to it. (T 1.3.14.8)

Hume then announces how he aims to contribute to the debate concerning the nature of matter and necessity:

> But before they enter'd upon these disputes, methinks it woul'd not have been improper to have examin'd what idea we have of the efficacy, which is the subject of the controversy. This is what I find principally wanting in their reasonings, and what I shall here endeavour to supply. (my underlining) (T 1.3.14.3)

By examining the *idea* of efficacy from the standpoint of his logic Hume indeed aims to *resolve* the controversy within natural philosophy concerning the necessary connection of bodies.

The passages presented in this section strongly support the following thesis: Hume conceives of the work he is carrying out within his science of man as supplying a new way of adjudicating on controversial subjects within Newtonian physics, mechanics, metaphysics, and geometry. The underlying argument seems to be that the debates scientists are involved in stem from a lack of understanding of the nature of the ideas involved in their thinking. Hume puts forward his logic as filling this crucial gap.

3. The Rejection of Ideas and its Implications—Some Proposals

Most of the time, the examination of ideas leads Hume to issue negative conclusions about core ideas in the sciences. We fail to have ideas we thought we had; certain objects or entities central to the sciences turn out to be objects we cannot conceive. But what exactly follows from these negative claims? It is not clear. For instance, concerning the vacuum, Hume insists that we cannot form an idea of a vacuum (T 1.2.4.2), but what is Hume's position concerning the vacuum itself and its role within Newtonian physics? Garrett argues that Hume's denial of the idea of a vacuum is 'a claim about representations, made within a cognitive science of representations, and it has no negative consequences for those who deny that the universe is a plenum'.[23] Norton maintains that Hume is inclined to believe, 'as ordinary people do, that there are vacuums (that there are empty spaces) even though we have no idea of a vacuum'.[24] These interpreters seem to suggest that Hume's denial of the idea of vacuum has no implications for the sciences. If that is true of the denial of the idea of vacuum, then it would also seem to be true of Hume's denial of other ideas.[25] In what

follows, however, I consider some possible consequences of Hume's denial of an idea and start by examining some proposals.

The Criterion of Meaning

Hume's criterion of meaning (and meaningfulness) was very influential for logical positivism or logical empiricism. Terms stand for ideas, and ideas are copies of impressions. The meaning of a term is given by the set of impressions that cause the idea. But how important is the criterion of meaning to Hume's own foundational project? Some interpreters consider it central to his 'reform of the sciences'.[26] But the evidence for this thesis is rather weak.

Alexander Rosenberg maintains that the criterion of meaning stands at the core of Hume's philosophy of science. But Rosenberg himself remarks on a number of problems or inconsistencies that render his own thesis rather questionable. Most important for us, he observes that there are several cases where Hume denies a given idea, but he fails to stigmatize the idea, or the term associated with the putative idea, as meaningless or unintelligible. Commenting on Hume's discussion of infinite divisibility, Rosenberg writes: 'Hume simply holds the claims that space and time are both infinitely divisible to be false, not unintelligible.'[27] Similarly, he points out that although Hume denies we have an idea of a mathematical point as defined within classical geometry, he fails to stigmatize the expression 'mathematical point' as meaningless.[28] Finally, Rosenberg also notes that although Hume denies that we have an idea of gravity, he does not conclude that 'gravity' is meaningless.[29]

In fact, however, Rosenberg's list of 'inconsistencies' or cases in which Hume inexplicably fails to apply the criterion of meaning is hardly complete. Hume denies that we have an idea of a vacuum, as the idea of space without something visible or tangible (for instance, T 1.2.4.2; T 1.2.5.1), but he never says that 'vacuum' is meaningless. Hume denies that we have an idea of changeless duration (for instance, T 1.2.3.7; T 1.2.5.28), but he simply does not maintain that claims about enduring unchanging objects are meaningless or incomprehensible. Hume denies that we have an idea of a straight line (T 1.2.4.25–26; T 1.2.4.29), but he does not claim that 'straight line' is meaningless. He denies that we have an idea of perfect equality (T 1.2.4.24), but his final verdict is not that 'equality' is meaningless. Hume does claim that the *fiction*, not the term 'equality', by which we arrive at the notion of equality is 'useless as well as incomprehensible' (T 1.2.4.24). But when he assesses the whole of geometry, including the standard of equality, his position is not that the terms central to geometry are meaningless; instead he says: 'the ideas which are most essential to geometry . . . are far from being exact and determinate' (T 1.2.4.29). Out of all the topics I discuss in section 2 of the present paper, only in the case of necessity does Hume draw the inference that because we fail to have an idea of necessity (in the objects), 'necessity' (as applied to objects) is meaningless.

Perhaps it might be objected that although Hume does not explicitly judge terms lacking ideas to be meaningless, that is indeed his intention. But Hume is

quite explicit in some cases. For instance, Hume attacks the ancient philosophers for 'their invention of the words *faculty* and *occult quality*' which are 'wholly insignificant and unintelligible' explaining that the frequent use of these words in discourse gives them the appearance of meaning (T 1.4.3.10). In the other cases we have discussed, vacuum, infinite divisibility, etc., Hume does not appear to be at all focused on words and their signification. Indeed, beside the central case of necessity, Rosenberg notes that Hume employs the criterion of meaning 'mainly to condemn a wide variety of concepts of traditional philosophical thought', concepts such as '*substance, substantial form, mode, essence*'.[30] But Hume could hardly be said to reform the sciences simply by pointing out that *such* terms were meaningless. As Rosenberg himself acknowledges, Hume stigmatizes 'many of the terms of Aristotelian metaphysics, terms that few empiricists would identify as practically or scientifically useful'.[31]

So why do Rosenberg, and, more recently Morris, insist that Hume's criterion of meaning is central to his 'reform of the sciences'? Rosenberg is explicit: 'Causation is the center stage for Hume's application of the empiricist theory of meaning to the problems in philosophy and scientific method.'[32] Rosenberg places Hume's discussion of causation at the core of his philosophy of science, and causation is the central case for the application of the criterion of meaning. And in his paper, Morris only discusses the application of the criterion of meaning to *necessity*, both within Hume's discussion of causality and the discussion of liberty and necessity. Interestingly, Hume only explicitly states the criterion of meaning in the *Abstract* and the *Enquiry*, both texts in which causation is the central theme. There is no real treatment either in the *Abstract* or in the *Enquiry* of the topics of infinite divisibility, space and time, vacuum, and geometry.[33] But the discussion of these subjects is surely part of the project of reforming the sciences that Hume so enthusiastically announces in the Introduction to the *Treatise*. As we have seen, Hume takes himself to have questioned the 'foundation of mathematics' (T 1.4.2.22). But the meaning of words does not seem to play any role in that foundational work. Thus if we take seriously Hume's foundational project, the project that makes sense of much of *Treatise* 1.2, then we cannot place the criterion of meaning at the center of that project.

Inconceivability and Impossibility

Since most of Hume's arguments regarding ideas central to the sciences involve the modal claim that we cannot form these ideas and that we cannot conceive the objects of these ideas perhaps the 'inconceivability principle' is the link between Hume's examination of ideas and the other sciences we have been searching for.

Hume denies that we can conceive certain objects: vacuum, changeless duration, geometrical mathematical points, necessity (in objects), among others. But what follows from the fact that an object is inconceivable for us? Early in the *Treatise*, Hume endorses the maxim in metaphysics*: 'whatever the mind clearly*

conceives includes the idea of possible existence, or in other words, *that nothing we imagine is absolutely impossible*' (T 1.2.2.8).[34] He illustrates this maxim with the following two examples: 'We can form the idea of a golden mountain, and from thence conclude that such a mountain may actually exist. We can form no idea of a mountain without a valley, and therefore regard it as impossible' (T 1.2.2.8). The first infers possibility from conceivability. The second infers impossibility from inconceivability. Perhaps when Hume maintains that we cannot conceive of a vacuum or changeless duration or necessity in objects the implication is also that the existence of these objects is impossible.

Surprisingly, no interpreter, that I know of, has defended the view that Hume considers the existence of empty space, absolute time, and necessity in objects to be *impossible*.[35] Indeed, Hume never even intimates that these objects might be impossible, and for all of these putative ideas he attempts to find the impressions that might generate the idea in question. If Hume thought that a vacuum or changeless duration or the necessary connection between objects were akin to a mountain without a valley he would not even feign a search for an impression.

And there are, indeed, important differences between these objects and a mountain without a valley, namely that only the latter involves a *contradiction*.[36] A mountain without a valley is in principle inconceivable. That Hume's 'Inconceivability principle' is concerned with what is *in principle* inconceivable is strongly suggested by the fact that in the maxim cited above Hume refers to 'absolute' possibility and impossibility. In contrast, in the cases we are considering, empty space or changeless duration, etc., it is *we* who cannot conceive of these objects. Hume does not claim that these objects are absolutely inconceivable and impossible.

So Hume is concerned not just with whether we have, as a matter of fact, a certain idea we believe we have. He is not merely concerned to show that there is no *actual* history of impressions that have given rise to a putative idea. For instance, in the case of the vacuum, the search is not just genetic. He does not only look for the impressions that *in fact* cause the putative idea; he devises a number of thought experiments to show that there are no *possible* impressions or experiences that can give rise in us to the idea of a vacuum.[37] In other words, Hume's goal is to show that we *cannot* form certain ideas. Why? What follows for him from this fact? What does *not* follow, as we have seen, is that certain terms like 'vacuum', 'changeless time', 'right lines' are meaningless or without content. Neither does it follow that the objects of the ideas we cannot form are impossible. And Hume never claims or suggests that the objects we cannot form an idea of do not *as a matter of fact* exist.

4. Hume's 'No Reason to Believe' Principle

At the end of *Treatise* 1.3.14, after concluding that we cannot form an idea of necessary connection between bodies, Hume discusses a number of corollaries. The fourth and last corollary is this: 'we can never have reason to believe that

any object exists, of which we cannot form an idea' (T 1.3.14.36). Here Hume draws an explicit implication from the fact that we cannot form an idea. If we cannot form an idea of *x*, then we can never have reason to believe that x exists. I shall call this Hume's 'No reason to believe' principle.

What follows from the fact that we cannot form an idea of a vacuum or empty space is that we can never have reason to believe that such an object exists. We are unable to form an idea of time without change or an idea of time itself, thus we can never have reason to believe that there is such a distinct object as time. Hume, of course, does not say these things. Later, I explain why the 'no reason to believe' principle could not be introduced earlier in Book 1, and thus why Hume does not apply this principle in *Treatise* 1.2, in his discussion of space, time, and geometry.

However, despite the lack of explicit mention of the principle, Hume's remarks in *Treatise* 1.2 are thoroughly consistent with the 'no reason to believe' principle and even suggest it. The texts we discuss next strongly suggest that Hume takes his discussion of the ideas of duration, vacuum, and geometry to have normative implications. In particular, they show that Hume is concerned with the claims scientists issue about objects that turn out to be inconceivable for us. For Hume, these claims lack justification.

Changeless Duration

Having argued that we cannot form an idea of duration without change, or an idea of duration without objects that change, Hume remarks: 'For it inevitably follows from thence, that since the idea of duration cannot be deriv'd from such an object, it can never in any propriety or exactness be apply'd to it, nor can any thing unchangeable be ever said to have duration' (T 1.2.3.11). What follows here from the fact that we cannot conceive changeless duration is that we cannot justify certain judgments and forms of speech about time and our ascribing temporal properties to objects. Hume's reference to what we can do with 'propriety and exactness' suggests that his target is not the vulgar, but the philosopher (although the vulgar does commit the errors Hume points out). This is supported by the fact that Hume later in the section explicitly identifies the target of his criticism as the '*doctrine*, that time is nothing but the manner, in which some real objects exist' (my emphasis) (T 1.2.5.28).

That Hume criticizes this doctrine might seem puzzling because it *looks* like Hume's own position.[38] To distinguish Hume's own position from the doctrine he is attacking we have to assume that he interprets the doctrine as postulating time or 'the manner' as having an independent existence from that of real objects. Interpreted that way, we can see that Hume's own position is just the opposite. For Hume claims: 'it is impossible to conceive . . . a time, when there is no succession or change in any real existence' (T 1.2.4.2). Thus interpreted, 'the doctrine' Hume is attacking is, for instance, Newton's conception of time in the *Principia*: 'Absolute, true and mathematical time, of itself, and by its own nature,

flows uniformly on, without regard to anything external. It is also called *duration.'*[39] Hume responds to this *doctrine* by pointing out 'that we really have no such idea' (T 1.2.5.28). And we cannot have such idea because it is '*impossible* to show the impression, from which the idea of time without a changeable existence is deriv'd' (my emphasis) (T1.2.5.28). There is no possible impression that is the impression of time itself.

Vacuum

Hume reaches the conclusion that 'tis impossible to conceive [. . .] a vacuum' (T 1.2.4.2), and that 'we can form no idea of a vacuum, or space, where there is nothing visible or tangible' (T 1.2.5.1). But what follows? He writes: 'If the *Newtonian* philosophy be rightly understood, it will be found to mean no more. A vacuum is asserted: That is, bodies are said to be plac'd after such a manner, as to receive bodies betwixt them, without impulsion or penetration' (T 1.2.5.26-App.2). In the Appendix to *Treatise* 1.2.5 Hume adds:

> As long as we confine our speculations to the *appearances* of objects to our senses, without entering into disquisitions concerning their real nature and operations, we are safe from all difficulties, and can never be embarrass'd by any question. (T 1.2.5.26-12 App.)

There is no impression of a vacuum; there is no experience that is the experience of a vacuum. So when Newtonians posit a vacuum in their theories, they are going beyond appearances, beyond experience. What we observe is that we can place bodies between other bodies without impulse or penetration. Although it is almost irresistible to infer from this observation the existence of a vacuum or empty space, we are not justified in doing so because *we cannot form an idea of a vacuum*.

Because we cannot form the idea of a vacuum, we cannot appeal to the vacuum to causally explain our observations. Hume explicitly rejects this appeal when he writes: 'Here is the whole of my system; and in no part of it have I endeavour'd *to explain the cause*, which separates bodies after this manner, and gives them a capacity of receiving others betwixt them, without impulse or penetration' (T 1.2.5.25; SBN 63; my emphasis). And Hume does not 'endeavour to explain the cause, which separates bodies' because 'such an enterprize is beyond the reach of human understanding, and [. . .] we can never pretend to know body otherwise than by those external properties, which discover themselves to the senses' (T 1.2.5.26; SBN 64).[40]

Geometry

Hume takes his arguments to show that 'the ideas which are most essential to geometry, *viz.* those of equality and inequality, or a right line and a plane surface,

are far from being exact and determinate'. He continues: 'As the ultimate standard of these figures is deriv'd from nothing but the senses and imagination, 'tis absurd to talk of perfection beyond what these faculties can judge of' (T 1.2.4.29). The (perfect) ideas of equality, of a right line, of a plane, are absolutely central to geometry. But we cannot form ideas of perfect objects: the standard for these objects derives from the senses and the imagination and these faculties cannot achieve absolute perfection. Thus Hume concludes that it is 'absurd to talk of perfection'. Geometry cannot justify its practice of appealing to (absolutely) perfect objects because we cannot form ideas of these objects. Instead, the standards of geometry must be true to experience aided by the best instruments that we possess.

5. The Foundational Project and Hume's 'No Reason to Believe' Principle

I have argued that Hume does carry out the foundational intention he so enthusiastically announces in the Introduction to the *Treatise*. In particular, in Book 1, he employs his logic or the examination of the nature of our ideas and the operations involved in reasoning to assess a number of questions within natural philosophy and mathematics. I have focused on the part of logic that examines the nature of our ideas, and in particular on the consequences of Hume's conclusion that many of the ideas central to the sciences are ideas that we cannot form.

Hume denies the conceivability of objects central to the sciences throughout Book 1, but it is not until the end of *Treatise* 1.3 that we find an explicit statement of the implications of our inability to form ideas: if we cannot form the idea of *x*, then we can never have reason to believe, or we can never justify our belief, in the existence of *x*. If this principle is as important and significant as I maintain, why is it explicitly stated so late in Book 1? In the paragraph where Hume introduces this principle, he explains that only causation can support 'reasonings concerning existence' and that causation depends essentially on the experience of conjunctions of objects. Hume adds: 'the same experience must give us a notion of these objects' (T 1.3.14.36). These claims crystallize much of what has been revealed in *Treatise* 1.3 thanks to Hume's meticulous examination of our idea of cause and causal reasoning. In the course of this investigation, Hume offers an account of nature of *belief in the unobserved* and of when we are *justified* in believing in the unobserved. Unlike other belief-forming mechanisms, such as beliefs formed through education or indoctrination (T 1.3.9.17) and beliefs in miraculous events (T 1.3.10.4), causal beliefs issue from experience, in particular from the observation of constant conjunction.[41]

But experience does not just naturally produce beliefs; experience for Hume is authoritative (T Intro. 10; Abs. 2). Indeed, Hume considers experience to be the ultimate source of authority, and it is this reverence for experience that inspires Hume's foundational ambition. The foundational project is essentially the project of grounding the sciences on Hume's science of man, and the science of man is

in turn grounded on 'experience and observation' (T Intro. 7). The primacy of experience and observation is formalized in the copy principle. For Hume, the ultimate source of all our ideas is or *must be able to* be impressions.

As I pointed out earlier, Hume's search for an impression from which ideas derive is not just genetic. The question is also whether there *could be* impressions, whether experience is a *possible* source for our ideas. Thus Hume's conclusion is often that we cannot form certain ideas, that the objects of these ideas are inconceivable for us. According to the 'no reason to believe' principle, we can never have reason to believe in the existence of an object of which we cannot form an idea. If experience is not a possible source for an idea, then we can never have reason to believe in the existence of the object of the idea. Experience, Hume insists, '*must* give us a notion of these objects' (my emphasis) (T 1.3.14.36). Hume's 'no reason to believe' principle can allow that, as a matter of fact, certain terms that fail to stand for ideas have *some* meaning for us. The term 'vacuum' is not devoid of all sense or meaning. It is meaningful and useful within, for instance, Newtonian theory. Hume could hardly be said to reform the sciences by questioning ideas which have no use in the sciences. The 'no reason to believe' principle forbids us, however, from employing ideas that we cannot form to reify objects in the sciences and allow them to play a causal explanatory role. Hume's 'no reason to believe' principle can also allow that, as a matter of psychological fact, we believe in the existence of things of which we can form no idea. We do indeed believe things that we have 'no reason to believe'. Finally, the 'no reason to believe' principle is friendly to Hume's general skepticism about positing *or rejecting* metaphysical entities. It does not positively reject the possibility that certain objects exist; it does not even deny that some objects in fact do exist. But it does impose strict normative demands on our beliefs and on our theorizing.

In this paper, I have focused on the import of Hume's negative thesis that many of the ideas central to the sciences are ideas that we cannot form. But Hume's examination also leads him to offer positive characterizations of the nature of our ideas. Hume's logic does not just deny our ability to form certain ideas, but it also imbues our ideas with new content, the content of experience and observation. Hume argues, for instance, that our idea of space or extension is essentially the idea of an uninterrupted continuum of visible or tangible points (T 1.2.3.13; T 1.2.5.1). He maintains that the divisibility of extension must end with a minimum sensible (T 1.2.1.3). He defends the view that necessity is a determination of the mind that is triggered by exposure to constant conjunctions (T 1.3.14.1). He argues that our idea of time necessarily involves change (T 1.2.3.8). What follows from Hume's positive characterization of the nature of our ideas?

Donald Baxter and Donald Ainslie have recently offered a similar interpretation, independently of each other, about the import of Hume's positive account of our ideas of space and time. But their reading traces 'the move' from ideas to the objects of the ideas, not to the foundational intention at the beginning of *Treatise*, but rather to the end of Book 1, to Hume's discussion of skepticism.

Baxter argues that, consistent with his skeptical philosophy, Hume is offering an account of space and time as *appearances*.[42] Ainslie identifies in Hume's account of *adequate ideas* in *Treatise* 1.2 what Ainslie refers to as the 'transfer principle', a principle that allows Hume to force space to conform to our idea of space. Ainslie understands this move against the background of Hume's skepticism in *Treatise* 1.4, and he suggests that Hume anticipates Kant in offering an account of space as it is for us.[43]

I cannot adequately engage with these readings in this paper, but I do wish to make some general comments and to contrast them briefly with the foundational interpretation. As we have seen in my discussion of the 'no reason to believe' principle, for Hume, experience is authoritative; it gives us reason to believe in the existence of objects. Given Hume's discussion in *Treatise* 1.3.6, the idea that experience gives us *reason* to believe in the existence of objects cannot be understood literally. Indeed, Hume himself maintains that causal reasoning follows 'without a reason' (T 1.3.6.12). However, experience does justify our beliefs in the unobserved.[44] Thus when Hume forces our ideas to correspond to or to conform to the character of our observations and experience, he offers us candidates for justified beliefs. In contrast to Baxter's and Ainslie's interpretation, the foundational interpretation does not understand Hume as positively asserting that, for instance, space is an appearance. Instead, by characterizing the actual nature of our idea of space, Hume is specifying what we are justified in believing concerning space. He is identifying the objects that we have a right to include in our theories, the objects that are allowed to play a causal role in our explanations. This reading of the import of Hume's positive characterization of our ideas seems to me to be more in line with Hume's skepticism than a reading that claims that for Hume space and time are *appearances*. Moreover, the thesis that space and time are appearances demands a meaningful contrast. Kant reasonably asserts that the claim that something is an appearance implies commitment to the things themselves over against appearances. Consider the following passage:

> . . . if we entitle certain objects, as appearances, sensible entities (phenomena), then since we thus distinguish the mode in which we intuit them from the nature that belongs to them in themselves, it is implied in this distinction that we place the latter, considered in their own nature . . . in opposition to the former, and that in so doing we entitle them intelligible entities (noumena). (B306)[45]

Kant's position contrasts sharply with Hume's. Hume positively identifies what would be the only candidate for the thing itself as *absurd* in the few explicit remarks he makes about the contrast between perceptions and external existences (T 1.4.2.2).

According to the foundational interpretation, then, Hume's positive characterization of ideas delivers ideas or concepts that we are justified in believing in and employing in the sciences: space or extension as a continuous array of visible or tangible points, time as essentially involving change or changing

objects; necessity as a determination of the mind that we project onto objects; geometry as less than *absolutely* perfect. But, concerning geometry, we might object: how is geometry established on a secure and 'solid foundation' when it is being denied what is most essential to it, namely absolute perfection, and hence absolute certainty (T Intro. 7)? Hume seems to anticipate this objection when he argues that absolute perfection is 'absurd' and that by forcing geometry to conform to experience we render its elements 'truly perfect', as opposed to absurdly perfect[46]. The main idea is well captured in the following, passage from 'Geometry and Experience', written by Albert Einstein:

> One reason why mathematics enjoys special esteem, above all other sciences, is that its laws are absolutely certain and indisputable, while those of all other sciences are to some extent debatable and in constant danger of being overthrown by newly discovered facts. In spite of this, the investigator in another department would not need to envy the mathematician if the laws of mathematics referred to objects of our mere imagination, and not to objects of reality.[47]

It is almost impossible to resist interpreting Einstein's language here as a direct reference to Hume, who had a significant influence on Einstein. Indeed, the nature of this influence is quite relevant to us. As a recent biographer remarks, what influenced Einstein most was 'the skepticism he learned from the Scottish philosopher David Hume regarding mental constructs that were divorced from purely factual observations'.[48] Geometry, according to Einstein, must choose between, being absolutely certain or perfect, but concerning itself only with 'objects of our mere imagination', or being less than certain or perfect, but grounded in reality. Einstein makes the same point, but more succinctly in the following: 'As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality.'[49] By being grounded on experience, geometry gains reality and only loses a fictitious or absurd perfection.

Hume's logic is not only concerned with the nature of our ideas, but also with the nature of reasoning. I have said very little in this paper about the latter. But there is little doubt that Hume's examination of the operations of reasoning must deliver an account of the justification of causal inferences or causal beliefs. The foundational project aims to establish the sciences on a solid and secure foundation and thus generates the expectation that Hume indeed provides an account of how causal reasoning is justified (despite the fact that it cannot be justified through reason). Hume could hardly be said to establish the sciences on a secure foundation if either he were arguing that causal beliefs were unjustified, or if he were merely *describing* the mechanism of causal reasoning.[50]

Finally, the last part of Book 1 concerns Hume's 'skepticism'. This important part of Book 1 needs to be assimilated within the foundational project. The Conclusion to Book 1 depicts a Hume in the throes of despair. Does the despair signal Hume's dissatisfaction with his foundational achievements? If so, this is not his final position. For Hume continues to carry out his foundational project

in the rest of the *Treatise* and, as we have seen, in the *Abstract*, he not only acknowledges the project, but he even takes pride in its success.[51]

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NOTES

[1] References to the *Treatise* are to David Hume, *A Treatise of Human Nature*, ed. David Fate Norton and Mary J. Norton (New York: Oxford University Press, 2011), hereafter cited as 'T' followed by Book, part, section, and paragraph numbers.

[2] James Moore compares different philosophical projects of the early modern period with Hume's science of human nature in an attempt to find significant commonalties. He does not find very many. James Moore, 'The Social Background of Hume's Science of Human Nature', *McGill Hume Studies*, eds. Norton, Capaldi and Robison, San Diego: Austin Hill Press, 1976: 23–42.

[3] John Passmore, *Hume's Intentions*, (London: Cambridge University Press, 1952), 15.

[4] In one place, Passmore writes: 'When Hume proclaims that his method is "the only one upon which they [the sciences] can stand with any security", he is deliberately arousing expectations, in order the more effectively to show that they cannot be fulfilled' (ibid., 42).

[5] As support Passmore quotes Hume in one of his letters where he expresses the intention to produce a work on 'the metaphysical principles of geometry' that will examine the subjects of space and time he omitted from the first *Enquiry*. And it is in his *Dialogues Concerning Natural Religion*, Passmore maintains, that Hume 'expounds and develops his logic in opposition to theology' (ibid., 6–7).

[6] Norton, *Treatise*, (2008), I 14–15.

[7] Janet Broughton, 'The *Inquiry* in the *Treatise*', *The Philosophical Review* 113–14 (2004): 537–56, 537.

[8] Ibid., 541.

[9] Don Garrett, *Cognition and Commitment in Hume's Philosophy* (Oxford: Oxford University Press, 1997).

[10] Ibid., 4 and 205.

[11] David Owen, *Hume's Reason* (Oxford: Oxford University Press, 1999), 64.

[12] Michael Williams, 'The Unity of Hume's Philosophical Project', *Hume Studies*, 30:2 (2004): 265–96, 269–71.

[13] Alexander Rosenberg, 'Hume and the Philosophy of Science', *The Cambridge Companion to Hume*, David Fate Norton, ed. (Cambridge University Press, 1993); William Edward Morris, 'Meaning(Fullness) Without Metaphysics: Another Look at Hume's Meaning Empiricism', *Philosophia*, 37: 3 (2009):441–54, 441–42.

[14] Williams, 'The Unity of Hume's Philosophical Project', 271.

[15] I discuss Hume's examination of the operations of reasoning in another paper 'The Normativity of Experience and Causal Belief in Hume's *Treatise*', *Hume Studies* (under review).

[16] Owen, *Hume's Reason*, 64.

[17] David Hume, *An Enquiry Concerning the Human Understanding*, ed. Tom L. Beauchamp (Oxford: Oxford University Press, 2006), hereafter cited as 'EHU' followed by section and paragraph. By the 'mental geography' interpretation, I am referring to readings of the *Treatise* that conceive of Hume as engaged *primarily* in a descriptive science of mind or psychology. I do not suggest that interpreters who defend these readings conceive of Hume as doing *only* mental geography in the *Treatise*. I mentioned some of these interpreters earlier in the paper. I would like to comment briefly on the context of Hume's employment of the phrase 'mental geography' in the first *Enquiry*. The point Hume is making is that if *nothing else*, his work in the *Enquiry* will advance our knowledge of mental geography. He writes: 'And if we can go no farther than this mental geography, or delineation of the distinct parts and powers of the mind, it is at least a satisfaction to go so far' (EHU 1.13). But Hume does indeed go farther in the *Enquiry*, as some of his most famous passages indicate. Only a few pages into the *Enquiry*, he writes: 'When we entertain, therefore, any suspicion, that a philosophical term is employed without any meaning or idea (as is but too frequent), we need but enquire, *from what impression that supposed idea is derived?* And if it be impossible to assign any, this will serve to confirm our suspicion' (EHU 2.9). And at the end of the *Enquiry*, in a passage known to every student of philosophy, Hume writes: 'If we take in our hand any volume; of divinity or school of metaphysics, for instance; let us ask, *Does it contain any abstract reasoning concerning quantity or number?* No. *Does it contain any experimental reasoning concerning matter of fact and existence?* No. Commit it then to the flames: For it can contain nothing but sophistry and illusion' (EHU 12.3). It seems that Hume never abandons his foundational ambition.

[18] Of course, this does not mean that Book 3 does not rely on anything in Book 1. Book 2 is based on Book 1, so Book 1 is also foundational to Book 3.

[19] The treatment of natural religion is not as evident in Book 1, but we know why this is the case: Hume extracted most of his discussion of religion from the *Treatise*. A significant contribution to natural religion in the *Treatise* might have been his essay 'On Miracles', which he chose to remove from the *Treatise* and was later published in a revised version in the first *Enquiry*. And Hume's 'An Early Fragment on Evil' also suggests that a substantial part of his discussion of the Problem of Evil might have been drafted with the *Treatise* in mind. (M. A. Steward and John P. Wright, ed., *Hume and Hume's connexions*, Edinburgh UP, 1994). And there is still some relevant material in Book 1, albeit somewhat scattered. Hume's discussion of the nature of belief in *Treatise* 1.3 draws explicit and suggestive connections to religious belief, and the section 'On the immateriality of the soul', confronts some classical theological issues. And although I do not regard the presence of religion in the *Treatise* to be as strong as the other subjects, Paul Russell has defended the view that religion, in particular irreligion, is one of the central themes of the *Treatise*. Paul Russell, *The Riddle of Hume's Treatise; Skepticism, Naturalism, and Irreligion*, (New York: Oxford University Press, 2008).

[20] See, for instance, T 1.2.4.19, 24.

[21] Consider also T 1.2.2.8–9.

[22] See, for instance, T 1.2.4.26–30 for criticisms of mathematicians.

[23] Garrett, *Cognition*, 54.

[24] David Hume, *A Treatise of Human Nature*, in D. F. and M. Norton, ed. (Oxford: Oxford University Press, 2008), 444, n. 25. For a similar view, see D. Tycerium Lightner, 'Hume on Conceivability and Inconceivability', *Hume Studies* 23 (1997): 113–32, 123.

[25] However, Hume does not believe in the existence of vacuums, and his denial of the idea of a vacuum does indeed have implications for the sciences. I defend this in my paper, 'Filling the Gaps in Hume's Vacuums', *Hume Studies*, 38:1 (2012): 79–99.

[26] Morris, 'Meaning(Fullness) Without Metaphysics', 441–42.

[27] Rosenberg, 'Hume and the Philosophy of Science', 82.

[28] Ibid., 82–83.

[29] Ibid., 68.

[30] Ibid., 66.

[31] Ibid., 70.

[32] Ibid., 71.

[33] Although Hume does acknowledge these topics in the *Abstract* and takes pride in his accomplishments in these areas. The *Enquiry* devotes a few paragraphs to these subjects (see EHU 12.18–20, including footnotes).

[34] Other places where Hume endorses this principle are, for instance, T 1.1.7.6, T 1.2.4.11, and Abs. 11.

[35] John Wright argues that though Hume endorsed the 'inconceivability principle' very early in the *Treatise*, he ultimately rejects it. In particular, he claims that Hume does not endorse the inference from inconceivability to impossibility in the case of absolute space. John P. Wright, 'Hume's Rejection of the Theory of Ideas', *History of Philosophy Quarterly* 8 (1991): 149–62, 150 and 152.

[36] The discussion in this paragraph relies heavily on Lightner's paper: 'Hume on Conceivability and Inconceivability'.

[37] See Hume's experiments in T 1.2.5.3–6.

[38] See, for instance T 1.2.4.2 where Hume writes: 'The ideas of space and time are therefore no separate idea or distinct idea, but merely those of the manner or order, in which objects exist.'

[39] Isaac Newton, *Principia,* in *Newton, Philosophical Writings*, ed. Andrew Janiak (Cambridge: Cambridge University Press, 2004), 64.

[40] For a fuller discussion of Hume's position on the vacuum, see my 'Filling the Gaps in Hume's Vacuums', *Hume Studies,* 38:1 (2012): 79–99.

[41] Hume considers the observation of constant conjunctions part of the concept of experience. See Hume's characterization of 'the nature of experience' in T 1.3.6.1.

[42] Donald Baxter, 'Identity, continued existence, and the external world'.*The Blackwell Guide to Hume's* Treatise, in Saul Traiger, ed., *The Blackwell Guide to Hume's Treatise* (Malden, MA: Blackwell Publishing, 2006): 114–32. Donald Baxter, 'Hume's Theory of Space and Time', *The Cambridge Companion to Hume Second Edition*, ed. David Norton and Jacqueline Taylor, Cambridge University Press, (2009): 105–46.

[43] Donald Ainslie, 'Adequate Ideas and Modest Scepticism in Hume's Metaphysics of Space', *Archiv für die Geschichte der Philosophie* 92.1 (2010): 39–67.

[44] I defend this thesis in my 'The Normativity of Experience and Causal Belief in Hume's *Treatise*', *Hume Studies* (under review).

[45] Immanuel Kant, *Critique of Pure Reason,* translated by Norman Kemp Smith, 2nd edition (London: Methuen, 1933): 266–67 (B306).

[46] In his discussion of geometry, Hume says: 'tis absurd to talk of any perfection beyond what these faculties [the senses and imagination] can judge of; since the true perfection of any thing consists in its conformity to its standard' (T 1.2.4.29).

[47] Albert Einstein (1953) ed. Feigl and Brodbeck, p. 189. (Reprinted from *Sidelights of Relativity,* E. P. Dutton & Co., Inc, New York 1923), 27–45.

[48] Walter Isaacson, *Einstein, His Life and Universe*, (New York: Simon and Schuster, 2007), 125.

[49] Einstein, Geometry and Experience, 189.

[50] Louis Loeb has the most substantial account of Hume's justification of causal belief. See Louis Loeb, *Stability and Justification in Hume's Treatise*, (New York: Oxford University Press, 2002). See also: Frederick Schmitt, *Knowledge and Belief* (London, Routledge, 1992); Edward Craig, *The Mind of God and the Works of Man* (Clarendon Press, Oxford, 1987), 81, 68–72; William Edward Morris, 'Belief, Probability and Normativity', in Saul Traiger, ed., *The Blackwell Guide to Hume's Treatise* (Malden, MA: Blackwell Publishing, 2006), 77–95. I offer a different account in 'The Normativity of Experience and Causal Belief in Hume's *Treatise*', *Hume Studies* (under review).

[51] For other works on particular subjects that are friendly to the general interpretation of this paper, see: Yoram Hazony, 'Newtonian Explanatory Reduction and Hume's System of the Sciences', Zvi Biener and Eric Schliesser, eds. *Newton and Empiricism* (New York: Oxford, forthcoming). Tamás Demeter, 'Hume's Experimental Method'. *British Journal for the History of Philosophy* 20 (3):577–99 (2012), Eric Schliesser, 'Hume's Newtonianism and Anti-Newtonianism', in Edward N. Zalta, ed. Stanford Encyclopedia of Philosophy. Schliesser develops a fuller account in 'Hume's attack on Newton's Philosophy' in *Enlightenment and Dissent*, 2009, 167–203.