**Hume’s Attack on Newton’s Philosophy[[1]](#footnote-1)\***

*Eric Schliesser*

**Introduction and Summary**

In this paper, I argue that major elements of Hume’s metaphysics and epistemology are not only directed at the inductive argument from design which seemed to follow from the success of Newton’s system,[[2]](#footnote-2) but also have far larger aims. They are directed against the authority of Newton’s natural philosophy; the claims of natural philosophy are constrained by philosophic considerations.[[3]](#footnote-3) Once one understands this, Hume’s high ambitions for a *refashioned* ‘true metaphysics’[[4]](#footnote-4) or ‘first philosophy’, that is, Hume’s ‘Science of Human Nature’,[[5]](#footnote-5) can be seen and evaluated in their proper light.[[6]](#footnote-6) Hume has three motives for his attack on Newton: his work is informed by and gives cover to superstitious beliefs; his project is not useful to the public; and its success generates a challenge to the independent authority of philosophy.

This essay consists of five sections in addition to this introduction. First, I discuss Hume’s attitude toward Newton. Newton claims that natural philosophy should be the foundation for other sciences, while in the ‘Introduction’ to the *Treatise* Hume asserts the supremacy of the ‘science of man’.[[7]](#footnote-7) For Hume the human sciences can attain the high epistemic status of ‘proof’, while much of the physical sciences must do with lower forms of ‘probability’. Furthermore, Hume’s ‘rules by which to judge of causes and effects’ do not replicate Newton’s fourth Rule; this opens a gap between the ontologies and methodologies of Newton and Hume. Moreover, Hume’s account of causation is designed to undercut the reductionist bias of natural philosophy. According to Hume the parts of natural sciences that go beyond common life can be evaluated from the point of view of the science of man. I end with remarks on the philosophic origins and significance of Hume’s attack on Newton’s natural philosophy.

 I depart from two independent traditions of interpreting Hume. One traditionmakes many references to Newton’s influence on Hume.[[8]](#footnote-8) On a more detailed level, proponents of this view may call attention to Hume’s ‘rules’,[[9]](#footnote-9) his ‘Experiments’ and ‘Anatomy’,[[10]](#footnote-10) his method of investi­gation,[[11]](#footnote-11) the application of Newtonian metaphors works (*e*.*g*., an ‘attraction’ in the ‘mental world’ on a par with that in the ‘natural world’ – the principles of association are, then, analogous to the laws of motion).[[12]](#footnote-12) Hume’s ‘science of man’ is said to be inspired by Newton’s science of nature.[[13]](#footnote-13)

 Hume wants his readers to feel that he is modeling his project on the successes of natural philosophy, exemplified by Newton. In the ‘Introduction’ to the *Treatise* and more explicitly in the opening pages of *EHU*,[[14]](#footnote-14) Hume suggests that his ‘science of man’ can parallel recent achievements in natural philosophy (especially planetary astronomy). Thus, my claim is not that Newton did not figure importantly in Hume’s philosophy,[[15]](#footnote-15) but, instead, that Hume’s project is in many respects more hostile to Newton’s achievements – as available to well-informed eighteenth-century readers – than many recent interpreters have realized.

 There is a different tradition that argues Hume simply did not understand Newton. Hume’s philosophy, thus, cannot do justice to Newtonian science.[[16]](#footnote-16) Hume’s lack of mathematical competence is said to be a barrier to his understanding of Newton’s mathematical natural philosophy. One finds this attitude behind the cranking of Bayesian machinery in Earman’s attack on Hume’s treatment ‘Of Miracles’.[[17]](#footnote-17) However, this tradition begs the question; it takes the authority of ‘science’ for granted in Hume.

 Against this second tradition I argue that Hume did understand salient features of Newton’s methodology and position, although in ways often unappreciated by the first tradition mentioned above. For example, in his comments on Newton in the *History of England*, Hume discerns the (broad) outlines of Newton’s commitment to the method of analysis and synthesis (see Newton’s *Opticks*, Query 31) and how it differs from Boyle’s methodology.[[18]](#footnote-18) So, Hume has a subtle understanding of Newton’s methodology – even if one were to grant that he lacks appreciation of the role of mathematics in Newton’s natural philosophy.[[19]](#footnote-19) Leaving open the question whether Hume understood all the details of Newton’s system, Hume’s *departures* from Newton are best interpreted not as ‘ironic’,[[20]](#footnote-20) but as philosophically motivated.

 I offer one methodological-historical comment. In the main body of this paper I treat Hume’s philosophic program statically as if there are no changes in the larger aims of his program during the progressive construction of his oeuvre. This presentation allows the argument to be stated in its most extreme and, thus, clearest form. Yet, this needs important qualification on two fronts.

 First Newton is never mentioned in the *Treatise*; only in the ‘Appendix’, which Hume wrote after he had published the first two volumes, does he use the phrase, ‘Newtonian philosophy.’ In contrast to *EHU*, which has a Newtonian rhetoric, some explicit mention of Newton, and increasing focus on the status of ‘laws’, the *Treatise* is remarkably unaffected by Newtonian themes, concepts, or methods.[[21]](#footnote-21)

 Second, the changed rhetoric and orientation between *Treatise* and *EHU* can be explained, in part, by the timing of both works. When Hume drafted the *Treatise* while at La Flèche in 1734-1737, Newton’s system was not a ‘settled fact’ – there were serious outstanding empirical issues (regarding shape of the Earth and the lengthening of the pendulum with latitude) that were not decided until French expeditions to Lapland and the Equator.[[22]](#footnote-22) Maupertuis’ *Sur la figure de la terre* appeared in 1738 (it also appeared in English translation that year). Hume’s close friend, Adam Smith, mentions this result as decisive evidence for Copernicanism and the Newtonian system in his ‘History of Astronomy’.[[23]](#footnote-23) That same year (1738) Voltaire published his influential piece of Newtonian propaganda *Elémens de la philosophie de Newton*; an English translation appeared in the same year**.** I have no idea when Hume became aware of the relevant empirical evidence, but probably not at La Flèche. It is, of course, possible that when back in Britain between the publication of the first two volumes of the *Treatise* and the drafting of the ‘Appendix’, which was added to the third volume published in November 1740, he became aware of these recent developments.

 So, to be clear, when Hume drafted the first two volumes of the *Treatise*, Continental Cartesians accepted celestial inverse-square gravity, and it was accommodated within various systems (Leibniz, Huygens, Rohault). But outside Britain Hume could have found himself in a large and important company for thinking that the terrestrial (and, thus, universal) gravity part of Newton’s claims was still speculative.[[24]](#footnote-24) After 1738, learned opinion moved decisively into Newton’s camp across Europe, and Hume’s increasing employment of Newtonian language and themes reflects this. But while Hume changed his position on some issues, I argue that he held steadfast to some important larger themes. I do not address the possibility that the texts I cite from Hume’s essays and histories might be taken as evidence of a genuine shift in his understanding of and his relationship to Newton. Here these works are merely treated as a rich source in illuminating the intentions of and meaning behind the *Treatise* and the *EHU*.[[25]](#footnote-25)

 One may think that the subtitle of the *Treatise*, ‘Attempt to Introduce the Experimental Method of Reasoning into Moral Subjects’, shows Hume’s self-conscious debt to Newton.[[26]](#footnote-26) After 1712 in the context of his polemic with Leibniz, Newton and his followers increasingly refer to his own philosophy as ‘experimental’.[[27]](#footnote-27) Even so, Newton always emphasizes that his are *Mathematical Principles of Natural Philosophy*.[[28]](#footnote-28) The subtitle of the *Treatise* probably illustrates Hume’s *methodological* commitment to Boyle.[[29]](#footnote-29)

**The Science of Man as an Attack on Newton’s Foundations**

In this section I first introduce a concept, “Newton’s Challenge”, in order to explain why Hume might have thought Newton’s success generates a challenge to the independent authority of philosophy. Second, Hume argues against Newton’s claim of the superiority of natural philosophy, and for the epistemic equality of moral and natural philosophy. Also, I offer evidence for at least two reasons for Hume’s moral hostility to Newton’s project: Hume thinks that Newton’s philosophy gives cover to superstition, and that it is not useful to the public.

 The nature of Hume’s ambitions is more evident when we put them in context of a text by Newton widely noted by Hume’s contemporaries.[[30]](#footnote-30) A query was added to the first Latin edition of the *Opticks* (*Optice*, 1706) by Newton and maintained in subsequent editions that is significant for our purposes: ‘And if, natural Philosophy in all its Parts, by pursuing this Method, shall at length be perfected, the Bounds of Moral Philosophy will be also enlarged. For so far as we can know by natural Philosophy what is the first Cause, what Power he has over us, and what Benefits we receive from him, so far our Duty towards him, as well as that towards one another, will appear to us by the Light of Nature’.[[31]](#footnote-31) It accords well with the *inductive* argument for God’s existence in the General Scholium, added to the second edition (1713) of the *Principia*: ‘to treat of God *from* phenomena is certainly a part of natural philosophy’ (emphasis added).[[32]](#footnote-32) In Newton’s *published* works he says, ‘We know [the Deity] only by his most wise and excellent contrivances of things, and final causes.’ For Newton the study of motion, duty, and unchanging, first causes are part of a shared enterprise (see also his claim in the General Scholium that although we will know nothing of God’s substance, we can ‘have ideas of God’s attributes’).[[33]](#footnote-33) Newton accords our knowledge of the existence of the Deity a lower epistemic status than the evidence that convinces us of the existence of a (beautiful) systematic arrangement of our solar system and the bodies within it, and the existence of similar such systems at an immense distance. According to Newton ‘these regular motions do not have their origin in mechanical causes’ (General Scholium).[[34]](#footnote-34)

 In order to discuss these passages, I introduce a concept: “Newton’s Challenge”.[[35]](#footnote-35) By this I refer to the fact that the authority of natural science is used to settle debates within philosophy. I distinguish among: (NC1) a philosopher claims that natural philosophy must be consulted in the process of doing metaphysics; (NC2) a philosopher claims that natural philosophy is epistemically prior to metaphysics; (NC3) a philosopher appeals to the authority of a natural science which is in some sense (institutionally, methodologically) not philosophy to settle argument over doctrine, method, *etc*. NC1 has an ancient pedigree; NC2-3 are more prominent after 1700. While it may not have originated with or even been intended by Newton, Newton facilitated “Newton’s Challenge” by allowing Cotes (the editor of the second edition of the *Principia*) to publish a highly influential, lengthy preface (1713), in which two competing approaches to philosophy, the Scholastic and mechanical philosophy, are severely criticized from the point of view of ‘observations and experiments’.

 In the passage from the *Opticks* Newton claims that natural philosophy can guide the search for first causes, or metaphysics (NC2). Moreover, natural philosophy is clearly the more secure, foundational enterprise to other forms of knowledge (that is, commitment to NC3). Newton’s infamous rejection of hypotheses (General Scholium) is also a version of NC3.

 Let us now turn to Hume’s ‘Introduction’ to the *Treatise*:

’Tis evident, that all the sciences have a relation, greater or less, to human nature; and that however wide any of them may seem to run from it, they still return back by one passage or another. 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 . . . [W]e ourselves are not only the beings, that reason, but also one of the objects, concerning which we reason

.…………………………………

And as the science of man is the only solid foundation for the other sciences, so the only solid foundation we can give this science itself must be laid on experience and observation.[[36]](#footnote-36)

Hume’s ‘science of man’ either displaces or is a reinterpretation of more traditional metaphysics as the fundamental form of knowledge of the order of things; knowledge of it is required if ‘certainty’ and ‘security’ are *possible* at all. Hume’s ‘science of man’ is not merely a goal in its own right, interesting as that may be, but may also be requisite to help better understand the other sciences.[[37]](#footnote-37) Hume also talks of the ‘changes and *improvements* we might make in these sciences’.[[38]](#footnote-38) Thus, the ‘science of man’ can instruct the other sciences. How this is supposed to work, and in what sense it is a ‘foundation’, is left unclear; maybe this is why Hume employs the more tentative sounding, ‘some measure’.

 I do not rehearse Hume’s well-known attack on the argument from design in Section XI of *EHU* or in the *Dialogues* here. No doubt Hume is in large part motivated to undercut Newtonian attempts to enlist natural theology in debates over moral philosophy.[[39]](#footnote-39) (In the *Dialogues*, Cleanthes is the spokesperson for this view). Such an enterprise fits squarely in the tradition of physico-theology, popular among Boyle lecturers; these are approvingly mentioned by, for example, the Scottish Newtonian Colin Maclaurin.[[40]](#footnote-40) Physico-theology makes natural philosophy a handmaiden to theology. One can interpret Hume as correcting Newton, and the eighteenth-century Newtonian natural religion advocates, on internal “Newtonian” grounds.[[41]](#footnote-41) This interpretation underestimates the programmatic ambition of Hume.

 For in the Introduction to the *Treatise*, Hume claims, first, that the ‘science of man’ is the *only* solid ‘foundation’ for the other sciences; it is the condition of possible certainty and security;[[42]](#footnote-42) second that it ‘will not be inferior in certainty’ to other forms of knowledge;[[43]](#footnote-43) our knowledge of ‘mental powers and œconomy’ can, despite some practical difficulties, have ‘equal success’ as our knowledge in natural philosophy.[[44]](#footnote-44) As Hume says in ‘Of the Balance of Trade’: ‘We need not have recourse to a physical attraction … There is a moral attraction, arising from the interests and passions of men, which is full as potent and infallible.’[[45]](#footnote-45)

 Hume’s ‘Introduction’ to the *Treatise*, then, signals the start of an ambitious program that departs from Newton’s project. We do not need the perfection of natural philosophy to make progress in moral philosophy. Moreover, Hume indicates that the science of man may be required to make further progress in natural philosophy. Hume makes it clear where his priorities are: ‘Nor ought we to think, that this latter improvement in the science of man will do less honour to our native country than the former in natural philosophy, but ought rather to esteem it a greater glory, upon account of the greater importance of that science, as well as the necessity it lay under of such a reformation.’[[46]](#footnote-46) In sum, Hume’s ‘science of man’ is ‘much superior in utility to any other of human comprehension’.[[47]](#footnote-47)

 When Hume comments more directly on Newton, the lack of utility of Newton’s works is an important part of Hume’s analysis: ‘Were we to distinguish the Ranks of Men by the Genius and Capacity more than by their Virtue and Usefulness to the Public, great Philosophers would certainly challenge the first Rank, and must be plac’d at the Top of human Kind. So rare is this Character, that, perhaps, there has not, as yet, been above two in the World, who can lay a just Claim to it. At least, Galilaeo [*sic*] and Newton seem to me sofar to excel all the rest.’[[48]](#footnote-48) Newton has unusual philosophic talent. Despite much Newtonian propaganda for the utility of Newton’s work,[[49]](#footnote-49) Hume thinks it is not very useful to the rest of mankind. For Hume there is a moral point of view from which Newton’s achievements have to be re-directed to more praiseworthy aims.[[50]](#footnote-50) By contrast, ‘There is no question of importance, whose decision is not compriz’d in the science of man.’[[51]](#footnote-51)

 Moreover, Hume thinks that Newton shares in the superstitious prejudices of his time. While defending the stylistic abilities of King James I, Hume comments: ‘[King James I] has composed a commentary on the Revelations, and proved the pope to be antichrist; may not a similar reproach be extended to the famous writer Napier; and even to Newton, at a time when learning was much more advanced than during the reign of James? From the grossness of its superstitions, we may infer the ignorance of an age; but never should pronounce concerning the folly of an individual, from his admitting popular errors, consecrated by the appearance of religion.’[[52]](#footnote-52) Hume thinks that Newton’s writings show that they are the product of an age of religious superstition.[[53]](#footnote-53) This criticism of Newton is significant because Hume’s ‘true metaphysics’ is meant as an attack on the ‘considerable part of metaphysics’, which results (in part) ‘from the craft of popular superstitions’.[[54]](#footnote-54) Among the many ‘positive advantages, which result from an accurate scrutiny into the powers and faculties of human nature’,[[55]](#footnote-55) it serves ‘only to discover larger portions of our ignorance’.[[56]](#footnote-56)

 In this paper, I offer cumulative evidence that Hume is concerned with more substantial parts of Newton’s edifice. Recall that even mathematics, natural philosophy, *and* natural religion are included among the list of sciences in some measure ‘dependent on the science of man’.[[57]](#footnote-57) Thus, if Hume can constrain the authority of natural philosophy, he does not only cut off one pillar of support for the superstitious natural religion fashionable among the learned (typified by Maclaurin),[[58]](#footnote-58) but also permits the building of a refashioned and, thus, more useful first philosophy, the ‘science of man’ of the *Treatise* or the ‘true metaphysics’ of *EHU*. In the next section, I analyze evidence of the epistemic priority of the ‘science of man’ in Hume.

**Proofs of Common Life**

In this section I argue that Hume’s fundamental epistemic categories privilege common life and moral philosophy over parts of natural philosophy. I clarify the relationship between Hume’s mitigated scepticism and common life.

 Hume distinguishes between three epistemic categories in descending degrees of certainty: ‘demonstrations’, ‘proofs’, and ‘probabilities’.[[59]](#footnote-59) It is a bit confusing that sometimes proofs are presented as a species of probabilities, but in context it is clear when he is distinguishing proofs from lesser probabilities. Demonstrations are restricted to relations of ideas, while proofs and probabilities concern matters of fact.[[60]](#footnote-60) Claims about ‘objects’ immediately present to the senses and memory can be proved.[[61]](#footnote-61) The realm of proof, which can be compared to what other philosophers of the period often call moral certainty,[[62]](#footnote-62) involves common sense claims, for example, ‘I see fire burning’; ‘the apple is green’; ‘I recall that it rained on Tuesday’. The mitigated sceptic does not doubt these provable facts from common life.[[63]](#footnote-63) Causal reasoning enables claims that go beyond the immediate evidence of the senses or memory; such claims produce probable belief of varying degrees.[[64]](#footnote-64) The proofs in the realm of common-life, however, can involve causal claims;[[65]](#footnote-65) Hume can claim that he knows ‘with certainty’ that if a friend were to throw himself out of the window, ‘and meet with no obstruction, he will not remain a moment suspended in the air’.[[66]](#footnote-66) In order to avoid confusion it is important to emphasize that the certainty involved in ‘proof’ is subjective.[[67]](#footnote-67)

 It is clear that for Hume at least some experimental results in natural philosophy can be part of common life and proven. For example, Humeallows some prism experiments in optics to be a source of very strong ‘proof’.[[68]](#footnote-68) Such experiments can produce high epistemic confidence, presumably because the varying experimental effects of the prism, which separates sunlight into different rays, are immediately present to one’s eyes. Hume’s language fits in nicely with the *rhetoric* of Boyle’s experimentalism, which emphasizes the importance of direct experience.[[69]](#footnote-69)

 Moreover, Hume discusses examples of economic activities as part of common life. For example, when, in the context of the rule of law, even ‘the poorest artificer’ brings goods to market and ‘offers them at a reasonable price’, he can be assured that he will ‘find purchasers’.[[70]](#footnote-70) As he did with the result of prism experiments, Hume links experimental reasoning with high epistemic confidence. In his political economy Hume treats causal reasoning, even when ‘abstruse’, as part of common life.[[71]](#footnote-71) This is why the language of ‘proof’ appears throughout his political economy.[[72]](#footnote-72) In Part I of the *Dialogues*, even Philo, the arch sceptic, agrees to accept that speculations concerning ‘trade, or morals, or politics, or criticism’ appeal to ‘common sense and experience’ and ‘remove (at least, in part) the suspicion which we so justly entertain with regard to every reasoning that is very subtle and refined’.

 So, at least four kinds of ‘matters of fact’ are susceptible to ‘proofs’: (1) claims about objects immediately present to senses and memory; (2) common sense (causal) claims; (3) results of some experiments in natural philosophy, especially if immediately present to eyes; (4) causal claims in moral sciences (*e*.*g*., economics and politics).

 Common sense and common life plays an important role in the two species of mitigates scepticism.[[73]](#footnote-73) In the first ‘common sense and reflection’ are a medicine against pride and dogmatism. Here ‘common sense and reflection’ means being ‘sensible of the strange infirmities of human understanding, even in its most perfect state, and when most accurate and cautious’. Practitioners of the second species of mitigated skepticism (*cf*. the modest skepticism of the Appendix to the *Treatise*) will not ‘be tempted to go beyond common life, so long as they consider the imperfection of those faculties which they employ, their narrow reach, and their inaccurate operations’.[[74]](#footnote-74)

 Thus, Hume’s ‘science of man’ emphasizes the weakness of even humanity’s best cognitive capacity and it is *at the same time* offering an argument for staying within confines of (potential) ordinary experience.[[75]](#footnote-75) In fact, mitigated scepticism is said to be ‘nothing but’ reflections of common life ‘methodized and corrected’.[[76]](#footnote-76) Hume’s public endorsement of the two species of mitigated scepticism, which like the ‘science of man’, may ‘be … durable and useful’,[[77]](#footnote-77) and ‘be of advantage to mankind’[[78]](#footnote-78) is not supposed to undermine the reasoning of common life.[[79]](#footnote-79) He insists that ‘experimental inference and reasoning concerning the actions of others enters so much into human life, that no man, while awake, is ever a moment without employing it’.[[80]](#footnote-80)

 So, causal claims of metaphysics and even natural philosophy that go beyond common life (*e*.*g*., the ‘origin of worlds’) cannot be ‘proven’. This conclusion is anticipated at the start of *EHU*: ‘The only method of freeing learning, at once, from these abstruse questions, is to enquire seriously into the nature of human understanding, and show, from an exact analysis of its powers and capacity, that it is by no means fitted for such remote and abstruse subjects.’[[81]](#footnote-81)

 One might think[[82]](#footnote-82) that mitigated sceptics endorse all of natural philosophy because of two passages. First, Hume asserts that ‘laws of nature’ have been ‘established’ by ‘firm and unalterable experience’.[[83]](#footnote-83) There is no evidence that here Hume has Newtonian laws or some other natural philosophy in mind. Rather, in context, the natural reading of ‘laws of nature’ refers to the collective experience of humankind going back to pre-history.[[84]](#footnote-84) By contrast, the evidence of, say, universal gravity is based on highly-detailed (and unusual) ‘phenomena’. But, Newton’s ‘phenomena’ are not simple observed events as is clear from a look at the six phenomena Newton lists just after the Rules of Reasoning in Book III. They are best understood as robust empirical generalizations accepted by natural philosophers. (Phenomenon 1 reads, for example: ‘The satellites of Jupiter, by radii drawn to the center of Jupiter, describe areas proportional to the times, and their periodic times—the fixed stars being at rest—are as 3/2 powers of their distances from that center’). They are known to and accepted by only a very narrow part of the collective experience of mankind. Once one understands Newton’s system of the world, it is not easy to overlook how strange his conception of the universe is to common life, even when ‘corrected and methodized’.[[85]](#footnote-85) It is hard to see how the collective experience of humankind would establish universal attraction without some extraordinary inferences. In fact, this ‘collective experience’ did not prepare ordinary people or astronomers for Newton’s theory, which was initially welcomed with incredulity even by learned commentators.[[86]](#footnote-86) So while the reading I oppose can be sustained on logical grounds, there is only very weak textual and historical evidence for it.[[87]](#footnote-87)

 There is a second passage that causes more problems for my reading: ‘There are some causes, which are entirely uniform and constant in producing a particular effect; and no instance has ever yet been found of any failure or irregularity in their operation. Fire has always burned, and water suffocated every human creature.’ For Hume these are clearly examples of matters of fact based on proof. He then continues, ‘the production of motion by impulse and gravity is an universal law, which has hitherto admitted of no exception’.[[88]](#footnote-88) Clearly Hume is inclined to assimilate a law of nature to the category of proof, given that this appears to be a nod to Newton’s famous law that gravity is inversely proportional to distance.[[89]](#footnote-89) Yet, Hume’s phrasing is considerably weaker than the statement of Newton’s Inverse-Square Law. Without the phrase ‘universal’ Hume’s comment borders on the banal. And unlike the cases of burning fire and suffocating water, Hume qualifies that the law is exceptionless provisionally. Moreover, against the argument built on either or both passages, ‘Of Miracles’ teaches quite clearly that it is ‘testimony’ that ‘assures’ us of the veracity of the ‘laws of nature’; claims relying on testimony, while provable, can still permit counterbalancing testimony.[[90]](#footnote-90)

 In principle, the ‘science of man’ can be the subject of more reliable knowledge than important parts of natural philosophy. *Some* parts of natural philosophy can be proven – recall the discussion of prism experiments above – and can be part of common life. For the mitigated sceptic there is a distinction between ‘corrected and methodized’ and, thus, provable common life and claims of lower probability found in the more surprising parts of natural science far removed from common life.[[91]](#footnote-91) Hume castigates the greedy embrace by philosophers of theories that have ‘the air of a paradox’, who are, thereby, distancing themselves from the ‘unprejudiced notions of mankind’.[[92]](#footnote-92)

 I have no direct textual evidence for the importance of the distinction between provable common life and claims of lower probability found in natural science in Hume’s philosophy. However, immediately in Part I of the *Dialogues*, in response to Philo’s very Humean comments, Cleanthes attacks the distinction sharply: ‘the most abstruse and remote objects are those which are best explained by philosophy … In vain would the sceptic make a distinction between science and common life, or between one science and another.’ So Hume is aware that a reading like mine is a natural response to his philosophy.[[93]](#footnote-93)

 I conclude this section by discussing briefly how Hume adapted Newton’s Rules of Reasoning.[[94]](#footnote-94) I claim that these rules explain how the mitigated sceptic can correct and methodize common life; they underwrite his ‘proofs’. I then focus on the lacks of equivalence in Hume to Newton’s fourth Rule.

 Hume states eight ‘rules by which to judge of causes and effects’. The source of these rules is ambiguous. Although they ‘might have been supply’d by the natural principles of our understanding’,[[95]](#footnote-95) Hume provides no evidence for this. Nevertheless, Hume thinks it is ‘proper’ to employ them in his ‘reasoning’.[[96]](#footnote-96) Earlier in the *Treatise*, he was even more adamant about the regulative character of these rules: ‘We shall afterwards take notice of some general rules, by which we ought to *regulate* our judgment concerning causes and effects; and these rules are form’d on the nature of our understanding, and on our experience of its operations in the judgments we form concerning objects’ (emphasis added).[[97]](#footnote-97) So, while these rules may be derived from reflection on how our minds work or some may be derived ‘from experience’,[[98]](#footnote-98) they prescribe how *we* should ascribe causes to ‘objects’ in the world.[[99]](#footnote-99) They may be what Hume has in mind in the when he speaks of ‘rules of just reasoning’.[[100]](#footnote-100) But on Hume’s definition of a cause, rules 4-8 are at most useful stipulations that help one identify causal relations.[[101]](#footnote-101)

 Hume may have these rules in mind when he describes how the mitigated sceptic corrects and methodizescommon life.[[102]](#footnote-102) For, the formulation of these rules *methodizes* common life, while the difficult application of them is frequently a tool in *correcting* common life by directing our ‘judgment’.[[103]](#footnote-103) It is, thus, a way to *imagine* philosophically what common sense is or should be. To reason ‘justly’ does not, of course, guarantee correctness, but it is the best we can do in common life.[[104]](#footnote-104) Hume tacitly relies on the rules throughout his political economy.[[105]](#footnote-105) This is prima facie evidence for the conceptual unity of Hume’s thought.

 A crucial difference between Hume’s and Newton’s rules is Hume’s lack of an equivalent to Newton’s Rule IV. It reads:

*In experimental philosophy, propositions gathered from phenomena by induction should be considered either exactly or very nearly true notwithstanding any contrary hypotheses, until yet other phenomena make such propositions either more exact or liable to exceptions*.

This Rule should be followed so that the arguments based on inductions may not be nullified by hypotheses.[[106]](#footnote-106)

 The rule is that we should treat well confirmed propositions as true (or nearly true) until there are deviations that promote new research, which, in turn, lead us to refine our original propositions or reject them for new ones. But while one has a theory, onemust not be distracted by possible differing explanations for the found regularities un­til one has empirical reason. One accepts a theory as true as a *means* to developing a better theory. As Newton writes in the Preface to the *Principia*, ‘the principles set down here will shed some light on either this mode of philosophizing *or some truer one*’ (emphasis added). That is, Newton accepts that physical inquiry is forward-looking and may be open-ended.[[107]](#footnote-107) Newton’s Rule IV implicitly accepts that the future may bring surprises and new evidence. Many are right to see in this an anticipation of Hume’s fallibilistic insights;[[108]](#footnote-108) it is overlooked, however, that this attitude is in contrast to Hume who had claimed in his interpretation of Newton’s results to know, in advance, what the *limits* and the ‘ultimate causes and principles which we shall ever discover in nature’, *could* be.[[109]](#footnote-109)

 Newton’s Rule IV is (1) a proposal of how to treat a theory, that is, as true until proven otherwise.[[110]](#footnote-110) It underwrites what I call “Newton’s Challenge” to philosophy. It is also (2) an encouragement to find and exploit known deviations from established regularities in order to make them ‘more exact’. I discuss the second point elsewhere.[[111]](#footnote-111) Here I focus on the first.

 With only slight anachronism, one can describe Newton’s position as an attitude toward ontic commitment with regard to one’s theory: one is committed to its truth until proven otherwise. While Newton formulates the claim as a research stance, he does not permit a second-order level, as it were, in which alternative hypotheses get a hearing. Hume’s omission of an equivalent rule has several implications. First, without commitment to the truth of a whole “scientific” theory, Hume can appeal to extra-Newtonian criteria in evaluating Newton’s claims. Second, Hume has conceptual space for his distinction between the provable, experimental claims of common life (including parts of natural philosophy), and the lesser, probable commitments of the more abstract parts of natural philosophy. Third, within common life we have natural and habituated principles of association that will make us *feel* committed to all kinds of things. In common life we can feel moral certitude based on habits. The moral philosopher (if he is a mitigated sceptic) systematizes and corrects these with Hume’s rules of reasoning to generate proofs, but does not have to defer to the natural philosopher.

 In this section, I argued that Hume’s epistemic categories underwrite the epistemic priority of the realm of the science of man over natural philosophy, most of which is subject to lesser, probable belief. In the next section, I show that this argument derives support from Hume’s treatment of causation.

**Hume’s Causal Anti-Reductionism**[[112]](#footnote-112)

From an explanatory point of view, for Hume the ‘science of man’ is prior or at least equal to the other sciences. In this section I show that Hume’s celebrated treatment of causation undercuts reductionist strategies. First, I offer a distinction between “pre-Newtonian mechanical philosophy” and “Newtonian mechanical philosophy” to remove some common confusion.

 Quite diverse thinkers proposed various mechanistic systems and principles. Here I mean this in the broadly pre-Newtonian sense, that is, a view that not only rejects substantial forms and occult qualities, but also expects (hypothetical) explanations to be cast in terms of colliding bodies.[[113]](#footnote-113) The rules of their impact become fun­damen­tal.[[114]](#footnote-114) By 1668/9 Huygens, Wren, and Wallis agreed on the proper mathematical analysis of these, and had created a stable field of enquiry relatively immune from theological and metaphysical argument.[[115]](#footnote-115)

 For Newton, explicitly building on the achievement by Huygens, Wren, and Wallis, by contrast, rational mechanics ‘will be the science, expressed in exact propositions and demonstra­tions, of the motions that result from any forces what­ever and of the forces that are required for any motions whatever.’[[116]](#footnote-116) So, we need to be care­ful to distinguish Newton’s ‘mechanical principles’, which are framed in terms of invisible forces, from the pre-Newtonian sense.[[117]](#footnote-117)

 In the *Treatise*, Hume quite elegantly analyzes how ‘our’ notion of causality[[118]](#footnote-118) – one applying to events that are contiguous, exhibit temporal priority of the cause, and have constant con­junction – is derived from experiencing constant con­junction of objects that produce a union in the imagination.[[119]](#footnote-119) Hume’s analysis is a useful first approximation of and unifies what ‘Moderns’ tend to mean by ‘causation’. In his hands, a redefined version of Aristotelian ‘efficient causation’ is the only kind of ‘causation’ available for use.[[120]](#footnote-120) There is, thus, a *stipulative* quality to Hume’s discussion.[[121]](#footnote-121) It *rules out*, for example, the general ‘final causes’ that Newton appeals to in his General Scholium (recall the quotation in the second section of this paper) or the more local final causes that, for example, Colin Maclaurin appeals to in his arguments against Spinoza.[[122]](#footnote-122) Hume was by no means the first to attack the four Aristotelian causes; the use of final causes, especially, had been a target for over a century.[[123]](#footnote-123)

 While Hume and Newton both appeal to the authority of ‘experience’, there are tensions between Hume’s account of causation and the *contents* of Newton’s natural philosophy.[[124]](#footnote-124) The behaviour of the moon in its orbit and that of, say, apples falling to the earth have the same cause: namely, the force of gravity, or weight, towards the earth.[[125]](#footnote-125) This conflicts with the contiguity requirement, which Hume considers ‘essential’ to causation.[[126]](#footnote-126) It is hard to see how contiguity could be made consistent with the universal nature of attraction. The most distant particles of the universe attract each other. More important, the acceleration produced by the exercise of a force is *simultaneous* with that exercise – thus defying temporal priority. It is hard to see how to make sense of this in light of Hume’s approach, which explicitly attacks the possibi­­lity of an effect being simultaneous with its cause.[[127]](#footnote-127) Hume claims that the temporal priority of the cause is ‘of no great importance’, yet it appears explicitly or implicitly in all of his definitions of ‘cause’ and his examples.[[128]](#footnote-128)

 It is the great virtue of Hume’s analysis to make clear what several generations of natural philosophers could have presupposed in discussing efficient causes.[[129]](#footnote-129) It is no surprise that Hume’s examples – for example the illustration of billiard balls[[130]](#footnote-130) – *seem* to presuppose something like what has been called a mechanistic world view.[[131]](#footnote-131) Of course, Hume’s examples of mental causation obviously are not mechanistic in the pre-Newtonian sense, although he calls ‘instincts … mechanical tendencies’;[[132]](#footnote-132) they are about the association of ideas, not bodies.[[133]](#footnote-133) Nevertheless, there is a fundamental similarity between Humean causes and pre-Newtonian mechanical causes: they have the samestructure, namely, the priority of the cause over the effect, contiguity, and constant conjunction.

 The full extent of Hume’s indebtedness to pre-Newtonian mechanical philosophy becomes evident once we realize that he accepts the mechanists’ view of what counts as a proper explanation. Hume writes about the nature of Newton’s achievements: ‘While Newton seemed to draw off the veil from some of the mysteries of nature, he shewed at the same time the imperfections of the mechanical philosophy; and *thereby* restored her ultimate secrets to that obscurity, in which they ever did and ever will remain’ (emphasis added).[[134]](#footnote-134) Hume treats Newton’s refutation of the mechanical philosophy not as a decisive *advance* in knowledge but, instead, as decisive evidence for the claim that nature will remain unknowable in principle.[[135]](#footnote-135) The way to make sense of Hume’s remark is to see that it reveals that he implicitly accepts[[136]](#footnote-136) the mechanists’ insistence that theirs was the only program that offered the possibility of intelligible explanation,[[137]](#footnote-137) even if it only offered hope of post-facto rational reconstruction.[[138]](#footnote-138)

 Nevertheless, although Hume’s conception of ‘cause’ appears to be inspired by pre-Newtonian mechanical philosophy, as has been shown, from an ontological point of view Hume is not in all things a pre-Newtonian mechanical philosopher. He rejects the reductionism of the mechanical philosophy.[[139]](#footnote-139) Hume’s anti-reductionism is made evident by the important assumption in his account of causation that all matters of fact are, in an important sense, alike. In the *Treatise*, he writes, ‘there is but one kind of necessity, as there is but one kind of cause, and that the common distinction betwixt moral and physical necessity is with­­out any foundation in nature.’[[140]](#footnote-140) Moreover, ‘Passions are connected with their objects and with one another; no less than external bodies are con­nected together. The same relation, then, of cause and effect, which belongs to one, must be common to all of them.’[[141]](#footnote-141) Hume thinks that we ap­ply the same type of inference about matters of fact, and that all facts have the same causal structure. In causal explanations there is, thus, no reason to privilege the motion of small bodies or *any* ‘lower level’ causes. Further evidence for his anti-reductionism comes from Hume’s eight ‘rules by which to judge of causes and effects’ because it is ‘possible for all objects to become causes or effects to each other.’[[142]](#footnote-142) Thus, the relative neglect by scholars of Hume’s historical, economic, and political works is odd because these should reveal as much about his views on causation as do those on more ‘philosophic’ topics.

 In this section, I argued that Hume’s treatment of causation is anti-reductionist and anti-physicalist. Moreover, his approach to causation is quite general: there is no fundamental difference between natural or moral causes. Within Hume’s epistemology, physical causes need not be prior to moral causes in any sense. Hume’s argument relies on the exclusive claims to intelligibility of the pre-Newtonian mechanical philosophy.[[143]](#footnote-143) In this next section I show how Hume rejects Newton’s metaphysics.

**Hume’s Rejection of Newton’s Metaphysics**[[144]](#footnote-144)

There is no doubt that Hume respects Newton’s intellectual achievement: ‘The severest scrutiny, which NEWTON’S theory has undergone, proceeded not from his own countrymen, but from foreigners; and if it can overcome the obstacles, which it meets with at present in all parts of Europe, it will probably go down triumphant to the latest posterity.’[[145]](#footnote-145) Nevertheless, in this section I give further evidence of Hume’s lack of commitment to Newtonian ontology and methodology. Hume does not only reject the reductionism of pre-Newtonian mechanical philosophers, he also rejects Newton’s claim that forces are a fundamental part of our explanatory framework. Moreover, I show that Hume distinguishes Newton from his followers.

 For Hume, we build up our causal theories from experience of *particular* events.[[146]](#footnote-146) This is an important *constraint* for Hume because it al­lows him to ask who has ever perceived an instance of a power or force in action – a crucial move for Hume’s attack on theoretical and in­vi­sible entities.

 It is well known that for Hume all our ideas are derived from impressions.[[147]](#footnote-147) Hume’s at­tacks on inflated claims about substance, essence, force, power, and – most importantly – God, all rely on his rhetorically-powerful ability to ask to what impression such notions can be traced.[[148]](#footnote-148) For, ‘[i]deas always re­­present the objects or impressions, from which they are derived.’[[149]](#footnote-149) This has become known as the ‘copy principle’. If no such ‘external’ objects or impressions are to be found, then we must conclude that such ideas are the pro­duct of ‘internal’ ‘passions and emotions’, a ‘trivial suggestion of the fancy’, or ‘some im­per­fection in [the] faculties [of mind]’.[[150]](#footnote-150) The thrust of Hume’s account is to make talk of, say, substance or force (power, God, *etc*.) seem either meaningless or restricted to the particular qualities of bodies from which the idea is derived.[[151]](#footnote-151) At best, they have refe­­ren­ce to ‘an effect, or some other event constantly conjoined with’ the cause.[[152]](#footnote-152) As Hume says in a late addition to the *Treatise*, we must ‘confine our speculations to the *appearances* of objects to our senses, without entering into disquisitions concerning their real nature and operations’.[[153]](#footnote-153) This imperative is, in fact, for Hume not derived from Newton, but the ‘*Newtonian* philosophy…rightly understood’ (emphasis in original).[[154]](#footnote-154) Newton’s speculations in the last paragraph of the General Scholium about ‘a certain very subtle spirit pervading gross bodies and lying hidden in them’, or Newton’s posthumously-published relational account of gravity as an inessential property of matter,[[155]](#footnote-155) may well have been Hume’s targets.

 Hume’s approach to natural philosophy means that when the sciences talk about forces or powers, these words must be reinterpreted.[[156]](#footnote-156) According to Hume ‘force’ and ‘power’ have, at most, a refe­­ren­ce to ‘an effect, or some other event’. And ‘Force, Power, Energy … [these] words, as commonly used, have very loose meanings annexed to them; and their ideas are very uncertain and confused’.[[157]](#footnote-157) Hume denies here the fundamental achievement of the *Principia*.[[158]](#footnote-158) What Hume refuses to accept is that Newton’s achievement shows that the ‘pre-Newtonian’ mechanical philosophy offers a *false* choice between hypothetical reconstructions in terms of colliding bodies or no explanations at all.

 In fact, despite Newton’s abhorrence of hypotheses, Hume is eager to propose and discuss his hypotheses in his ‘science of man’.[[159]](#footnote-159) Hume’s willingness to introduce and describe hypotheses in his main argument brings him closer to, say, Boyle’s methodology.[[160]](#footnote-160)

 In the *Treatise*, Hume makes no obvious move in the direction of deriving the basic principles of, say, physics, from his theory of human nature. He is quite explicit: ‘this belongs not to my present purpose’. He thinks it is ‘beyond the reach of human understanding’ to ‘penetrate into the nature of bodies, or explain the secret causes of their operations’. He cannot ‘approve’ of the ambition to go beyond knowing bodies by their external properties.[[161]](#footnote-161) For Hume, ‘we have no idea of substance, distinct from that of a collection of particular qualities’.[[162]](#footnote-162)

 One may think that Hume was inspired by Newton’s (Lockean) remarks in the General Scholium to the *Principia* (in the context of a discussion of our knowledge of God’s attributes): ‘In bodies we see only their figures and colours, we hear only the sounds, we touch only their outward surfaces, we smell only the smells, and taste the savours; but their inward substances are not to be known, either by our senses or by any reflex act of our minds: much less, then, have we any idea of the substance of God.’[[163]](#footnote-163) Hume and Newton agree that our inquiries should be guided by experienced properties of bodies; they agree that we can have no knowledge of what Newton calls ‘innermost’ substances (or Lockean real essences). The General Scholium may have been the textual source for Hume’s claim (quoted before) about Newton restoring nature’s ‘ultimate secrets to that obscurity, in which they ever did and ever will remain’.[[164]](#footnote-164) Yet, Newton’s position is less constraining than Hume’s. For, while substances are not known to us by our senses or by reflection, Newton does not rule out that future inquiry may give us some access to ideas of such substances as is hinted at by his claim about having ‘much less’ an idea of the substance of God. Newton’s words imply that in principle we can at least know something about the features of our ignorance about the ideas of substances of bodies and perhaps learn something positive about invisible properties associated with bodies with Newton’s method of inquiry.[[165]](#footnote-165)Newton’s General Scholium obscures that Newton’s natural philosophy has no need for a notion of substance – the concept does no work in the *Principia* and *Opticks*.[[166]](#footnote-166) Newton’s pessimism about our ability to possess ideas of innermost substances is not evidence of general scepticism about knowledge of nature, but rather a change in how to conceive what knowledge of nature is about: the (Newtonian) ‘mechanical principles’ centring on the discovery of nature’s forces and the original and connate properties of bodies.

 Moreover, in the final paragraph of the General Scholium, Newton hints at a program of research, perhaps inspired by the success of Francis Hauksbee’s electrical experiments, to penetrate into the nature of matter.[[167]](#footnote-167) This program was by no means finished by the time of Newton’s death. As my discussion of Newton’s Rule IV indicates, it is characteristic of Newton’s willingness to think of his results as programmatic for further research. This attitude is even apparent in Newton’s famous lines in the General Scholium when he admits about his treatment of gravity that he has ‘not *yet* assigned a cause to it’ and that he has ‘not *as yet* been able to deduce from phenomena the reason for these properties of gravity’[[168]](#footnote-168) (emphasis added).

 One may think that Hume’s use of ‘Newtonian philosophy’ in the *Treatise* suggests that Hume has described *Newton’s* natural philosophy (as understood by Hume). But this is not likely because elsewhere he writes: ‘It was never the meaning of Sir ISAAC NEWTON to rob second causes of all force or energy; though some of his followers have endeavoured to establish that theory upon his authority.’[[169]](#footnote-169) So, first, *Hume’s* Newton accepts *some* real causes in nature;[[170]](#footnote-170) Hume’s Newton is neither a sceptic about causation nor an occasionalist (Leibniz had raised this concern in his exchange with Clarke). Second, Hume is careful to distinguish Newton from the Newtonians.[[171]](#footnote-171) Elsewhere, in the context of a discussion of the doctrine of occasionalism, Hume emphasizes the differences between Newton and the Newtonians again: ‘Sir *Isaac Newton* (tho’ some of his Followers have taken a different Turn of thinking) plainly rejects it, by substituting the Hypothesis of an Ætheral Fluid, not the immediate Volition of the Deity, as the Cause of Attraction.’[[172]](#footnote-172)

 Thus, a more likely interpretation is that Hume believes he has offered a prescriptive interpretation of how Newtonian philosophy should be viewed in light of the results of his ‘science of man’, which shows the limitations of our cognitive capacity, and his restrictive form of Empiricism which contribute to his ‘modest’ or mitigated scepticism. Hume is aware that Newton’s universe is filled with invisible interactive causal forces. He sees himself as arguing that the authority of experience does not require us to accept Newton’s own understanding of his achievement.[[173]](#footnote-173)

**Conclusion: Hume’s attitude toward Newton’s impact on philosophy**

Hume and Newton both appeal to the authority of experience; it is their shared ‘foundation’.[[174]](#footnote-174) Nevertheless, the copy principle, what is known as the separability principle,[[175]](#footnote-175) and Hume’s ‘rules of reasoning’, guide how Hume believes ‘experience’ should be analyzed. Hume’s Newton has shown merely the road *to* the ‘true philosophy’.[[176]](#footnote-176) One way to understand Hume’s self-understanding of the ‘science of man’ is to see it, then, as the fulfillment of the Newtonian philosophy ‘rightly understood’ – that is, of course, by Hume.[[177]](#footnote-177)

 Hume’s unified account of causation is a rejection of Newtonian final causes, Newtonian simultaneous causes, and the foundational priority of natural philosophy. Hume may have thought that his unified and restrictive account of causation relieved him of the need to offer the kind of detail we find in, for example, Berkeley’s analysis of natural philosophy.[[178]](#footnote-178) Of course, Hume does offer some guidance on how to interpret aspects of mathematics and natural philosophy.[[179]](#footnote-179) Perhaps, a more detailed account would have been offered in a work mentioned in his correspondence, ‘Considerations previous to Geometry and Natural Philosophy’, now lost.[[180]](#footnote-180)

 I argued that major currents in Hume’s philosophy can be read as a (tacit) attack on the authority of Newton’s philosophy. First, they have potentially negative religious consequences; second they are not useful if not appropriately re-interpreted.[[181]](#footnote-181) Third, Hume may be responding to “Newton’s Challenge”. Here I expand briefly on the third.

 As Cleanthes points out, in Hume’s time it has become a sign of severe ignorance to oppose natural philosophy: ‘even monks and inquisitors are now constrained to withdraw their opposition [to Copernicanism]’.[[182]](#footnote-182) Maclaurin, for example, argues from the empirical success and authority of Newtonian natural philosophy to *rejection of* alternative positions, methodologies, and foundations within philosophy. Yet, by Hume’s lights, many crucial elements of Newton’s natural philosophy do not have a proper foundation. While offering the perspective of the ‘abstract’ philosophy in, Hume writes that it is a ‘reproach’ that ‘philosophy should not yet have fixed, beyond the controversy, the foundations of morals, reasoning, and criticism’.[[183]](#footnote-183) The context suggests that the foundation would be the ‘source of … distinctions’ for ‘truth and falsehood, vice and virtue, beauty and deformity’.

 It is worth recalling that Hume starts the *Treatise* with the following observation: ‘philosophy’ seems to have ‘drawn disgrace’ upon ‘itself’. There is widespread ‘prejudice against metaphysical reasonings of all kinds’.[[184]](#footnote-184) Only after articulating this state of malaise *surrounding* and *within* philosophy does Hume offer the science of man as a ‘foundation’ for the other sciences. Hume’s attack on Newton’s authority is thus connected to his general attempt to resurrect the prestige and independence of a reinterpreted and morally constrained first philosophy. My paper explains Hume’s otherwise puzzling passage: ‘religion, and politics, and consequently metaphysics and morals. All these form the most considerable branches of science. Mathematics and natural philosophy … are not half so valuable.’[[185]](#footnote-185)

 Hume’s ambitions for the science of man are grander and more controversial than his many admirers and critics realize. Hume offers what he takes to be a useful and virtuous philosophy that can regulate Newtonian natural philosophy. Oddly enough the simultaneously-enduring successes of science and Hume’s account of causation are to blame for the state of affairs that makes Hume’s aims so difficult to see for us. Hume’s stipulative account of causation narrowed the possible space in which reflection on the sciences by philosophers and scientists alike was to take place. *We* take the terms with which he redefined the problem so much for granted, it is difficult for us to evaluate his attempted lasting contributions, regardless of their merits, to philosophy.

Eric Schliesser,

Ghent University

1. \* This paper has its origin in a chapter of my dissertation drafted in 2000. Material from it has been presented under various titles in a large number of workshops and conferences; I have incurred countless intellectual debts along the way. Special thanks to Dan Garber, Charles Larmore, Howard Stein, Ian Mueller, Lisa Downing, Sam Fleischacker, Allesandro Pajewski, William Vanderburgh, Leonidas Montes, Abe Stone, Christopher Berry, Ursula Goldenbaum, Joe La Porte, Carl Craver, Cindy Schossberger, Don Baxter, Rachel Zuckert, Steffen Ducheyne, Sarah Brouillette, Peter Millican, Stephen Snobelen, and Graciella de Pierris for very helpful comments on earlier drafts and audiences at Mid-Atlantic Seminar in Early Modern Philosophy (2004) at Rutgers, NJ, especially John Hawthorne, and Sean Greenberg; audiences at Syracuse University (2005), especially Jose Benardete, Andre Gallois, and Eric Hiddleston; the University of Chicago (2005), especially Bill Tait and Michael Greene; the University of Utah, especially Lex Newman and Steve Downes; The Hume Society (2005), especially my commentator, Saul Traiger; the History of Science Society (2006), where Dan Garber enjoyed calling attention to the changes in my views. Finally, I warmly thank all the diligent and generous anonymous referees, especially, for this journal. [↑](#footnote-ref-1)
2. [Robert H Hurlbutt,](http://www.amazon.com/exec/obidos/search-handle-url/index%3Dbooks%26field-author%3DHurlbutt%2C%252520Robert%252520H./104-5581596-6669529) *Hume, Newton, and the design argument* (Lincoln, 1985, revised edn.). [↑](#footnote-ref-2)
3. Forerunners of aspects of my view can be found in S K Wertz, ‘Hume and the Historiography of Science’, *Journal of the History of Ideas*, 54 (1993), 411-36; and Wayne Waxman ‘The Psychologistic Foundations of Hume’s Critique of Mathematical Philosophy’, *Hume Studies*, 22 (1996), 123-68. Yoram Hazony, ‘Hume’s Program as an Alternative to Naturalism in Contemporary Epistemology and Philosophy of Mind’, presented at Hume Society, Halifax, 2009, discerns much of the same position in Hume*.* [↑](#footnote-ref-3)
4. David Hume, *An enquiry concerning human understanding* (*EHU*), ed. Tom L Beauchamp (Oxford, 1999), 1.12. I quote Hume from the following editions: *A treatise of human nature* (*Treatise*), ed. David Fate Norton and Mary J Norton (Oxford, 2007); *Essays, moral, political, and literary* (*EMPL*), ed. with foreword, notes and glossary by Eugene F Miller (Indianapolis, 1985, revised edn.); *An enquiry concerning the principles of morals* (*EPM*), ed. Tom L Beauchamp (Oxford, 1998); *Dialogues concerning natural religion* (*Dialogues*), ed. with intro. and notes by Martin Bell (London, 1990); *The history of England* (*History*), (6 vols., Indianapolis, 1983); and *The natural history of religion* (*Natural history*), ed. with intro. by James Fieser (New York, 1992). [↑](#footnote-ref-4)
5. Hume, *Treatise*, 1.1.1.12ff. [↑](#footnote-ref-5)
6. I use Hume’s phrases, ‘science of man’, ‘science of human nature’, and ‘moral philosophy’ as rough synonyms, meaning in our terminology, ‘social science’ in a *very broad* sense. I use ‘natural philosophy’ as a broad synonym for what we tend to call ‘physical science’. [↑](#footnote-ref-6)
7. See also Louis E Loeb, *Stability and justification in Hume’s Treatise* (Oxford, 2002). [↑](#footnote-ref-7)
8. See, *e*.*g*., James Force, ‘Hume’s Interest in Newton and Science’, *Hume Studies*, 13 (1987), 180-7, which provides an excellent overview of different approaches to understanding the relationship between Hume and Newton. See also Graciela De Pierris, ‘Causation as a Philosophic Relation in Hume’, *Philosophy and Phenomological Research*, 64 (2002), 499-545; and Barry Stroud, *Hume* (London and New York, 1977), chapter 1. In their debate over the New Hume, included in *Reading Hume on human understanding*, ed. Peter Millican (Oxford, 2002), both Galen Strawson, ‘David Hume: Objects and Power’, 237, 245, 247, 249, 251, 256 n. 46, and Simon Blackburn, ‘Hume and Thick Connexions’, 266, appeal to Hume as a follower of Newton. For a corrective see Michael Barfoot, ‘Hume and The culture of Science in the Early Eighteenth Century’, *Studies in the philosophy of the Scottish Enlightenment*, ed. M A Stewart (Oxford, 1990). [↑](#footnote-ref-8)
9. Hume, *Treatise*, 1.3.15. [↑](#footnote-ref-9)
10. Hume, *Treatise*, 1.4.6.23. [↑](#footnote-ref-10)
11. See, *e*.*g*., Norman Kemp Smith, *The philosophy of David Hume*, (London, 1941), 53-62, 550, and 559 n. 1; James Noxon, *Hume’s philosophical development: a study of his methods* (Oxford, 1973); and De Pierris, ‘Causation as a Philosophic Relation in Hume’. Nicholas Capaldi, *David Hume, the Newtonian philosopher* (Boston, 1975), stakes out the most extreme position of this kind. My dissertation, ‘Indispensable Hume: from Isaac Newton’s natural philosophy to Adam Smith’s science of man’ (PhD diss., University of Chicago, 2002), also reflects this orientation. [↑](#footnote-ref-11)
12. Hume, *Treatise*, 1.1.4.6; see, *e*.*g*., David Owen, *Hume’s reason* (Oxford, 1999), 77-8. *Cf*. Jerry A Fodor, *Hume variations* (Oxford, 2006), 121-3. [↑](#footnote-ref-12)
13. Janet Broughton, ‘Hume’s Ideas about Necessary Connection’, *Hume Studies*, 13 (1987), 217-44; Martin Bell, ‘Hume and Causal Power: The Influence of Malebranche and Newton’, *British Journal for the History of Philosophy*, 5 (1997), 67-86; Kenneth P Winkler, ‘The New Hume’, in *The new Hume debate*, ed. Rupert Read and Kenneth A Richman (London, 2000), 52-87, move beyond the strategy of noticing similar metaphors by describing what they take to be the parallel nature of Newton’s and Hume’s positions; they then use these parallels to resolve interpretive disputes about Hume. [↑](#footnote-ref-13)
14. 1.15. [↑](#footnote-ref-14)
15. Stephen Buckle, *Hume’s Enlightenment tract: the unity and purpose of an enquiry concerning human understanding* (Oxford, 2001). [↑](#footnote-ref-15)
16. See Howard Stein, ‘On Philosophy and Natural Philosophy in the Seventeenth Century’, *Midwest Studies in Philosophy*, 18 (1993), 177-201. See also Eric Schliesser, ‘Hume’s Missing Shade of Blue Reconsidered from a Newtonian Perspective’, *Journal of Scottish Philosophy*, 2 (2004), 164-75. For an earlier version, see P Jones, *Hume’s sentiments: their Ciceronian and French context* (Edinburgh, 1982), 12-13. [↑](#footnote-ref-16)
17. John Earman, *Hume’s abject failure: the argument against miracles* (Oxford, 2002) 47, calls Hume’s arguments ‘blunderbuss’ and his conception of inductive inference ‘impoverished’. See also James Franklin, ‘Achievements and Fallacies in Hume’s Account of Infinite Divisibility’, *Hume Studies*, 20 (1994), 85-102. [↑](#footnote-ref-17)
18. See section 3 of Eric Schliesser ‘Hume’s Newtonianism and Anti-Newtonianism’, The Stanford Encyclopedia of Philosophy (edn. Winter, 2008), ed. Edward N Zalta, URL = http://plato.stanford.edu/archives/ win2008/entries/hume-newton/. On the method analysis and synthesis in Newton, see G E Smith, ‘The Methodology of the *Principia’*, in *The Cambridge companion to Isaac Newton*, ed. I B Cohen and G E Smith (Cambridge, 2002), 138-73; and Leonidas Montes, *Adam Smith in context: a critical reassessment of some central components of his thought* (Basingstoke, 2004), 132-44. [↑](#footnote-ref-18)
19. Graciela De Pierris, ‘Hume and Locke on Scientific Methodology: The Newtonian Legacy’, *Hume Studies*, 32 (2006), 320. [↑](#footnote-ref-19)
20. Dale Jacquette, ‘Hume on the Infinite Divisibility of Extension and Exact Geometrical Values’, in *New essays on David Hume*, ed. Emilio Mazza and Emanuele Ronchetti (Milan, 2008), 81. *Cf*. Eric Schliesser, ‘Critical Notice of New Essays on David Hume edited by Mazza et al.’, *Journal of Scottish Philosophy*, 6 (2008), 203-8. [↑](#footnote-ref-20)
21. Martin Bell, ‘Hume and Causal Power: The Influence of Malebranche and Newton’, *British Journal for the History of Philosophy*, 5 (1997), 67-86. Bell calls attention to how the language of *EHU* is more Newtonian than the *Treatise*. Given that Hume ascribed the relative failure of the *Treatise* to its rhetoric (see ‘Advertisement’ to *EHU*), it makes sense for him to appeal more to public prejudice among the educated in favour of Newtonianism after 1740. For more on Hume’s changes, see Eric Schliesser, ‘Two Definitions of Causation, Normativity, and Hume’s Debate with Newton’, in *Future perspectives on Newton scholarship and the Newtonian legacy in Eighteenth-century science and philosophy*, ed. Steffen Ducheyne (Brussels, 2009), 47-69. [↑](#footnote-ref-21)
22. See Eric Schliesser and George E Smith, ‘Huygens’ 1688 Report to the Directors of the Dutch East India Company on the Measurement of Longitude at Sea and the Evidence it Offered Against Universal Gravity’, *Archive for the History of the Exact Sciences*, forthcoming; and K Maglo, ‘The Reception of Newton’s Gravitational Theory by Huygens, Varignon, and Maupertuis: How Normal Science may be Revolutionary’, *Perspectives on Science*, 11 (2003), 135-69. [↑](#footnote-ref-22)
23. Adam Smith, *Essays on philosophical subjects*, ed. W P D Wightman and J C Bryce, vol. III of *The Glasgow edition of the* *works and correspondence of Adam Smith* (Indianapolis, 1982), section IV: ‘The History of Astronomy’. See Eric Schliesser, ‘Realism in the Face of Scientific Revolutions: Adam Smith on Newton’s “Proof” of Copernicanism’, *British Journal of the History of Philosophy*, 13 (2005), 687-732. [↑](#footnote-ref-23)
24. This was Locke’s position to his death. See Mary Domski, ‘Locke’s Qualified Embrace of Newton’s *Principia*’, in *Interpreting Newton*, ed. A Janiak and E Schliesser, Cambridge, in press. [↑](#footnote-ref-24)
25. Lorne Falkenstein, ‘Hume on “Genuine”, “True”, and “Rational” Religion’, *Eighteenth-Century Thought*, ed. James G Buickerood, 4 (2008), 171-201 offers a careful analysis of Hume’s publication history and reconciles apparent inconsistencies in Hume’s stance on religion. [↑](#footnote-ref-25)
26. See Kemp Smith, *The philosophy of David Hume*, 58-62 or Buckle, *Hume’s Enlightenment tract*, 70ff. [↑](#footnote-ref-26)
27. For example, see Newton’s fourth Rule of Reasoning, which was added to third edition, quoted in body of text. Newton also uses the phrase ‘experimental philosophy’ in the General Scholium to the *Principia* (added to second edition of 1713). See Alan Shapiro, ‘Newton’s Experimental Philosophy’, *Early Modern Science and Medicine*, 9 (2004), 185-217. [↑](#footnote-ref-27)
28. De Pierris, ‘Hume and Locke on Scientific Methodology’, 320. [↑](#footnote-ref-28)
29. For more on this see the section on Hume’s experimentalism at: <http://plato.stanford.edu/entries/hume-newton/#Exp>. The experimental method of Boyle and Newton are often lumped together, *e*.*g*., Buckle, *Hume’s Enlightenment tract*, 82. [↑](#footnote-ref-29)
30. See, *e*.*g*., the discussion of George Turnbull’s *The principles of moral and Christian philosophy* in Paul Wood ‘Thomas Reid and the Tree of the Sciences’, *Journal of Scottish Philosophy*, 2 (2004), 124-5. [↑](#footnote-ref-30)
31. Newton, *Opticks, or a treatise of the reflections, refractions, inflections and colours of light* (4th ed., 1730; New York, 1952), 405.This is not to say that Newton would have expressed his full views; on Newton’s esotericism, see S Snobelen, ‘To Discourse of God: Isaac Newton’s Heterodox Theology and his Natural Philosophy’, *Science and Dissent in England, 1688-1945*, ed. Paul Wood (Aldershot, 2004), 39-65. [↑](#footnote-ref-31)
32. See Howard Stein, ‘Newton’s Metaphysics’, in *The Cambridge companion to Newton*, 261. See also Hurlbutt, *Hume, Newton, and the design argument*, which is still quite useful. I quote from Isaac Newton, *The principia: mathematical principles of natural philosophy*, trans. I Bernard Cohen, Anne Whitman and Julia Budenz (3rd ed., 1726; Berkeley, 1999), 943. In Hume’s *Dialogues* (Part II), Cleanthes concedes that the *a posteriori* argument offers probable evidence. [↑](#footnote-ref-32)
33. Newton, *Principia*, 942; Andrew Cunningham, ‘Getting the Game Right: Some Plain Words on the Identity and Invention of Science’, *Studies in History and Philosophy of Science*, 19 (1988), 365-89; *idem*, ‘How the *Principia* Got Its Name; Or, Taking Natural Philosophy Seriously’, *History of Science*, 29(1991), 377-92. Cunningham, along with Andrew Janiak in his *Newton as philosopher* (Cambridge, 2008), claim that Newton’s physics presupposes his theology. See also G A J Rogers, ‘Newton and the Guaranteeing God’, in *Newton and Religion: context, nature and influence*, ed. James E Force and Richard H Popkin (Dordrecht, 1999), 221-37. [↑](#footnote-ref-33)
34. Newton, *Principia,* 942. [↑](#footnote-ref-34)
35. See also Eric Schliesser, ‘The Newtonian Refutation of Spinoza’, in *Interpreting Newton*, in press and *idem*, ‘Newton’s Challenge to Philosophy’, unpublished typescript. [↑](#footnote-ref-35)
36. Hume, *Treatise*, Intro., 4-7. In this ‘Introduction’ Hume inverts Descartes’ tree of the sciences; the roots are not metaphysics as Descartes thought, but a theory of human nature. See John Passmore, *Hume’s intentions* (London, 1968), 12. Hume follows Locke and Malebranche in emphasizing the importance of a science of man. [↑](#footnote-ref-36)
37. Hume, *Treatise*, Intro., 6. Thomas Reid caught some of this spirit in the opening paragraph of a work otherwise deeply critical of Hume: ‘The human mind is curious and wonderful ... a subject highly worthy of inquiry on its own account, but still more worthy on account of the extensive influence which the knowledge of it hath over every other branch of science’ (Chapter 1, Section I of *An inquiry into the human mind: or the principles of common sense*). In a Humean vein, Reid talks about an ‘anatomy of the mind’ (12) in the same section. [↑](#footnote-ref-37)
38. Hume, *Treatise,* Intro., 4; emphasis added. [↑](#footnote-ref-38)
39. See Hurlbutt, *Hume, Newton, and the design argument*, especially chapters 1 and 9, and Buckle, *Hume’s Enlightenment tract*, chapters 2-3. [↑](#footnote-ref-39)
40. #  Colin Maclaurin, *An* *account of Sir Isaac Newton’s philosophical discoveries* (London, 1748), 62. See Jonathan Israel, *Radical Enlightenment: philosophy and the making of modernity 1650-1750* (Oxford, 2001), 456-71. Maclaurin is not mentioned; a better treatment on these matters is Hurlbutt, *Hume, Newton, and the design argument*, see especially 65ff.

 [↑](#footnote-ref-40)
41. See Buckle, *Hume’s Enlightenment tract*, 29 n. 8, 286. [↑](#footnote-ref-41)
42. Intro. 6; See also Louis E Loeb, *Stability and justification in Hume’s Treatise*. [↑](#footnote-ref-42)
43. Hume, *Treatise*, Intro., 10. [↑](#footnote-ref-43)
44. Hume, *EHU*, 1.15. [↑](#footnote-ref-44)
45. Hume, *EMPL*, 313; see also the concluding line of the ‘Dissertation of the Passions’: ‘It is sufficient for my purpose, if I have made it appear, that, in the production and conduct of the passions, there is a certain regular mechanism, which is susceptible of as accurate a disquisition, as the laws of motion, optics, hydrostatics, or any part of natural philosophy’ (Hume, *The Philosophical works of David Hume*, ed. T H Green and T H Grose [4 vols., London, 1886-89], II, 166. [↑](#footnote-ref-45)
46. Hume, *Treatise*, Intro., 8 [↑](#footnote-ref-46)
47. Intro., 10; see also Intro., 6 quoted above. [↑](#footnote-ref-47)
48. Hume, ‘Of the Middle Station of Life’, *EMPL*, 550. [↑](#footnote-ref-48)
49. Larry Stewart, *The rise of public science: rhetoric, technology, and natural philosophy in Newtonian Britain, 1660-1750* (Cambridge, 1992). [↑](#footnote-ref-49)
50. Eric Schliesser, ‘The Obituary of a Vain Philosopher: Adam Smith on Hume’s My Own Life’, *Hume Studies*, 29 (2003), 327-62, discusses Hume’s commitment to public service. [↑](#footnote-ref-50)
51. Hume, *Treatise*, Intro., 6. [↑](#footnote-ref-51)
52. Hume, *History*, V, 155. [↑](#footnote-ref-52)
53. Hume appears to be making a claim about Newton’s religious sincerity. See also: ‘It is for the same reason, I maintain, that Newton, Locke, Clarke, etc. being Arians or Socinians, were very sincere in the creed they professed: And I always oppose this argument to some libertines, who will needs have it, that it was impossible, but that these philosophers must have been hypocrites’ (*Natural history*, Section XII, note 133). [↑](#footnote-ref-53)
54. Hume, *EHU*, 1.11 [↑](#footnote-ref-54)
55. Hume, *EHU*, 1.13 [↑](#footnote-ref-55)
56. Hume, *EHU*, 4.1.12. Hume appears to have thought there was something flawed in Newton as a *model* for other philosophers (such as Socrates among Ancient sects, or himself in ‘My Own Life’, see Schliesser, ‘The Obituary of a Vain Philosopher’); for discussion of *The history of England,* VI, 542), see, <http://plato.stanford.edu/entries/hume-newton/#HumEvaNew>. [↑](#footnote-ref-56)
57. Hume, *Treatise*, Intro., 6; Wayne Waxman, *Hume’s theory of consciousness* (Cambridge, 1994), 183-4, suggests that Hume has the Newtonian achievement in mind here. [↑](#footnote-ref-57)
58. Schliesser, ‘The Newtonian Refutation of Spinoza’. Hume follows Berkeley, who, in response to Newton’s success, tries to minimize the scope and content of natural philosophy’s authority. See Eric Schliesser, ‘On the Origin of Modern Naturalism: the significance of Berkeley’s response to a Newtonian Indispensability Argument’, *Philosophica*, 76 (2005), 45-66. [↑](#footnote-ref-58)
59. See especially, Hume’s footnote at the beginning of Section 6 of *EHU*. Peter Millican called my attention to M J Ferreira, ‘Hume’s Naturalism–“Proof” and Practice’, *The Philosophical Quarterly*, 35 (1985), 45-57, which anticipates claims in this section. See also De Pierris, ‘Hume and Locke on Scientific Methodology’. See Don Garrett, *Cognition and commitment in Hume’s Philosophy* (New York, 1997), 143ff. or Loeb, *Stability and justification in Hume’s Treatise*, 101-2. *Cf*. Kevin D Hoover, *Causality in macroeconomics* (Cambridge, 2001), 9ff. In the *Treatise*, Hume distinguishes between knowledge, proof, and probability to mark ‘several degrees of evidence’ (1.3.11.2). [↑](#footnote-ref-59)
60. Hume, *EHU*, 4.1.1. [↑](#footnote-ref-60)
61. *Cf*. the footnote at start of Hume, *EHU*, 6 with 4.1.3-4. [↑](#footnote-ref-61)
62. See, *e*.*g*., Descartes’ *Principles of philosophy*, IV, 205. [↑](#footnote-ref-62)
63. See also Hume, *EHU*, 12.3.25 and the ‘wise man’ at 10.4. [↑](#footnote-ref-63)
64. *Cf*. Hume, *EHU*, 4.1.3-4 and 4.2.19. [↑](#footnote-ref-64)
65. Hume’s definition of ‘proof’ at Hume, *Treatise*, 1.3.11.2, ‘by proofs, those arguments, which are deriv’d from the relation of cause and effect, and which are entirely free from doubt and uncertainty’, suggests that proofs are, in fact, *limited* to causal arguments. I follow the broader definition of Hume, *EHU*, 6, n. 1: ‘By proofs meaning such arguments from experience as leave no room for doubt or opposition.’ [↑](#footnote-ref-65)
66. Hume, *EHU*, 8.1.20. See Peter Millican, ‘Hume’s Sceptical Doubts Concerning Induction’, in *Reading Hume*, 114 n. 18. [↑](#footnote-ref-66)
67. See Robert J Fogelin, *A defense of Hume on miracles* (Princeton, 2003), 26ff. [↑](#footnote-ref-67)
68. Hume, *Treatise*, 2.3.9.19; see also Hume, ‘Dissertation of the Passions’, 140. [↑](#footnote-ref-68)
69. See Steven Shapin, *A social history of truth: civility and science in seventeenth-century England* (Chicago, 1994), 375-6. [↑](#footnote-ref-69)
70. Hume, *EHU*, 8.1.17. [↑](#footnote-ref-70)
71. ‘Hume, ‘Of Commerce’, *EMPL*, 253. [↑](#footnote-ref-71)
72. See, Hume, ‘Of Refinement in the Arts’, *EMPL*, 276, ‘Of Balance of Trade’, *EMPL*, 311, and ‘Of Interest’, *EMPL*, 297, *etc*.) [↑](#footnote-ref-72)
73. Hume, *EHU*, 12.3.24-5. [↑](#footnote-ref-73)
74. Hume, *EHU*, 12.3.25. [↑](#footnote-ref-74)
75. *Cf*. Hume, *EHU*, 1.12 [↑](#footnote-ref-75)
76. Hume, *EHU*, 12.3.25; ‘Of Miracles’ shows that this can still create considerable distance between how ordinary human beings are likely to react to certain experiences and what the cultivated judgment informed by the ‘reflections of common life’ is willing to endorse. For Hume, ‘common sense’ is quite fragile. [↑](#footnote-ref-76)
77. Hume, *EHU*, 12.3.24 [↑](#footnote-ref-77)
78. 12.3.25 [↑](#footnote-ref-78)
79. *Cf*. Hoover, *Causality in macroeconomics*, 9. [↑](#footnote-ref-79)
80. Hume, *EHU*, 8.1.17. [↑](#footnote-ref-80)
81. 1.12 [↑](#footnote-ref-81)
82. See, besides Buckle, *Hume’s Enlightenment tract*, De Pierris, ‘Causation as a Philosophic Relation in Hume’, 501, and De Pierris, ‘Hume and Locke on Scientific Methodology’. [↑](#footnote-ref-82)
83. Hume, *EHU*, 10.12 [↑](#footnote-ref-83)
84. See also ‘laws of nature’ at Hume, *EHU*, 4.1.8-9. [↑](#footnote-ref-84)
85. For example, the most distant particles of the universe attract each other. In *EPM*, Appendix 2.7, Hume shows, by quoting Fontenelle, awareness of this. [↑](#footnote-ref-85)
86. See Eric Schliesser and George E Smith, ‘Huygens’ 1688 Report’, forthcoming. [↑](#footnote-ref-86)
87. There is a passage (at *Treatise*, 1.3.11.2), where Hume writes that ‘One would appear ridiculous, who wou’d say, that ’tis only probable the sun will rise tomorrow, or that all men must dye.’ Here Hume is clearly using common-sense language and not the language of natural philosophy in describing orbits of the Sun and Earth. Hume appears to be following Berkeley’s Baconian advice – offered in discussion of the Copernican refutation of the common sense idea that the Sun rises! – that, ‘we ought to think with the learned and speak with the vulgar’ (*Principles*, 51; *cf*. Philo’s comments on Bacon’s ‘fool’ in Part I of *Dialogues*.) [↑](#footnote-ref-87)
88. Hume, *EHU*, 6.4 [↑](#footnote-ref-88)
89. The editor of *EHU*, Tom L Beauchamp, has no doubt about this (233). See also De Pierris, ‘Hume and Locke on Scientific Methodology’. [↑](#footnote-ref-89)
90. This is especially clear in a letter to Hugh Blair 1761 (*HL*, i 349-5). I thank Peter Millican for calling attention to and discussion of this passage. [↑](#footnote-ref-90)
91. Recall Hume, *EHU*, 12.3.25. [↑](#footnote-ref-91)
92. Hume, *Treatise*, 1.2.1.1 [↑](#footnote-ref-92)
93. See Millican, ‘Hume’s Sceptical Doubts Concerning Induction’, 64 n. 42. Hume’s awareness of Adam Smith’s ‘The History of Astronomy’ may account for the need to respond to criticism of the distinction (see also Wertz, ‘Hume and the Historiography of Science’). The *Dialogues* are in part Hume’s effort to educate the students of natural religion and show how intellectual friendship, or ‘true liberty’ is *possible* despite superstitious, doctrinal disagreements; the work does not state Hume’s positive ‘science of man’ or ‘true metaphysics’. [↑](#footnote-ref-93)
94. For a fuller version of this, see section 4.5 of Eric Schliesser, ‘Hume’s Newtonianism and Anti-Newtonianism’. [↑](#footnote-ref-94)
95. Hume, *Treatise*, 1.3.15.11. [↑](#footnote-ref-95)
96. 1.3.15.11; 1.3.15.2. [↑](#footnote-ref-96)
97. 1.3.13.11. See Graciela De Pierris, ‘Hume’s Pyrrhonian Skepticism and the Belief in Causal Laws’, *Journal of the History of Philosophy*, 39 (2001), 351. [↑](#footnote-ref-97)
98. 1.3.15.6. [↑](#footnote-ref-98)
99. See Marie A Martin, ‘The Rational Warrant for Hume’s General Rules’, *Journal of the History of Philosophy*, 31 (1993), 245-57. [↑](#footnote-ref-99)
100. Hume, *EHU*, 10.1.1. [↑](#footnote-ref-100)
101. Hume uses ‘to fix’ at *Treatise*, 1.3.15.2. [↑](#footnote-ref-101)
102. Hume, *EHU*, 12.3.25. [↑](#footnote-ref-102)
103. *Cf*. Hume, *Treatise*, 2.3.3.2 [↑](#footnote-ref-103)
104. See the ‘Indian prince’, *EHU*, 10.1.10 and Cardinal de Retz at *EHU*, 10.2.26. [↑](#footnote-ref-104)
105. See Eric Schliesser, ‘Causal reasoning in Hume’s political economy’, unpublished typescript. [↑](#footnote-ref-105)
106. Newton, *Principia*, 796. [↑](#footnote-ref-106)
107. See Smith, ‘Newton’s Methodology’ and Stein, ‘Newton’s Metaphysics’. [↑](#footnote-ref-107)
108. Hume, *EHU*, 4.2.18-21. [↑](#footnote-ref-108)
109. Hume, *EHU*, 4.1.12, but there he hedges his bets a bit; note his use of ‘probably’. *Cf*. Buckle, *Hume’s Enlightenment tract*, 83-9, who rates *Newton* as inconsistent on this point (87, 89). [↑](#footnote-ref-109)
110. See Force, ‘Hume’s Interest in Newton and Science’, 180-7, especially footnotes 30 and 40. [↑](#footnote-ref-110)
111. Eric Schliesser, ‘Galilean Reflections on Milton Friedman’s Methodology of Positive Economics: with thoughts on Economics in the Laboratory’, *Philosophy of the Social Sciences*, 35 (2005), 50-74. [↑](#footnote-ref-111)
112. A longer version of this section was published in Schliesser, ‘Two Definitions of Causation’. [↑](#footnote-ref-112)
113. In the *Principia*’s ‘Author’s Preface to the Reader’ Newton does not mention the ‘Moderns’’ demand for an explanation in terms of colliding bodies because this he rejects in his famous phrase from the General Scholium, ‘Hypotheses non fingo’. For representative examples, see Huygens’ negative reactions to Newton’s earliest published work on colors and his demand for a ‘hypothesis, that should explain mechanically and by the nature of motion’ the colors yellow and blue in his ‘An Extract of a Letter Lately Written by an Ingenious Person from Paris, Containing Some Considerations upon Mr. Newtons Doctrine of Colors, as Also upon the Effects of the Different Refractions of the Rays in Telescopical Glasses’, *Philosophical Transactions of the Royal Society*, 96 (21 July 1673), 6086-7, which can be found on the Newton Project website at: www.newtonproject.sussex.a.uk/view/texts/normalized/NATP00016. [↑](#footnote-ref-113)
114. See Descartes’ seven rules of collision in the *Principles of philosophy*, II, 26-42 [↑](#footnote-ref-114)
115. See Richard S Westfall, *Force in Newton’s physics: the science of dynamics in the seventeenth century* (Amsterdam, 1971) for an introduction to these. In the Scholium to Corollary VI of the laws of motion Newton calls ‘Sir Christopher Wren, Dr. John Wallis, and Mr. Christian Huygens, easily the foremost geometers of the previous generation’ (Newton, *Principia*, 424). [↑](#footnote-ref-115)
116. Buckle (*Hume’s Enlightenment tract*, 77), quotes this passage in the middle of an argument attempting to show that Hume and Newton agree that natural philosophy can only attain mathematical description (that is, a kind of instrumentalism), but not knowledge of nature, without noticing that *Newton* is committed to the *reality* of forces and makes it a centerpiece of his new form of explanation. For corrective to Buckle, see Andrew Janiak, ‘Newton and the Reality of Force’, *Journal of the History of Philosophy*, 45 (2007), 127-47; Steffen Ducheyne, ‘Newton’s Training in the Aristotelian Textbook Tradition: From Effects to Causes and Back’, *History of Science*, 43 (2005), 217-37; and *idem*. ‘Reid’s Adaptation and Radicalization of Newton’s Natural Philosophy as an Anticipation of Positivism’, *History of European Ideas*, 32 (2006), 173-89. [↑](#footnote-ref-116)
117. Newton, ‘Author’s Preface to the Reader’, *Principia*. See Stein, ‘Newton’s Metaphysics’, especially pp. 282ff. Kant’s distinction between a ‘mathematical-mechanical’ and a ‘metaphysical-dynamical’ is, although slightly different, useful in this regard; see Michael Friedman, *Kant and the exact sciences* (Cambridge, Mass., 1992), 137-40 and 181-3. [↑](#footnote-ref-117)
118. At Hume, *Treatise*, 1.3.14.31, Hume gives two definitions of ‘cause’. For discussion see Garrett, *Cognition and commitment in Hume’s Philosophy*, Chapter 5; *cf*. Schliesser, ‘Two Definitions of Causation’, for an exploration of many differences in the definitions between the *Treatise* and *EHU*. [↑](#footnote-ref-118)
119. 1.3.6.16. The relation of a necessary connection is also very important to Hume’s thinking on causa­tion (see, 1.3.2.11; 1.3.14, and *EHU*, 6). See Broughton, ‘Hume’s Ideas about Necessary Connection’ and De Pierris, ‘Causation as a Philosophic Relation in Hume’. [↑](#footnote-ref-119)
120. Hume, *Treatise*, 1.3.14.32 [↑](#footnote-ref-120)
121. Recall Hume, *Treatise*, 1.3.15. [↑](#footnote-ref-121)
122. Maclaurin, *An account*, 17 and 36. See also Hume’s letter to Hutcheson dated 17 September 1739. [↑](#footnote-ref-122)
123. For attempts at ‘banishing’ the search for final causes, see Descartes, *Principles of philosophy*, I, 28, and especially the Appendix to Part I of Spinoza’s *Ethics*. Of course, prior to Hume few philosophers managed to eliminate final, formal, or material causes from their explanatory practices. See Margaret J Osler, ‘From Immanent Natures to Nature as Artifice: The Reinterpretation of Final Causes in Seventeenth-Century Natural Philosophy’, *The Monist*, 79 (1996), 388-408. On the curious fate of formal causation, see Thomas S Kuhn, ‘Concepts of Cause in the Development of Physics’, in *idem*, *The essential tension: selected studies in scientific tradition and change* (Chicago, 1977), 21-30. See also Eric Schliesser, ‘Emanative Causation and Ontology in Newton, Measurement, and the Baconian Laws of Nature’, *Foundations of Science* in press. [↑](#footnote-ref-123)
124. # . See Stein, ‘On Philosophy and Natural Philosophy in the Seventeenth Century’. De Pierris, ‘Hume and Locke on Scientific Methodology cites Stein’s authority, but ignores this aspect.

 [↑](#footnote-ref-124)
125. Newton, *Principia*, Book III, Scholium to Proposition IV, Theorem IV [↑](#footnote-ref-125)
126. Hume, *Treatise*, 1.3.2.6. At *Treatise*, 2.1.11.5, contiguity plays a striking role in explaining why blood-relation is a species of causation. Don Garret, ‘The Representation of Causation and Hume’s Two Definitions of ‘Cause’”, *Noûs*, 27 (1993), 179, n.1, correctly points out that contiguity disappears from the definitions of ‘cause’ in Hume, *EHU*, 7.2.29. But Hume’s examples, *i*.*e*., the billiard balls at 7.2.30 and a vibrating string at 7.2.29, still seem to rely on intuitions using contiguity. By the time he wrote *EPM* Hume was certainly aware that natural philosophers thought that the behavior of the moon in its orbit and that of bodies falling to earth have the same cause, see 6.1.6. [↑](#footnote-ref-126)
127. Hume, *Treatise*, 1.3.2.7-8 [↑](#footnote-ref-127)
128. 1.3.2.8. Perhaps, the following is perhaps a counter-example to my claim: Hume clarifies one of his definitions of ‘cause’ as follows: ‘if the first object had not been, the second never had existed’ (*EHU*, 7.2.29). In the clarification, ‘first’ and ‘second’ are not obviously temporal in kind. But in the original definition, Hume talks about one object ‘followed’ by another, and this is temporal. [↑](#footnote-ref-128)
129. For a different argument with same conclusion see Buckle, *Hume’s Enlightenment tract*, 48ff. [↑](#footnote-ref-129)
130. *E*.*g*., Hume, *Treatise*, 1.3.14.18 and *EHU*, 7.2.30; Marina Frasca-Spada, *Space and the self in Hume’s ‘Treatise’* (Cambridge, 1998), 92, correctly points out that Hume uses it in the ‘Abstract’, but she is wrong to claim it does not appear in the *Treatise*. [↑](#footnote-ref-130)
131. Malebranche’s influence on Hume’s account of causation has been mined ever since the seminal articles by R W Church, ‘Malebranche and Hume’, *Revue Internationale de Philosophie*, 1 (1938), 143-61 and C W Doxee, ‘Hume’s relation to Malebranche’, *Philosophical Review*, 25 (1916), 692-710. [↑](#footnote-ref-131)
132. Hume, *EHU*, 5.2.22. [↑](#footnote-ref-132)
133. Hume, *Treatise*, 1.1.4. [↑](#footnote-ref-133)
134. Hume, *History*, VI, 542. [↑](#footnote-ref-134)
135. Buckle (*Hume’s Enlightenment tract*, 85ff) reads Hume’s remarks as an echo of Newton’s famous ‘hypotheses non fingo’ and, thus, that Hume’s (sceptical realist) position is quite compatible with Newton’s. Hume is correct to state that Newton had ‘shewed the imperfections of mechanical philosophy’. But Buckle does not realize that ‘hypotheses non fingo’ is a rejection of the norms of evaluation and, especially, of the criteria of intelligibility promoted by the mechanical philosophy. For Newton one can accept the reality and intelligibility of forces even if one cannot provide an underlying ‘physical-mechanical’ account because he rejects the demand for one. But this does not mean that for Newton nature’s secrets will therefore remain, in principle, unknowable forever. (As the queries to the *Opticks* reveal, Newton thinks that it is worthwhile to speculate about all kinds of potential causal explanations of the phenomena). Thus, it is far too strong to assert that this means that Newton does not think there is a need to look for further, underlying causes, or that they will remain unavailable on epistemic grounds. *Cf*. Strawson, ‘David Hume: Objects and Power’, 237, 247-8, 250-1. [↑](#footnote-ref-135)
136. *Cf*. Broughton, ‘Hume’s Ideas about Necessary Connection’, 234. [↑](#footnote-ref-136)
137. *Cf*. Section III of *The Natural History of Religion*: ‘Could men anatomize nature, according to the most probable, at least the most intelligible philosophy, they would find, that these causes are nothing but the particular fabric and structure of the minute parts of their own bodies and of external objects; and that, by a regular and constant machinery, all the events are produced, about which they are so much concerned.’ Thus, Hume thinks the mechanical philosophy is the most intelligible, even ‘most probable’. [↑](#footnote-ref-137)
138. See the quotations from Boyle in Lisa Downing, ‘The Status of Mechanism in Locke’s *Essay*’, *The Philosophical Review*, 107 (1998), 386 and 399. Another *locus classicus* is Huygens’ Preface to the *Treatise of light* (Leiden, 1690). For Hume’s approach to intelligibility see Winkler, ‘The New Hume’, especially the postscript which is not part of the version published earlier in *Philosophical Review*. [↑](#footnote-ref-138)
139. See T Pitson, *Hume’s philosophy of the self* (London, 2002), chapters 1-2. See De Pierris, ‘Hume and Locke on Scientific Methodology’ for more differences between Hume’s conception of causation and the mechanical philosophy. [↑](#footnote-ref-139)
140. 1.3.14.33; *EHU*, 8.1.19 and 8.1.16. Hume distinguishes between particular and general facts *EHU*, 12.3.30-1. [↑](#footnote-ref-140)
141. 1.3.2.16; 1.3.12.16, 1.3.14.33 [↑](#footnote-ref-141)
142. 1.3.15. [↑](#footnote-ref-142)
143. One may think that Hume’s treatments of the example of the collision of billiard balls shows that even the standard, pre-Newtonian mechanical example of (efficient) causation is, in fact, unintelligible. (See also Locke’s *Essay*, II, xxiii.28). Fair enough. [↑](#footnote-ref-143)
144. The argument of this section bears on the debate generated by John Wright, *The sceptical realism of David Hume* (Manchester, 1983), but I have no space to work out the implications here. [↑](#footnote-ref-144)
145. Hume, ‘Of the Rise and Progress of the Arts and Sciences’, *EMPL,* 121. [↑](#footnote-ref-145)
146. Hume, *Treatise*, 1.3.14.6-15; also footnote at *EHU*, 11.26. Pitson also notes the methodological importance of this footnote, but the interpretive situation is complicated because it occurs in the middle of a dialogue. [↑](#footnote-ref-146)
147. Hume, *Treatise*, 1.2.3.2-3 [↑](#footnote-ref-147)
148. *E*.*g*., Hume, *Treatise*, 1.1.6; 1.2.5.28; 1.4.14, and 1.4.5.3-4; on idea of God, see *EHU*, 2.6. Spada-Frasca, *Space and the self,* 71, argues that for Hume the idea of space is different. [↑](#footnote-ref-148)
149. Hume, *Treatise*, 1.2.3.11. [↑](#footnote-ref-149)
150. Hume, *Treatise*, 1.1.6.1, 1.4.7.6, and 1.1.7.8. [↑](#footnote-ref-150)
151. Hume, *Treatise*, 1.1.6.1 and *EHU*, 4.2.16 [↑](#footnote-ref-151)
152. Hume, *EHU*, 7.2.29; Reid described the strategy as ‘a tribunal of inquisition e­rec­ted by certain modern philosophers before which every thing in nature must answer’ (*An Inquiry*, Chapter 6, Section VIII, 98; *cf*. Quine’s ‘tribunal of experience’ in Two Dogmas.) [↑](#footnote-ref-152)
153. See Philo’s comments in Part IX of the *Dialogues*. [↑](#footnote-ref-153)
154. 1.2.5.26 n. 12. [↑](#footnote-ref-154)
155. See Eric Schliesser, ‘Without God: Newton’s Relational Theory of Attraction’, *Vanishing matter and the laws of motion from Descartes to Hume*, ed. D Jalobeanu and P Anstey (under review). [↑](#footnote-ref-155)
156. See Millican, ‘Hume’s Sceptical Doubts Concerning Induction’, 144-5. The note to Hume, *EHU*, 4.2.16 tells us to look for this in section 7. [↑](#footnote-ref-156)
157. Hume, *EHU*, 7.2.29; *Cf*. *Treatise*, 1.3.14.27 [↑](#footnote-ref-157)
158. Hume cannot be taken at face value when he describes the ‘philosopher’ [*i*.*e*., Newton] who had ‘determined the laws and forces, by which the revolutions of the planets are governed and directed’ (*EHU*, 1.8). This passage must be interpreted in light of his claims later in the book. Hume lets his reader believe that he is embracing Newton’s achievements before he offers full attack. *Cf*. Buckle, *Hume’s Enlightenment tract*, 51. [↑](#footnote-ref-158)
159. See, for example, Hume, *Treatise*, 1.1,7.16; 1.3.8.14; 1.3.9.2; 1.3.9.10; 1.3.9.16; 1.3.12.25; 1.3.16.3; 1.4.1.8-9; 1.4.6.7, and many more. [↑](#footnote-ref-159)
160. Robert Boyle, ‘About the Excellency and Grounds of the Mechanical Hypothesis’, in Excellency of theology (1674) reprinted in volume VIII of Boyle, The works of Robert Boyle, ed. Michael Hunter and Edward B Davis (14 vols, London, 1999-2000). [↑](#footnote-ref-160)
161. Hume, *Treatise*, 1.2.5.25. [↑](#footnote-ref-161)
162. 1.1.6.1 [↑](#footnote-ref-162)
163. I quote from Motte’s translation (London, 1729) because it facilitates understanding Newton’s meaning more so than Newton, *Principia*, 942. I thank Howard Stein for discussion of the Latin in this passage. [↑](#footnote-ref-163)
164. Hume, *History*, VI, 542. [↑](#footnote-ref-164)
165. Newton’s optical research had revealed many surprising parts of the internal constitution of light. See Howard Stein, ‘The Enterprise of Understanding and the Enterprise of Knowledge’, *Synthese*, 140 (2004), 1-2. See also Stephen D Snobelen ‘God of Gods, and Lord of Lords: The Theology of Isaac Newton’s General Scholium to the *Principia*’, *Osiris*, 16 (2001),169-208. [↑](#footnote-ref-165)
166. This radical, innovative position is quite explicit in a work now known as ‘De gravitatione’, but unknown in Hume’s time. *Isaac Newton Philosophical writings*, ed. Andrew Janiak (Cambridge, 2004), 29-32. See Stein, ‘Newton’s Metaphysics’, 281-2. [↑](#footnote-ref-166)
167. Cohen, ‘Guide to Newton’s *Principia*’, in Newton, *Principia,* 280-92. [↑](#footnote-ref-167)
168. Ducheyne, ‘Reid’s Adaptation and Radicalization’. [↑](#footnote-ref-168)
169. Footnote at the end of Hume, *EHU*, 7.1.25; a note on Hume’s Terminology: God would be the ‘first cause;’ ‘second causes’ are causes that operate in nature without divine interference (Bell, ‘Hume and Causal Power’, 72). [↑](#footnote-ref-169)
170. Broughton, ‘Hume’s Ideas about Necessary Connection’, 234. [↑](#footnote-ref-170)
171. This is why Broughton, ‘Hume’s Ideas about Necessary Connection’, 229-34, and Winkler, ‘The New Hume’, 68-9, should not appeal toeighteenth-century Newtonian textbook-writers, however important and popular as authoritative guides to interpreting Hume’s likely views of Newton. [↑](#footnote-ref-171)
172. Hume, *A Letter from a Gentleman to his Friend in Edinburgh*, ed. Ernest C Mossner and John V Price (Edinburgh, 1967 [1745]), 28-9. [↑](#footnote-ref-172)
173. *Cf*. Broughton, ‘Hume’s Ideas about Necessary Connection’, 230, where she contrasts Berkeley and Hume. Broughton (237) interprets Hume as not ‘robbing ‘second causes of all force or energy’’. (Broughton is quoting one of Hume’s discussions of Newton). Yet, on 235-37, Broughton attributes a broadly instrumentalist reading to Hume. (Bell, ‘Hume and Causal Power’, 84-5, also ascribes a broadly instrumentalist reading of Hume). Her note 26 (243) expresses with admirable honesty the difficulty of settling on the appropriate description of Hume’s stance. There is, however, an independent argument against Broughton’s claim (237) that for Hume finding or ‘marking’ facts ‘*is* investigating the forces and powers in nature’ (emphasis in Broughton). For, she is attributing to Hume a view about the nature of natural philosophy (the collection or ordering of bare facts), which he explicitly claims is appropriate to moral philosophy/science of man, but not natural philosophy (Hume, *EHU*, 1.13). [↑](#footnote-ref-173)
174. Millican, ‘Hume’s Sceptical Doubts Concerning Induction’, 149-51 argues that Hume’s phrase, ‘founded on’ means ‘derives authority from’. [↑](#footnote-ref-174)
175. See Garrett 1997, chapters 2-3. [↑](#footnote-ref-175)
176. Hume, *History*, VI, 542. Wertz, ‘Hume and the Historiography of Science’, argues that Harvey is exemplary natural philosopher for Hume. [↑](#footnote-ref-176)
177. Ernan McMullin interprets Newton as a kind of instrumentalist, thus Berkeley and Hume are not re-interpreting Newton, but drawing on a strain within Newton (‘The Impact of Newton’s *Principia* on the Philosophy of Science’, *Philosophy of Science*, 68 [2001], 279-310). For criticism of McMullin’s view, see G E Smith’s comments in the same volume or Janiak, ‘Newton and the Reality of Force’ and Ducheyne, ‘Newton’s Training in the Aristotelian Textbook Tradition’. The footnote in Hume, *EHU,* 7.1.25 is a decisive refutation of McMullin’s position in so far as it pertains to Hume’s self-understanding. [↑](#footnote-ref-177)
178. This follows from Hume’s deflationary attitude toward philosophical relations that are not identical to natural relations, see Schliesser, ‘Two Definitions of Causation’. [↑](#footnote-ref-178)
179. *E*.*g*., Hume, *Treatise*, 1.2, especially 1.2.4.31; *EHU*, 4.1.13. See Waxman, ‘The Psychologistic Foundations of Hume’s Critique of Mathematical Philosophy’ and Millican, ‘Hume’s Sceptical Doubts Concerning Induction’, 126. Recently, Hume’s approach to mathematics has been receiving more favorable interpretations: see Dale Jacquette, ‘Hume on the Infinite Divisibility of Extension and Exact Geometrical Values’; Graciela de Pierris, ‘Hume on Space, Time and Mathematics’ (delivered on 24 February 2008, San Fransisco State University); and Aaron Koller, ‘Hume’s critique of the infinite divisibility of space’, unpublished typescript. [↑](#footnote-ref-179)
180. See Hume’s letter to Andrew Millar, 12 June 1755. In his letter to William Strahan, 25 January 1772, Hume explains that Lord Stanhope had discouraged him from printing it. Both reprinted in *The letters of David Hume*, ed. J Y T Greig (Oxford, 1932) [↑](#footnote-ref-180)
181. Elsewhere (Schliesser, ‘Newtonian Refutation’), I call attention to the ‘Socratic problem’, that is that social forces (religious, political, moral) can threaten independence and authority of philosophy. Hume’s first two criticisms of Newton are a version of it. [↑](#footnote-ref-181)
182. Hume, *Dialogues*, Part I. [↑](#footnote-ref-182)
183. Hume, *EHU*, 1.2 [↑](#footnote-ref-183)
184. Hume, *Treatise*, Introduction 1-3. [↑](#footnote-ref-184)
185. Hume, ‘Of the Rise of Arts and Sciences’, *EMPL*, 126 [↑](#footnote-ref-185)