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Hume's 'Of Scepticism with Regard to Reason' and the Degeneration of Knowledge in Practice

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Hume's 'Of scepticism with regard to reason' opens with an argument that is supposed to show how 'all knowledge degenerates into probability' (T1.4.1.1/SBN180). While compelling with respect to demonstrative knowledge, commentators disagree over whether the argument plausibly extends to intuitive knowledge. This disagreement, I contend, is the result of mistakenly treating intuitions as a uniform class. Distinguishing what I call (i) philosophical intuitions from (ii) vulgar intuitions allows us to see why only the latter are subject to degeneration. That the former survive degeneration, however, is no objection to Hume's argument. Demonstrative knowledge is possible *in principle* because philosophical intuitions are certain. Accepting this much at the outset, Hume calls on recollected errors to show how, *in practice*, all knowledge degenerates to probability.

I. Introduction

Hume's 'Of scepticism with regard to reason' opens with an argument claiming to show how 'all knowledge degenerates into probability' (T1.4.1.1/SBN180).[1]

1. References to the *Treatise* are to David Hume, *A Treatise of Human Nature*, ed. David Fate Norton and Mary J. Norton (Oxford: Clarendon Press, 2000), hereafter cited in the text as 'T' fol-

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The degeneration of knowledge is supposed to be a consequence of our ability to recall past errors in reasoning. The basic idea is that recalling past errors gives us some reason to worry that any present judgment might be similarly mistaken. Because the recollection of errors ensures a degree of uncertainty for anything we might claim to know, all knowledge is vulnerable to degeneration (T1.4.1.1/SBN180). Taken at face value, the upshot of the Degeneration Argument is that genuine knowledge is beyond our grasp since demonstration and intuition—the only two sources of knowledge for Hume—are shown to be dead ends.

While this is a fair sketch of Hume's reasoning, getting the Degeneration Argument right requires moving beyond its basic idea. With respect to demonstrative knowledge, the argument is fairly compelling. Hume confines the demonstrative sciences to algebra and arithmetic, so, strictly speaking, all demonstrative judgments are mathematical judgments (T1.3.1.5/SBN71).[2] Most of us will admit that recalling past miscalculations gives us some reason to worry that any present calculation might be similarly mistaken. This admission, however, is not enough to establish Hume's general conclusion. After all, intuitive knowledge does not depend on 'enquiry or reasoning,' so a recollected error in reasoning seems to provide no reason for worrying that an intuition might be similarly mistaken (T1.3.1.2/SBN70). But if the errors offered as evidence against demonstrative knowledge fail to motivate doubts about intuitive knowledge, then Hume has overreached in claiming to have shown how *all* knowledge degenerates to probability.

This is a familiar objection to Hume's argument, and it divides interpreters into roughly two camps. On one side are interpreters like David Owen who supposes that once we confess our liability to mathematical errors, 'Hume can extend [the argument] to simpler demonstrations and intuitions' (1999: 180).[3] Taking the other side are interpreters like Robert Fogelin who suggests that 'our grasp of a "simple proposition concerning numbers" may not involve any calculation at all but, instead, an immediate insight…[so that] the fallibility that infects our calculations (and demonstrations) need not touch our intuitive understanding' (1985:

lowed by Book, part, section, and paragraph, and to *A Treatise of Human Nature*, ed. L. A. Selby-Bigge, revised by P. H. Nidditch, 2nd ed. (Oxford: Clarendon Press, 1978), hereafter cited in the text as 'SBN' followed by page number.

2. When I talk of demonstrations, demonstrative judgments, and demonstrative knowledge, I intend Hume's restricted sense. Still, what I say about Hume's restricted class of demonstrative sciences easily extends to any formal system, such as classical logic, where truth-preserving rules of structure and application are deployed. In what follows, I note relevant points where what is said regarding Hume's restricted sense extends to a more general conception of demonstration.

3. See also: William Edward Morris (1989: 44–5), Francis W. Dauer (1996: 212–13), Henry Allison (2008: 212–217), Kevin Meeker (2013: 31–2).

15).[4] Both sides have a point, and in what follows, I argue that both sides of this disagreement are partly right. The reason is that each side focuses on a different sort of intuiting. Their shared mistake, I contend, is in treating intuitions as a uniform class.

Getting clear on the implications of the Degeneration Argument requires distinguishing what I will call (i) *vulgar intuitions*, which target the objects of experience, from (ii) *philosophical intuitions*, which target only our ideas. Vulgar intuitions rely on a comparison of ideas only insofar as the ideas represent objects of experience (T1.2.2.1/SBN29). Importantly, all of us can recall mistaken intuitions of this sort. All of us have, for instance, judged two objects to be the same color, only to discover later that they are actually different colors. Recalling such errors give us some reason to worry that any similar intuition may be similarly mistaken. Because we cannot be certain about our vulgar intuitions, they are subject to degeneration.

In contrast, philosophical intuitions follow from a comparison of ideas 'consider'd as such' (T1.3.6.6, 2.3.10.2/SBN89, 448–449). Here we are considering and contemplating only our ideas, independently of any particular objects of experience. While the detection of mistaken vulgar intuitions proves our ideas are not always 'adequate representations of objects,' our ideas always adequately represent themselves (T1.2.2.1/SBN29).[5] Given this key difference between them, mistaken vulgar intuitions give us no reason to worry that philosophical intuitions might be similarly mistaken. Since we can neither discover nor recall a mistaken philosophical intuition, they are immune to degeneration. In that case, not *all* knowledge degenerates to probability.

Rather than serving as an objection to Hume's argument, this result marks a first step in explaining why it is run in the first place. Demonstrative knowledge is possible in principle because philosophical intuitions are certain. Granting this much, the Degeneration Argument calls on recollected errors to show how, *in practice*, all judgments fall short of certainty. The key is that in the Degeneration Argument Hume is concerned with *applications* of knowledge, as the opening line makes clear: 'In all demonstrative sciences the rules are certain and infallible; but when we *apply* them, our fallible and uncertain faculties are very apt to depart from them, and fall into error' (T1.4.1.1/SBN180, my emphasis). We see that Hume grants a restricted class of knowledge at the outset. The interpreta-

4. See also: Mikael Karlsson (1990: 121–30, 124–25) and Robert J. Fogelin (2009: 160–1 fn. 2). Peter Millican (2018: 168) also allows for this type of reading.

5. This is why Hume identifies ideas that adequately represent their objects as the foundation of knowledge: 'Wherever ideas are adequate representations of objects, the relations, contradictions and agreements of the ideas are all applicable to the objects; and this we may in general observe to be the foundation of all human knowledge' (T 1.2.2.1; SBN 29). For especially clear expressions of this point see T 1.4.2.7; SBN 190, and T 2.2.6.2; SBN 366–7.

tion developed below explains why Hume grants this, why he thinks past errors must be taken into account, and how doing so entails the degeneration of all knowledge in practice.

II. Possible Objects of Knowledge

'By knowledge,' Hume says, 'I mean the assurance arising from the comparison of ideas' (T1.3.11.2/SBN124). The assurance characteristic of knowledge is certainty, and for Hume, if something is certain, then its falsity is inconceivable (T1.3.7.3/SBN95). This type of certainty is possible because the objects of knowledge are ideas that stand in constant relations: '[a]ll certainty arises from the comparison of ideas, and from the discovery of such relations as are unalterable, so long as the ideas continue the same' (T1.3.3.2/SBN79). Hume singles out judgments regarding four constant relations which, 'depending solely upon ideas, can be the objects of knowledge and certainty' (T1.3.1.2/SBN70). The four relations are: (1) resemblance, (2) contrariety, (3) degrees in quality, and (4) proportions in quantity or number. The first three of these are 'discoverable at first sight,' which is why Hume says our judgments concerning them 'fall more properly under the province of intuition than demonstration' (T1.3.1.2/SBN70). But for sufficiently simple cases, proportions of quantity or number can also be judged intuitively where, for instance, 'at one view [we] observe a superiority or inferiority betwixt any numbers, or figures' (T1.3.1.3/SBN70). Then so long as we are dealing with cases of the simplest sort, all four constant relations can be judged intuitively or, as Hume puts it, 'at first sight, without any enquiry or reasoning' (T1.3.1.2/SBN70).

Where proportions of quantity and number cannot be 'comprehended in an instant,' Hume claims, 'we must settle the proportions with some liberty, or proceed in a more *artificial* manner' (T1.3.1.3/SBN70). If our aim is to secure knowledge, then settling the proportions with some 'liberty' by estimating or guessing is not an option. Alternatively, to proceed in an 'artificial manner' is to engage in demonstrative reasoning where the existence of a 'precise standard' allows us to 'carry on a chain of reasoning…and yet preserve a perfect exactness and certainty' (T1.3.1.5/SBN71).

Hume provides frustratingly little detail or description of how he understands demonstrative reasoning. Interpreters like Don Garrett, David Owen, and Henry Allison have suggested that Humean demonstrations are best understood as chains of intuitions.[6] Owen provides the following sketch of such a procedure:

6. See: Garrett (1997: 223), Owen (1999: 100–101), and Allison (2008: 217).

> There is, of course, a formally valid deductive argument with the proposition '3467 = 2895 + 572' as its conclusion, but that is not the way Hume thought, nor is it the way, we reason. Rather, the idea of 3467 is seen to stand in the relation of equality to the idea of 2895 + 572, because we can match each unit in 3467 with a unit in 2895 + 572. This matching is a matter of providing the relevant intermediate ideas. The complete chain of ideas would be something like this. We can intuitively judge that 3467 is equal to 3466 + 1, which is in turn equal to 3465 + 2. This chain ends with the intuitive judgement that 2896 + 571 is equal to 2895 + 572. (1999: 95–6)

For my part, I see no compelling textual evidence in favor of this reading, and the scant descriptions Hume does provide seem to count against it.

In what is offered Hume talks of applying 'rules' while invoking commonplace examples of mathematicians and accountants going about their work (T1.4.1.1-3/SBN180-1). A compelling reason against the chains-of-intuitions reading, then, is its practical implausibility—it would take an accountant ages to work through even a relatively simple addition, e.g., 893 + 3,475, by constructing a chain of intuitive links along the lines suggested by Owen. Furthermore, such a procedure would be entirely unfamiliar to an accountant, which is to say this procedure fails to reflect how someone would actually do the work of an accountant.

All of this counts against reading Humean demonstration in the way suggested by these influential interpretations. For our purposes, perhaps it is enough to note that the question of how we ought to understand Humean demonstration is at least an open one. The clues Hume provides suggest he is concerned to capture the ways in which we actually perform calculations when complexity precludes intuitive judging. To that end, the methods of calculation and rule-application we learn in arithmetic and algebra courses suffice.

As I read Hume, the 'manner' of demonstrations is 'artificial' in at least two ways. First, all knowledge and certainty arise from a comparison of ideas. But in contrast to intuitions where the target ideas are compared directly and immediately, the target ideas of a demonstration can be compared only *indirectly* when mediated through 'the interposition of *other* ideas' (T1.3.7.3/SBN95, my emphasis).[7] For example, most of us are unable to tell at a glance whether *893 + 3,475 = 4,368*. If we wish to *know* whether the equality holds, we need to employ some intermediate steps that will enable us to *see* that *893 + 3,475 = 4,368*.

This points to the second artificial aspect of demonstrations, namely, that achieving an indirect comparison of target ideas requires setting up and then working through the steps of the demonstration either in our heads or on paper. More precisely, with demonstrations we follow rules for employing intermedi-

7. On this point, see David Owen (2015: 109).

ary ideas or objects to indirectly demonstrate what we cannot directly intuit. In the forgoing case, we might reach for a pen and paper and do the addition by hand. Hume gestures at this feature of demonstrations when he refers to the 'diagrams' a mathematician 'describes upon paper,' and again when he points out how an accountant's reasoning is aided by 'the artificial structure of the accompts' (T1.2.4.33, T1.4.1.3/SBN53, 181).[8]

The utilization of artificial structures, whether in the mind or in the external world, allows for tracking applications of demonstrative rules while displaying chains of reasoning to oneself and others(T1.4.1.1/SBN180).[9] From these identifying characteristics of demonstrative reasoning, we can say that all demonstrative judgments are *artifice-dependent,* in that whether 'a perfect exactness and certainty' is preserved through the intermediary steps of our reasoning depends in part on the artifice or artificial structures that facilitate our demonstrative reasoning. Insofar as they are artifice-dependent, demonstrations are indirect determinations of proportions in quantity or number made in accordance with rules for employing and manipulating intermediary ideas. To 'settle the proportions' in an 'artificial manner,' then, is to make artifice-dependent judgments by way of demonstrative reasoning.

A clue that this is the right way to read Hume on the artificial manner of demonstrations emerges from a comparison with his description of the 'oblique manner' characteristic of a kind of probable reasoning:

> In [probable] reasoning we commonly take knowingly into consideration the contrariety of past events; we compare the different sides of the contrariety, and carefully weigh the experiments, which we have on each side: Whence we may conclude, that our reasonings of this kind arise not *directly* from the habit, but in an *oblique* manner. (T1.3.12.7/SBN 133)[10]

8. To more carefully illustrate, suppose we are faced with a sufficiently complex addition. Whether we do the calculation in our heads or on paper, we employ and follow the rules of addition. One way we might do this is to start by placing one number over the other so that they are aligned with respect to their units' places. From there we would add individual columns of numbers from right to left, and unless we are at the leftmost column, when a result is equal to or exceeds 10, we carry the value in the tens place over to the next leftmost column. Obviously, one might adopt an alternative procedure. The point here is only that one must adopt *some* proven procedure for carrying out the calculation.

9. While we are concerned with Hume's restricted use of demonstrative reasoning, this point extends to any formal system, e.g., classical logic, where truth-preserving rules of structure and application are deployed in working through problems or proofs.

10. Recall that Hume makes a similar remark about matter of fact reasoning in general, and causal reasoning in particular: 'Nay we find in some cases, that the reflection produces the belief without the custom; or more properly speaking, that the reflection produces the custom in an *oblique* and *artificial* manner' (T1.3.8.14/SBN104-5).

Just as the certainty of knowledge may arise directly and immediately from intuition, the less-than-full assurance of a probable judgment may arise directly from custom and habit. In such cases, because 'the custom depends not upon any deliberation, it operates immediately, without allowing any time for reflection' (T1.3.12.7/SBN133). And just as demonstrative judgments follow from an indirect comparison of the target ideas, judgments from probable reasoning follow indirectly from habit when we knowingly select and weigh the evidence from past experience (T1.3.11.2, 1.3.12.7, 1.3.12.19/SBN124, 133, 137–8). Then we can say the mark of a judgment reached by reasoning—as opposed to intuition or custom—is that it follows from an indirect '*comparison*, and a discovery of those relations, either constant or inconstant, which two or more objects bear to each other' (T1.3.2.2/SBN73-4).

So far, we have it that, for Hume, the assurance of knowledge is certainty arising 'either immediately' from intuition or indirectly from demonstration achieved 'by the interposition of other ideas' (T1.3.7.3/SBN95). Intuitions may target any of the four constant relations while demonstrations target just those proportions of quantity and number that preclude intuitive judging (T1.3.1.2-3/SBN70). While these are helpful first steps, fully capturing the possibilities Hume is entertaining requires a further distinction.

Hume identifies the 'foundation of all human knowledge' as ideas that are 'adequate representations of objects' (T1.2.2.1/SBN29). When ideas adequately represent objects, 'the relations, contradictions and agreements of the ideas are all applicable to the objects' (T1.2.2.1/ SBN29). That means any comparison yielding knowledge of the ideas must yield knowledge of the objects as well. At least up to this point in the *Treatise*, Hume is treating empirical knowledge as a live possibility.[11]

With respect, then, to our two sources of knowledge, there are also two sorts of things we might target for comparison, depending upon whether the relata that stand in a constant relation are supposed to be ideas or objects of experience. In the former case, knowledge follows from a comparison of 'ideas, consider'd as such,' that is, ideas insofar as they are internal mental entities (T1.3.6.6, 2.3.10.2/SBN89, 448–9). In the latter case, knowledge arises from a comparison of ideas that are representations of objects, that is, ideas insofar as they represent particular external objects of experience.[12]

11. For more on this see: David Owen (1999: 93–4) and Miren Boehm (2013: 71–2).

12. I have opted for this terminology since it tracks Hume's usage, for instance, when he says that '[p]robability…discovers not the relations of ideas, consider'd as such, but only those of objects,' and again when discussing truth: 'Truth is of two kinds, consisting either in the discovery of the proportions of ideas, consider'd as such, or in the conformity of our ideas of objects to their real existence' (T1.3.6.6, 2.3.10.2/SBN89, 448–9). Hume seems to have a similar distinction in mind when he says: 'The understanding exerts itself after two different ways, as it judges from demon-

The targets of our judgments determine the grounds of our knowledge-seeking efforts. This is why we need to be clear as to whether we are targeting ideas or objects. To my knowledge, Robert Imlay is one of the few commenters to pick up on this issue in Hume scholarship; however, he identifies the possibility of judgments concerning either ideas or objects as arising from a failure of clarity on Hume's part that forces us to choose between the two possibilities:

> Despite its somewhat arbitrary nature an unambiguous interpretation of 'intuition' is nonetheless desirable. Which interpretation should it be? It seems to me that it should be the one on which intuition is intellectual as opposed to sensuous. (1975: 39)

While I agree that Hume could have been clearer, I disagree that we must choose between the two readings. What is needed is an awareness of these distinct targets along with a precise way of identifying them. Differentiating ideas considered as such from ideas as representations allows us to differentiate cases of judging constant relations where the target relata are taken to be internal mental entities from those where the target relata are taken to be external objects of experience.

Taking intuitive judgments first, those that target ideas considered as such are what I call 'philosophical intuitions.' With philosophical intuiting we are comparing ideas, and from that comparison we make an immediate judgment that the target ideas stand in a constant relation. To illustrate, suppose I call to mind two ideas of red fire engines. The comparison of these mental entities yields philosophical intuitions such as: *the ideas resemble with respect to their color* and *the number of ideas is equal to 2*. These are intuitions because they are judgments about relata standing in constant relations made without the aid of reasoning, and more specifically, they are philosophical intuitions because they utilize only ideas, without appeal or application to any particular objects of experience. As such, the truth of philosophical intuitions does not depend upon any matter of fact. Even if it turns out that fire engines do not exist or that I am dreaming or stuck in the *Matrix*, my philosophical intuitions hold.

By contrast, intuitions about the world of experience rely on ideas only insofar as they are representations of external objects. Following Hume's description of those situations where we suppose our 'perceptions are our only objects,' these sorts of judgments are what I call *vulgar intuitions* (T1.4.2.46/SBN 211-2).[13] When we take for granted that our perceptions *just are* the objects of experience,

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stration or probability; as it regards the *abstract relations* of our ideas, or those *relations of objects*, of which experience only gives us information' (T2.3.3.2/SBN413-4, my emphasis).

13. For further details on Hume's usage here, see: T1.4.2.14, 1.4.2.31, 1.4.2.43, 1.4.2.48, 1.4.2.50, 1.4.2.53/SBN 193, 201–2, 209–10, 212–3, 213–4, 216.

we make direct comparisons of the target representations. Where such comparisons yield an immediate judgment that the target objects stand in a constant relation, we have a vulgar intuition.[14] So, when I look across the street and see two red fire engines, my immediate judgment that *those fire engines are the same color* is a vulgar intuition.

Ideas that represent objects are the lively ideas produced by present sensation or called to mind by memory.[15] As such, vulgar intuitions are of three types depending upon whether the lively ideas are produced by present sensation or memory, or some combination of both. When both objects are present to the senses, a vulgar intuitive judgment is made literally 'at first sight.' This is what we saw in the example of looking across the street. These are also the sorts of intuitions Hume highlights by saying that 'when any objects *resemble* each other, the resemblance will at first strike the eye, or rather the mind' (T1.3.1.2/SBN70). But we can make similar judgments when only one object is present to the senses since another can be supplied by memory. For instance, if I see a single red fire engine across the street and compare this with a memory of my first car, I immediately judge that *the fire engine is the same color as my first car*. Likewise, when no object is present to the senses a comparison can be made solely on the basis of remembered objects; for instance, when I compare a memory of my first car with a memory of my first bike and immediately judge that *my first car was the same color as my first bike*.

These are all examples of intuitions because they are judgments about objects standing in constant relations reached without any reasoning. What makes them vulgar intuitions is that they concern lively ideas that are the objects of immediate experience. Accordingly, the truth of vulgar intuitions depends upon matters of fact, namely, how the real world really is. This is what exposes vulgar intuitions to Hume's skeptical attack. But before getting to that attack, we need to make a similar distinction between two types of demonstration.

After all, some demonstrations concern only ideas, whereas others are about objects of experience, such as account balances. Hume appeals to such cases for

14. I have left what is meant by a *lively idea insofar as it represents an object* intentionally broad. While my examples focus exclusively on sensible objects like fire engines, 'object' is meant to include anything an idea might represent. For instance, from a comparison of lively ideas I might immediately judge that *today and last Thursday resemble with respect to temperature*. Even though days are not sensible objects like fire engines, this is an example of a vulgar intuition because it is a comparison of ideas insofar as they are representations. For the sake of simplicity, I leave these considerations aside in what follows.

15. See, for instance, T1.1.1.1, 1.1.3.1, 1.3.4.1, 1.3.4.2, 1.3.5.1, 1.3.5.3, 1.3.9.7, 1.3.10.9, 1.3.13.19/SBN 1–2, 8–9, 82–3, 84, 110, 123, 153–4. I avoid using 'impressions' here for the reasons cited in the preceding footnote. The present definition is meant to capture judgments regarding objects of experience in a broad sense. While our lively ideas of such objects are impressions, not all impressions are lively ideas of such objects. To avoid confusion, I talk only of lively ideas, representations, and objects.

the arguments in 1.4.1 and later in the *Treatise* when he notes that '[m]athematics, indeed, are useful in all mechanical operations, and arithmetic in almost every art and profession' (T2.3.3.2/SBN413-4). A key difference from intuitions is that all demonstrations are artifice-dependent. Keeping that in mind, I will refer to those that are purely mental as *philosophical demonstrations*. In such cases we reach a mediate judgment that the target ideas stand in a constant relation through the interposition of intermediary ideas.

To illustrate, suppose I am wondering about the sum of 893 and 3,475. What it is to rely on ideas considered as such is to follow rules for setting up and working through the calculation in my head. In doing so, I employ intermediary ideas to indirectly demonstrate that the target ideas stand in a constant relation of equality, viz., that *893 + 3,475 is equal to 4,368*. This is an example of a demonstration because it is a judgment of proportion in number that requires reasoning. It is a *philosophical* demonstration because it is an artifice-dependent judgment that relies only on ideas, without any appeal or application to particular objects of experience.

Those demonstrations that target or employ ideas insofar as they are representations of objects are what I will call *vulgar demonstrations*. In such cases, we achieve an indirect comparison of target representations through the interposition of either (i) intermediary ideas or (ii) intermediary objects so as to demonstrate that the target objects stand in a constant relation. The distinguishing feature of vulgar demonstrations is that they make use of, or are intended to apply to, particular objects of experience.[16]

Kids doing addition on their fingers and adults making use of scratch paper offer helpful illustrations of this. Likewise, suppose that completing my taxes requires adding 893 and 3,475. Recording the sum in the appropriate box requires working through the calculation either in my head or on paper. If I do the calculation in my head, I use intermediary ideas to indirectly demonstrate that the target objects '893 + 3,475' and '4,368' stand in a constant relation of equality i.e., ' = '. Alternatively, if I work through the calculation on paper, I use intermediary objects, such as marks on a page, to indirectly demonstrate that the target objects stand in a constant relation. In either case, these are examples of demonstrations because they are judgments of proportion in number that require reasoning. But they are also vulgar demonstrations because they are artifice-dependent judgments that target or employ objects of experience.[17]

16. To spell this out a bit more clearly, the implication is that to rely on intermediary objects just is to indirectly demonstrate something about the target objects; hence the appeal to 'target representations.' The reason for this is that if we work through a calculation on paper, even where we start from an idea considered as such, we end up with an indirect comparison of target objects facilitated by intermediary objects.

17. It is important to keep in mind that vulgar demonstrations might be about any objects, i.e., lively ideas either seen or remembered. For instance, I might be trying to calculate the total number

Thus, there are four distinct types of judgments that, insofar as they concern constant relations, are possible objects of knowledge: (1) philosophical intuitions, (2) vulgar intuitions, (3) philosophical demonstrations, and (4) vulgar demonstrations. These distinctions help to clarify the scope of the Degeneration Argument by allowing us to isolate the probabilistic vulnerabilities—*the matters of fact*—that render all demonstrations and all vulgar intuitions susceptible to degeneration.

By 'probabilistic vulnerabilities,' I mean anything required to engage in a type of judging or reasoning that is associated with past errors such that, by the light of past experience, conclusions from that type of judging or reasoning are merely probable. More simply, a probabilistic vulnerability is a source of uncertainty—*confirmed as such*—by past errors. For instance, memory and sense-perception are familiar aides to our reasoning and judging. But all of us have made erroneous judgments due to misperception and misremembering. Given our awareness of these past errors, any judgment requiring sense-perception or memory is inherently uncertain. More carefully, any such judgment is merely probable. In this way, the presence of a probabilistic vulnerability entails uncertainty.

Probabilistic vulnerabilities like those just mentioned are what drive the degeneration of knowledge in practice. Where probabilistic vulnerabilities feature in our demonstrative reasoning, what I will call its *legitimacy* is merely probable. Where probabilistic vulnerabilities feature in our intuiting, what I will call its *adequacy* is merely probable. Where adequacy and legitimacy are merely probable, our intuitions and demonstrations do not depend 'solely upon ideas,' and thus cannot be 'the objects of knowledge and certainty' (T1.3.1.2/SBN70). This is part of the lesson the Degeneration Argument aims to teach. Indeed, Hume explains his conclusion with an example of a vulgar demonstration, spotlighting some probabilistic vulnerabilities that render all demonstrations uncertain. But before getting to that example, we need to say a bit more about why Hume grants the possibility of demonstrative knowledge, at least in principle.

III. Uncertainty in Practice

In the broadest terms, demonstrative certainty depends upon error-free reasoning. At the very least, that means reasoning from the appropriate or intended numbers and figures while properly applying demonstrative rules with respect to those numbers and figures. Additionally, the certainty of all vulgar demon-

of fire engines for two different states or the total number of people attending two events, or the number of sick days used by Bill and Ted. What matters here is that we are faced with proportions of quantity or number that must be settled by reasoning and that make use of or apply to objects.

strations also depends upon the accurate perception of the target objects. When our perception is accurate and we properly apply demonstrative rules with respect to the appropriate numbers and figures, we reason from the right evidence and in the right way.[18] When we reason from the right evidence and in the right way, our demonstrative reasoning is what I call *legitimate*.

Recollected errors in demonstrative reasoning reveal three general probabilistic vulnerabilities that render the legitimacy of any demonstration uncertain. Recollected errors prove that (i) whether the right evidence is selected, (ii) whether demonstrative rules are properly applied, and (iii) whether the target objects are accurately perceived are all matters of probability.[19] We have seen how the first two probabilistic vulnerabilities feature in both philosophical and vulgar demonstrations while the third impacts only vulgar demonstrations. In admitting this much, we are acknowledging evidence from past experience confirming that the legitimacy of all demonstrations is merely probable. And if the legitimacy of all demonstrations is merely probable, then all demonstrative conclusions must fall short of certainty.

To make this point, Hume offers the following example of an accountant going about his business:

> In accompts of any length or importance, merchants seldom trust to the infallible certainty of numbers for their security; but by [1] *the artificial structure* of the accompts, produce a probability beyond what is deriv'd from *the skill and experience* of the accomptant. For that is plainly of itself some degree of probability; tho' uncertain and variable according to [2] *the degrees of his experience* and [3] *length of the accompt*. (T1.4.1.3/SBN181, my emphasis)

Here we see Hume highlighting probabilistic vulnerabilities that entail the uncertainty of demonstrations generally and vulgar demonstrations in particular. Because all demonstrations are artifice-dependent, the legitimacy of all demonstrative reasoning partially depends on facts about (1) the artifice employed, i.e., 'the artificial structure' that facilitates demonstrative reasoning, (2) the reasoner's competence, i.e., 'the degrees of his experience,' and (3) the complexity and difficulty of the problem, i.e., 'the length of the accompt.' Crucially, our past experiences include errors attributable to each of these probabilistic vulnerabilities.

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18. Also, what 'the right evidence' is depends upon one's present aims and circumstances, for instance, whether one is trying to solve an equation or balance the company's books.

19. With relatively few adjustments, the foregoing points apply equally to a general view of demonstrations that includes formal logic. For instance, to get things 'right,' proofs must be appropriately set-up, inference rules must be properly applied, and symbols must be accurately perceived. But in light of past errors, whether we have successfully done all of this is merely probable.

Misperceptions have led us to misread numbers or overlook negative signs. Slips of the pen have caused us to mistakenly transcribe characters and symbols. Confusion, distraction, and fatigue have led us to reason from the wrong numbers and misapply demonstrative rules both in our heads and on paper. Each of these—perception, artifice, competence, and complexity—are probabilistic vulnerabilities because they are confirmed sources of error that are required for demonstrative reasoning. As such, they render all demonstrations uncertain. Noting this inherent uncertainty, Hume concludes that 'demonstration is subject to the controul of probability' (T1.4.1.5/SBN181-2).

A type of reasoning or judging is *subject to the control of probability* if, having reached some conclusion or made some judgment, our awareness of a 'contrariety of events' in the past 'oblig[es]' us to 'vary our reasoning' to account for the contrariety:

> [A]s 'tis frequently found, that one observation is contrary to another, and that causes and effects follow not in the same order, of which we have had experience, we are oblig'd to vary our reasoning on account of this uncertainty, and take into consideration the contrariety of events. (T1.3.12.4/SBN131)

For the purposes of the Degeneration Argument, the crucial point is that past experience shows our demonstrative reasoning is sometimes legitimate and sometimes not. Since '[o]ur reason must be consider'd as a kind of cause,' each recollected demonstrative error gives us a reason to worry that any present demonstration may be similarly mistaken (T1.4.1.1/SBN180). To merely accept an initial demonstrative judgment would be to ignore relevant reasons for rejecting it as mistaken, namely, *the evidence afforded by past experience*.

Rather than ignoring this evidence, Hume says '[we] must enlarge our view to comprehend a kind of history of all the instances, wherein our understanding has deceiv'd us, compar'd with those, wherein its testimony was just and true' (T1.4.1.1/SBN180). In other words, any step of demonstrative reasoning is *provisional* and must be completed with a step of probable reasoning where we 'take knowingly into consideration the contrariety of past events…and carefully weigh the experiments, which we have on each side' (T1.3.12.7/SBN133). This marks a central disagreement between my reading and those of recent commenters who see the arguments in 'Of scepticism with regard to reason' as driven by the mere possibility that we have made some error or simply by our awareness of human fallibility. The thought is that by merely acknowledging human fallibility, we acknowledge a reason to doubt any conclusion reached by reason.[20]

20. See Fogelin (1985: 16), Lynch (1996: 91), Garrett (1997: 228), Owen (1999: 180), Morris (2000: 103), Meeker (2000: 224), Bennent (2001: 312–316), Loeb (2002: 223), and KarÁnn Durland

But as Hume stresses, and as my interpretation highlights, the goal is not merely to hedge our bets in light of our acknowledged fallibility or to increase our chances of being right. Hume is pointing out that when making an initial demonstrative judgment we necessarily leave relevant evidence unconsidered, namely, the evidence from past experience regarding our susceptibility to demonstrative errors. When we subject an initial step of demonstrative reasoning to the 'control of probability,' we continue that reasoning with a probable step that incorporates this unconsidered evidence. So, it is an attempt to proportion our beliefs to the evidence—not a hedge against our fallibility or a hope to improve an initial judgment—that obliges the continuation of any initial step of demonstrative reasoning with a corrective step of probable reasoning.

Once we 'vary' our demonstrative reasoning with a step of probable reasoning, the assurance of demonstrative certainty inevitably degenerates to the less than full assurance of a probable judgment (T1.3.12.7/SBN133). Why? Well, supposing we can recall at least one relevant error, acknowledging that possibility must erode at least some of our initial confidence. More carefully, our initial assurance must be divided between the competing and mutually exclusive possibilities that, on the one hand, we have reasoned legitimately and, on the other, that we have made some error.

We have all experienced this divided confidence following from someone slyly asking: '*Are you sure?*' Even with the simplest of calculations, that slyly asked question (whether asked of ourselves or by someone else) is usually enough to remind us of past errors and get us to recalculate. Our recalculation is an admission of our worry about the possibility that we have made some as-yet-undetected mistake. Hume highlights this by describing a mathematician who does not 'place entire confidence' in an initial conclusion 'or regard it as any thing, but a mere probability' until going 'over his proofs' again and again (T1.4.1.2/SBN 180-1). Because all demonstrations are uncertain in this way, they are all subject to the control of probable reasoning. As a result, all demonstrative knowledge 'degenerates into probability' (T1.4.1.1/SBN 180).

A moment's reflection shows that vulgar intuitions are subject to degeneration for analogous reasons. In general, to secure the assurance of intuitive certainty we need to be sure that our intuiting is *adequate* or error-free. Our vulgar intuitions are adequate only if the target objects are accurately perceived or remembered—that is, only if our lively ideas adequately represent their objects. But reflection on past experience affords countless examples where our vulgar intuitions have been mistaken.

(2011: 66). Peter Millican argues for something similar, telling us that Hume requires a 'check or control' on judgments from reason in the hopes that we might 'improve' them by 'taking our reliability into account' (2018: 170). I take it 'improve' means something like increase the likelihood that our judgment is correct.

For instance, two objects sometimes appear to be the same color *and* different colors, depending upon the lighting conditions. Reflections in mirrors and windows sometimes cause one object to appear as two. Likewise, all of us can recall vulgar intuitions where misremembering or misperceiving led to mistaken judgments about even 'the most simple question' regarding proportions in number (T1.4.1.3/SBN181). I recently had one of these experiences when I saw the question *1 + 1 = ?* on my nephew's homework and immediately concluded that *1 + 1* = *2*. When a second glance revealed the actual question to be *–1 + 1 = ?*, I realized my mistake.

That we are able to notice and recall these sorts of errors gives us some reason to worry about the adequacy of any vulgar intuition. To stand pat with respect to any initial vulgar intuition is to ignore a contrariety in the evidence afforded by past experience. Like the legitimacy of all demonstrations, the evidence of past experience confirms the mere probability of the adequacy of all vulgar intuitions. And like all demonstrations, all vulgar intuitions are subject to the control of probability.

That means all of our vulgar intuitions are also provisional and must be completed with a step of probable reasoning where we 'take knowingly into consideration the contrariety of past events…and carefully weigh the experiments, which we have on each side' (T1.3.12.7/SBN133). Taking this step ensures degeneration from intuitive certainty to the less-than-full assurance of a probable judgment. Since all vulgar intuitions are inherently uncertain and, thus, subject to the control of probability, any hoped-for knowledge from them inevitably 'degenerates into probability' (T1.4.1.1/SBN180).

Even assuming that our demonstrations and vulgar intuitions are often legitimate and adequate, the key point in the Degeneration Argument is that past experience gives us reasons for present doubts. This is why I said that interpreters like Owen who claim that intuitions are subject to degeneration are at least partly right. The Degeneration Argument exploits probabilistic vulnerabilities to show how judgments that are *possibly* certain are *actually* merely probable. Past errors confirm the presence of probabilistic vulnerabilities, thereby exposing the inherent uncertainty of all demonstrations and vulgar intuitions. While judgments issued from these sources are certain in principle, they are merely probable in practice. Because the legitimacy and adequacy of our demonstrations and vulgar intuitions does not depend '*solely* upon ideas,' they cannot be 'the objects of knowledge and certainty' (T1.3.1.2/SBN 70, my emphasis).

It is a mistake, however, to think that this paves the way for extending the argument to philosophical intuitions. Philosophical intuitions follow from a direct comparison of ideas considered as such and are adequate just in case the ideas adequately represent *themselves*—that is, just in case the ideas *are* as they appear. Hume marks ideas that are 'adequate representations of objects' as the foundation of knowledge precisely because there is no question as to whether they are as they appear (T1.2.2.1/SBN29).[21] When we call the target ideas to mind we immediately perceive them, and cannot help but perceive them, as they are—including whether they stand or fail to stand in particular constant relations.[22] Consequently, recalling a mistaken vulgar intuition, an error in application or practice, gives us no reason to worry that a philosophical intuition might be similarly mistaken.

Fogelin gestures at something along these lines with his explanation of an error with a simple addition: 'We can make errors in adding a long column of numbers without at some point mistakenly believing that, say, 2 + 3 = 7. We know that 2 + 3 = 5 but, distracted, write down the wrong number, or read a number incorrectly.'[23] We can now make this observation more precise by saying that recalling mistaken vulgar intuitions provides no reason for thinking we might be similarly mistaken about philosophical intuitions.

To see this, consider the example of my nephew's homework. Recalling how misperception led to that error provides no reason for doubting my philosophical intuition that *1 + 1 = 2*. Likewise, mistakenly judging that *those fire engines are the same color* provides no reason for worrying I might be similarly mistaken in judging that *these two ideas are of fire engines that are the same color*.[24] The truth of philosophical intuitions is entirely independent of any matter of fact, and while experience proves our ideas are not always adequate representations of their objects, our ideas always adequately represent themselves.[25] Because there is no room to detect or even conceive of an error when comparing ideas considered

21. Hume echoes this point in the following passage: '[E]very impression, internal and external…whatever other differences we may observe among them, they appear, all of them, in their true colors, as impressions or perceptions…since all actions and sensations of the mind are known to us by consciousness, they must necessarily appear in every particular what they are, and be what they appear. Every thing that enters the mind, being in *reality* a perception, 'tis impossible any thing shou'd to *feeling* appear different. This were to suppose, that even where we are most intimately conscious, we might be mistaken' (T1.4.2.7/SBN 190).

22. While ideas may be more or less clear or obscure, their clarity or obscurity is immediately apparent to us: 'If its weakness render it obscure, 'tis our business to remedy that defect, as much as possible, by keeping the idea steady and precise; and till we have done so, 'tis in vain to pretend to reasoning and philosophy' (T1.3.1.7/SBN 72–3). In the simplest cases where the ideas are clear and precise, intuitions of ideas are beyond doubt.

23. See Fogelin (2009: 161 fn. 2).

24. Further, had the ideas been adequate representations of the objects such that the fire engines and the question on my nephew's homework were as they appeared, then my vulgar intuitions would have been correct.

25. This point is made especially clearly in Book II: 'The essence and composition of external bodies are so obscure, that we must necessarily, in our reasonings, or rather conjectures concerning them, involve ourselves in contradictions and absurdities. But as the perceptions of the mind *are perfectly known*, and I have us'd all imaginable caution in forming conclusions concerning them, I have always hop'd to keep clear of those contradictions, which have attended every other system' (T2.2.6.2/SBN 366–7, my emphasis).

as such, the adequacy of our philosophical intuitions is free from probabilistic vulnerabilities. Since there are no probabilistic vulnerabilities to drive degeneration, philosophical intuitions are not subject to the control of probability and, thus, are immune to degeneration.

IV. The Degeneration of Knowledge in Practice

The immunity of philosophical intuitions explains why interpreters like Fogelin who claim that some intuitions survive degeneration are at least partly right. When making this general point though, such interpreters tend to treat it as a kind of objection to Hume's argument. The thought is that *all* knowledge is supposed to degenerate, so if anything survives the argument fails. We are now in a position to show how that line of thought misunderstands the aim of Hume's argument.

As a first step, consider the opening lines of the argument where Hume makes clear his acceptance of a restricted class of knowledge by granting that demonstrative rules 'are *certain and infallible*' while acknowledging the 'infallible certainty of numbers' (T1.4.1.1, 1.4.1.3/SBN180-1, my emphasis). This certainty and infallibility, I contend, derives from the certainty of philosophical intuitions. Indeed, philosophical intuitions are the best candidate for underwriting the 'precise standard' that grounds the very possibility of demonstrative knowledge:

> [A]lgebra and arithmetic [are] the only sciences, in which we can carry on *a chain of reasoning* to any degree of intricacy, and yet *preserve a perfect exactness and certainty*. We are possest of a *precise standard*, by which we can judge of the equality and proportion of numbers…When two numbers are so combin'd, as that the one has always an unite answering to every unite of the other, we pronounce them equal. (T1.3.1.5/SBN71, my emphasis)

From the certainty of philosophical intuitions like *a square and a rectangle have the same number of sides* or *1 + 1 = 2*, we *know* that one-to-one correspondence guarantees equality. That is, we know that whenever one set of things, like a set of plates, has a unit corresponding to each unit of another set of things, like a set of spoons, the two sets are equal in number. This shows how the certainty of philosophical intuitions allows us to capture and express conditions pertaining to demonstrations as well as the external world and its contents.[26]

26. I am thankful to a reviewer's comment for prompting me to make this point more explicit.

The certainty of our standard of equality is why the legitimate application of 'certain and infallible' rules works to '*preserve* a perfect exactness and certainty' for our demonstrative judgments (T1.4.1.1, 1.1.3.5/SBN 180, 71, my emphasis).[27] It is also why Hume is so confident in saying that, 'according as [the proportions] correspond or not to that standard, we determine their relations, *without the possibility of error*' (T1.3.1.5/SBN 71, my emphasis).[28] By accepting a restricted class of known propositions in the opening line, Hume grants the possibility of demonstrative knowledge in principle.

Furthermore, if Hume intended to show that *everything* is uncertain, he could have availed himself of a much simpler strategy than what we get in the Degeneration Argument. For if philosophical intuitions were uncertain there would be no precise standard—no certainty to preserve—and thus, no possibility of demonstrative knowledge. In that case, calling on past errors would be superfluous. Hume could simply rule out the possibility of demonstrative knowledge by denying the existence of 'a precise standard' for judging 'the equality and proportion of numbers' (T1.3.1.5/SBN71). Notice too that Hume had this line of argument at the ready since it is precisely the strategy he used to justify excluding geometry from the demonstrative sciences: ''tis for want of such a [precise] standard of equality in *extension*, that geometry can scarce be esteem'd a perfect and infallible science' (T1.3.1.5/SBN 71, my emphasis). Tellingly, this is not the strategy Hume pursues in developing his skeptical attack on demonstrative knowledge.

This is because the Degeneration Argument aims to establish a slightly weaker claim: *in practice*, we never secure certainty from *applying* what we know. Hume marks this slightly weaker aim by contrasting the infallibility of demonstrative rules with our fallible applications of them:

> In all demonstrative sciences the rules are certain and infallible; but when we *apply* them, our fallible and uncertain faculties are very apt to depart from them, and fall into error. (T1.4.1.1/SBN180, my emphasis)

The claim is not that *every* proposition falls short of certainty. Rather, Hume is reminding us that we sometimes make errors in spite of what we know. That we are able to detect and recall past errors gives us reason to worry that any

27. I should also mention that, in addition to grounding the possibility of demonstrative knowledge in principle, the certainty of philosophical intuitions also accounts for the detectability of demonstrative errors in practice. After all, if I was not certain that 1 + 1 = 2, I could not be sure I had made an error on my nephew's homework or the company's accounts.

28. Again, a similar point holds for other formal systems that might be included in a general description of the demonstrative sciences where the foundations of a precise standard remain beyond doubt, e.g., excluded middle and non-contradiction, while judgments supposedly made in accordance with that standard are less than certain.

relevantly similar judgments may be similarly mistaken. So, while philosophical intuitions are certain, the evidence of past experience guarantees the uncertainty of all demonstrations and vulgar intuitions. All attempts to *apply* what we know are inherently uncertain.

To see this with each type of intuition, consider a simple case of applying something we know about numbers. The philosophical intuition that *3 is greater than 1* is certain. But due to past errors, we cannot apply this knowledge to any particular objects while preserving that certainty. For example, if it appears that there are 3 lemons and 1 lime in the fruit bowl, I might immediately judge that *the number of lemons is greater than the number of limes*. But when I reflect on past errors in similar circumstances, the initial certainty of this vulgar intuition degenerates to something with less-than-full certainty. It is not that the philosophical intuition is uncertain or that it fails to capture a relevant condition for possible objects of experience. The problem is that our past errors force us to admit that this might be a case where our knowledge has been misapplied.

We can show something similar for other vulgar intuitions. Take a claim about color resemblance.[29] From our philosophical intuition that *red more closely resembles pink than blue,* we know that, for any possible objects of experience, *the red ones will more closely resemble the pink ones than the blue ones*. This is why I have associated philosophical intuitions with Hume's remarks about the foundations of knowledge: 'Wherever ideas are adequate representations of objects, the relations, contradictions and agreements of the ideas are all applicable to the objects; and this we may in general observe to be the foundation of all human knowledge' (T1.2.2.1/SBN 29, my emphasis).

The question I take Hume to be pressing with the Degeneration Argument is this: after reflecting on our past errors, how, in any given instance, can we be certain that this is a case where our knowledge about things like numbers or color resemblance applies to the objects of experience? Put differently, given past errors in similar circumstances, how can I be certain about the number of objects or their qualities? If my reading of Hume's argument is right, the probabilistic elements inherent to our demonstrative reasoning and vulgar intuiting guarantee the uncertainty of any attempt to apply what we know. Thus, with a slight emendation, we can say that Hume runs the Degeneration Argument to show that, in practice, 'all knowledge degenerates into probability' (T1.4.1.1/SBN180).

29. I am grateful for a reviewer's comment that pressed for more clarity on this issue. The following example regarding color resemblance is the result of that helpful comment.

V. Understanding Degeneration with Hume's Critique of Geometry

Understood in this way, the Degeneration Argument echoes Hume's conclusion about geometry. Just before reminding us that geometry 'can scarce be esteem'd a perfect and infallible science,' Hume cites examples of possibly certain intuitions about 'figures' and 'very limited portions of extension; which are comprehended in an instant' (T1.3.1.5, 1.3.1.3/SBN71, 70). These remarks suggest that, with the appropriate qualifications, judgments in geometry are candidates for certainty at least in principle.

We can make sense of this in light of Hume's appeal to an *imprecise* standard for judgments in geometry that, while 'deriv'd from a comparison of objects, upon their general appearance,' is nevertheless secured by 'first principles… [that are] certain and infallible' (T1.2.4.31/SBN638).[30] As with the opening line of the Degeneration Argument, I take it when Hume refers to 'first principles' he is appealing to philosophical intuitions, which are beyond doubt in geometry for the same reason philosophical intuitions are beyond doubt in general—*the target ideas must be as they appear*. Supposing the ideas are adequate representations of objects, any comparison yielding knowledge of the ideas will yield knowledge of the objects as well:

> [T]he eye, or rather *the mind is often able at one view* to determine the proportions of bodies, and pronounce them equal to, or greater or less than each other, without examining or comparing the numbers of their minute parts. Such judgments are not only common, but in many cases *certain and infallible*. When the measure of a yard and that of a foot are presented, *the mind can no more question*, that the first is longer than the second, than it can doubt of those principles, which are the most clear and self-evident. (T1.2.4.22/SBN 637, my emphasis)

Then within certain bounds, namely, when they conform to a standard secured by general appearances, our vulgar intuitions are candidates for certainty even in geometry.

Unfortunately, as we reminded ourselves above, past experience proves that our lively ideas sometimes fail to adequately represent their objects even in the simplest of cases. For our judgments in geometry, Hume makes this point espe-

30. For a helpful discussion of Hume's 'precise' and 'imprecise' standards with respect to geometry see Emil Badici (2008: 235–39). While Badici is willing to draw more far-reaching conclusions on the basis of Hume's imprecise standard than I am, the discussion convincingly makes the point argued for above, i.e., that judgments in geometry are not *necessarily* uncertain.

cially clear by describing how we often discover and attempt to 'correct' our mistaken vulgar intuitions:

> '[T]ho…decisions concerning these proportions be sometimes infallible, they are not always so; nor are our judgments of this kind more exempt from doubt and error, than those on any other subject. We frequently correct our first opinion by a review and reflection; and pronounce *those objects to be equal*, which at first we esteem'd unequal…Nor is this the only correction, which *these judgments of the senses* undergo; but we often discover our error by a juxta-position of the objects…[or] by the use of some common and invariable measure. (T1.2.4.23/SBN 47, my emphasis)

This passage calls to mind the reasoning of the Degeneration Argument as I have sketched it. In practice, we have made, detected, and are able to recall mistaken vulgar intuitions. So, by the lights of past experience, we cannot be certain of the adequacy of our vulgar geometrical intuitions, which is why all judgments in geometry fall short of certainty in practice.

This calls attention to a crucial but seldom appreciated fact: while geometry is excluded from the demonstrative sciences, it is not because everything in geometry is necessarily uncertain. Hume restricts the demonstrative sciences to those fields where we can 'carry on a chain of reasoning…and yet *preserve* a perfect exactness and certainty' (T1.3.1.5/SBN71, my emphasis). Chains of reasoning that preserve certainty are possible because we are 'possest of a *precise* standard of equality, by which we can judge of the equality and proportion of numbers' (T1.3.1.5/SBN71, my emphasis). While we know that 'lines or surfaces are equal, when the numbers of points in each are equal,' we can neither perceive nor count the points of a line (T1.2.4.19/SBN 45). Then even though we cannot doubt philosophical intuitions based on general appearances, such as *these ideas of lines are equal with respect to their length,* we can never know whether any two lines are equal with respect to the number of their points.[31] It is in this sense that a precise standard of equality in extension 'tho'… *just*, as well as obvious…is entirely useless' in geometry (T1.2.4.19/SBN45).[32] On this basis, Hume concludes

31. Hume's discussion of abstract ideas is instructive on this point where length is treated as a quality rather than a quantity: ''tis evident *at first sight*, that the precise length of a line is not different nor distinguishable from the line itself; nor the precise degree of *any quality* from the quality' (T1.1.7.3/SBN18–19, my emphasis).

32. 'For as the points, which enter into the composition of any line or surface, whether perceiv'd by the sight or touch, are so minute and so confounded with each other, that 'tis utterly impossible for the mind to compute their number, such a computation will never afford us a standard, by which we may judge of proportions. No one will ever be able to determine by an exact numeration, that an inch has fewer points than a foot' (T1.2.4.19/SBN45). Fleshing out the description a bit, Hume describes the problem by saying the intricate chains of reasoning needed

that ''tis for want of such a [precise] standard of equality in extension, that geometry can scarce be esteem'd a perfect and infallible science (T1.3.1.5/SBN71).

Unlike extensions, the objects of the demonstrative sciences do not preclude the possibility of judging in conformity with that precise standard. This is why Hume is unable to claim that judgments in algebra and arithmetic are uncertain in principle. It is also why he is forced to call on past errors in reasoning to show that, in practice, demonstrative judgments are inherently uncertain. Past errors confirm the inherent uncertainty of demonstrative reasoning and, in turn, the uncertainty of all demonstrative judgments. Consequently, the existence of a precise standard for judging the equality and proportion of numbers is useless for securing demonstrative knowledge in practice. While reached by a different route, Hume's conclusion seats geometry and the demonstrative sciences in the same sinking ship.

We opened by noting that, for Hume, the assurance characteristic of knowledge is certainty, and that certainty is possible because the objects of knowledge are ideas that stand in constant relations. When distinguishing knowledge from belief in the *Enquiry*, however, Hume opts for a more familiar distinction between '*Relations of Ideas*, and *Matters of Fact*' (E4.1/SBN 25).[33] This cleaves the possible objects of knowledge neatly away from the world of experience. Peter Millican (2017) suggests this represents Hume's abandonment of the apparently defective distinction between constant and inconstant relations provided in the *Treatise*. But if my reading is right, the Degeneration Argument signals this shift.

Appealing to constant relations as the distinguishing feature of possible objects of knowledge allows for the possibility of securing knowledge about the objects of experience. What we find in the *Treatise*, at least until we reach 'Of scepticism with regard to reason,' is a philosophical account that allows for the possibility of acquiring empirical knowledge. Once the Degeneration Argument is run, however, we see that empirical knowledge is possible in principle but not in practice. Appealing to relations of ideas and matters of fact in the *Enquiry* allows for respecting this conclusion while avoiding the need to establish it with the poorly received and (if I am right) poorly understood Degeneration Argument from the *Treatise*.

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to secure the 'subtile inferences' claimed by geometers requires a precise standard that is useless in practice (T1.2.4.31/SBN638).

33. References to the first *Enquiry* are to David Hume, *An Enquiry concerning Human Understanding: A Critical Edition*, ed. Tom L. Beauchamp (Oxford: Clarendon Press, 2000), cited as 'EHU' followed by section and paragraph number, and to *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*, ed. L. A. Selby-Bigge, revised by P. H. Nidditch, 3rd ed. (Oxford: Clarendon Press, 1975), hereafter cited as 'SBN' followed by page number.

VI. 'Simple Additions' and the Degeneration of *All* Knowledge

I have argued that the scope of the Degeneration Argument is not actually unrestricted and that Hume does not intend it to be so. By granting a restricted class of known proposition at the outset, Hume signals that at least some knowledge is safe from degeneration. This conclusion is not likely to sit well with interpreters. While there is disagreement over the Degeneration Argument's actual scope, there is widespread agreement that Hume intended it to be unrestricted.

There is some evidence for this view. Hume twice describes the conclusion of the Degeneration Argument as extending to 'all knowledge' (T1.4.1.1, 1.4.1.4/SBN180, 181). On its face, this looks like an endorsement of the unrestricted reading. But we need to keep in mind that the Degeneration Argument is a skeptical attack on *reason*. It appears in a section of the *Treatise* called 'Of scepticism with regard to reason.' Given that Hume's explicit targets are the products of reasoning, 'all' should be read with a narrow scope.[34] So when Hume says 'all knowledge degenerates,' he is best understood as referring only to knowledge secured by demonstrative reasoning. Significantly, before turning to the argument against probable reason Hume appears to endorse this reading by claiming to have shown only that '*demonstration* is subject to the controul of probability' (T1.4.1.5/SBN181-2, my emphasis).

Still, some interpreters will be tempted to see Hume's remarks about the 'addition of two single numbers' as evidence that intuitions are a target:

> Now as none will maintain, that our assurance in a long numeration exceeds probability, I may safely affirm, that there scarce is any proposition concerning numbers, of which we can have fuller security. For 'tis easily possible, by gradually diminishing the numbers, to reduce the longest series of addition to the most simple question, which can be form'd, to an addition of two single numbers…[but] if any single addition were certain, every one wou'd be so, and consequently the whole or total sum. (T1.4.1.3/SBN181)

34. When describing the targets of Hume's argument, interpreters often focus exclusively on demonstrative reasoning and demonstrative judgments. Annette Bair identifies Hume's target as 'calculative (non-causal) reasoning' (1991: 96). Louis Loeb states plainly that: '"Of scepticism with regard to reason" concerns "reason" or the "understanding"…and…demonstrative and probable reasonings. It is the sustained operation of the "understanding"…that subverts itself' (2002: 223). Michael Lynch also characterizes the argument as squarely focused on conclusions from calculation: 'The first argument…is meant to show that any belief formed in the "demonstrative sciences"—any *a priori* belief about (say) mathematics—cannot be held with certainty…[because in] performing any set of calculations, no matter how simple, we are susceptible to error' (1996: 89–90). Don Garrett says the argument aims to undermine 'the certainty of any demonstrative reasoning' (2006: 161).

What Hume means by 'diminishing the numbers' and 'the most simple question' is open to interpretation. However, that Hume appeals to an *addition* or the activity of *adding* 'two single numbers' is significant. Indeed, it speaks against reading the passage as an attempt to single out intuitions. As we've seen, intuitive judgments are made 'at first sight, without any enquiry or reasoning' (T1.3.1.2/SBN70). So, an intuitive judgment about proportions in quantity or number is not made by adding numbers. Consequently, in this passage we ought to understand Hume to be saying that even the simplest demonstrations—the simplest additions—fall short of certainty.

In light of the above considerations, we have good reason to think intuitions are not an intended target of the Degeneration Argument. Even so, the skeptical argument forces a question about the status of intuitions that interpreters are right to try to answer. I have shown that vulgar intuitions are subject to degeneration for reasons analogous to those provided against demonstrations. I have also argued that our errors in practice give us no reason for doubting our philosophical intuitions. This general remark about the status of philosophical intuitions points to a final, salient interpretive issue that has gone unmentioned by commentators.

A background assumption in the dispute over the scope of the Degeneration Argument is that if any philosophical intuition about proportions in quantity or number might be mistaken, then *all* intuitions are uncertain. This assumption is wrong. Even if we suppose that a philosophical intuition about numbers might be mistaken, this would not show that a philosophical intuition about, say, *resemblance* might be similarly mistaken. More precisely, we would not have been given any reason for doubting our philosophical intuitions about the other three constant relations, namely, resemblance, contrariety, and degrees in quality (T1.3.1.2/SBN70). To show that knowledge unrestrictedly degenerates into probability, we would need an argument showing that philosophical intuitions regarding all four constant relations are uncertain. Hume does not take-up that line of argument, choosing instead to fix his attention squarely on proportions in quantity or number. This affords further evidence that intuitions are not an intended target of the Degeneration Argument and that the survival of philosophical intuitions is no objection to that argument.

VII. Conclusion

While interpreters have remained divided over whether the Degeneration Argument extends to intuitions, we have shown that both sides are partly right because both sides mistakenly treat intuitions as a uniform class. Once philosophical intuitions are distinguished from vulgar intuitions, we can see why only the latter are subject to degeneration.

Because our ideas do not always adequately represent their objects, our vulgar intuitions are sometimes mistaken. That we are able to detect and recall these errors gives us reason to worry that any present vulgar intuition might be similarly mistaken. But because our ideas always adequately represent themselves, we could never even detect a mistaken philosophical intuition. This is why vulgar intuitions are subject to degeneration while philosophical intuitions remain beyond doubt.

By admitting a restricted class of knowledge in the opening lines, Hume grants this exception to degeneration at the outset. It is because philosophical intuitions are beyond doubt that demonstrative knowledge is possible in principle. It is because demonstrative knowledge is possible in principle that Hume must rely on past errors to prove the inherent uncertainty of the demonstrative sciences. By appealing to recollected errors, the Degeneration Argument shows how, in practice, all of our judgments fall short of certainty in spite of what we know.

While accepting a restricted class of knowledge may seem a bit of a watering-down of Hume's skeptical conclusion, the concession is a minor one. Supposing the interpretation developed above is right, Hume grants we have knowledge only from philosophical intuitions and only until we try to do something with it. While we cannot doubt that two ideas are of resembling colors or that $1 + 1 = 2$, in light of past errors we can never be certain that, for instance, two objects resemble with respect to their color. The appearances of our ideas is something we cannot doubt. Whether they are 'adequate representations of objects' is something we can never know (T1.2.2.1/SBN29).[35]

Competing Interests

The author has no competing interests to declare.

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