Hume's Negative Argument Concerning Induction
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(for the PUBLISHED version of this paper, scroll down; this draft summarizes the argument in symbolic form while the published version is a summary of the argument in English)

Where does the necessity that seems to accompany causal inferences come from? "Why [do] we conclude that … particular causes must *necessarily* have such particular effects?" (Hume 2002, 1.3.2.15) In 1.3.6 of the *Treatise,* Hume entertains the possibility that this necessity is a function of *reason*. However, he eventually dismisses this possibility, where this dismissal consists of Hume's "negative" argument concerning induction. This argument has received, and continues to receive, a tremendous amount of attention. How could causal inferences be *justified* if they are not justified by *reason*? If we believe that p causes q, isn't it *reason* that allows us to conclude q when we see p with some assurance, i.e. with some necessity?

The responses to these questions are many, but they may be parsed into four groups: [1] Some argue that Hume's negative argument shows that he thought that inductive inferences are *worthless.* Hume was actually a closet "deductivist," where he *meant* to show that any method that does not rely on *a priori* principles is useless. (e.g. Stove 1973). [2] Others have alleged that Hume's negative argument only meant to show that we cannot use *demonstrative* reason to justify inductive inferences, but we can, apparently, justify them with probable reason (e.g. Beauchamp and Rosenberg 1981, Arnold 1983, Broughton 1983 and Baier 1991). [3] Still others argue that Hume's notion of justification (in regard to beliefs in general, including beliefs in causal inferences) should be understood in two stages in Book I of the *Treatise.* In the first, Hume *does* lay out a theory of justification. In the second (particularly in 1.4.7), he retracts it (e.g. Passmore

1952/1968, 54-64, 99-101, Immerwahr 1977, Schmitt 1992 and Loeb 2002). [4] Finally, there are those who claim that no "justification" is needed for causal inferences. In fact, asking for it amounts to a misplaced demand for epistemic explanation; to some degree, this is what the negative argument shows us. What we must do instead is give a descriptive *psychological explanation,* where this explanation consists of Hume's "positive" account of induction; see for instance, *Treatise* 1.3.14, "of the idea of necessary connexion." (e.g. Strawson 1952, Garrett 1997 and Owen 1999).

Hume's negative argument may be parsed into four subsections:[1] the *introduction*, the argument that rules out *demonstrative* reasoning, the argument that rules out *probable* reasoning and Hume's *concluding* argument. In the arguments that rule out demonstrative and probable reasoning, Hume assumes that the principle of uniformity *is* justified by, respectively, demonstrative reason and probable reason, and then he respectively shows why these assumptions are incorrect. In the concluding argument, he shows that this means that the principle of uniformity is not justified by reason, nor is the necessity that obtains of our causal inferences a function of reason. To do so, he draws on the premises established in his introduction and the conclusions established in the arguments that rule out demonstrative and probable reason.

Introduction

[we must now] discover the nature of that *necessary connexion*, which makes so essential a part of [the relation of cause and effect]… Since it appears, that the transition from an impression present to the memory or senses to the idea of an object, we call cause and effect, is founded on past *experience,* and our resemblance of their *constant conjunction*, the next question is, whether experience produces the idea by means of the understanding or of the imagination; whether we are determin'd by reason to make the transition, or by a certain association of perceptions. If reason determin'd us, it wou'd proceed upon that principle, *that instances, of which we have had no experience must resemble those, of which we have had experience, and that the course of nature*

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[1] I have omitted the subsection where Hume rules out "powers" (T 1.3.6.8-10). This section does not affect Hume's final conclusion, so for the sake of brevity, we may overlook it.

continues always uniformly the same. In order therefore to clear up this matter, let us consider all the arguments, upon which such a proposition may suppos'd to be founded' and as these must be deriv'd either from *knowledge* or *probability*, let us cast our eye on each of these degrees of evidence, and see whether they afford any just conclusion of this nature. (Hume 2002, 1.3.6.3, 1.3.6.4)

Intro. **P1.** When the mind makes what appears to be a necessary transition from a present impression, or a memory of an impression, to a given idea, we call that transition "cause and effect." The question is, on what is this seemingly necessary transition founded? What is it a function of? Understanding (i.e. *reason*), or the imagination?

Intro. **P2.** If reason *does* "determin[e]" us to make these causal transitions, then this "reasoning" must "proceed upon that principle" that "instances" (e.g. particular associations of any two objects Δ and Φ) that occurred in the past, will continue to occur as such in the future. This principle is the idea that "nature continues uniformly the same;" a maxim that is typically referred to in the literature as the *principle of uniformity*. The role that it plays is simple: We constantly experience that Δ precedes and is contiguous to Φ, i.e. Δ and Φ are "constantly conjoined." Following, as a result of our faith in the principle of uniformity, we seem to *reason* that Φ should necessarily follow Δ, and thus, we conclude that Δ is a "cause" and Φ is and "effect." In symbolic form, this reads: N ⊃ P, where 'N' stands for "the necessity that accompanies causal reasoning is a function of reason" and 'P' stands for "such reason depends on the principle of uniformity."

Intro. **P3**. If causal necessity is a function of reason, where that reason is based on the principle of uniformity, then the principle of uniformity must, in some fashion or other, be *justified;* it too must be "founded" in reason. In symbolic form this reads: (N ⊃ P) ⊃ J, where 'J' stands for "the principle of uniformity is justified by reason."

Intro. **P4.** There are only two kinds of reason that may justify a principle, including the principle of uniformity: a.) "knowledge" (demonstrative reasoning), *or* b.) "probable" reasoning. In symbolic form, this reads: J ⊃ (D v R), where 'D' stands for "the principle of uniformity is justified by demonstrative reasoning" and 'R' stands for "the principle of uniformity is justified by probable reasoning."

Ruling out Demonstrative Reason

Our foregoing method of reasoning will easily convince us, that there can be no demonstrative arguments to prove, that those instances, of which we have had no experience, resemble those, of which we have had experience. We can at least conceive a change in the course of nature; which sufficiently proves, that such a change is not absolutely impossible. To form a clear idea of any thing, is an undeniable argument for its possibility, and is alone a refutation of any pretended demonstration against it (Hume 2002, 1.3.6.5)

Dem. **P1**. Assume that the principle of uniformity *is* justified by demonstrative reasoning. Or in symbolic terms: J ⊃ D, where, recall, 'J' stands for "the principle of uniformity is justified by reason" and 'D' stands for "the principle of uniformity is justified by demonstrative reasoning."

Dem. **P2.** A demonstrative claim is a claim or principle that we cannot imagine otherwise without generating a contradiction (Hume 2002, 1.3.14.13). In this case, we are speaking specifically of the principle of uniformity. Thus, If the principle of uniformity is justified by demonstrative reasoning, i.e. is an instance of demonstrative reasoning, then the principle of uniformity cannot be imagined otherwise. In symbolic form, this reads: D ⊃ U, where 'U' stands for "the principle of uniformity cannot be imagined otherwise."

***Dem.* P3.** We *can* imagine that nature will *not* continue uniformly in the future, while simultaneously imagining that nature has always continued the same in the past, *without* contradicting ourselves. Thus, the principle of uniformity *can* be imagined otherwise. In symbolic form, this reads: ~U

***Dem.* C1.** Thus, the principle of uniformity is *not* "prove[d]" i.e. justified, by demonstrative reasoning. This is a valid conclusion:

> *Dem.* P2. $D \supset U$
> *Dem.* P3. ~U
> *Dem.* C1. ~D, (Modus Tollens, *Dem.* P2, P3)

Ruling out Probable Reason

Probability, as it discovers not the relations of ideas, consider'd as such, but only those of objects, must in some respects be founded on the impressions of our memory and senses, and in some respects on our ideas. Were there no mixture of any impression in our probable reasonings, the conclusion woul'd be entirely chimerical: And were there no mixture of ideas, the action of the mind, in observing the relation, wou'd, properly speaking, be sensation, not reasoning. 'Tis therefore necessary, that in all probable reasonings there be something present to the mind, either seen or remember'd; and that from this we infer something connected with it; which is not seen or remember'd (Hume 2002, 1.3.6.6).

***Prob.* P1.** Assume that the principle of uniformity is justified by probable reasoning. In symbolic form, this reads: $J \supset R$, where recall, 'J' stands for "the principle of uniformity is justified by reason" and 'R' stands for "the principle of uniformity is justified by probable reasoning."

Prob. P2. If the principle of uniformity is justified by probable reason, then the reasoning at hand is probable reasoning, i.e $R \supset X$, where 'X' stands for "the reasoning at hand is probable reasoning."

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Prob. **P3.** Probable conclusions occur when we compare the nature of "objects," such that we discover relations that allegedly hold between such "objects." Thus, if we have an instance of probable reason, then this reasoning holds between objects. In symbolic terms, this reads: $X \supset O$ where 'O' stands for "the reasoning at hand holds between objects."

Prob. **P4.** However, when we are engaged in probable reason about objects, we must, to some degree, be reasoning about *ideas*. For if no ideas were present in our minds, we would just be manipulating *impressions*. As a result, we would just be sensing, and thus we could not possibly be reasoning. Moreover, the objects of probable reasoning could not *just* be ideas; this would "be entirely chimerical" because, it seems, our reasoning would not have anything to do with actual experience. Thus, probable reasoning concerns reasoning about "objects" where these objects consist of *both* [i] impressions and/or memories of impressions *and* [ii] ideas. Moreover, whatever is immediately "present to the mind," i.e. an impression or a memory of an impression, leads us to "infer" an idea. Thus, we may symbolize Hume's thought as follows:

$X \supset \{O \supset [(M \bullet I) \bullet L]\}$

Here, 'M' stands for "it is reasoning that holds between impressions or memories of impressions," 'I' stands for "it is reasoning that holds between ideas," and 'L' stands for "the impression or the memory of an impression at hand leads us to infer the idea at hand."

Proceeding deeper into the argument, Hume writes:

The only connexion or relation of objects, which can lead us beyond the immediate impressions of our memory and senses, is that of cause and effect' and that because 'tis the only one, on which we can found a just inference from one object to another. The idea of cause and effect is deriv'd from *experience*, which informs us, that such particular objects, in all past instances, have been constantly conjoined with each other: And as an object similar to one of these is suppos'd to be immediately present in its impression, we thence presume on the existence of one similar to its

usual attendant. According to this account of things, which is, I think, in every point unquestionable, probability is founded on the presumption of a resemblance betwixt those objects, of which we have had experience, and those, of which we have had none; and therefore 'tis impossible this presumption can arise from probability. The same principle cannot be both the cause and effect of another. (Hume 2002, 1.3.6.7)

Prob. **P5.** The only relation that, when presented with a sense impression, or alternatively, a memory of a sense impression of any object Δ, that can lead us to think of (specifically, have an idea of) another object Φ, is the relation of cause and effect. Moreover, Hume reminds us (recall *Intro.* P2.), the relation of cause and effect depends on the principle of uniformity. In symbolic terms, this may be expressed as follows:

$\{O \supset [(M \bullet I) \bullet L]\} \supset (C \supset P)$

Here, 'C' stands for "the reasoning at hand is an instance of causal reasoning," and recall that 'P' stands for "such reasoning depends on the principle of uniformity."

Prob. **C3.** Thus, if we have an instance of probable reasoning, then we have an instance of causal reasoning, where such reason depends on the principle of uniformity, i.e. $X \supset (C \supset P)$. This conclusion is valid.

> *Prob.* P4. $X \supset \{O \supset [(M \bullet I) \bullet L]\}$
> *Prob.* P5. $\{O \supset [(M \bullet I) \bullet L]\} \supset (C \supset P)$
>> *Prob.* P6.   X (Assumed Premise, Conditional Proof)
>> *Prob.* C1. $O \supset [(M \bullet I) \bullet L]$ (Modus Ponens, *Prob.* P6, *Prob.* P4)
>> *Prob.* C2. $C \supset P$ (Modus Ponens, *Prob.* C1, *Prob.* P5)
> *Prob.* C3. $X \supset (C \supset P)$ (Conditional Proof, *Prob.* P6- *Prob.* C2)

Prob. **C7.** However, this is very problematic. It means that the principle of uniformity both *justifies* causal reasoning and is justi*fied* by causal reasoning, i.e. $J \supset (C \supset P)$, where recall, 'J' stands for

"The principle of uniformity is justified by reason," and 'C' stands for "the reasoning at hand is causal reasoning" and 'P' stands for, "such reason depends on the principle of uniformity." We may validly conclude J ⊃ (C ⊃ P) as follows:

> *Prob*. P7. J (Assumed Premise, Conditional Proof)
>
> *Prob*. P1.   J ⊃ R
>
> *Prob*. C4.   R   (Modus Ponens, *Prob*. P7, *Prob*. P1)
>
> *Prob*. P2.   R ⊃ X
>
> *Prob*. C5.   X (Modus Ponens, Prob. C4, Prob. P2)
>
> *Prob*. C3.   X ⊃ (C ⊃ P)
>
> *Prob*. C6.   (C ⊃ P) (Modus Ponens, *Prob.* C5, *Prob.* C3)

   Prob. C7. J ⊃ (C ⊃ P) (Conditional Proof, Prob P7- Prob C6)

***Prob*. C8.** Thus, Hume must conclude that the principle of uniformity is *not* justified by probable reason, i.e. ~R, because to do so is to engage in circular reasoning, as shown in *Prob*. C7: 'tis impossible [that the principle of uniformity] can arise from probability. The same principle cannot be both the cause and effect of another."

Concluding Argument

Thus, not only our reason fails us in the discovery of the *ultimate connexion* of causes and effects, but even after experience has inform'd us of their *constant conjunction*, 'tis impossible for us to satisfy ourselves by our reason, why we shou'd extend that experience beyond those particular instances, which have fallen under our observation. (Hume 2002, 1.3.6.11)

***Con*. P1.** The principle of uniformity is not justified by either demonstrative or probable reasoning.

That is, we have concluded ~D • ~R in *Dem.* C1 and *Prob.* C8, respectively.

***Con.* C2.** Thus, we must reject the claim that the principle of uniformity is justified by reason, i.e. ~J. This is a valid conclusion:

> *Intro.* P4. J ⊃ (D v R)
>
> *Con.* P1. ~D • ~ R
>
> *Con.* C1. ~(D v R)   (Demorgans, *Con.* P1)
>
> *Con.* C2. ~J   (Modus Tollens, *Intro.* P4, *Con.* C1)

***Con.* C5.** Moreover, we must reject the claim that the necessity that seems to accompany causal relations is a function of *reason*, i.e. we must conclude ~N. In fact, as Kemp Smith points out, this means that natural causal reasoning is really not *reason* at all, and so is not, technically speaking, an "inference" (1941, 375). This conclusion is shown to be valid by continuing the proof in *Con.* C2.

> *Intro.* P4. J ⊃ (D v R)
>
> *Con.* P1. ~D • ~ R
>
> *Con.* C1. ~(D v R)   (Demorgans, *Con.* P1)
>
> *Con.* C2. ~J   (Modus Tollens, *Intro.* P4, *Con.* C1)
>
> *Intro* P2.   N ⊃ P
>
>> *Con.* P2.   N (Assumed Premise, Indirect Proof)
>>
>> *Intro.* P3. (N ⊃ P) ⊃ J
>>
>> *Con.* C3   J   (Modus Ponens, *Intro.* P2, *Intro.* P3)
>>
>> *Con.* C4   ~J • J   (Conjunction, *Con.* C2, *Con.* C3)
>
> *Con.* C5. ~N   (Indirect Proof, *Con.* P2- *Con.* C4)

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Where does the necessity that seems to accompany causal inferences come from? "Why [do] we conclude that […] particular causes must *necessarily* have such particular effects?" (Hume 2002, 1.3.2.15) In 1.3.6 of the *Treatise,* Hume entertains the possibility that this necessity is a function of reason. However, he eventually dismisses this possibility, where this dismissal consists of Hume's "negative" argument concerning induction. This argument has received, and continues to receive, a tremendous amount of attention. How could causal inferences be justified if they are not justified by reason? If we believe that p causes q, isn't it reason that allows us to conclude q when we see p with some assurance, i.e., with some necessity?

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account of induction; see for instance, *Treatise* 1.3.14, "of the idea of necessary connexion" (e.g., Strawson, Garrett, and Owen).

In the arguments that rule out demonstrative and probable reasoning, Hume assumes that the principle of uniformity is justified by, respectively, demonstrative reason and probable reason, and then he respectively shows why these assumptions are incorrect. In the concluding argument, he shows that this means that the principle of uniformity is not justified by reason, nor is the necessity that obtains of our causal inferences a function of reason. To do so, he draws on the premises established in his introduction and the conclusions established in the arguments that rule out demonstrative and probable reason.

> *[We must now] discover the nature of that necessary connexion, which makes so essential a part of [the relation of cause and effect] […]. Since it appears, that the transition from an impression present to the memory or senses to the idea of an object, we call cause and effect, is founded on past experience, and our resemblance of their constant conjunction, the next question is, whether experience produces the idea by means of the understanding or of the imagination; whether we are determin'd by reason to make the transition, or by a certain association of perceptions. If reason determin'd us, it wou'd proceed upon that principle, that instances, of which we have had no experience must resemble those, of which we have had experience, and that the course of nature continues always uniformly the same. In order therefore to clear up this matter, let us consider all the arguments, upon which such a proposition may suppos'd to be founded' and as these must be deriv'd either from knowledge or probability, let us cast our eye on each of these degrees of evidence, and see whether they afford any just conclusion of this nature.*
> [Hume 2002, 1.3.6.3, 1.3.6.4]

P1. When the mind makes what appears to be a necessary transition from a present impression, or a memory of an impression, to a given idea, we call that transition "cause and effect." The question is, on what is this seemingly necessary transition founded? What is it a function of? Understanding (i.e., reason), or the imagination?

P2. If reason does determine us to make these causal transitions, then this reasoning must proceed upon that principle that "instances (e.g., particular associations of any two objects) that occurred in the past, will continue to occur as such in the future (the principle of uniformity).

P3. If causal necessity is a function of reason, where that reason is based on the principle of uniformity, then the principle of uniformity must, in some fashion or other, be *justified;* it too must be "founded" in reason. In symbolic form this reads: $(N \supset P) \supset J$, where 'J' stands for "the principle of uniformity is justified by reason."

P4. There are only two kinds of reason that may justify a principle, including the principle of uniformity: a.) "knowledge" (demonstrative reasoning), or b.) "probable" reasoning.

P5. Assume that the principle of uniformity is justified by demonstrative reasoning.

P6. If the principle of uniformity is justified by demonstrative reasoning, i.e., it is an instance of demonstrative reasoning, then the principle of uniformity cannot be imagined otherwise.

P7. We can imagine that nature will not continue uniformly in the future, while simultaneously imagining that nature has always continued the same in the past, without contradicting ourselves.

   C1. The principle of uniformity is not proved, i.e., justified by demonstrative reasoning (*modus tollens*, P6, P7).

P8. The principle of uniformity is justified by probable reasoning (assumption for *reductio*).

P9. Probable reasoning is actually causal reasoning since both are cases where we are automatically led to think of an idea in virtue of experiencing an impression or remembering an impression.

P10. If the reasoning at hand is an instance of causal reasoning, then such reasoning is justified by the principle of uniformity.

C2. Probable reasoning is justified by the principle of uniformity (modus ponens, P9, P10)

C3. The principle of uniformity is justified by probable reasoning (i.e. causal reasoning) *and* justifies probable reasoning (i.e. causal reasoning). (P7, C2)

C4. The principle of uniformity is not justified by probable reason (*reductio*, P7, C3).

C5. The principle of uniformity is not justified by either demonstrative or probable reasoning (conjunction C1, C4).

P11. If the principle of uniformity is not justified by either demonstrative or probable reasoning, then we must reject the claim that the principle of uniformity is justified by reason.

C6. We must reject the claim that the principle of uniformity is justified by reason (*modus ponens*, C5, P11).

P12. If we must reject the claim that the principle of uniformity is justified by reason, then we must reject the claim that the necessity that seems to accompany causal relations is a function of reason.

C7. We must reject the claim that the necessity that seems to accompany causal relations is a function of reason (*modus ponens*, P13, C7).