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Intuitions for inferences

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Abstract In this paper, I explore a question about deductive reasoning: why am I in a position to immediately infer some deductive consequences of what I know, but not others? I show why the question cannot be answered in the most natural ways of answering it, in particular in Descartes's way of answering it. I then go on to introduce a new approach to answering the question, an approach inspired by Hume's view of inductive reasoning.

Keywords Deductive reasoning · Suppositional reasoning · Intuition · Conditional intuition · Descartes · Hume

1 The easy/hard question

There are infinitely many true propositions that are deductive consequences of the things I believe right now, but toward which I presently have no attitude. Most of these propositions I am not in a position to *immediately* infer. I mean that in order to infer them, I need to first come to believe a few other things, a few lemmas. Label these propositions that I'm not in a position to immediately infer *the hard consequences*. Other deductive consequences, as soon as I consider them, I am in a position to infer them immediately: I'm in a position to infer these consequences without first forming any new beliefs in other propositions. Label these *the easy consequences*.

Here's an example of an easy consequence: as I consider, for the first time, the proposition that dolphin babies are born live, I am in a position to infer it immediately; I adopt a belief in this proposition on the basis of beliefs I already hold in two other propositions: that all dolphins are mammals, and that all mammals are

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born live. An example of a hard consequence would be one of the following two propositions: (i) the decimal expansion of π up through the first 10 digits contains more odd than even digits, (ii) that expansion contains more or as many even digits. One of (i) and (ii) is a deductive consequence of things I know right now. But, knowing only what I know right now, I find that I am not in a position to immediately infer either one. To infer one, I'd first need to learn other propositions; for example, I could first calculate the beginning of π's expansion, or I could even just learn, from expert testimony, that (i), say, is a deductive consequence of what I already know.

I wonder: what is it about the easy consequences that **explains why** I am in a position to immediately infer them, but not in a position to immediately infer the hard ones? That's the question I want to explore in this paper. Let's call it *the easy/ hard question*. (This is also a good name for the question because it can at first seem easy to answer, but as we'll find, it turns out to be harder than it looks.).

2 A question posed from the subjective perspective

Note that I did deliberately pose the easy/hard question in the first-person. The question explored in this paper is a question about *one's own* reasoning, and I impose as a constraint on an acceptable answer that it appeal only to resources that are currently accessible to one's subjective perspective.

What's my motivation for focusing on this question? After all, according to many influential views, some of the most important features of deductive reasoning aren't always accessible to the reasoner's own perspective.

Consider two very prominent such views: First, cognitive scientists take the explanation of how we actually do reason to crucially involve subjectively inaccessible processes; the mental models theory of deductive reasoning is a representative example.[1] Second, externalists in epistemology argue that the features in virtue of which reasoning *is justified* are not always accessible to the reasoner's own perspective.[2]

I have no complaint with theories of cognitive science that address a psychological question about how we reason. I agree that subjectively inaccessible features of reasoning can be, and in fact are, important for answering certain interesting questions about how we reason. The existence of illuminating proposals like the mental models theory demonstrate this.

I'm open to externalist views in the theory of justification. Specifically, I am open to the view that, along one dimension of epistemically normative evaluation, externalism is correct. More specifically, the view I'm open to is this: when one person calls another's belief unjustified (irrational, etc.), the attributed property is one that holds in virtue of conditions that are not always accessible to the subject of

[1] See Johnson-Laird (2006). Such theories count as subjectively inaccessible because the researchers' methodology is to collect statistically significant data from tests (even tests using brain scans) on large numbers of people.

[2] See, for example, Goldman (1986) and Williamson (2000).

the evaluation. I do think this interpersonal dimension of epistemic evaluation has an important function.[3] And, what I'm open to is the idea that this dimension of evaluation involves the attribution of an externalist property of rationality. For example, if someone else infers, from the same premises as mine, that *not* all dolphins are born live, I will call him irrational. What I'm allowing, now, is that such an evaluation might not depend just on what's accessible *to him*. (The 'someone else' here could even be my past self or my counterpart in another possible world.)

However, all that having been conceded, there is an important reason to *also* examine our own reasoning from entirely within the subjective perspective. The fundamental reason for this is simple: I want to know about the epistemic justification I can, right now, *claim* for my beliefs. Anything inaccessible to me right now will not allow my claiming whatever justification it might generate.[4]

This question of one's first-personal claim to justification has a great deal of intrinsic philosophical interest and importance. Additionally, I believe it derives importance from the fact that the first-personal claim to justification is partly constitutive of any non-skeptical and non-trivial worldview. Why? Well, if I cannot even judge that my beliefs are justified, then I will not be able to judge that my beliefs amount to knowledge, and that, I am worried, would almost already be to relinquish my beliefs altogether. I could try to hold on to my beliefs while foregoing the claim to justification, but that would be akratic, and, I suspect, psychologically unstable: the choice is thus either to not believe, or to believe with a claim to justification.

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[3] See Dogramaci (forthcoming).

[4] The importance of this first-personal question has been emphasized by a number of epistemologists, perhaps most especially Foley; see Foley (1987), 1993 and 2001). Crispin Wright emphasizes the importance of claims to justification in a number of recent papers; see, for example Wright (2001), 2004, and 2009). And here is a helpful passage from Peacocke (1998) emphasizing the main point:

> In the basic, personal-level case in which something is done for a reason, whether it be in thought or bodily action, the reason-giving state must be either conscious, or it could become conscious for the thinker. A reason-giving state need not be actually conscious. If you decide to fly to Paris, you may call one airline rather than another. There need not be any conscious state, one contributing to what it's like for you, just before or after your decision, which is the reason-giving state which rationally explains your calling that airline. But if this was a minimally rational action, your reason could become conscious if the question arose. In a case in which no reason becomes conscious, when the question arises, and the thinker consequently cannot explain why he chose to call that airline, we have a much-diminished sense of the rationality of the action. The requirement that the reason could become conscious is reminiscent of a Kantian position: "It must be *possible* for the 'I think' to accompany all my representations; for otherwise…the representation…would be nothing to me" [B131; my (Peacocke's) emphasis]. The requirement that the reason-giving state is one which is or could become conscious is intimately related to our conception of an agent as someone with a point of view, and whose rational actions make sense to the subject himself (and not just to other experts) given that point of view. For an alleged reason-giving state which could not even become conscious, this condition would not be met. Any action produced by it would not make sense even to the subject himself. (P. 96)

Note that earlier in the paper (footnote 13), Peacocke says, 'My own view is that judgements are in fact actions, a species of mental action. Judgements are made for reasons.' Peacocke thus should be understood as talking about both practical and epistemic reasons.

Before I turn to the search for an answer to my question, let me add a quick note (one that foreshadows a conclusion reached at the end of the paper). While my question ostensibly concerns *deductive reasoning* as contrasted with inductive reasoning, I use this label only to identify my concern with inferences where the conclusion in fact is a deductive consequence of all the beliefs in the inference's basis. I do not assume at the outset that anything makes the *way* we reason in these cases special. For all we can assume as the outset, it may turn out, as Harman has suggested, that inductive and deductive reasoning are not at all interestingly different ways of reasoning.[5]

3 Logic doesn't answer the easy/hard question

A natural initial reaction to the easy/hard question is to think: shouldn't logic provide the answer to the question? After all, isn't logic the study of the relation of deductive consequence? In this section, I briefly say why I doubt logic will help answer my question. At a minimum, I want to justify devoting the rest of this paper to what I consider to be more promising strategies for answering the easy/hard question.

One thing logic textbooks do is *define* the deductive consequence relation in terms of preservation of truth. But, this doesn't help at all, since it doesn't discriminate among *any* consequences, much less the hard and easy ones.

What about the various *proof theories* found in the textbooks, the sound ones? Are certain consequences easy because they are the ones that follow by a single application of a primitive axiom or rule of inference in any of these systems? No, that's not right. In some sound axiomatic proof theories, there are unobvious axioms that would immediately take me to a hard consequence.[6] In the course of the soundness proof for such systems, the axioms' soundness require non-trivial arguments, which they wouldn't if these really were easy consequences.

Alright, why aren't certain consequences easy because they are the conclusions that follow by a single application of the primitive rules of a canonical *natural deduction* proof theory? After all, isn't natural deduction proof theory supposed to model actual reasoning? Also, doesn't my acceptance of canonical natural deduction rules plausibly constitute my grasp of logical concepts, and couldn't this somehow privilege those rules epistemically? Unfortunately, this suggestion also can't be right, because the set of propositions that follow by a single application of any natural deduction rule is only a small subset of the set of easy consequences. All natural deduction proof theories include a manageably small number of primitive rules, usually about twelve (two rules for each of the canonical connectives). It's true that, in most such systems, if a proposition follows by a single application of one of those twelve or so rules, then it is an easy consequence of what I know. Perhaps this is because they are meaning-constituting, or perhaps

[5] See Harman (1973) and (1986).

[6] For example, Peirce used this axiom (now called 'Peirce's Law'): $((p \supset q) \supset p) \supset p$. Or see the axioms on pp. 81–2 of Goldfarb (2003) or those on p. 167 of Hunter (1971).

not; it doesn't matter. The problem is that the vast majority of easy consequences of what I know do *not* follow by a single application of a rule in any set of 12 or even 20 rules. For example, just consider my inference that dolphins are born live. Note, the conclusion does not follow by Modus Ponens. The relevant rule would be something like: All *X*s are *Y*s, All *Y*s are *Z*s / ∴ All *X*s are *Z*s. The proof theories found in textbooks don't include a rule like this as a primitive rule. Of course, the primitive rules will allow me to derive this inference's conclusion from its premises; however, it takes at least something like nine or ten steps (grab any natural deduction textbook and try it out). But, my dolphin inference is certainly an easy inference, because I am in a position to infer it *immediately*. I don't need to first draw other intermediate conclusions, certainly not nine or ten(!), before I am in a position to infer that dolphins are born live. So, I can't answer the easy/hard question by saying the easy consequences are those that follow by a single application of the primitive rules of a canonical natural deduction proof theory.

Alright then, why aren't certain consequences the easy ones because they are the ones that follow by a *small number* of applications of primitive rules in a canonical natural deduction proof theory? Might the primitive rules provide a foundational layer of entitlement which then leaches to 'nearby' consequences? Unfortunately, even ignoring the ridiculous vagueness of this proposal, it still can't be right. This is because many deductive consequences are easy, even though the shortest proof is quite long. For example, knowing the axioms of set theory, an easy consequence is the so-called Pigeonhole Principle (roughly: if n items are in m sets, with $n > m$, then at least one set must contain more than one item). Even the shortest proof, however, is moderately lengthy and non-trivial.[7] And, some hard consequences can actually be proved in a very small number of steps. For example, the inconsistency of a naive comprehension axiom may not be difficult to see, but it will count as a hard consequence for most people, since the entailment of Russell's paradox must first be pointed out before the axiom's inconsistency can be inferred.

Finally, it will be useful to add the following reason why logic doesn't explain why I'm in a position to immediately infer certain consequences and not others. What one is in a position to immediately infer is relative to the reasoner. One obvious way that it's relative is that different reasoners have different bodies of knowledge. But there is more relativity than that. Even when reasoners have the exact same knowledge, what they're in a position to infer can still differ. I'm not in a position to immediately infer much about the decimal expansion of π, but somebody like the mathematical genuis Ramanujan can be, even if he or she doesn't start out knowing more propositions than I do. Since logic doesn't involve the study of anything that is relative to me or anyone else in particular, it doesn't address the question of this paper.

These points suggest that logic was never even meant to answer the easy/hard question. Perhaps there are other suggestion that could be made in defense of the relevance of logic to the theory of reasoning.[8] In particular, views that appeal to the

[7] See, for example, Enderton (1977, pp. 134–5), (including Corollary 6C).

[8] Harman has long argued that logic is irrelevant to the theory of reasoning; see, for example, Harman (1986). See Field (2009) for a recent attempt to defend a normative role for logic against Harman's objection; and see Harman (2010) for a reply. Harman's main point is that only *recognized* relations of implication could be relevant to reasoning, but ordinary reasoners do not recognize any relations

meaning-constituting nature of canonical natural deduction rules continue to be defended.[9] But, at least for the present, I take there to be sufficient motivation to look elsewhere.

4 Cartesian Views of deductive reasoning

Suppose logic is not the answer. The other natural, and currently most popular, ways of responding to the easy/hard question are what I call 'Cartesian Views'. Descartes was not the only, or even the first, philosopher to hold a view of this kind, but I use this name because many philosophers associate such views with him, especially in the context of a first-personal approach like mine in this paper. I give the general form of Cartesian Views as follows:

Cartesian Views of deductive reasoning If a reasoner is in a position to immediately infer a deductive consequence *p* of her beliefs, it's because she recognizes that a consequence relation holds between a set of believed propositions and *p*.

This is not a single view, but a family of views: the two underlined expressions are to be understood as place-holders. Descartes himself thought that a reasoner had to have an *intuition*, one of Descartes's notorious clear and distinct perceptions, that a relation of *necessary consequence* holds.[10]

Footnote 8 continued
specifically *as logical*, therefore logic is not relevant to the theory of reasoning. I think Harman's point is correct, and it suggests a view of the kind discussed in the next section of this paper.

[9] For defenses, see Peacocke (1993) and Boghossian (2003). For criticisms, see Schechter and Enoch (2006), Horwich (2008), Williamson (2008), and Dogramaci (2012).

[10] The primary basis for this historical attribution is the *Rules for the Direction of Mind*. Descartes never published the Rules, however it is the only place where he tried to define deduction. There, Descartes holds even the most elementary pieces of deductive reasoning to very high standards:

> The self-evidence and certainty of intuition is required not only for apprehending single propositions, but also for any train of reasoning whatever. Take for example, the inference that 2 plus 2 equals 3 plus 1: not only must we intuitively perceive that 2 plus 2 make 4, and that 3 plus 1 make 4, but also that the original proposition follows necessarily from the other two. (Descartes 1985, pp. 14–15)

Additionally, specialists on Descartes's theory of inference have explicitly attributed the present view to Descartes. See Gaukroger (1989, p. 53): '... Descartes could simply deny that one can define inference in terms which are better understood. But he does not do this. Quite the contrary, he effectively provides just such a definition in maintaining that, in the limiting case [in effect, the fundamental building block of multi-step deductions], inference comes down to the intuitive grasp of a necessary connection between premiss and conclusion.'

Against this interpretation of Descartes, one might draw on Descartes's claim in several correspondences that his *cogito* inference is not a 'syllogism'. One might then use that to argue that Descartes did not generally endorse a Cartesian View of deductive reasoning. For critical discussion of this suggestion, see Williams (1978/2005, p. 71 to end of chapter). Williams argues that even in the *cogito*, while it is not a syllogism with a major premise that *All thinkers exist*, Descartes does appeal to a premise that *In order to think, it is necessary to exist*. Also see p. 177 for Williams's endorsement of the present interpretation of Descartes's view of deductive reasoning.

At first glance, both those features of Descartes's view can appear problematic. Some philosophers complain that intuition sounds like a supernatural mental faculty, its reliability, in particular, difficult to explain. And, some complain that requiring reasoners to represent a relation such as necessary consequence is an implausibly excessive conceptual demand.[11] Partly for these reasons, a number of epistemologists, such as Chisholm, Foley, and Fumerton, defend Cartesian Views in which the place-holders aren't filled by either intuition or necessary consequence.[12] Foley, for example, has a very spare view: he only requires reasoners to have a certain kind of reflectively stable disposition to believe a certain conditional, namely, the conditional that if all the premises (are true), then the conclusion (is true).

From now on, then, I propose to focus on Cartesian Views in which the consequence relation is conceptually undemanding; we can suppose, as on Foley's view, it's a simple conditional, even a material conditional if we like. (More precisely, take the consequence relation to be the truth condition of the material conditional, sometimes called 'Philonean consequence'. In future, for brevity, I'll conflate talk of a conditional and talk of the associated consequence relation.)

However, I do not propose to dispense with intuitions. I think intuitions are especially well suited to help answer the easy/hard question. This is an important point, and requires some discussion, because it means that there is reason to stick with an intuition-based view, even if (and when) the Cartesian Views are all rejected.

5 Intuitions allow for a more general explanatory theory

Should a Cartesian interpret 'recognition' as having an intuition? Well, a preliminary, negative reason in favor of doing so is that 'recognition' cannot plausibly be belief (much less knowledge). When I inferred that dolphins are born live, my reasoning didn't involve any beliefs other than my beliefs (knowledge) that all dolphins are mammals and that all mammals are born live. For any consequence relation between those premises and conclusion, at best I might have been *disposed* to form a belief in it. But, since I didn't *already* believe in a consequence relation between those propositions when I made the inference, there was no belief to explain why I was in a position to draw the inference. To be clear, the problem is not that the belief that some consequence relation holds would have been *unconscious* at the time of the inference. The problem is I had no mental state of *belief*, conscious or unconscious, that represented any consequence relation between the premises and conclusion.

[11] The reliability worry descends from the problem Benacerraf (1973) raised for mathematical knowledge, a problem later sharpened in Field (1989) and (2005). Both the reliability and excessive conceptual demands objections are endorsed in Boghossian (2001), a review of BonJour (1998). BonJour endorses a Cartesian View like Descartes's own, using both intuition and necessary consequence to fill the place-holders. BonJour, though, understands intuitions very differently than Descartes does, and differently than I will below. (Note that Boghossian has sounded more receptive to intuitions in Boghossian (2009), a later review of another defense of intuitions, Sosa (2007)).

[12] See chap. 4 of Chisholm (1989), chaps. 1 and 2 of Foley (1987), and chaps. 3 and 7 of Fumerton (1995).

One might, at this point, grasp for Foley's suggestion: although I had no belief, I was in a state of *being disposed to believe*, say, that if my premises are true then my conclusion is too. But, I'll now argue, there are important positive reasons to think that intuitions are far better suited to *generally* explain why I am in a position to form the beliefs I do. This emerges from a proper interpretation of the nature of intuitions, especially their ability to explain how I'm in a position to form beliefs *non-inferentially*, and to claim justification for such beliefs. A proper interpretation of intuitions and their circumscribed normative role also defuses worries that intuitions are intolerably supernatural, and that their reliability is inexplicable. So, let me now say what I understand an intuition to be.

We have to start by considering the intuition-theorist's standard inspiration: perceptual experience. Suppose my eyes are shut, and I wonder whether the lights are on. I open my eyes and quickly form the belief that the lights are on. If I then ask myself what *explains why* I am in a position to form the belief that the lights are turned on, there is a natural, if simplistic, answer. I am in a position to form the belief that the lights are on *because* it visually *seems* to me that the lights are on. Furthermore, I can claim justification for my belief that the lights are on by citing this visual seeming. A mere disposition to believe provides no such satisfying explanation of these epistemic facts about perceptual belief. So, in the case of our perceptual beliefs, a visual seeming provides the overwhelmingly natural answer to a non-inferential, empirical analog of the easy/hard question.

I'm not going to offer any positive defense here of the view that citing our perceptual experiences suffices to explain how we are in a position to form, and claim justification for, perceptual beliefs. Rather, what I intend to do is take for granted the view's natural appeal, and then explore how to extend it to the epistemology of inference.[13]

Thus, the sort of seeming present in ordinary perceptual experiences is all that I will take an intuition to be. And the particular elaboration of the view that I will favor is this: intuitions just are a certain kind of phenomenally conscious temptation to believe.[14]

They are the temptations that we self-attribute in ordinary language by saying 'It seems to me that …'. Such temptations come in degrees, and if a temptation is strong enough, we might better say 'I find it obvious that …'.[15] (My use of

[13] For endorsements of this view of perceptual experience, see Pryor (2000), (2004), and Silins (2008). Note that I am remaining neutral on an important claim that Pryor and Silins disagree about, namely the claim that we can make an *argument* for the negation of Cartesian skepticism just by citing the fact that we are having certain perceptual experiences. That claim is criticized in White (2006). Silins (2008) accepts White's objections, and uses them to motivate his view. What I'm endorsing, with both Pryor and Silins, is the claim that our perceptual experiences are *what explains* why our perceptual beliefs have justification, and subjectively accessible justification at that.

[14] Endorsements of views of intuition, each one similar to the present one in at least some important respect, can be found in Bealer (2000), Huemer (2007), Rosen (2001), Sosa (2007), Yablo (1993), Chudnoff (2011a), (2011b), and Bengson (2010). The "temptation" language is used, with tentative endorsement, in Boghossian (2009). BonJour (1998) and Descartes (1985) take an intuition to involve significantly more than others do.

[15] Even if a proposition is false, I can find it obvious. Not every member of a known paradox can be true, but I can find each one obvious.

'intuition' thus may slightly extend the word's common meaning, since I use it to refer to a state that occurs in perceptual experience, and explains our claim to an empirical justification. Some might prefer to reserve 'intuition' to exclusively characterize apriori justifications. But some term is needed if our aim is to capitalize on the explanatory *generality* of a theory that posits a common source for perceptual as well as other kinds of justification, and 'intuition' suits the purpose best.[16])

The kind of temptation that counts as an intuition is not, of course, just any old phenomenally conscious temptation. A movie actor might feel the conscious wish that he sincerely believed his lines so that he could give a more compelling performance. Such a temptation, even if phenomenally conscious, is not the kind involved in intuition. The relevant kind of temptation in intuition is, as I say, the kind we find in our ordinary perceptual experiences.[17]

[16] Huemer, Chudnoff, and Bengson are intuition-theorists especially concerned with giving a general explanation of both perceptual and apriori justifications by appealing to a single type of state. Huemer (2007) uses 'appearance' to pick out the general justificatory state, but this conveys, as does 'seeming', a sense of tentativeness that I prefer to avoid, since I think intuitions are very often attributed with 'I find it obvious that …'. Chudnoff (2011a) and (2011b) uses the nicely evocative labels 'presentational phenomenology' and 'presentational feel' to characterize the justificatory state common to perceptual and apriori justification, but he doesn't offer a useful noun to pick out the state. Bengson (2010) calls the common state a 'presentation'. This is again a nicely evocative label, but I think it extends the meaning of an ordinary term even more than my use of 'intuition' does. (The characterization of perceptual experience as having a *presentational* phenomenology is also put to good use in a series of co-authored papers on the phenomenology of intentionality by Horgan, Graham and Tienson. See, for example, Horgan et al. (2004)).

[17] I insert 'ordinary' here (in the footnoted sentence) and elsewhere as a cautionary qualification, but I am in fact sympathetic to the view that phenomenal temptations are *essential* to perceptual experience: you cannot possibly have a perceptual experience without being tempted, in a phenomenally conscious way, to form an associated perceptual belief. I am skeptical of examples in which a subject reports that a perceptual experience does not tempt her to form a perceptual belief.

Sosa (2007, p. 48) briefly states his view that a perceptual experience need not 'attract' any perceptual belief: but his reason for saying this is his view that if you did not '*notice*' the scene in front of you, there would be no attraction to form any belief. Perhaps Sosa has in mind a far more substantial notion of attraction or temptation than the one I mean to be working with. In any case, I'm unconvinced by his point about noticing. Compare: while immersed in a conversation, an itch will *tempt* me, in a phenomenally conscious way, to scratch my knee, totally regardless of whether I *notice* the itch. Noticing is a matter of access consciousness; temptation, as I'm concerned with it here, is a matter of phenomenal consciousness. (The now famous access/phenomenal consciousness distinction is from Block (1995)).

What about examples where one has an experience known to be illusory, and thus reports no temptation to form any perceptual beliefs? I'm skeptical of the import of such examples as well. One reason for my skepticism is that temptations can often be fully *suppressed*, and when that's the case it might be appropriate to *assert* that you have 'zero' temptation to believe something for which you actually have a fully suppressed temptation. For example, when viewing the Müller-Lyer illusion, a subject who has taken measurements with a ruler may say 'I feel zero temptation to believe the upper line is longer than the lower line', but I would claim there is still an underlying temptation here. After all, when viewing the illusion, you are not in the exact state of equanimous non-temptation (to believe one line is longer) that you are in when viewing two *unmarked* lines of equal length.

In any case, for the present paper's purposes, I could allow that, using some much more out-of-the-ordinary examples, a case could be made for a perceptual experience that generated zero temptation to adopt any perceptual belief. My aim here is only to draw on the intrinsic appeal of the view that perceptual beliefs inherit justification from their associated perceptual experiences, but the appeal of this view come entirely from consideration of *ordinary examples* (for emphasis of this last point, see Pryor (2005), especially Sect. 3). An outlandish example of a perceptual experience that did not generate a temptation would not be a compelling example of an experience that plausibly generated justification.

And not *only* in perceptual experience. These temptations are familiar also from our attitudes toward examples of propositions known non-inferentially and *a priori*. When I consider whether it is necessary that Modus Ponens preserves truth, I have the same kind of phenomenal temptation to believe that content: I find it obvious that it's necessary that Modus Ponens preserves truth. I also find it obvious that $2 + 3 = 5$, that nothing is red all over and blue all over, that bachelors are unmarried, that Bill Gates could have been a poor man, and that any known proposition is a true proposition. Sometimes it turns out the contents of my intuitions are false: for example, it seems to me there are more composite numbers than prime numbers, even while I have zero confidence in that proposition.

Such intuitions play a normative role, though a circumscribed one: they explain, from within the subjective perspective, why I am in a position to form certain beliefs, and to claim justification for those beliefs. That is the *only* normative role for intuitions that I am defending here. I am *not* here defending the view that a subject's having an intuition suffices for epistemic justification of all kinds. For example, I'm allowing that when we make certain interpersonal evaluations, we are attributing a kind of epistemic justification which requires more than the subject's just having an intuition. That leaves externalists free to say, if they wish, that correctly attributing one kind of justification to Jones requires, say, that she have *reliable* intuitions, even though their (un)reliability might be inaccessible to her. Also, although in this paper I am assuming a non-skeptical view, I am avoiding taking any specific stand on what role intuitions may play in explaining why I'm in a position to believe that I'm not a brain in a vat, such that I can claim justification for that belief.[18]

So, the role for intuitions I am defending here is only this. Assume I know I am not a brain in a vat. Opening my eyes, I quickly come to believe that the lights are on. Furthermore, I claim to be justified in so believing. I then ask myself what explains why I am in a position to form the justified belief that the lights are on? I can only appeal, obviously, to what I have access to. But, the answer to my question is simple: the answer is that things seem to be a certain way; it seems that the lights are on.[19] And the same sort of explanation can be given for why I am in a position to form justified beliefs in certain *non*-perceptual matters as well, since it can also seem that $2 + 3 = 5$, that knowledge is factive, and so on.

[18] Thus, as mentioned in note 13, I am not committed to the anti-skeptical strategy, known as dogmatism, defended in Pryor (2000) and (2004). Dogmatism centrally involves a controversial position about when skeptical hypotheses serve as epistemic defeaters. In this paper, I am taking it as given that I know I'm not a brain in a vat, and only then am I endorsing the view that the phenomenology of perceptual experiences explains why I'm in position to form and claim justification for my ordinary perceptual beliefs. Again, as mentioned in note 13, this view of the explanatory power of perceptual experience's phenomenology is shared by dogmatists and non-dogmatists, such as Silins (2008). Silins argues that, though we must first know, *independently* of our perceptual evidence, that we are not brains in vats, the phenomenology of perceptual experience is still what explains our justification for our ordinary perceptual beliefs. (Silins talks of the experience's being what *makes* one justified; I read this as an explanatory relation.)

[19] To be complete, we might add that it doesn't also seem I'm being tricked, it doesn't also seem the lights are not on, or anything like that. For simplicity, I'm ignoring such potential conflicts among seemings in all these examples.

There is nothing mysterious or supernatural about it. Seemings are just phenomenally conscious states. We access them first-personally, just like how we grasp what it's like to see red. Grasping the relevant concept of a seeming requires having such seemings in your own first-personal experience, but we are all perfectly familiar with them.

Complaints about the unreliability of intuitions are irrelevant to the invocation of them from within a non-skeptical subjective perspective. Even supposing I *were* the unwitting victim of a Cartesian demon, intuitions could still play their role. Since I would still be a non-skeptical philosopher even in that scenario, it would still be the case, as far as *my* explanations would be concerned, that I am in a position to believe that the lights are on, and that I am justified in believing this, because of its visually seeming to me to be so.[20]

Now, so far I've been arguing that intuitions are well suited to explain why I am in a position to form beliefs about certain things *non-inferentially*: both perceptual and *a priori* matters. But, the topic of this paper, the easy/hard question, is *inference*. How should I explain a certain fact about my *reasoning*, namely that I am in a position to infer the easy consequences but not the hard consequences? If the explanatory power of intuitions extends to the domain of reasoning, then what exactly is the role of intuition in reasoning? A Cartesian View gives an answer to this question. To the extent that the recent advocates of intuition have even considered the role of intuitions in reasoning (and they have barely given it any attention), they haven't strayed from Cartesian Views.[21] But if—and *when*—the Cartesian Views turn out to fail, we will need to reconsider the role, if there is one, of intuitions in reasoning.

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[20] Moran rightly emphasizes that the actual truth-values of my propositional attitudes are not, in themselves, generally relevant to the deliberative question of what my reasons for belief are. See the discussion of *justifying reasons* in Sect. 4.5 of Moran (2001).

[21] BonJour explicitly endorses a Cartesian View; see BonJour (1998) and (2001). Sosa does not directly address the question, but on p. 58 of Sosa (2007), he seems to presuppose a Cartesian View. In the course of discussing a case of someone who has reasoned fallaciously, Sosa says,

> When we work our way back through the reasoning we eventually hit the fallacy; let it be an affirming of the consequent. At that point it must have seemed intuitive to the reasoner to think something of the following form: *that, necessarily, if q, and* $p \rightarrow q$*, then p*. In making that immediate inference, the thinker makes manifest his intuitive attraction to its corresponding conditional.

Huemer and Bealer both say almost nothing about the role of intuitions in inference. In a footnote, Huemer simply states, with no elaboration, that his view is that intuitions govern justification in general, not merely non-inferential justification. See the first footnote in Huemer (2007). Bealer's writing suggests his view is that inferences do not involve intuition. He says: '… [T]here are many mathematical theorems that I believe (because I have seen proofs) but that do not *seem* to me to be true and that do not *seem* to me to be false; I do not have intuitions about them either way.' See p. 3 of Bealer (2000).

One defense of intuitions that is exceptional for extensively discussing and defending a role for intuitions in inferences is Ewing (1941). Ewing's primary case for intuitions is that they are necessary for inference to be possible at all (see especially pp. 6–8). Ewing rests his case, however, on his very unambiguous assumption of a Cartesian View of reasoning.

6 Initial pressure on Cartesian Views: Boghossian's Carrollian point

I've heard many philosophers, at least in conversation, casually take it for granted that a problem is raised for Cartesian Views by Lewis Carroll's famous note 'What the Tortoise Said to Achilles'.[22] But, Carroll's note is so brief and cryptic that if it really does point toward some problem, it would take a great deal of work to draw out and elaborate that problem.

When you read Carroll's dialogue between Achilles and the Tortoise, one thing is clear: whatever Carroll's point could really have been, it must be about an infinite regress of some kind. This is, after all, the humor in Achilles's naively accommodating the Tortoise's endless requests for more and more premises. But, if that's so, then Carroll provides no good objection that applies to all Cartesian Views, and it is thus not strange that so many major epistemologists have continued to endorse Cartesian Views, including Chisholm, BonJour, Fumerton and Foley.[23] The Cartesian is not committed to an infinite regress of psychological states: the Cartesian says I am in a position to infer that dolphins are born live just because I have two premise beliefs and one intuition about a consequence relation. No 'intuition of an intuition' or any such thing is called for. And the Cartesian is not committed to an infinite regress of justificatory states: to claim justification for my belief that dolphins are born live, the Cartesian invites me to cite my intuition, but the intuition itself calls out for no further justifying state. The intuition itself is plausibly neither justified nor unjustified; it is not evaluable. If so, then intuitions thus halt any danger of a regress of justifying states in the same way many epistemologists think that perceptual experiences do.[24]

Now, Paul Boghossian has recently developed a new objection to Cartesian Views, one that is inspired by Carroll.[25] Boghossian's objection is not about a regress; rather, it concerns an explanatory weakness in Cartesian Views. I will now try to present Boghossian's objection. While I do think the objection ends up putting pressure on Cartesian Views, I will also explain why I do not think the objection, by itself, is fatal. In the next section, I will develop an original objection that, I think, leaves all Cartesian Views untenable. Then, in the section after next, I will begin to develop a new view that is motivated both by Boghossian's and my objections.

To see Boghossian's objection, consider any Cartesian View where the consequence relation just is the corresponding conditional for the inference in question. On such a view, what explains why I am in a position to infer that dolphins are born live is that I recognize a certain conditional.[26] I recognize that *if* all mammals are born live and dolphins are mammals, *then* dolphins are born live. I am

[22] See Carroll (1895).

[23] See notes 12 and 21.

[24] The plausible claim that intuitions are unevaluable, and thus regress stoppers, is not beyond questioning, and indeed it has been recently challenged by Sosa (2007, p. 55). But, of course, Sosa's contemporary argument won't vindicate anyone's casual appeal to Lewis Carroll as having made trouble for the Cartesian View.

[25] See Boghossian (2000), (2001a), (2001b), and (2003).

[26] What 'recognition' amounts to on the view won't matter. And, again, to strictly fit the general form I gave for Cartesian Views, we could say I recognize the holding of the consequence relation that captures

in no position to infer that there are (not) more odd digits in a certain expansion of π, because I recognize no conditional connecting that together with anything I know.

Now, this sort of view may have at least some initial plausibility as long as we only focus on examples like the above two. The problem arises when we ask how the view explains my ability to engage in one of the most fundamental patterns of reasoning, namely reasoning to a conclusion with the logical form ***q*** on the basis of known premises of the logical forms ***p*** and if-***p***-then-***q***. Call this pattern of reasoning, *reasoning by Modus Ponens*.[27]

Suppose I infer that Chicago lost on the basis of my beliefs that Jordan was injured and that if Jordan was injured then Chicago lost. The inferred deductive consequence is an easy consequence. The Cartesian Views under consideration, now, purport to explain why I am in a position to infer that easy consequence by appealing to my recognition of a certain conditional. What conditional? The conditional that IF: Jordan was injured, and if Jordan was injured then Chicago lost, THEN: Chicago lost. What Boghossian is concerned to point out is the explanatory redundany here. How does my recognition of such a conditional provide any *explanation* of anything? Recognition of the corresponding conditional adds nothing of significance when it comes to this pattern of reasoning. Invoking recognition of the corresponding conditional implies that recognizing such a conditional is explanatorily significant, but if it is, then wasn't the entire explanation already in hand to begin with? After all, when I reason by Modus Ponens, I already *know*—not just *recognize*—a conditional whose antecedent is something that I know, and whose consequent is the proposition I infer.

So, these Cartesian Views fail to explain a fundamental pattern of reasoning. Could other Cartesian Views do better, such as ones that interpret the consequence relation as something stronger, for example necessary truth-preservation? No, all alternatives have the same problem. Boghossian presented his point only in connection with views that take the consequence relation to be a conditional, but his point is general. Whatever a Cartesian View chooses for the consequence relation, the view will have a major blind spot: there will be a major pattern of reasoning that it cannot extend its explanation to. For any remotely interesting consequence

Footnote 26 continued
the truth condition of the conditional. If you think indicative conditionals don't have truth conditions (see discussion in Bennett (2003)), instead just consider material conditionals and Philonean consequence.

[27] It's a good idea to pause here to review an important clarificatory distinction due to Harman; see Harman (1986). Earlier, I talked about rules in proof theories. One such rule goes by the name 'Modus Ponens'. That is a rule of *derivation*, a rule that figures in some formal systems. Now, however, when I talk about *reasoning by Modus Ponens*, I am not talking about a rule of derivation, or any *rule* at all. I am talking about a certain *pattern* found in our ordinary reasoning, namely, all those pieces of reasoning where the thinker adopts a belief with the logical form ***q*** on the basis of two beliefs with the logical forms ***p*** and if-***p***-then-***q***. These two things are patently different: one is a rule in formal systems, the other is a pattern found in many bits of ordinary reasoning. Most philosophers take for granted that there exists some *rule* that guides ordinary reasoning and that bears a close connection with the rule of derivation Modus Ponens. As Harman has shown, it is not safe to assume there is any such rule. My discussion makes no such assumption. All I am interested in is reasoning of a certain *pattern*, i.e. the class of all those pieces of reasoning whose elements exhibit a certain logical form.

relation, any ordinary reasoner will be in a position to infer that ***q*** on the basis of knowledge that ***p*** and that ***q*** is a consequence, in the relevant sense, of ***p*** (e.g. that ***p*** necessitates ***q***). And, the Cartesian View won't explain why I am in a position to infer the conclusion when my reasoning exhibits that pattern. Every Cartesian View faces a blind spot.

I turn now to consider two ways that a defender of a Cartesian View could resist the pressure created by Boghossian's point. First, she might retreat to the following disjunctive position: she claims that her explanation covers most reasoning, including my inference that dolphins are born live, but she holds out hope for a separate explanatory theory to cover the blind spot, be it reasoning by Modus Ponens or something else.

Such a disjunctive maneuver would involve disjoining two explanatory theories, as follows. First, there is a Cartesian View, intended to handle most cases, cases where I only *recognize* that my conclusion is a consequence of known premises, like in my dolphin inference. Then, Boghossian points out that this Cartesian View cannot explain why I am in a position to infer a conclusion when, as in my Chicago inference, I reason by Modus Ponens (or whatever pattern is the blind spot in the particular version of the Cartesian View being considered). So, the Cartesian adds a separate theory; call it *T*. This separate explanatory theory *T* is intended to handle the blind spot, where I *know* that my conclusion is a consequence of known premises. *T*, though, can't handle all cases, since not every case is one of reasoning by Modus Ponens (or whatever the pattern of the blind spot is).

Though such a disjunctive position can seem *ad hoc*, it is also, unfortunately, nearly impossible to refute. It would, of course, be preferable to answer the easy/hard question without resorting to such a position. Pre-theoretically, reasoning by Modus Ponens and other conventional patterns of deductive reasoning all demand a single, unified explanation of why we are in a position to infer our conclusions in all these cases. So, if the Cartesian were to adopt this line of resistance, she could claim that Boghossian has not refuted her, even if he has still robbed her view of some of its explanatory power. Let's turn now, however, to a second and somewhat better way for the Cartesian to resist Boghossian's point.

The second line of resistance aims to preserve the goal of finding a single, fully general explanation to cover all patterns of reasoning. The suggestion here is that whenever I am in a position to infer ***q***, it's fundamentally because of a fact about *logical form*. The explanation is entirely provided by the logical form of the conclusion ***q*** together with the forms of the propositions that I either know or recognize: that ***p*** and that ***q*** is a consequence of ***p***. This fact about logical form provides the whole explanation, whether I know that ***q*** is a consequence of ***p*** (as in reasoning by Modus Ponens, or whatever the blind spot would've been), or merely recognize that ***q*** is a consequence of ***p*** (as in all others, such as the dolphin inference).

On this line, the Cartesian says that what is illuminating about her theory is its assimilation of all reasoning to a single and fundamental type, a type characterized by logical form. Speaking in her defense, she might observe that explanations must come to an end somewhere, so why not end with a fact about logical form that unifies all reasoning? This second line of resistance, thus, looks more attractive than the first. It does not appear quite as *ad hoc* as the first did.

However, even taking this line of resistance, Boghossian's point still robs Cartesian Views of some of their explanatory power. This is because there are areas of deliberation to which the theory now cannot generalize, and so the Cartesian must again resort to a disjunctive position.

One area the Cartesian View now cannot generalize to is *non-inferential* deliberation. The explanation of how I am in a position to form beliefs in any matters non-inferentially cannot be provided by facts about logical form. There are no premises for the conclusion to exhibit an interesting logical relation to, and certainly the logical form of the conclusion alone will not account for most non-inferential knowledge. The attractive explanation when it comes to non-inferential deliberation is, as I argued above, one that appeals to intuitions. By turning to logical form for her fundamental explanation in the inferential case, the Cartesian gives up on the hope of a fully general explanation for all belief formation.

At this stage of the debate, sympathizers with the Cartesian View can argue that a division between explanations in the non-inferential and inferential cases is tolerable. After all, they may say, inferential and non-inferential belief formation are quite different sorts of things.

Unfortunately, things are going to end up worse than that. It turns out the Cartesian View also cannot be extended to several of our most fundamental patterns of inference. For reasons very different from Boghossian's Carrollian point, the Cartesian View suffers from several further serious blind spots; there are several fundamental patterns of inference that require a very different explanation from the Cartesian's. This is shown next.

7 A new objection to Cartesian Views: inferences based on suppositional reasoning

It is a hasty over-generalization to identify inference with the adoption (or rejection) of one belief on the basis of other *beliefs*. Although many inferred beliefs are based exclusively on other beliefs, some are not. Some inferred beliefs are based not (only) on previously existing beliefs, but (also) on previously performed *inferences*, specifically suppositional inferences. Examples include *reductio ad absurdum*, reasoning by cases, and conditional proof. In *reductio ad absurdum*, first you reason from a supposition to an absurdity (usually a contradiction), and then on that basis you infer the negation of (or you inferentially come to reject) the supposition. Reasoning by cases is a hybrid, premised both on a belief and on instances of suppositional reasoning: you have a disjunction as a premise, and taking each disjunct as a supposition you reason from each toward a common conclusion, and on the basis of all that you infer the conclusion. In conditional proof, you infer a conditional on the basis of suppositional reasoning in which you infer that conditional's consequent from its antecedent.

Can a Cartesian View address these kinds of inferences? Recall the exact statement of the general form of Cartesian Views, which went as follows: if a reasoner is in a position to immediately infer a deductive consequence *p* of her knowledge, it's because she recognizes that a consequence relation holds between a set of believed propositions and *p*. Now, there is no purely *structural* obstacle to a Cartesian View addressing inferences based on suppositional reasoning. The relevant set of believed propositions can perfectly well be the empty set in some cases, if need be. Perhaps that's how we reason toward elementary logical truths according to a Cartesian View. But, what we find is that the plausibility of Cartesian Views turns out to rely on our having narrowly attended only to inferences that are based solely on beliefs, as in the dolphin inference. Cartesian Views lose all plausibility when applied to inferences that are based on other inferences. Let's look at a detailed example to see why.

Consider the subjective perspective of a bright undergraduate in her first logic course. How do you reason your way toward your first ever belief in an instance of the distributive law, a claim of the form: $[\ h \vee (i \,\&\, j)\ ] \supset [\ (h \vee i) \,\&\, (h \vee j)\ ]$? Unless you're another Ramanujan, you're not in a position to believe such a complex claim non-inferentially. Some reasoning is required. But the reasoning that leads you to this belief is not based on any standing, previously existing beliefs. Nor do you need to first come to believe any lemmas in order to infer this conclusion. All your reasoning requires as a basis is just a few iterations of suppositional reasoning. First, you suppose the antecedent of the entire conditional, $[\ h \vee (i \,\&\, j)\ ]$. Then, still holding on to that supposition, you make two separate further suppositions: the disjuncts inside that antecedent, *h* and *i* & *j*. Under either disjunct as supposition, the consequent is inferred. Then, under only the antecedent as supposition, the consequent is inferred. And finally, outside all the previous suppositions, you infer, and now outright believe, the conclusion $[\ h \vee (i \,\&\, j)\ ] \supset [\ (h \vee i) \,\&\, (h \vee j)\ ]$.

What this example illustrates is a piece of reasoning that results in the inference to an easy consequence, where the inference is not based on beliefs in premises, but is based rather on a mental process of suppositional reasoning. The conclusion meets the definition of an easy consequence for the reasoner, because no intermediate lemmas had to be learned before inferring the final conclusion. Suppositions are made, and reasoned under, but no outright beliefs are adopted until the conclusion is reached.[28]

As an easy consequence, it thus falls within the scope of what Cartesian Views purport to be able to explain. So we now have to consider how the Cartesian would explain why you are in a position to infer $[\ h \vee (i \,\&\, j)\ ] \supset [\ (h \vee i) \,\&\, (h \vee j)\ ]$. The

[28] Should I have set up my initial definitions so that a consequence is classified as hard if the inference to it requires *any* intermediate cognitive accomplishment, No, that would result in a theoretically uninteresting classification, since it would count all or nearly all inferences as hard. For example, every inference to a deductive consequence would count as hard according to any Cartesian, since Cartesians always require an act of recognition. And even non-Cartesians must agree that all inferences require some amount of cognitive preparation. In particular, before any inference can be drawn, the basis from which it will be inferred must be brought to mind in such a way as to enable the inference to instantiate the basing relation. In the dolphin example, the reasoner must bring the premise beliefs to mind in such a way that the inference to the conclusion is based on those beliefs (though this might not require the premise beliefs to be made fully conscious). In the distributive law example, a bit of suppositional reasoning is among the preparations that the inference requires in order to be appropriately based (and again, this might not all need to be fully conscious). None of this is any reason to classify these inferences as hard.

Cartesian says you must have recognized a consequence relation between some believed propositions and the proposition that $[\, h \vee (i \,\&\, j) \,] \supset [\, (h \vee i) \,\&\, (h \vee j) \,]$. The Cartesian says that *is what explains why* you are in a position to infer $[\, h \vee (i \,\&\, j) \,] \supset [\, (h \vee i) \,\&\, (h \vee j) \,]$.

The obviously bizarre thing about this explanation is that, since there are no previously believed propositions involved in the reasoning, recognizing a consequence relation here amounts to recognizing that $[\, h \vee (i \,\&\, j) \,] \supset [\, (h \vee i) \,\&\, (h \vee j) \,]$ is a consequence of a set of no propositions. In effect, it amounts to recognizing that it is a theorem. This is an utterly implausible explanation, for two reasons. First, it completely leaves out of the explanation the most important part of the reasoning, the act of inferring one thing under the supposition of another. The reasoning is distinctly inferential; there is an important role played by the cognitive basis of the reasoner's conclusion. Second, what the Cartesian instead does include is not plausibly relevant or helpful at all. It is not plausible that, in order to explain why you are in a position to infer the *truth* of a simple conditional, an appeal should be made to your recognition of any kind of fact about *theoremhood*.

It's crucial to note that, with that second point, I'm *not* complaining about any excessive psychological or conceptual demands made by the Cartesian View. Let the psychological and conceptual demands of the Cartesian View be completely watered down. My problem is about what would serve as an adequate *explanation* of why we are in a position to infer something. No matter how much the Cartesian simplifies her interpretations of recognition and theoremhood (the consequence relation), her explanation is severely implausible. Let recognition be, as in Foley's view, only a disposition to believe upon sufficient reflection. Let the consequence relation be the truth condition of a material conditional. Applied to our distributive law example, this would lead to an attempt to explain why you are in a position to infer some proposition by appealing to your disposition to believe just that proposition! That's obviously no explanation at all. Strengthening the consequence relation, say to necessary truth-preservation, doesn't help either. Your being in a position to infer a conditional is not plausibly explained by your recognition that the conditional is necessary. More generally, your being in a position to infer p is not plausibly explained by appealing to any relation you bear, in the course of your reasoning, to a more complex and stronger proposition, such as that p is necessary.

Could the Cartesian plausibly reinterpret the example, arguing that you reasoned in a *self-aware* way? What if the Cartesian said something like the following? First, you engaged in a bit of suppositional reasoning. Then, you reflected on your having so reasoned and came to recognize, say, that if your reasoning was truth-preserving, or perhaps rational, then belief in a certain conditional will be true, or rational. And only after all that did you infer the conditional.

At least the Cartesian has finally brought the suppositional reasoning into the picture. But still, recognition of a fact about your own suppositional reasoning cannot explain why you are in a position to infer your conclusion. Imagine using conditional proof to infer a material conditional, $p \supset q$. What fact about your suppositional reasoning could you recognize which would explain why it is rational for you to come to believe $p \supset q$? Consider the possibilities.

The explanation of why it is rational to believe a simple material conditional cannot be that you recognize that the transition in your suppositional reasoning (from p to q) was truth-preserving. Such an explanation assumes you *already* recognize either that $p \supset q$ or if not that then something even logically stronger. It's the same problem as before.

What about the suggestion that perhaps you must recognize that the inference from p to q in your suppositional reasoning was *rational*? This also won't explain how you're in a position to adopt the inferred belief. The obvious problem is that it's psychologically implausible to think that conditional proof involves the use of epistemically normative concepts. The problem is exacerbated by the fact that sometimes we use conditional proof to infer some material conditional, even though it would be *ir*rational to actually infer the consequent from the antecedent. I can use conditional proof to learn that $(p \,\&\, \sim p) \supset q$. But, I certainly don't recognize the rationality of the inference from antecedent to consequent; if I were to believe the antecedent, I should give up some existing belief rather than infer anything new. The transition is only rational when it occurs wholly within suppositional reasoning. But, to think a reasoner must recognize *that* fact—the fact that a transition is rational though only when restricted to contexts of suppositional reasoning—is all the more wildly implausible.

Let me emphasize again that our approach to the issue is from a subjective perspective. This is what brings out the sheer implausibility of the suggestion that our reasoning is and always was such a remarkably self-aware and conceptually demanding process. Worse, who would find an answer to the easy/hard question that crucially relies on dubious allegations of self-awareness a very satisfying *explanation*?

I conclude that the Cartesian View is untenable. And now we are able to appreciate the real challenge of the easy/hard problem. If no version of the Cartesian View can adequately answer it, how can there possibly be *any* good answer?

8 Hume's view of induction as a guiding model

I'm going to develop a new approach to answering the easy/hard question, a Humean alternative to Cartesian Views of deductive reasoning. But Hume himself did not clearly hold the kind of view of *deductive* reasoning that I'm going to develop. At least according to several prominent scholars, Hume held a squarely Cartesian View of deductive reasoning.[29] It will be useful for us to briefly look at

[29] According to some scholars, Hume, Locke and Descartes all held very nearly the exact same intuition-based version of the Cartesian View of deductive reasoning. See, in particular Owen (1999, pp. 91–2) and also see Millican (2002, p. 117 and the preceding section). In a personal conversation, Don Garrett identified himself as someone with some doubts about Owen's and Millican's interpretation. Garrett suggested that Locke does not count intuitions in the way that following Descartes would mandate, and that Hume, having no reason to follow Descartes's more extravagant view, would have followed Locke's view on such a matter as this. There may be no textual basis for deciding exactly which interpretation of Hume's view of deductive reasoning is correct. If Garrett is right, then the view of deductive reasoning that I am going to develop is not simply inspired by Hume's view of induction; Hume may have accepted it himself!

Hume's own views here. Here is an indicative interpretive summary of Hume's views on deduction, or 'demonstration' as he called it, from David Owen's book, *Hume's Reason*:

> I want to suggest that Hume took over from Locke and Descartes this view of demonstrative reasoning as the discernment of a relation of ideas . . . Intuition is the direct awareness that two ideas stand in a certain relation. And since for Hume ideas can sometimes be propositional, if two such ideas are intuitively related, we will have an intuitive inference. Demonstrative reasoning is the process whereby we become aware that one idea stands in a relation to another, not directly, but via a chain containing one or more intermediate ideas such that the relation between each idea and its neighbour is intuitively known. If the two ideas that stand in this indirect, demonstrative relation are themselves propositional, we will have a demonstrative inference from one proposition to another.[30]

Notice the clear commitment to the defining features of the Cartesian View. The deductive reasoner must recognize (specifically, through intuition) a consequence relation (a 'demonstrative' relation, whatever that may be).

These features of inference under the Cartesian View are exactly what Hume unambiguously does away with in his revolutionary theory of induction. Hume expresses his positive view of induction as follows:

> Reason can never shew us the connexion of one object with another, tho' aided by experience, and the observation of their constant conjunction in all past instances. When the mind therefore passes from the idea or impression of one object to the idea or belief of another, it is not determin'd by reason, but by certain principles, which associate together the ideas of these objects, and unite them in the imagination. Had ideas no more union in the fancy than objects seem to have to the understanding, we could never draw any inference from causes to effects, nor repose belief in any matter of fact. The inference, therefore, depends solely on the union of ideas.[31]

If the above seems too widely open to interpretation, Hume helps clarify his view in a long footnote that shortly follows; there, he says this:

> As we can thus form a proposition, which contains only one idea, so we may exert our reason without employing more than two ideas, and without having recourse to a third to serve as a medium betwixt them. We infer a cause immediately from its effect; and this inference is not only a true species of reasoning, but the strongest of all others, and more convincing than when we interpose another idea to connect the two extremes.[32]

Here is Owen's useful summary of what Hume is saying about induction:

[30] See p. 91 of Owen (1999).

[31] See p. 64 of Hume (2000).

[32] See p. 67 of Hume (2000).

> What makes Hume's account of this most basic sort of probable reasoning [i.e. induction] so distinctive is precisely that it is not based on reason, considered as a faculty that discovers the connection between ideas via intermediate ideas: there is no intermediate idea via which we reason from the impression to the idea. If we have had the relevant past experience, then, upon being confronted with the impression, the idea directly appears without our considering any intermediate ideas.[33]

Now, the aspect of Hume's thought that Owen is emphasizing in this summary is exactly the guiding idea that I want to extend to the case of deduction. No intermediate idea, no recognition of any *consequence relation*, helps to explain why we are in a position to immediately infer easy consequences. Instead of a recognized consequence relation, what Hume says 'unites' the basis and conclusion in an inference is some kind of 'associative' psychological mechanism.[34]

Hume's view of induction thus serves as a guiding model for a general category of views of deductive reasoning, which I characterize thus:

Humean Views of deductive reasoning If a reasoner is in a position to immediately infer a deductive consequence *p* of her beliefs, it's because she stands in an unmediated psychological relation to both the basis of her inference and the belief in *p*.

Put in other words, what's essential to any Humean View is that what connects, or as Hume says 'unites', the basis and conclusion of an inference is something at the level of *psychology*, and it does this without the help of any intermediating propositional *contents*. A Humean View thus excludes any explanatory role for the consequence relations which Cartesian Views said the reasoner must recognize to hold. My general formulation of Humean Views leaves it open, though, what this psychological relation is that unites the two halves of an inferences. So, as with my earlier characterization of Cartesian Views of deductive reasoning, this one underlines a placeholder that can be filled and elaborated in a variety of very different ways.

Unlike the family of Cartesian Views, however, it's much less easy to see what some concrete instances of a Humean View might look like. What could this mysterious associative psychological relation be? Hume's own view, expressed in the quotes that I just gave, is that the *imagination* (he also calls it 'the fancy') serves as the associative mechanism that unites the idea of cause with the idea of effect. But how exactly is the imagination supposed to unite these ideas? Hume claims that once we've experienced the constant conjunction of the two ideas, the experience of

[33] See p. 154 of Owen (1999).

[34] None of this is to say that these inferences aren't *reasonable*. Careful attention to the difference between 'reason' and 'reasoning' in Hume's vocabulary is crucial here. Although Hume writes that these inferences are not 'determin'd by reason', this is, as Owen notes, merely Hume's way of expressing his rejection of a Cartesian View for induction. They are still 'a true species of reasoning', indeed the 'strongest of all others'. I am thus reading Hume as no skeptic about the *epistemic* legitimacy of induction. Owen and Garrett similarly read Hume's as not aiming to raise a doubt about the epistemic legitimacy of induction. See chaps. 6 and 8 of Owen (1999) (especially pp. 118 and 117), and chap. 4 of Garrett (1997) (especially p. 92).

either idea *transmits vivacity* to the experience of the other, with no role for an intermediary idea of a consequence relation.[35]

But, I propose we set aside, at least for the moment, these further positive details of Hume's own theory about the associative mechanism of inference. Rather than try to interpret Hume's own notions of imagination and vivacity and rely on them as our guide, I want return to our old notion of an *intuition*. I want to develop the idea that intuitions are what guide deliberation, though they do so without the intervention of the Cartesian's 'intermediate idea'. What we're eventually going to come up with is a Humean View of deductive reasoning, where a special kind of intuiting will serve as the associative psychological relation. The next section begins to home in on exactly what this special kind of intuition needs to be like.

9 Toward a unified theory of belief formation

As emphasized earlier in the paper, what's appealing about an intuition-based theory of inference is the prospect of unifying our account of inference with a plausible theory of non-inferential belief formation. The question in front of us now, once we've given up on Cartesian Views and introduced the possibility of a Humean View of deductive reasoning, is this: *how* could intuitions play a role that will help us answer the easy/hard question? The objections to the Cartesian Views serve as constructive guides here. Let's look at them again.

First, return to Boghossian's Carrollian point. The lesson of that point was that Cartesian Views have a good deal less explanatory power than it at first seemed. We saw that the Cartesian's best prospect for explaining how we are in a position to draw an inference is to appeal, somehow or other, to the logical form of the reasoning. But, then the Cartesian can no longer give a unified account of inferential and non-inferential deliberation.[36] This sacrifices the most important explanatory gains that were promised by an appeal to intuitions. The hope was that we might elegantly generalize a satisfying theory of how perceptual experiences put us in a position to form perceptual beliefs: we hope to generalize a satisfying explanation we already have in the non-inferential domain to the inferential domain. Boghossian's point shows that this project is compromised, at least so long as the intuitions involved in inference are intuitions that some consequence relation obtains.

We need to forget about Cartesian Views, forget about consequence relations, and instead directly extend the role of intuitions from the non-inferential case, where they're intuitions in the form of perceptual experiences, to the inferential case. Inferences must involve intuitions *for the very conclusions drawn*.

It is, in retrospect, strange to explain inference by appealing to a reasoner's intuition of some consequence relation's holding between premises and conclusion.

[35] For useful discussion of vivacity, see Fogelin (1985), especially the chapter "Skepticism and the Triumph of Imagination", Garrett (1997) and Owen (1999).

[36] I'm just considering Boghossian's point in isolation now. As we saw, once my suppositional reasoning objection is added, even inferential deliberation itself cannot be given a unified account.

How does that explain why I am in a position to infer a conclusion, unless I can take the explanatory relevance of a certain logical form of reasoning for granted? It is simpler and more satisfying if the explanation appeals to an intuition directly aimed at the inferred conclusion.

My suppositional reasoning objection against Cartesian Views leads to the very same moral. We'd like to appeal to an intuition to explain why we're in a position to infer a conditional (such as an instance of the distributive law) on the basis of a piece of suppositional reasoning to its consequent from its antecedent. But, our inferring that conclusion has nothing to do with an intuition concerning any consequence relation. We ought to, if we can, completely throw those consequence relations out of our theorizing about inferential reasoning. Intuitions, if they explain why we're in a position to draw inferences of these kinds, point us directly to our conclusions. I'm in a position to form the belief that the lights are on because it seems to me that the lights are on. In general, then, I must be in a position to form a belief that *p* because it seems to me that *p*.

However, our moral so far cannot tell the whole story: we cannot fully explain why we're in a position to infer an easy consequence just by appealing to an intuition of the relevant conclusion. That would suggest that the conclusion was in fact *non*-inferential. Inferential and non-inferential belief formation are appreciably different from the subjective perspective. The right explanation of why we are in a position to *infer* something must mention the *basis* of that inferential reasoning.

We've reached a crucial point. Our predicament is this. On the one hand, an intuition of a conclusion cannot explain *inferential* reasoning, if the intuition lacks any connection with the inference's basis. On the other hand, an intuition that some consequence relation holds, while it may make a connection with the basis of the inference, it does so at a high expense. It does so at the expense of losing contact with the conclusion (by shifting the explanation to logical form) and dramatically overcomplicating the architecture of inferential deliberation (as illustrated when suppositional reasoning is part of the basis). What kind of intuition, then, gives us everything we want: direct guidance to the conclusion, but firm grounding in the basis?

The lesson is that we need a Humean View. We should connect an intuition of an inferred conclusion with the basis, but not by locating that connection within some *consequence relation* between the *contents* of the basis and the conclusion. Rather, the connection is to be found in the *mental state* that is the intuition itself. The intuitions themselves are grounded in the basis of the inference. We are thus seeking to unite the basis and conclusion of an inference not by appealing to a consequence relation, but something psychological, a mental state. It's this mental state that will fill the placeholder in the general formulation of Humean Views.

The intuitions we are seeking require a crucial feature. The feature is that, in order to play the explanatory role a Humean View assigns to them, these intuitions need to be conceived of as *three-place relations*. My having this kind of intuition cannot just be a matter of my bearing a two-place mental relation (like recognition) to some two-place consequence relation (like necessary truth-preservation) between the contents of my inference's basis and my inferred belief. My having this kind of intuition must involve participation in a three-place relationship between myself, the basis of my inference, and the inferred belief.

An analogy may help illustrate the distinction I'm drawing. Compare our folk conceptions of, on the one hand, *believing* and *desiring*, and on the other hand, *preferring*. Our folk conceptions of the former are of relations between just two things, a person and a proposition. For example, Al believes that snow is white, or in other words, the belief relation is instantiated by the ordered pair consisting of the person Al and the proposition that snow is white. But, our folk conception of preferring is of a three-place relation. *Al* prefers *that Betty come home late* than *that she never come home*. In the previous sentence, the italicized words express the three parameters of a three-place relation, which is expressed by the unitalicized words.

This three-place conception of preferring is extremely important to our folk way of thinking. It figures in our richest explanations of a person's behavior. Of course, we often do give explanations of someone's behavior just in terms of her beliefs and desires. We say that Jones signed up for the army because she desires to protect her country's freedom and she believes that she can do so only if she fights in the army. But we can give a richer, better explanation of Jones's behavior if we can appeal to her preferences, rather than just things she flat-out believes and things she flat-out desires. We can explain why Jones signed up for the army, even over the protests of her family.[37]

In addition to preference, the Bayesian notion of conditional belief provides another useful example of the kind of fundamentally three-place mental relation we seek. As David Lewis showed, conditional belief cannot be a two-place relation, on pain of an absurd identification of $P(\mathrm{H}|\mathrm{E})$ and $P(\mathrm{H})$.[38] Unfortunately, the Bayesian framework relies on an assumption that agents are probabilistically coherent, and hence deductively omniscient.[39] In such a framework, it is impossible to address any question, like our easy/hard question, about deductive learning.

[37] We could give the rich explanation in terms of just belief-like and desire-like notions if we replace our folk two-place conceptions with the modern three-place decision-theoretic conceptions of credence (degree of belief) and utility. The three-place relations here are between a person, a proposition, and a value between 0 and 1. Indeed, one of the major goals (accomplishments, some would argue) of modern decision theory is to show that when an agent's preferences meet certain coherence constraints, they can be uniquely modeled by a pair of credence and utility functions for her. For a non-technical and philosophical discussion of such representation theorems, see Christensen (2005). For a thorough technical treatment, see Joyce (1999).

[38] See Lewis (1976). Lewis's original paper was followed-up, by him and others, and his proof has been strengthened several times. See Bennett (2003) and Edgington (1995) for overviews.

[39] There have been a few attempts to make Bayesianism more realistic by relaxing the assumption, notably Hacking (1967). (The assumption has also been relaxed in the course of attempts to solve Bayesianism's so-called Problem of Old Evidence, most famously Garber (1983). But, Garber only relaxes the assumption partially: he still requires an agent to be omniscient about the truth-functional deductive consequences in a certain language. See Earman (1992, p. 124) for discussion.) Hacking's theory allows a rational agent to not know any deductive consequences of things she already knows. Hacking, unfortunately, says almost nothing about, when an agent actually does infer a deductive consequence, *how* she does so. (He only says one thing about how a rational agent may, in his theory, know a deductive consequence q: Hacking says she may use Modus Ponens to infer it from the known propositions p and $p \supset q$. His presentation does leave it open that there are other ways of coming to know a deductive consequence.).

10 Introducing conditional intuitions

Now, is there a mental state that, as a three-place relation, can explain why I'm in a position to infer easy consequences? The type of mental state we seek exists. I call these mental states *conditional intuitions*, and though they don't have a familiar name, the state itself is perfectly familiar. Earlier, I characterized intuitions as a certain kind of phenomenally conscious temptation to believe, the kind we are familiar with through perceptual experience. Conditional intuitions are just a more specific category of such temptations: to have a conditional intuition is to be tempted, in a phenomenally conscious way, *by* certain existing considerations *to* believe a conclusion. And though there is no name in ordinary language for conditional intuitions, we do have ordinary ways of attributing them to ourselves. We say, 'In the light of certain considerations, it seems to me that …', or, if we are strongly tempted by those considerations, 'In the light of those considerations, I find it obvious that …'.[40]

Conditional intuitions play the role of the unmediated psychological relation in my Humean View. Conditional intuitions thus are not simply two-place relations between reasoners and contents. They relate (a) a reasoner, (b) mental states or processes that serve as the basis of the reasoning, and (c) the belief that serves as the conclusion of the reasoning. A reasoner's conditional intuition relates her at once to both the basis of her reasoning and to the conclusion she draws (or withdraws[41]). She is tempted *by* the considerations that serve as the basis of her inference, and she is tempted by those considerations *to* adopt a new belief. The basis can be a belief (a state), it can be a piece of suppositional reasoning (a process), or it can include both, as it does in reasoning by cases, for example.

The way in which a conditional intuition *unites* your basis and conclusion, on this Humean View, is not by representing both of them in a single content, but via the psychological relations of being tempted *by* the basis *to* believe the conclusion. Because having a conditional intuition is, in part, a matter of your being tempted-by your basis, there is no need for you to represent, via some highly complex content, your having believed or supposed or suppositionally inferred this or that. Rather, the basis itself, a mental state, is a causal predecessor of your temptation to believe the conclusion. Note, however, that mere causal origination, as such, is not what's explanatorily significant from the subjective perspective. What's explanatorily significant here is something available to the subjective perspective: it's your being

[40] To avoid unnecessary complexity, throughout this paper, I have only talked about outright belief, rather than degree of belief. I am sympathetic, though, to taking degree of belief as the fundamental doxastic state. Temptations to believe come in degrees as well, degrees of intensity. We might eventually hope to explain the fact that temptations to believe come in degrees by associating those degrees of temptation with the degree of belief one is tempted to hold. But still, the relationships among the degrees of belief we have in the various propositions involved in our reasoning are very complex, too complex for me to say much about them here. All I'll note here is that a straightforward Bayesian story will not be plausible for our purposes, since, as noted, Bayesians assume deductive omniscience, and so they have no theory of deductive learning, which is our interest here.

[41] For expository convenience, I generally talk as if inference always results in the addition of a new belief. Of course, sometimes inference results in the reasoner's giving up some old belief. In these cases, her conditional intuition involves a temptation to disbelieve.

tempted, *in a phenomenally conscious way*, by your basis (some beliefs, some suppositional reasoning, or both), to believe your conclusion.

This phenomenal temptation *by* the basis of the reasoning that the reasoner feels in having a conditional intuition is what distinguishes conditional intuitions from the intuitions that explain how a reasoner settles matters non-inferentially. Call the latter sort of intuition, the kind with the conventional two-place structure that Descartes, BonJour, Huemer, Sosa and Bealer all presumed intuitions to have, *unconditional intuitions*. It may be helpful if we contrast the special tempting-by feature of conditional intuition with a paradigmatic case of unconditional intuition. I am tempted to believe that nothing is red all over and green all over, and am thereby in a position to settle the matter. I would report my intuition by saying 'I find it obvious that nothing is red all over and green all over.' I find this claim of color incompatibility obvious without having to consider it in the light of any other considerations. Perhaps I *could* also find it obvious in the light of something else, for example if I visualized a ball and found myself unable to paint it both red all over and green all over in my mind; I might be tempted by such a mental exercise to believe that nothing is red all over and green all over. But, even if this did serve as the basis for an inference (using reasoning by universal generalization), it would not show that I don't (also) believe this proposition non-inferentially. I don't find the claim obvious *only* in the light of such a consideration. I am tempted to believe the claim in a way that does not involve any other consideration that I am being tempted by. This puts me in a position to settle the matter non-inferentially.

Since early in the paper, I've emphasized that temptations-to, the state present in both unconditional and conditional intuitions, be understood as something phenomenally conscious. What I'm emphasizing now is that it's no less important that the temptation-*by* in conditional intuitions be understood as phenomenally conscious. Temptation-by is a feature of our first-personal experience. This is how we can explain, from within the subjective perspective, why we are in a position to draw conclusions *on the basis of other considerations*. Accessibility to the subject is important here. Without it, the subject cannot make sense of why certain beliefs of hers are *dependent* on other prior considerations, why, for example, a challenge to those considerations poses a challenge to the inferred conclusion as well.

Readers familiar with and interested in drawing comparisons to other intuition-based views in the literature may now notice some of the advantages of plugging my particular account of intuitions into a Humean View. One point already suggested much earlier was that views that define intuitions as having an inaccessible external component (e.g. views that say only reliable intuitions are genuine intuitions) are unsuited to address the particular question of this paper, the easy/hard question. They don't provide the subject sufficient resources to claim justification. But what advantages does the present view have over the views of an intuition-theorist who is an avowed internalist, e.g. BonJour (1998) or Huemer (2007), or one who emphasizes the *sui generis* nature of intuitions, e.g. Bealer (2000) and perhaps BonJour and Huemer as well?

On the one hand, I welcome the incorporation of these views into a Humean framework. A main aim of the present paper has been to make a useful suggestion about what anyone attracted to such a view should consider when extending it to the case of inference.

On the other hand, I think that the *mere* claim that intuitions should be deployed in a Humean View, while perhaps somewhat appealing on its own, calls out for elaboration. In particular there are questions such as the one I tried to address a few paragraphs earlier: what can be said by the subject who wonders why her being in a position to infer and claim justification for some conclusion is *dependent on certain other considerations*, namely the considerations that serve as the basis of the inference? My proposal has been that we should generalize a plausible view of perceptual experience and belief. A perceptual experience can explain why the subject is in a position to form and claim justification for a perceptual belief: it can do so because of the experience's phenomenally conscious nature. If we want to generalize that to explain a subject's being in a position to form and claim justification for an *inferred* belief, then we should look to a similarly phenomenally conscious state present in inference: this is an advantage of interpreting intuitions as phenomenally conscious states. And by interpreting them as phenomenally conscious *temptations*, we gain the further advantage of being able to explain how intuitions can serve as a three-place psychological relation to both halves of an inference: a conditional intuition is a temptation *by the basis*, *to believe the conclusion*. Theorists who favor some other view of intuitions to plug into a Humean View of deductive reasoning will need to say how their view provides a psychological relation that is (i) accessible to the subject, (ii) a relation to both the inference's basis and conclusion, but not via some intermediating content, and (iii) is plausibly found in ordinary inferences to easy consequences.

To again emphasize an important point from earlier, the kind of temptation involved in intuition on my view is not, of course, just any old phenomenally conscious temptation. The temptation created by an offer of money for believing that Pepsi tastes better is not the right kind. What sort of phenomenally conscious experience is the right kind? The relevant kind of temptation is one we are each familiar with only through our first-personal experience, through our roles as perceivers and reasoners.

And now, although we did not explicitly take Hume's notion of *vivacity* as our guide, we may have converged onto something very much like it. Hume emphasized the impossibility of grasping the nature of vivacity in any way other than through one's own subjective experience. 'I scarce find any word that fully answers the case, but am oblig'd to have recourse to every one's feeling, in order to give him a perfect notion of this operation of the mind.' (Hume 2000, p. 68). Vivacity thus may be that ineffable phenomenal feature that is the distinguishing mark of intuitions in the present view.

If I may be allowed to rely on our antecedent familiarity with the phenomenology of intuition as a temptation, my hope is to have proposed a novel and plausible elaboration of the structure of these intuitions as they play a role in our inferences. Intuitions in inferences are three-place relations between the reasoner, the considerations serving as the basis of the reasoning, and the conclusion of the reasoning. The result, in effect, is that I have to borrowed Hume's classic views on inductive reasoning, and extended them to where he did not, to the case of deductive reasoning.

11 A conclusion: deductive versus inductive reasoning

The main question of the paper was: what is it about an easy consequence, such as that dolphins are born live, that explains why I am in a position to infer it, even while I am in no position to infer a hard consequence, such as that there are more odd digits in some expansion of π? I asked and meant to answer the question from the subjective perspective, my perspective as the reasoner who infers that dolphins are born live. I required an explanation that will allow me to claim justification for my belief.

According to a Cartesian View of deductive reasoning, I'm able to infer easy consequences because I recognize a consequence relation holding between the conclusion I infer and my previous knowledge. I argued against such an explanation. The particular objections to Cartesian Views guide us instead toward a Humean View, which I've elaborated using a notion of *conditional intuition*. I have a conditional intuition that dolphins are born live, which is generated by my belief that dolphins are mammals and all mammals are born live. I might self-attribute this conditional intuition by saying, 'It seems to me, in the light of my beliefs that dolphins are mammals and mammals are born live, that dolphins are born live.' This does not involve my bearing any recognition relation to a consequence relation between propositions. I am at once related to the basis and conclusion of my reasoning. I have no such intuition to put me in a position to infer how many digits are in some long expansion of π.

If we accept a Humean view of *inductive* reasoning, the extension to the case of *deductive* reasoning has an interesting upshot. For all our attention to that category of reasoning labeled 'deductive', it turns out, as Harman (1973) insisted, there aren't two fundamentally different *ways of reasoning*, deductively and inductively. To be sure, if we wanted to, we could continue to categorize reasoning as deductive whenever the thinker draws a conclusion with a content that is a deductive consequence of the beliefs she based her conclusion on. But, the category has no significance from the subjective perspective of the reasoner. Even though, upon reflection, we often do know of various consequence relations that hold among the contents of our inferences, no recognition of such relations is involved in the reasoning itself.

In the end, then, it's a virtue of the Humean approach that it gives a highly general explanation of why we are in a position to form beliefs about all kinds of matters. The general explanation is by appeal to intuitions, be they the unconditional intuitions of perceptual belief formation, or the conditional intuitions of inference. We have also met the goal of providing an explanation entirely from within the subjective perspective. It's the reasoner's intuitions, a feature of her phenomenally conscious experience, that explains why she is in a position to immediately infer easy consequences. And, it is these intuitions that the reasoner cites in claiming justification for her belief.

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