Is logical knowledge dispositional?

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Abstract

In a series of recent papers, Corine Besson argues that *dispositionalist* accounts of logical knowledge conflict with ordinary reasoning. She cites cases in which, rather than applying a logical principle to deduce certain implications of our antecedent beliefs, we revise some of those beliefs in the light of their unpalatable consequences. She argues that such instances of, in Gilbert Harman's phrase, 'reasoned change in view' cannot be accommodated by the dispositionalist approach, and that we would do well to conceive of logical knowledge as a species of *propositional* knowledge instead. In this paper, we propose a dispositional account that is more general than the one Besson considers, viz. one that does not merely apply to *beliefs*, and claim that dispositionalists have the resources to account for reasoned change in view. We then raise what we take to be more serious challenges for the dispositionalist view, and sketch some lines of response dispositionalists might offer.

Keywords: Logical knowledge · Change in view · Dispositions · Blameless but blind reasoning · Propositional knowledge

Joe Shmoe is an ordinary reasoner. He has never undergone any logical training, and yet he displays a certain logical competence: he oftentimes engages in correct deductive reasoning and is sensitive at least to the more obvious contradictions in his

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thought and talk, and in that of others. It seems reasonable to credit Joe at least with basic logical knowledge.

Here are two questions we might ask concerning Joe's logical knowledge. First, we might ask what makes Joe's logical knowledge *knowledge*, i.e. in what sense (if any) are Joe's logic-based belief-forming processes (and the beliefs formed by means of them) justified? Second, we might ask after the *nature* of Joe's knowledge of logical principles (e.g. Joe's knowledge of Modus Ponens (MP)).[1] Is it a form of explicit knowledge that Joe is able to articulate (at least under favorable conditions), or does Joe's knowledge fall within the remit of implicit or tacit knowledge? Is it a type of *propositional* knowledge or is it better accounted for in *dispositional* terms? Our focus will be on the second set of questions.

Propositional accounts of logical knowledge, as the name make plain, maintain that having knowledge of MP consists in having knowledge of a proposition, for instance the proposition that expresses MP's validity. Traditionally, accounts of this form faced a number of well-known obstacles.[2] First, if Joe's knowledge of logic is propositional shouldn't we expect him to be able explicitly to formulate the relevant propositions? But Joe has no such ability.[3] Second, Joe arguably does not even possess the concepts necessary for an understanding of the proposition he allegedly knows.[4] This would be the case, at least, if propositional knowledge of a principle like MP presupposed a grasp of meta-logical (and possibly modal) concepts like those presumably involved in understanding the schematic nature of logical principles as well as the general notion of logical consequence.[5] Third, it has been argued that propositionalist accounts of logical knowledge are vulnerable to a Lewis Carroll-type

[1] For simplicity we will adopt MP as our stock example of a piece of logical knowledge. As we will see later, however, it will at times be necessary to consider other types of logical principles. For now we may leave it open how much logical knowledge can be ascribed to the average reasoner.

[2] To be sure, there are a number of responses propositionalists might try to offer in response to each of these objections. Our objective here is not to make the case against propositionalism, but merely to present some *prima facie* motivations that have led some philosophers to seek alternatives.

[3] A natural reaction to this charge would be to hold instead that propositional knowledge can be a form of implicit knowledge, which can nevertheless become explicit through reflection or theorizing. Similar claims have famously been made by Noam Chomsky with respect to the grammatical competence of ordinary speakers (Chomsky, 1986). Other philosophers have questioned the intelligibility of such a notion of propositional but implicit knowledge. Again: here is not the place to address this thorny question.

[4] Cf. Boghossian (2001, p. 638).

[5] Corine Besson's (expressly provisional) formulation of the proposition supposedly mastered by MP-knowers is a case in point: 'P and ⌜if P, then Q⌝ implies Q' (see Besson, 2012, p. 20). Besson argues that the conceptual demands that propositionalism places on the average logically competent reasoner are not as stringent as the dispositionalist makes them out to be (idem, p. 78–9).

regress argument.[6]

In light of these worries many authors have shunned propositionalism, putting their money on dispositional accounts of logical knowledge instead. In recent years this approach was perhaps most prominently championed by Paul Boghossian (2000, 2001, 2003) as part of his account of the possibility of deductively acquired knowledge (or justified belief) by what he calls "blind but blameless reasoning" (2003, p. 237). Our practice of deductive inference is 'blind' because we lack explicit knowledge of the deductive principles we tacitly follow; rather we are disposed to infer according to such principles. Yet our practices (and our knowledge of the underlying principles) are blameless because they are constitutive of the very concepts ingredient in them. To posses a logical concept is, in Boghossian's view, to be *disposed* to infer according to the basic rules governing its use. Hence, both his account of the *nature* of our logical knowledge, and his account of our understanding of logical concepts, is dispositional.[7]

In her recent paper 'Logical knowledge and ordinary reasoning', Corine Besson takes issue with dispositional accounts both of logical knowledge and of our understanding of logical concepts. Dispositional accounts, she argues, are in conflict with ordinary reasoning.[8] To substantiate her point, she cites cases in which, rather than applying a logical rule to deduce consequences of our antecedently held beliefs, we abandon some of those beliefs in the light of the consequences they give rise to. Such cases of, in Gilbert Harman's phrase, 'reasoned change in view' abound in ordinary reasoning and yet, Besson argues, they appear to be at odds with the dispositionalist approach. Consequently, logical knowledge and our understanding of the logical concepts are best conceived of as species of *propositional* knowledge. In this paper, we offer a novel dispositionalist account that does have the resources to accommodate our ordinary practices of belief formation and revision.

The paper is structured as follows. Sections 1–2 introduce Besson's objections to dispositionalism. Section 3 argues that dispositionalists can account for episodes of 'reasoned change in view', and presents a more general dispositional account which, we claim, is immune to Besson's challenges. Section 4 focuses on what we think are

[6]See Boghossian (2001, p. 26 and ff.).

[7]For Boghossian the aforementioned questions concerning the justification of our logical knowledge and its nature (whether it is a type of propositional or dispositional knowledge) are inextricably linked to the question of our understanding of logical concepts or expressions. For present purposes, however, we do well to distinguish the three questions.

[8]While Besson (2012) focuses on dispositional accounts of logical knowledge, analogous arguments, this time targeting dispositional accounts of what constitutes understanding of logical concepts, are developed in Besson (2010a). See also Besson (2010b).

more serious challenges to dispositionalism and considers possible replies on the dispositionalist's behalf. Section 5 offers some concluding remarks.

1 Dispositions to infer and ordinary reasoning

The crux of Besson's argument is that dispositional accounts of logical knowledge conflict with ordinary reasoning; in its stead she proposes a propositional account of logical knowledge, which, she argues, *is* in line with our practices of belief maintenance while being equally capable of accounting for deductively acquired knowledge as 'blind but blameless'. To fix ideas, let us lay down the following schematic principle:

- (Dispositionalism) A reasoner S knows MP iff S has a disposition (or set of dispositions) with respect to MP.[9]

Besson's argumentative strategy is perhaps best illustrated by considering a somewhat flatfooted form of dispositionalism. We obtain it by spelling out Besson's phrase "having a disposition with respect to MP" by means of the following principle:

- (Inference) S has a disposition with respect to MP iff S is disposed to infer in compliance with MP.

Putting the two—(Dispositionalism) and (Inference)—together and adding the following

- (Belief) S is disposed to infer in compliance with MP iff whenever S believes P and $\ulcorner$if P, then $Q\urcorner$, S is disposed to infer (and hence *form the belief* that) Q.

we obtain

- (Crude) S knows MP iff whenever S believes P and $\ulcorner$if P, then $Q\urcorner$, S is disposed to infer (and hence form the belief that) Q.[10]

How is dispositionalism so conceived in conflict with our deliberative modes of forming and revising beliefs (i.e. 'reasoned change in view')?

To bring the said conflict to light, Besson appropriates examples familiar from Gilbert Harman's work.[11] Harman has long emphasized the lack of a straightforward

[9] See Besson (2012), *passim*.
[10] (Crude) is identical to Besson's principle (DTI) (p. 63).
[11] See e.g. Harman (1986) and Harman (2002).

normative connection between logic and reasoning: my believing P and ⌜if P, then Q⌝ in no way entails a permission, let alone an obligation on my part inferentially to form the belief Q. If reasoners frequently fail to conform to MP in such situations it need not be because they are committing logical blunders (mere errors could perhaps be dealt with by appeal to a competence/performance distinction): in many cases they may be acting *rationally* in doing so. More precisely, an agent who desists from making the inference in question may be acting on two types of reasons. She may have *epistemic* (broadly evidential) reasons for doing so: e.g. Q might clash with some of her more deeply held antecedent beliefs in which case, rather than blindly following MP and embracing Q, the agent ought to abandon at least one of P and ⌜if P, then Q⌝. Alternatively our agent may have *practical* or *prudential* reasons for refraining from inferring Q: e.g. the agent may have gotten distracted/have more important things to do/find the belief morally repugnant or otherwise unpleasant/reject Q on the basis that it will have harmful consequences (e.g. if Q is the proposition that the agent has a severe disease and believing it might reduce her chances of overcoming it).

Either way it is clear that (Crude) may clash with our broader norms of rationality as well as with our actual practices. Hence, insofar as we engage in episodes of ordinary reasoning, we appear to violate (Crude), which is to say that we no longer qualify as knowers of MP. This is one of the ways, according to Besson, in which dispositionalism is in conflict with ordinary reasoning (it "destroys logical knowledge" Besson (2012, p. 61)). Worse still, if being disposed to infer according to MP is constitutive of our grasp of the concept *if*, as Boghossian suggests, we would no longer qualify as possessing that concept either—a rather unattractive feature of the proposed account it would seem.

Besson illustrates the problem by way of an example, (Ice-Cream), which can be summarized as follows. Let P be the proposition that I will get ice-cream, and Q the proposition that I will miss the train. Besson now considers the following:

- I form the project of getting some ice-cream and hence form the belief that P.
- I am reliably informed that ⌜if P, then Q⌝.
- Seeing that catching my train ranks higher among my preferences than getting ice-cream, I give up on my initial project and hence abandon my belief in P (rather than blindly inferring Q).

Schematically:

$$\text{(Ice-Cream)}\ \frac{P \qquad \ulcorner\text{if } P\text{, then } Q\urcorner \qquad \text{not-}Q}{\text{not-}P}.$$

Instead of deriving Q from P and $\ulcorner$if P, then $Q\urcorner$, I thus appear to conclude not-P directly given my rejection of Q. To be sure, this shouldn't come as a surprise. It is a well-known fact, at least since Harman's work, that the principles of logic are not—at least not in any simplistic way—*diachronic principles* that guide our processes of belief formation and revision. We are not—nor should we be—automated theorem provers that unreflectingly apply rules to derive ever more consequences from our initial stock of beliefs. Besson in effect questions that dispositionalists can agree even about this much. The failure to accommodate ordinary reasoning exemplified in (Ice-Cream)-type scenarios, Besson argues, afflicts *any* form of dispositionalism, however sophisticated. In an attempt to establish this, she considers two main types of dispositionalist responses: what we might label the 'stubborn' and the 'sophisticated' responses. We discuss each of these responses in turn, along with Besson's objections to them.

2 The sophisticated and the stubborn

Let us begin with the sophisticated response. As we have seen, the problem with (Crude) was that the operative notion of disposition was too, well, crude. The manifestation-conditions for our dispositions to infer in compliance with MP came out rather too rigid to do justice to our ordinary modes of belief revision. What is needed, it might therefore be thought, is a rather more flexible notion of disposition, one that tolerates exceptions. This would enable us to retain the idea that agents have knowledge-constituting dispositions to infer in accordance with MP, while making room for the possibility of (Ice-Cream)-like exceptions. Though there are several accounts of exception-tolerating dispositions on the market (masks, antidotes, habituals), the idea driving the sophisticated response can be summarized in the form of a single umbrella principle:[12]

- (Favorable$_D$) S knows MP iff whenever S believes P and $\ulcorner$if P, then $Q\urcorner$, S infers (and hence forms the belief that) Q *provided the circumstances are favorable*.

Besson successively considers (and rejects) a number of variations on the (Favorable$_D$) theme. However, her most compelling objection to responses of the sophisticated sort, we feel, is perfectly general.

[12]For general background on dispositions, see Fara (2009). See also Besson (2012, §§5.1-2).

Begin by defining 'favorable' circumstances simply as those cases in which S's disposition to infer in conformity with MP is *not* overridden by epistemic or practical considerations. A dispositionalist account of this shape is not necessarily vacuous provided one has a sufficiently rich story to tell about the overriding epistemic and practical norms in question and their relation to the MP-disposition. Assuming (as we will) that such a story is in the offing, (Favorable$_D$) seems to capture the idea behind the sophisticated response adequately. Where, then, lies the problem? While (Favorable$_D$) satisfactorily deals with cases in which we fail to infer Q given our beliefs in P and ⌜if P, then Q⌝ because of intervening practical reasons (I get distracted by the ringing of the phone, I suddenly develop a terrible headache, I commit a logical blunder, etc.), it fails to account for the fact that while agents finding themselves in (Ice-Cream)-like scenarios do not *follow* MP (and hence do not form the belief that Q), they nevertheless *exercise*[13] their knowledge of MP. After all, (Ice-Cream) scenarios are cases of belief revision in response to recognized inconsistencies in the agent's belief set. They thus seem to be motivated by a (at least *prima facie*) concern for coherence standardly expressed by the epistemic norm that agents should strive for consistency in their beliefs (at least where possible).[14] But in order to apply the norm I must have the logical tools necessary to detect inconsistencies in my beliefs. In particular, I must presumably know MP (or have equivalent knowledge of the relevant truth-tables) in order to recognize the inconsistency of the set $\{P$, ⌜if P, then Q⌝, not-$Q\}$. According to (Favorable$_D$), I can only exercise my knowledge of MP by activating my corresponding disposition. The trouble is that (Ice-Cream) cases are precisely *un*-favorable cases in which, by definition, the dispositions fail to be activated. But so long as my MP-dispositions are not activated, I have no way of drawing on my logical knowledge. And without recourse to my disposition-based logical knowledge, I am unable to recognize the inconsistency of my belief set and so am in no position to appreciate the need for revising my beliefs in the first place. Hence, although (Favorable$_D$)-based accounts may adequately account for mistakes or intervening practical reasons blocking our MP-dispositions, they are incapable of explaining how agents are able to draw on their logical knowledge in (Ice-Cream)-like

[13] We follow Besson's apt terminology here.

[14] Note that this formulation is compatible with views that favor sub-consistency norms of coherence (probabilistic or qualitative), as well as with positions such as Niko Kolodny's according to which coherence norms are but epiphenomena of more fundamental evidentialist norms of belief (Kolodny, 2007).

situations.[15] So much for the sophisticated response. Let us now briefly turn to what Besson terms the dispositionalist's 'stubborn' strategy.

As its name makes plain, the stubborn strategy simply consists in the dispositionalist's digging in her heels and insisting that, contrary to appearances, agents *do* in fact follow MP even in (Ice-Cream)-like scenarios. It seems to us that Besson is right in dismissing the stubborn strategy in its original form. And yet, as we will explain, there is something right about it. Indeed our discussion of Besson's reasons for rejecting the stubborn strategy will lay the ground for our positive proposal in the next section. But we're getting ahead of ourselves.

How could the stubborn strategy be motivated? It will not have escaped the reader familiar with natural deduction that (Ice-Cream) cases can be thought of as deductions culminating in an application of the rule of negation-introduction:

$$\text{(Stubborn)} \quad \dfrac{\dfrac{[P] \qquad [\ulcorner \text{if } P, \text{ then } Q \urcorner]}{Q} \qquad [\text{not-}Q]}{\dfrac{\bot}{?}}\,.$$

We derive a contradiction from the set of premises $\{P, \ulcorner \text{if } P \text{ then } Q \urcorner, \text{not-}Q\}$, enabling us to deduce, via negation introduction, the negation of at least one of P, $\ulcorner \text{if } P \text{ then } Q \urcorner$ and not-Q. What the natural deduction representation suggests—and what drives the stubborn strategy—is that, contrary to what we have seen to be the case on (Favorable$_D$)-based sophisticated approaches, there is a very straightforward sense in which reasoners exercise their knowledge of MP in (Ice-Cream)-style cases of belief revision. Indeed it is precisely *by* inferring Q via MP that the agent comes to recognize the inconsistency of her belief set and hence appreciates the need for revising her beliefs. (Of course the answer to the question as to which beliefs should be jettisoned in the face of inconsistency will typically be dictated by non-logical norms and, in the case of (Ice-Cream), my preferences.)

What should we make of the stubborn strategy? Besson bases her rejection of the stubborn strategy on the following four objections:

1. It lacks motivation.

2. It simply amounts "to denying the phenomenon of reasoned change in view" (p. 67).

[15] Let it be emphasized once more that Besson's argument that we are reproducing here applies across the board to any of the aforementioned exception-tolerating notions of dispositions (masks, antidotes, habituals).

3. Belief revision appears to be nigh instantaneous, not leaving enough time to form attitudes like beliefs.[16]

4. It ought to be possible to appreciate the consequences of your beliefs "without embracing them: considering your beliefs' commitments does not require believing those commitments" (*Ibid.*).

We find all but the last of these objections wanting.[17] We begin by explaining why we take objections 1.-3. to be unconvincing, at least when taken on their own. Insofar as these objections have any force, it stems from objection 4. In the next section, we propose a more general dispositionalist framework that addresses Besson's objection 4. Our framework makes room for the possibility of exercising one's logical knowledge, for instance in exploring the logical consequences of one's beliefs, without thereby being forced to endorse those consequences. If this is correct, our account demonstrates that dispositionalism need not be in conflict with 'reasoned change in view' in either of the two ways adverted to by Besson: our quotidian modes of reasoning neither 'destroy logical knowledge' on our account, nor are they in conflict with the exercise of logical knowledge. First, though, let us consider Besson's objections (1.-3.).

1. fails to convince, since the stubborn strategy clearly *is* well-motivated for anyone sympathetic to dispositionalism. As we already pointed out above, the reason we do revise our beliefs in (Ice-Cream)-like cases, is because of the perceived inconsistency of our belief set. But perceiving an inconsistency in our belief set presupposes the requisite logical knowledge, i.e. the knowledge that the set $\{P, \ulcorner \text{if } P, \text{ then } Q\urcorner, \text{not-}Q\}$ is inconsistent. The dispositionalist explains this knowledge in dispositionalist terms, in particular the disposition to infer in conformity to MP. Invoking MP-dispositions can therefore only 'lack motivation' if it is *antecedently assumed* that the logical knowledge underlying such episodes of belief revision cannot properly be accounted for in dispositionalist terms.

[16] In Besson's words (Ibid.):

> [I]f you really always infer Q once you believe that P and that $\ulcorner$ if P then $Q\urcorner$, that means that sometimes you will form the belief that Q for an extremely short time—perhaps a nanosecond. But that might not be enough time to form a belief or a proper propositional attitude. (*Ibid.*)

[17] Besson mentions a fifth objection, viz. that there may be intervening practical reasons.

> [S]ometimes you might do nothing whatsoever once you believe P and $\ulcorner$ if P then $Q\urcorner$: you might leave the matter there, get distracted or interrupted, or do something completely unrelated. (*Ibid*). See also Harman (2002).

However, this objection only afflicts *crude* dispositional accounts.

2. is similarly question-begging. To be clear: the 'phenomenon' exemplified by (Ice-Cream)-like scenarios is that an agent revises her belief P in light of the (recognized) fact that P, in concert with the reliable belief that ⌜if P, then Q⌝, entails the unpalatable Q. It is true, therefore, that the phenomenon in question can be correctly described as a scenario the final outcome of which is the rejection of the antecedently held belief P *rather than* the formation of the belief Q via MP. But the fact that MP did not, as it were, have the final word, does not entail that MP could not have played a role in the process of reasoning. There is no reason why the stubborn dispositionalist should not be able to offer an explanation, in MP-dispositional terms, of the logical knowledge that motivates the revision of our agent's belief in P in the first place. Hence, the stubborn dispositionalist's proposal does not amount to "denying the phenomenon of reasoned change in view" as Besson claims. It simply offers a particular interpretation of the phenomenon, one that interposes an MP-conforming inference to Q in order to account for the revision-necessitating inconsistency in the agent's belief system.

Nevertheless, it might be thought that this way of posing the problem raises the worry that Besson's conception accords better with the phenomenology of reasoned change in view than does the stubborn dispositionalist's story. For the agent may not actually have the conscious experience of mentally wading through all of the steps in the above natural deduction derivation: first applying MP in order to generate the contradiction, then introducing the negation of one of the premises. Since neither our own phenomenology nor the observed deductive habits of our peers seem to concur with the stubborn dispositionalist's posit of a brief stint of believing Q, it may seem that the evidence is stacked against the stubborn strategy. In response to this, it may plausibly be pointed out that basic inferences can be (and indeed frequently are) *unconscious* processes that leave no phenomenological trace. Consequently, processes of belief revision might well, at times at least, be accompanied by unconscious inferences. And the dispositions to these inferences constitute (and so explain) the logical knowledge required to monitor the consistency of the agent's belief system.

But suppose it turns out there is no unconscious inferring going on and the phenomenology turns out to be reliable. Suppose, in other words, that, in most cases, agents really do not manifest their MP-dispositions in (Ice-Cream)-like scenarios. How is the dispositionalist to explain *that*? Even this supposition is compatible with the dispositionalist story. For the dispositionalist can reasonably maintain that subjects not only have dispositions to apply *basic* rules of inference, but also *derived* ones. That is, she can contend that Besson ignores an important distinction between *basic* and *derived* rules, and a related distinction between a *basic* and a *more-than-basic*

grasp of the logical concepts. Let us elaborate.[18]

On the dispositionalist view, knowing what a logical expression '$' means ,understanding '$' or having the concept expressed by '$', is to be disposed to (in some sense) infer according to the basic $-rules, i.e. $-introduction and elimination rules.[19] Moreover, knowing such rules just consists in being appropriately disposed to (in some sense) infer accordance with them.[20] That is, on the foregoing picture there is no real difference between one's understanding of '$' and one's knowledge of its introduction and elimination rules. Still, the difference between one's understanding of the logical vocabulary, on the one hand, and logical knowledge in general, on the other, is conceptually important. For instance, merely grasping the concept *if* (and, perhaps *not*) shouldn't *per se* yield knowledge of Peirce's Rule

$$\text{(Peirce's Rule)}\ \frac{(A \supset B) \supset A}{A}$$

And indeed it doesn't on the view we have been considering: although Peirce's Rule can be *derived* in standard natural deduction systems by means of the basic rules for 'if' and 'not', being disposed to infer according to such rules isn't tantamount to being disposed to infer according to Peirce's Rule. The basic rules for 'if' and 'not' suffice for deriving Peirce's Rule, but *finding such a derivation* goes beyond one's basic dispositional knowledge of such rules. Now say that S has *basic logical knowledge* just in case she is (only) disposed to infer according to—a possibly a proper, but large enough, subset of—the introduction and elimination rules for each of the logical expressions. Then, on the dispositionalist view, one's understanding of the logical vocabulary only yields basic logical knowledge. But logically more proficient agents typically will also have a more elaborate logical repertoire that enables them to

[18] We should stress that, if dispositionalism is to provide an account of our *actual* logical knowledge, the following is merely an empirical hypothesis, which would require further support from a fully worked out dispositionalist epistemology. Yet, the hypothesis seems plausible to us: logic students who are taught natural deduction typically eventually develop an ability to use shortcuts in derivations. To be sure, this alone doesn't show that *ordinary speakers* learn to use shortcuts. But, it does constitute a reasonable conjecture.

[19] Although dispositionalists typically equate understanding of '$' with a mastery of its introduction and elimination rules (see e.g. Boghossian, 2000, 2003), understanding need not be so conceived. All that is presupposed by the argument below is that there be *some* distinction between basic and derived rules, and that mastering $'s basic rules is sufficient for understanding '$'. For expositional convenience we will continue to assume that understanding for logical constants amounts to mastery of the corresponding introduction and elimination rules.

[20] At least this is the case for the dispositionalist accounts of logical knowledge and the understanding of the logical constants discussed so far. The same is not strictly speaking true for the account we present in the next section. As will become obvious, though, the distinctions between basic and derived rules and basic and more-than-basic understanding extends to our account in a straightforward way.

perform *shortcuts* in the sense that they apply derived rules rather than following the tedious, more circuitous path of basic rules.[21] Moreover, the dispositionalist could argue, it is plausible that they develop dispositions to apply such derived rules. And here's the key point: we can now explain why on Besson's (Ice-Cream)-example the agent does not run through the tortuous deductive route consisting in applying only basic rules, first deducing a contradiction and then introducing not-P. The experienced reasoner *immediately* recognizes the inconsistency of the relevant subset of her beliefs (i.e. $\{P, \ulcorner$if P, then $Q\urcorner$, not-Q $\}$) without first having to perform the inference to Q via MP. And from the recognition of this inconsistency, and the fact that she is less confident in her belief that P than she is in her belief that $\ulcorner$if P, then $Q\urcorner$, she *directly* concludes $\neg P$. Her reasoning can be represented thus:

$$\text{(Less stubborn)}\quad \frac{[P] \qquad \ulcorner\text{if } P\text{, then } Q\urcorner \qquad \text{not-}Q}{\frac{\bot}{?}}\,.$$

Hence, when presented with P, $\ulcorner$ if P then $Q\urcorner$ and not-Q, instead of activating their MP-disposition, they might—legitimately—reason according to (Less stubborn). More precisely, to anticipate a point we will more fully develop in Section 3, they might first weigh their credences in P, $\ulcorner$ if P then $Q\urcorner$ and not-Q against each other, then decide to jettison the element in whose truth they have the least confidence (in this case P), and *finally* apply a disposition to infer according to *modus tollens*.

Plausibly, normal agents with some (more-than-basic) logical competence will take shortcuts of this sort. But that is not to say that their logical knowledge is not ultimately founded on their knowledge of the basic logical laws. To see this consider the situation in which our agent, upon verbalizing her reasoning, is challenged by her interlocutor. In order to justify the direct deductive step (Less stubborn) she inevitably has to break it down into its more basic components, and in this process of decomposition she will eventually have to fall back on (Stubborn). To conclude: Episodes such as (Ice-Cream) *only* pose a problem for dispositionalism if the view is understood not to extend beyon basic logical knowledge. But clearly the dispositionalist's account of logical knowledge need not be so limited in scope. As we have just seen, ordinary agents will typically possess more-than-basic logical knowledge, enabling them to make the sorts of shortcuts exemplified in (Ice-Cream)-style reasoning.

[21] For instance, logically proficient agents will typically master Disjunctive Syllogism, which is, however, a derived rule at least in standard natural deduction systems.

Finally, what are we to make of objection 3., that the stubborn strategy implies that credal attitudes are frequently formed and abandoned in implausibly short time windows? On the stubborn dispositionalist's story it does look as if the agent's belief in Q may be very short-lived indeed. Is this a problem? To begin with, notice that this objection, again, assumes that subjects lack dispositions to apply derived rules. For if, as we have suggested, subjects can have dispositions to apply derived rules, and hence infer according to patterns such as (Less stubborn), subjects *need not* form the nigh instantaneous belief that Q in order to conclude not-P from the set $\{P, \ulcorner \text{if} P, \text{then} Q \urcorner, \text{not-}Q\}$. But even setting this—decisive, in our view—point aside, it seems to us that the objection need not worry the dispositionalist. Besson's uneasiness appears to stem from the fact that she takes mental attitudes like beliefs to enjoy—apparently by their very nature—a certain permanence: beliefs, if they really are beliefs, simply do not lead so fleeting an existence. But why should this be so? To be sure, when we come to adopt beliefs through an extended process of doxastic deliberation, we expect beliefs to endure at least long enough for us to consider and weigh countervailing evidence. But surely not all of our processes of belief formation are conscious: the vast majority of our beliefs were never consciously formed, but are rather implicit or dispositional. And even those of our beliefs that *are* the product of conscious deliberation may be underwritten by unconscious inferential episodes such as, perhaps, the inference to Q in (Ice-Cream)-like cases. In summary, it seems to us that to substantiate her claim that beliefs, by their very nature, cannot be so short-lived, Besson would have to offer a more elaborate account of mental attitudes and their relation to personal and sub-personal cognition.

That being said, we believe that objection 4. is essentially on target. Hence, Besson is right to reject dispositionalism, insofar as it is framed as a thesis about dispositions to form beliefs as a result of inference. In the following section we sketch and examine an alternative dispositionalist account—one that, we claim, is immune to Besson's objection.

3 An alternative approach

The objection, recall, is that it ought to be possible to appreciate the consequences of one's beliefs "without embracing them" (p. 67). We believe that this objection gets to the heart of the issue. If dispositionalism is committed to the notion that logical knowledge amounts to having the right inferential dispositions and if these disposi-

tions, once activated, irrevocably entrain the formation of beliefs in the conclusions of the inferences, this would indeed amount to a grave problem for dispositionalism; an agent could not exercise her logical knowledge without performing the corresponding inferences and embracing the propositions so entailed. The dispositionalist account of logical knowledge so understood would force upon us an untenable account of the role of logic in our cognitive economy: it implies that any logically knowledgable agent who exercises her knowledge would indeed have to infer in accordance with the basic logical rules of inference. But if there is one thing Harman has taught us, it is that logical rules of inference cannot (at least not in any straightforward way) be construed as *diachronic rules* of belief formation: we do not (nor should we) reason by blindly generating the logical consequences of our beliefs and adopting them.[22] The naive dispositionalist account (by which we mean to include both crude and sophisticated approaches) thus puts a burden on logic it is not fit to bear: logic *does not* in general—at least not taken on its own—instruct us which new beliefs to form or which old ones to reject; the role of logic is a more modest one.[23] Logic sets *synchronic* norms for our reasoning; it tells us at any given point in time which consequences of our beliefs we are committed to and whether our system of beliefs is logically coherent.[24] In the remainder of this section we propose a dispositionalist account that is in line with this modest conception of logic as a purveyor of synchronic principles for reasoning. As we will see, such a modest conception of logic is not at odds with ordinary reasoning in any of the ways suggested by Besson.

In a first step the dispositionalist can point out that it is implausible that inference—whether in conscious thought or at the sub-personal level—always leads from a set of beliefs to a further belief.[25] Our ability to engage in suppositional reasoning

[22]Cf. Christensen (2004, p. 5). Perhaps there is a more sophisticated diachronic normative connection linking logical laws and ordinary reasoning, but like Besson (p. 60), we do not wish to pronounce on this issue here. For recent explorations of some of the more sophisticated accounts of logical laws as diachronic norms of rationality see MacFarlane (2004), Field (2009), Milne (2009), Steinberger (2012).

[23]At least the dispositionalist need not assume that logic plays a grander role in reasoning.

[24]Some authors will protest that even this modest task is more than logic can handle. Pointing to epistemic paradoxes like the lottery and especially the preface paradox, they argue that rational agents may have logically inconsistent beliefs, and that therefore a weaker coherence norm for beliefs is needed (see e.g. (Christensen, 2004) and (Easwaran and Fitelson, 2012)). The issue cannot be adequately addressed in the confines of this footnote. Suffice it to say that even advocates of sub-consistency coherence norms agree that the demand for logical consistency is legitimate when it comes to belief sets of manageable sizes. The modest conception of logic's role in regulating reasoning need not presuppose anything more than the local applicability of logic-induced synchronic norms of reasoning.

[25]Besson herself mentions this lacuna in the dispositions literature (p. 64). Unlike the standard strictly belief-based dispositionalist approaches, her criticisms apply rather more broadly to any kind of pro-attitude. Nevertheless, as we will see, they do not impact our account, which does not presuppose the formation of anything like a pro-attitude.

provides ample evidence for the fact that we oftentimes trace out the consequences of propositions we need not (and do not) endorse.[26] It seems plausible that, in such situations, we run our familiar inferential apparatus *off-line*, to borrow terminology familiar from simulationism literature in the philosophy of mind.[27] That is, we deploy inferential procedures, while, as it were, disabling the ensuing process of belief formation. Crudely put, instead of chucking the conclusions reached into our belief box, we merely explore the consequences of our beliefs and suppositions without automatically adopting the corresponding beliefs. The significance of this is that it affords a way of reconciling dispositionalism with the idea that we can 'appreciate the consequences of our beliefs without embracing them'.

Now, it may be objected that inferences *essentially* have beliefs as inputs and outputs and thus that it makes no sense to speak of inferences that do not result in beliefs. The issue here is purely terminological. If the mental acts occurring in suppositional reasoning are not deserving of the label 'inference', give them a distinct label.[28] For want of a better word, let us call them *transitions*.[29] Transitions could then be thought of simply as mental acts or events exactly like inferences, except that they admit of a wider range of inputs and outputs.[30] That there really is such a broader category of mental acts of which inferences (in the strict sense) are a species is vouchsafed by the phenomenon of suppositional reasoning. But what kinds of inputs and outputs do transitions admit of? As in the case of suppositions, an agent can be in any kind of *cognitive* (as opposed to conative) mental state with respect to an input proposition. Let us use *entertaining* as a catch-all term for such attitudes with belief-like direction of fit. Certainly, any proposition entertained in this sense can serve as fodder for transitions. But we have already seen other types of plausible

[26] An agent may have a wide variety of attitudes vis-à-vis the assumptions made in the course of suppositional reasoning: she may be uncertain about their truth (e.g. to assess their credibility via their consequences or in the case of contingency planning), she may be convinced of their falsity or even know them to be necessarily false (e.g. in the case of an argument by *reductio*). Suppositional reasoning can thus occur in a host of different contexts: e.g. in thought experiments in inquisitive or theoretical contexts, planning ('Suppose the mammoth tries to escape to the river…', arguments or proofs by reductio ad absurdum, conditional proof, heuristic reasoning for purposes of persuasion or for developing an argument ('Suppose the Archduke Ferdinand had not been assassinated by a Serbian nationalist in 1914, …'), make-belief, fictional contexts, etc.

[27] The *loci classici* here are Gordon (1986) and Heal (1986).

[28] It seems to us that common philosophical practice, if there is such a thing, would include such acts under the label of 'inferences'. See for example (Wright, 2012). Even so, it will be useful to use a different label to highlight the properties of the mental act we are after.

[29] The perhaps more natural label 'deductions' would have precluded applying the dispositionalist framework to non-deductive reasoning, which is something we wish to leave open in this paper.

[30] The label 'mental act' is to be understood here so as to make room for the possibility of unconscious 'acts' of inferring or transitioning.

inputs that do not fall in this class: suppositions. The speech act of supposing (or its mental counterpart) in the intended sense seems to have neither belief-like or desire-like direction of fit.[31] Still we would like the class of permissible inputs for transitions to encompass all of these types of attitudes. Hence we should understand transitions to take both entertained as well as supposed propositions as input.[32]

What happens then? The transition gives rise to a conclusion, where the content of this conclusion is a proposition, namely a proposition entailed by the contents of the corresponding premises. But what attitude can we or ought we to have vis-à-vis this proposition? The naive dispositionalist story—crude and sophisticated—prescribed that one believe the consequences of one's inferences. It was due to this prescription that logic was accorded an unreasonably immodest role in our reasoning. The right story, we believe, is that the consequences of our transitions merely need to be *considered*, where this consideration does not dictate any particular attitude towards the conclusion of the transition. What Besson's argument makes clear, is that, in general, there will be no hard and fast rules as to which attitudes one ought to adopt towards the conclusions as a function of the attitudes one adopts towards the corresponding inputs: often many epistemic norms will have to be negotiated in complicated ways. Reasoning is a messy business. And logic alone does not (and should not be expected to) give all the answers. What transitions *do* ensure, though, is that the reasoner *has to reckon with* the conclusion in some shape or form (provided at least that it plays a salient role in the agent's cognitive projects and in the absence of overriding practical considerations).[33] Hence, given their relevance, agents must consider (even if only to reject) the consequences of transitions. To summarize, transitions compare to inferences (of which they are the genus) as follows:

- Inferring: S infers Q from $P_1, \ldots, P_n$ iff S forms the belief that Q *on the strength* of her belief in the P_i;[34]

- Transitioning: S transitions from from $P_1, \ldots, P_n$ to Q iff S considers Q *on the*

[31] Mitchell Green emphasizes this point in his Green (2000, p. 377).

[32] Entertaining and supposing seems to cover just what acceptance covers in (Stalnaker, 1984). However, 'acceptance' is overused enough as it is.

[33] This proviso is important to forestall Harmanian worries of 'clutter avoidance'. Finite beings cannot possibly attend to *all* of the consequences of any possible transition. Hence, it is only insofar as the transition is relevant to the agent's aims and doxastic duties (whether or not the agent recognizes it to be) that she ought to consider its conclusions.

[34] A full account of inference and transition, would have to offer a detailed analysis of the phrase 'on the strength of'. What is clear is that it must be a specific kind of causal relation, linking the premises to the conclusion of the inference. For discussion about the nature of this causal relation see (Boghossian, 2012) and the comments by (Broome, 2012) and (Wright, 2012).

strength of entertaining or supposing the P_i

With this sketch in place, we now lay down the transition-based analogue of our principle (Inference) above

- (Transition) S knows MP iff S is disposed to transition in compliance with MP.

which can be extended to an analogue of (Crude):

- (NotSoCrude) S knows MP iff whenever S entertains or supposes P and ⌜if P, then Q⌝, S considers Q (provided Q is relevant to S's cognitive aims or doxastic responsibilities).

With (NotSoCrude) we can now give a satisfactory dispositionalism-friendly rendering of Besson's (Ice-Cream)-case. I intend to procure some ice-cream on a sunny day, thus forming the belief that I will get ice-cream. I am then reliably informed that if I get ice-cream, I am bound to miss my train. It is at this point that my disposition-based knowledge of MP manifests itself in my transitioning to Q. I transition to Q, it is worth emphasizing again, *without forming the belief that* Q. Yet my transition to Q is crucial in that it explains my capacity to recognize the inconsistency of my belief set (given my belief in not-Q) and accounts for the fact that a revision of beliefs is called for.

The advantage of (NotSoCrude) is obvious—it respects the desiderata laid down by Besson (which she claims are satisfied by her own favored propositional account but not by any dispositional account):

A. One's knowledge of MP shouldn't *bind* one to infer (and come to believe) Q once one believes both P and if P, then Q.

B. An account of one's knowledge of MP should make good sense of the fact that you can exercise your knowledge of MP without *inferring according to* MP. (Besson, 2012, p. 77)

A. and B., recall, were the main reasons why (Crude) and the more refined (Favorable$_D$) fell out of favor. How hopeful ought our dispositionalist be in the light of (NotSoCrude)?

This will depend on how successful she is in addressing at least one additional worry: the problem of overriding practical reasons applies equally to (NotSoCrude). While transition-based dispositionalism is able to accommodate (Ice-Cream)-like

cases where inferential dispositions are blocked by epistemic reasons, it may still be the case that I entertain, say, P and ⌜if P, then Q⌝, but that I fail to transition to Q because my train of thought is interrupted when I notice my kitchen to be on fire. What are we to make of such cases involving interfering practical reasons? The obvious response is simply to impose a 'no-overriding-practical-reasons' condition restricting applications of (NotSoCrude), thus paralleling once more our discussion in §2:

- (Favorable$_T$) S knows MP iff whenever S entertains or supposes P and ⌜if P, then Q⌝, S considers Q *provided there are no overriding practical reasons*.

(Favorable$_T$), then, is what we take to be the dispositionalist's best line of defense in the face of Besson's attack, in that it avoids both types of conflict with ordinary reasoning described by Besson.

4 The problem of alternatives

So much for the good news. Here comes the bad news for the dispositionalist in the form of what we take to be a more pressing problem. Call it the *problem of alternatives*. In a nutshell the problem is this: each time the manifestation conditions for one type of knowledge-constituting disposition are met, there are countless other deductive options open to me. For instance, suppose I entertain P, ⌜if P, then Q⌝ and not-Q, and realise that I have far less confidence in P than I have in either ⌜if P, then Q⌝ and not-Q. What should I do? So far we considered only the following as live options: I could *either* activate a *modus tollens*-disposition and directly conclude not-P via the (Less stubborn) pattern described in Section 2, *or* I could apply MP, explicitly deriving a contradiction, leading me to negate and discharge, say, P, as described in (Stubborn). But clearly these are not the only transitions available to me upon realising that I have more confidence in ⌜if P, then Q⌝ and not-Q than I have in P. Why ought I to transition to, say, not-Q rather than to ⌜not-Q or R⌝ or to ⌜not-Q and (if P, then Q)⌝ (assuming that I have corresponding dispositions to transition in accordance with other basic deductive inferences)?[35]

A related worry arises for any transitions corresponding to inference rules like or-introduction: there are an indefinite number of conclusions of the form ⌜P or R⌝ one could transition to based on one's entertaining of P. (Analogous difficulties

[35] Besson discusses a similar objection (p. 75).

arise for the elimination rule for the universal quantifier.) Even the simplest logical transitions, it would seem, involve an unavoidable element of *choice*, but it is not clear that the dispositionalist can account for this. My disposition to transition does not generally appear to be the sort of thing that can be activated at will. And if that is correct, this seems to cast doubt on the very idea of describing talk of reasoning in dispositional, and hence quasi-causal, terms.

The problem seems to be that legitimate ascriptions of dispositions presuppose that it is possible to disclose the conditions under which those dispositions manifest themselves. Yet, the dynamic and often goal-directed nature of our processes of belief formation and revision appear to defy description in terms of rigid, quasi-causal conditions of manifestation. The dispositionalist, it may be argued, risks to be stuck between the rock resulting from laying down overly simplistic manifestation conditions for the presumed knowledge-yielding dispositions on the one hand, and, on the other hand, the hard place of rendering dispositional talk of logical knowledge meaningless altogether due to her inability to formulate sufficiently precise such conditions given the immense complexity of ordinary reasoning that she is trying to do justice to.

What is the dispositionalist to make of this? Clearly, a reasoner cannot run through all the possible transitions given a certain set of inputs. A *prima facie* attractive avenue may be to postulate that most transition-making occurs at the lower, sub-personal level (or 'level two' as it is sometimes referred to in the psychological literature) and that these lower-level processes somehow dramatically narrow down the range of possibilities, which are then submitted to further higher-level filtering processes which carry out the final selection from this pre-selected set of salient alternatives. However, aside from making a number of substantive speculative assumptions about our cognitive architecture and its relation to logical reasoning, it is impossible, even at the sub-personal level, for us aimlessly to run through a potential infinity of possible transitions. It seems therefore that transitions must be subject to certain constraining principles that immediately identify the relevant options relative to our cognitive goals: if I am reasoning about whether to buy an ice-cream or catch my train, it is highly unlikely that propositions about Canadian tides, nuclear submarines or the Milky Way will feature in my transitions. One might further speculate that we operate with something like reasoning analogues to Gricean maxims: e.g. 'Don't transition beyond necessity' (corresponding loosely to Grice's maxim of quantity)—unless I am pursuing a particular cognitive goal for which a transition seems relevant, my disposition to transition shouldn't be needlessly activated. Some of these principles

may be basic sub-personal processes, some may be acquired heuristics. For instance, some dispositions may be selected on the basis of the results they yield. Thus, a disposition to transition according to the general pattern of which (Ice-Cream) is an instance will in general allow us to reason more quickly than, say, a disposition to transition according to the pattern exhibited by (Stubborn).

It may be objected that the problem of alternatives doesn't arise on a propositional account and that, for this reason, it should be taken as evidence against dispositionalism.[36] However, it seems to us that the problem equally afflicts propositional accounts. Even supposing that our logical knowledge is propositional, why should I decide to transition from P and Q to $\ulcorner P$ and $Q\urcorner$ rather than, say, $\ulcorner Q$ or $R\urcorner$, or $\ulcorner$If not-P, then $Q\urcorner$? Why should I employ one piece of logical knowledge rather than another?

That being said, it is clear that the gargantuan question of the nature and the functioning of these cognitive filtering mechanisms is a hard nut to crack. It seems undeniable that there are some filtering processes of the kind invoked. However, giving an adequate theory of them is likely to be a considerable interdisciplinary enterprise.[37] We are happy, therefore, to concede that much work, both philosophical

[36] We thank an anonymous referee for raising this potential concern.

[37] This said, we'd like to suggest that two considerations go some way towards, if not to providing a solution to the problem of alternatives, at least to alleviating some of the burden. The first is that, although training alone cannot account for logical knowledge, it seems plausible to assume that speakers will be more likely to activate dispositions to transition according to the rules that are most often used by their fellow speakers. In conjunction with our earlier observation that, in any given context, speakers will be largely disposed to transition to propositions that are relevant to the topic at hand, this severely constrains the number of propositions that, in a given context, are live options for transitioning in the first place. Secondly, it is worth noting that the problem raised by rules such as (standard) or-introduction depends on the extra assumption that (standard) or-introduction is indeed a basic rule for 'or', mastery of which is a necessary condition for having a basic understanding of 'or'. This assumption, however, can be challenged. One often hears that the standard introduction rules for disjunction do not actually represent the way disjunctions are asserted in everyday practice, and that the meaning of 'or' in ordinary language is radically different from its meaning in logic. This complaint seems reasonable enough: we almost always assert $\ulcorner P$ or $Q\urcorner$ on the grounds that P and Q cannot both be false—not because we already know that one of the disjuncts to be true (see e.g. Soames, 2003, p. 207). This suggests that inferentialists may substitute the standard rules for disjunction with the following pair of introduction and elimination rules:

$$\text{or-I}^*, n\ \frac{\begin{array}{c}[\text{not-}P, \text{not-}Q]^n \\ \vdots \\ \bot\end{array}}{P \text{ or } Q} \qquad \text{or-E}^*\ \frac{P \text{ or } Q \qquad \text{not-}P \qquad \text{not-}Q}{\bot}.$$

If mastery of *these* rules is a necessary, if not sufficient, condition for having a basic understanding of 'or', the problem mentioned one paragraph back doesn't obviously arise. Given *classical reductio*, or-I* and or-E* are provably equivalent to the standard disjunction rules.

and empirical, remains to be done. We also believe, however, that whatever difficulties dispositionalism may face, it is hard to see how propositionalism—the view that logical knowledge, and indeed our understanding of logical concepts, are a kind of propositional knowledge—can offer a viable alternative. As we have just seen, it itself faces a version of the problem of alternatives. Moreover, as things stand, propositionalism is but a fantasy; a fully worked out propositionalist account has yet to be advanced.

5 Concluding remarks

We have argued that episodes of change in view are compatible with dispositionalism, provided the dispositionalist adopts a more liberal notion of 'having a disposition with respect to MP'. A disposition of this type need not be a disposition *to infer*, since neither the premises nor the conclusion of the inference-like act must be believed. We propose that our logical knowledge and our understanding of the logical concepts should rather be accounted for in terms of dispositions to *transition*. Transitioning, unlike inferring (which is a species of it), allows for a wider array of inputs (propositions entertained or supposed) and outputs (propositions considered), rather than having to be all-out believed. We went on to show that dispositionalism understood in this way avoids Besson's objections. However, we then also showed dispositionalism to be beset by an even more pressing difficulty: the problem of alternatives. Having indicated some possible lines of reply the dispositionalist might adopt, we happily leave this issue for future debate.

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