Logical Knowledge and Ordinary Reasoning

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Abstract. This paper argues that the prominent accounts of logical knowledge have the consequence that they conflict with ordinary reasoning. On these accounts knowing a logical principle, for instance, is having a disposition to infer according to it. These accounts in particular conflict with so-called 'reasoned change in view', where someone does not infer according to a logical principle but revise their views instead. The paper also outlines a propositional account of logical knowledge which does not conflict with ordinary reasoning.

I. Introduction

This paper concerns the relationship between logical knowledge and ordinary reasoning. Logical knowledge is knowledge of the truths and principles of deductive logic. For instance truths such as that everything is self-identical and deductive principles such as Modus Ponens, which licences the inference from P, and if P, then Q, to Q.[1] It is almost a platitude to say that the connection between logic and reasoning is tortuous, some would even say that there is no clear connection: deductive logic just isn't especially relevant to ordinary reasoning. Famously, this sort of claim has been famously made by Gilbert Harman in his book *Change in View* (1986, esp. chs 1 & 2).

Here is a Harman-style case to illustrate the point:

> **(Ice-Cream)** It is a hot summer afternoon and you fancy something cool. You form the project of having an ice-cream, and come to believe that you'll buy one. However, looking at your watch, you then come to believe that if you buy an ice-cream, you will miss your train. But you do not want to miss your train. So rather than inferring that you will miss your train, you change your mind: you decide not to buy the ice-cream, and to catch your train instead.[2]

What's going on in (Ice-Cream) is this: you know Modus Ponens (henceforth 'MP'), and in some sense you *exercise* your knowledge of MP – when you see what your initial beliefs

[1] This formulation of an inference in Modus Ponens is grammatically problematic, since 'P' and 'Q' occur both as noun-phrases (when standing alone) and as sentences (in 'if P, then Q'), and ''if P, then Q' occurs as a noun-phrase. I keep this formulation for convenience. But a final characterization should avoid the use of noun-phrases and, perhaps, be given in terms of the inference pattern:

$$\frac{P \qquad Q}{\text{If P, then Q}}.$$

[2] As Harman stresses (1986, p. 1), pieces of reasoning such as (Ice-Cream) have two features: one theoretical and one practical. They are theoretical in that they affect one's *beliefs* (e.g. you give up the belief that you will buy an ice-cream), and they are practical in that they affect one's *intentions* (e.g. you give up the intention to buy an ice-cream). I shall only be concerned with the theoretical aspect of change in view, and shall not discuss its practical aspect.

commit you to. However, you do not *infer according* to MP – you do not infer that you will miss your train; and you give up one of your initial views *instead*.[3]

Cases such as (Ice-Cream) are possible, indeed common. Many pieces of ordinary reasoning cannot, or cannot wholly, be explained in terms of one's knowledge of logic – in particular, in terms of one's knowledge of logical principles such as MP. Now, characterising both how ordinary reasoning works and how exactly it interacts with logical knowledge is no small task. This paper addresses aspects of the latter issue, of how one's logical knowledge interacts with one's ordinary reasoning.[4] In particular it addresses the question of how knowledge of logical principles interacts with reasoned change in view: when you reason in a perfectly acceptable or reasonable way, which might not follow a logical principle, although knowledge of that principle might be exercised.[5]

So the question this paper addresses is how to characterise knowledge of logical principles, given that we do not, or do not always, follow those principles in ordinary reasoning.

Note here that Harman is sceptical about the very idea that we might follow a logical principle in reasoning: he suggests that deductive reasoning might not exist at all (1986, p. 6) or that ordinary people do not at all 'employ' a deductive logic in reasoning (2009, p. 334). In discussions in the epistemology of logic it is however nearly always presupposed that we can (and do) reason deductively.[6] Insofar as this paper looks at how to account for knowledge of a logical principle *given that* you might not infer according to it, it is by and large compatible with Harman's view. However I will not challenge the common assumption that we can, and sometimes do, follow logical principles in reasoning, and indeed I will take it that whatever logical knowledge is, it should allow for the possibility that we might do so.

Now the problem is this: the prominent account of knowledge of logical principles conflicts with cases of reasoned change in view such as (Ice-Cream). On this account, knowing a logical principle is having a *disposition* with respect to this principle.[7]

I will argue that this account entails that cases of reasoned change in view conflict with logical knowledge. Further, given that reasoned change in view is a perfectly rational and ordinary way to reason, an account of logical knowledge that conflicts with it cannot be right. It is one thing to say that logic does not capture ordinary reasoning, but quite another

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[3] Characterising what it means to exercise knowledge of MP as well as to infer according to MP one of this paper's concerns. And how these are characterised partly depends on what the content of MP is taken to be. Different characterisations are considered in sections III, V, VI and VII.

[4] Here I frame the issue in terms of the way in which logical knowledge interacts with ordinary reasoning rather than in terms of the way logical principles interact with principles of ordinary reasoning (whatever they might be). It is really the epistemological question that interests me, not the foundational one.

[5] This is not meant as a definition of reasoned change in view, but merely an initial characterisation to fix ideas.

[6] Harman's claim that ordinary reasoning is reasoned change in view is widely accepted (but see Knorpp 1997 for arguments against this claim). However, some have argued against Harman that that doesn't mean that there is no relation between logic and reasoning or that we never reason deductively. One focus has been the question of whether there is a normative connection between logic and reasoning – whether logic provides norms for reasoning, even if the contents of logical principles are not explicitly normative. On this matter, see for instance Field 2009 (and Harman's replied to Field in his 2009) and MacFarlane (unpublished).

[7] See for instance Boghossian 1996, 2000 and 2001, Brandom 1998, Devitt 2006, Field, 2009 and in conversation, Harman 1986, Priest 1979, Rumfitt 2001, and Ryle 1946 and 1949, for endorsements of the dispositionalist view.

that logical knowledge conflicts with ordinary reasoning. The following thus seems to be an adequate requirement on a correct account of logical knowledge of logical principles:

> **(R)** An account of logical knowledge should not entail that there is a conflict between knowledge of logical principles and cases of reasoned change in view.

This notion of conflict is a bit vague and it will be made precise in the course of the discussion. Briefly, two ways in which there might be a conflict will be discussed: first, there is a conflict if reasoned change in view destroys logical knowledge; second, there is a conflict if exercise of knowledge of a logical principle is incompatible with reasoned change in view.

Thus the paper argues that the prominent, dispositional, account of logical knowledge violates requirement (R). The paper indeed shows that no dispositional account can meet (R): it considers different construals of the account and it rejects them all on that ground. It then offers another account of logical knowledge which meets (R). On this account, knowing a logical principle is having a bit of propositional knowledge.

The sample logical principle used in the discussion will be MP, and the sample case of reasoned change in view will be (Ice-Cream). So the issue will be primarily framed in terms of giving an account of knowing MP that does not entail that (Ice-Cream) counts as an incorrect way to reason. However, it will be clear how the discussion of these examples generalises.

II. Outline of the Dispositional Account of Logical Knowledge

The dispositional account says that knowing MP is fundamentally to be explained in terms of having a disposition with respect to MP.

There are many reasons to hold this dispositional account. One that has received much attention recently is the following: many people follow MP successfully but do not – and perhaps cannot – articulate what MP says. It thus seems right to say that in some sense these people know MP even if they do not or cannot articulate what it says. Dispositions seem a good candidate to explain the sort of knowledge that can be attributed to such people.

For instance, Boghossian has argued recently that logical reasoning can be, as he puts it, 'blameless but blind' (see Boghossian 2003). On the one hand, such reasoning can be the manifestation of *knowledge* of a logical principle; and so it is epistemologically blameless or responsible. On the other hand, that knowledge is *not explicitly articulated*, and so the inference is blind.

But how are we to account for the blamelessness of a logical inference, if it is blind? According to Boghossian, logical inferences are epistemically responsible when we have dispositions to infer in such ways. Moreover, we are *entitled* to these dispositions because they fix what we mean by our logical words (such as 'not', 'if, then', or 'and') or logical concepts (such as negation, material implication and conjunction).[8] If having a disposition is required to even have the relevant logical concept, we cannot be epistemically irresponsible

[8] I do not go into the details of what exactly makes a logical rule meaning-constituting according to him here. But see Boghossian 1996.

in performing the relevant logical inference. This is the case, even if we cannot state the logical principle that governs it, let alone give an explicit justification for that principle.

So Boghossian's overall picture is this: to count as knowing MP in any way whatsoever, it is necessary to have a disposition with respect to MP. Having that disposition is not having a propositional attitude: the disposition can be had independently of having any (explicit) belief about MP, e.g. that it is truth-preserving. And to have this sort of belief at all, someone must have the disposition. Also, to even count as understanding 'if, then' or having the concept of material implication, it is necessary to have this disposition with respect to MP. So someone who does not have the disposition cannot have any beliefs about MP because they do not even have the relevant concepts that would figure in these beliefs. But someone who has the disposition can count as knowing MP.

The discussion will mainly focus on Boghossian's account, which is the best developed recent dispositional account. However, the conclusions of the discussion are taken to apply to all dispositional accounts. Notice also that the discussion will concern mainly dispositions in an account of knowledge of logical principles, rather than in an account of understanding the logical constants. But since it is the same dispositions that are involved in both, it will be easy to see how the arguments against the former can be applied to the latter. In what follows, I will take the dispositional account to say that for anybody to count as knowing MP in any way whatsoever, they must have the relevant disposition – where this is a mere disposition. Some people, such as logicians, may also have explicitly articulated beliefs about MP but everybody who knows MP also has the disposition.

This sort of dispositional account of knowing logical principles is usually contrasted with a propositional one, according to which knowing a principle such as MP is having propositional knowledge. One argument against propositional accounts is that they cannot account for cases of blameless but blind reasoning.[9] In particular it cannot account for the logical inferences performed by people (e.g. young children) who cannot state the rule because, for instance, they 'wouldn't even have the ingredient (meta-)logical or modal concepts' (Boghossian, 2001, p. 638). Thus the problem is that a propositional account looks too demanding conceptually. This point has already been made by Harman (1986, pp. 17-19) who suggests that the fact that few people have the concepts required to state deductive principles is a reason to prefer a dispositional account. In section VII, the propositional account will be defended against these objections. The ensuing discussion of the dispositional account will be integral to showing that propositionalists can give a better account of blameless but blind reasoning than dispositionalists.

III. Disposition to Infer and Disposition to Reason

The natural way of stating the dispositional account of what knowing MP requires is (Disposition to Infer) or (DTI):

> **(DTI):** Knowing MP requires having a disposition to infer according to MP, i.e. a disposition to believe Q, from the beliefs that P, and that if P, then Q.

[9] Many other arguments have been put forward against the propositional account. One has to do with Carroll's regress argument in his 1895, which many take to show that knowledge of logical principles cannot be propositional and must be dispositional. See my 2010 for arguments that Carroll's regress does not provide support for dispositional accounts. In his 1949, Ryle also famously argued that knowing a logical principle is having a bit of knowledge-how, which is in turn analysed in terms of dispositions. Field (2009 and in conversation) has also suggested that Curry's paradox provides some motivation for dispositional accounts.

However, Boghossian states the account in a different way. On his view, in order to know MP, one needs to have a disposition to *reason* according to MP (rather than merely a disposition to infer according to MP). And for him a subject S has a disposition to reason according to MP in the following circumstances:

> '… Whenever [S] believes that p, and believes that 'if p, then q', he is disposed either to believe q or to reject one of the other propositions.' (Boghossian, 2000, p. 230; see also 2001, p. 633 n. 10).

This suggests that the disposition required for knowing MP should be stated in the manner of (Disposition to Reason) or (DTR):

> **(DTR):** Knowing MP requires having a disposition to reason according to MP, i.e. a disposition to believe Q or reject P or reject if P then Q, from the beliefs that P and that if P, then Q.

(DTR) is clearly designed to handle pieces of reasoning such as (Ice-Cream); for the very characterisation of the disposition allows for the rejection of one of the initial beliefs as a manifestation of the disposition. For this reason, it might be thought that it will do better than (DTI) as an account of knowing MP given the existence of pieces of reasoning such as (Ice-Cream).

Not all of the issues that arise from stating the disposition required for knowing MP in terms of (DTR) will be discussed below. The focus will be mainly on the question of whether (DTR) meets requirement (R). But notice here some initial worries with (DTR).

(i) It is unclear in what sense (DTR) gives a characterisation of knowledge *of* MP. The standard way of stating MP is silent about rejection. And *prima facie* rejecting initial beliefs goes beyond the exercise of one's knowledge of MP.

(ii) (DTR) makes knowing MP closer to knowing a principle of *belief revision* than to knowing a logical principle in trying to cover different things one might do when one believes both P and if P, then Q – when one's reasoning in some sense involves one's knowledge of MP. But doing this is drawing the wrong sort of moral from examples such as (Ice-Cream), which rather seem to show that one's knowledge of MP at least doesn't do all the work in one's reasoning. Indeed Harman's point (see 1986: pp. 3 ff.) is that MP is a rule of implication and *not* a rule of inference or reasoning. It says nothing about belief revision.

(iii) Boghossian thinks that (DTR) is necessary not only for knowing MP but also for understanding 'if, then' or material implication. If so, that means in the first place that one's understanding requires having a fairly sophisticated disposition involving rejection. And, provided that rejecting P amounts to accepting (or believing) not-P, the disposition will require understanding negation.[10] But it might be thought that this disposition is too sophisticated to be required for understanding 'if, then'.

Now there is a larger issue looming here, brought up by the remarks in (i)-(iii). It concerns what the *content* of MP really is: MP says that P, and if P, then Q, together entail Q. This is *equivalent* to saying that P, and if P, then Q, and not-Q, together entail a contradiction. So for instance it could be suggested that because of this equivalence, we could take a disposition to infer according to MP to be a disposition to avoid believing simultaneously P,

[10] See here Rumfitt 2000 for arguments that rejecting P does not amount to accepting not-P.

if, P, then Q and not-Q. However, I take it that, that P, and if P, then Q, and not-Q, together entail a contradiction is not a statement of MP; for it is not about the consequent following the conditional and its antecedent, which is what MP is about. If it were a statement of MP, that is, if all the principles equivalent to MP were taken to be MP, giving an account of knowing MP would be implausibly difficult.

(iv) As stated, (DTR) entails that the disposition only has *beliefs* as inputs and outputs, and indeed it seems to be the orthodoxy to characterise the dispositional account in terms of beliefs. Harman also takes it as a disposition concerning beliefs (see again note 2). However, one can reason according to MP with propositional attitudes different from belief (e.g. suppositions), and perhaps even less than fully formed propositional attitudes. So the statement of (DTR) has to allow for these other kinds of attitudes. This is actually a big issue for a characterisation of the disposition, which cannot be addressed here. For the purpose of the discussion I am going to assume that these inputs and outputs are belief. However I will also consider briefly an alternative proposal.

Thus the example in (Ice-Cream) ought to be taken, perhaps slightly artificially, as follows.

You form two initial beliefs:
P: that you will buy an ice-cream.
If P, then Q: that if you buy an ice-cream, you will miss your train.

You do not want to infer (come to believe) **Q**: that you will miss your train.

And you rather come to believe **not-Q**: that you will not miss your train.

So instead of coming to believe **Q**: that you will miss your train, you reject your belief **P**: that you will buy an ice-cream.

Let's also introduce some useful terminology to capture the difference between (DTI) and (DTR): (DTI) is a *single-track* disposition and (DTR) is a *multi-track* disposition.[11]

> A **single-track** disposition is a disposition that has a single type of stimulus and a single type of manifestation.

A possible example of a single-track disposition is fragility: on some accounts, fragility is a disposition to break easily when stressed.

> A **multi-track** disposition is a disposition that has more than one type of stimulus or manifestation or both.

A possible example of a multi-rack disposition (due to Ryle) is knowing French: if you know French, in different circumstances, you might do any of asking a question in French, giving an order in French, obeying an order in French, thinking in French, etc. These are all manifestations of your knowledge of French that might be prompted by different stimuli.

In the next three sections, I will argue that neither (DTI) nor (DTR) nor any variants of these, that is, no dispositional account of knowing MP, whether single-track or multi-track,

[11] This distinction is due to Ryle in his 1949, ch.5, p. 114. Some philosophers argue that fundamentally there aren't really multi-track dispositions but only single-track ones. Others argue that many apparently single-track dispositions are really multi-track. Consider fragility again: although it is usually stated as a single-track disposition, it could be stated as a multi-track one, with different types of stimuli (stressing, dropping, smashing, etc.) and different types of outcome for each of the types of stimuli (breaking into pieces, cracking, tearing, etc.).Whether a disposition ultimately comes out single- or multi-track will largely depends on how types of stimuli and types of manifestations are individuated (i.e. finely or coarsely). I cannot discuss these issues here. See Bird 2007 for a useful discussion.

can meet requirement (R). The bulk of the argument will concern (DTI), and it will then be extended to other accounts. Section VII will introduce the propositional account and argue that, because it can meet requirement (R), it accounts better than the dispositional one for blameless but blind reasoning.

IV. (DTI) and Reasoned Change in View

Consider the following single-track disposition (ST1) as a characterisation of the disposition involved in (DTI):

(ST1) Being disposed to believe Q from believing P and believing if P, then Q.

It is easy to see that (ST1) is going to make trouble for reasoned change in view. Consider (Ice-Cream) again. You start off by believing P, that you will buy an ice-cream and if P, then Q, that if you buy an ice-cream, you will miss your train. At this point, the condition of manifestation of (ST1) obtains. Given this, you should manifest the disposition: you should infer/form the belief Q, that you will miss your train. But now we have a problem: you do *not* form this belief and revise your initial beliefs *instead*.

The problem is that given (ST1), a case where you have the relevant initial beliefs but fail to infer (the condition of manifestation obtains but there is no manifestation) is a case in which (Dispositional) has a *falsifying exception*; for intuitively dispositions cannot fail to manifest when their conditions of manifestation obtain. (I'll say more about this matter below.)

The consequence of this is that you seem to have lost (ST1): it was destroyed when you formed the belief not-Q. And since having the disposition is required for knowing MP, and it was assumed you knew MP when you started your reasoning in (Ice-Cream), you no longer know MP. Your knowledge too has been destroyed. And further, if the disposition is required to even understand 'if, then' (or have the concept of material implication), your understanding has also been destroyed. But of course this is an absurd consequence: your understanding and knowledge haven't been destroyed by coming to believe not-Q.

Obviously, requirement (R) is not met by (DTI): your knowledge of MP conflicts with your reasoned change in view. Indeed we can give a precise characterisation of the nature of the conflict here: reasoned change in view can *destroy* your knowledge of logical principles.

A proponent of the dispositional account will no doubt have much to say about ways to avoid this consequence, and she is likely to want to move to a more complex account of dispositions in order to avoid it. What seems to be required here is something written into the disposition that enables it to handle exceptions. The way Harman puts it is by saying that the disposition should be such that it 'may be overridden by other considerations'.[12]

Before turning to refinements on (DTI), a natural dispositionalist answer to the problem is worth considering.

[12] See Harman (1986: p. 19). Harman does not give any detail as to how these dispositions that can be overridden ought to be characterized (although it is clear that he would not go for anything like (DTR) for the reasons outlined in section III (i)-(ii)). The dispositionalist accounts discussed below can be seen as attempts to characterize the relevant dispositions in a way that makes them apt to be overridden.

A dispositionalist might just think that she should be *stubborn* here, and argue that you really *do* infer Q in (Ice-Cream): you first infer Q, from your initial beliefs P, and if P, then Q; then you also come to believe not-Q, see that something has to go, and eventually reject P. She could even make the stronger claim that you *have to* infer Q *in order to* revise one of your initial beliefs: you have to come to believe that you will miss your train in order to give up buying an ice-cream because you do not want to miss your train. You have to reach an outright contradiction. Only then can you really see the conflict between this and believing that you will not miss your train.

However, being stubborn is going to create further problems for the dispositionalist. For one thing, there doesn't seem much by way of a motivation for insisting that you infer Q in (Ice-Cream), except that it is required by (ST1).

But also, being stubborn just seems to amount to denying the phenomenon of reasoned change in view: it amounts to denying that *instead of* inferring according to MP, you could revise your beliefs.

Further, it does not seem right to say that if you believe a conditional and its antecedent, any action on these beliefs will involve believing the consequent. It seems possible to appreciate or see the commitment of your beliefs without embracing them: considering your beliefs' commitments does not require believing those commitments. Saying that would amount to saying that seeing that A follows from B requires believing A.

Another problem with the stubborn reply is that, if you really always infer Q once you believe that P and that if P, then Q, 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: it is unclear that propositional attitudes such as a belief could kick in for a nanosecond. So the outputs of (DTI) for instance might not be fully-formed propositional attitudes. And so dispositionalists at least owe us an account of what these outputs would be and how they would relate to such attitudes.

A further big problem for the stubborn dispositionalist reply is that sometimes you might do nothing whatsoever once you believe P and if P, then Q: you might leave the matter there, get distracted or interrupted, or do something completely unrelated. The stubborn dispositionalist would also have to say that you actually do infer in these cases – otherwise there would be a falsifying exception to the disposition. However, it seems wrong to say, as the dispositionalist would have to say that in this sort of case you come to believe Q and only after, perhaps, give up that belief.

So the dispositionalist cannot just be stubborn. She has to find a way to take into account the fact that that the relevant disposition can be 'overridden'. I consider three ways to do so in terms of single-track dispositions. I will then consider (DTR) and multi-track dispositions.

V. Refinements of (DTI) and Reasoned Change in View

V. i. Antidotes/Masks/Interfering Factors

It is natural for the dispositionalist to turn to masks or antidotes to handle falsifying exceptions to (DTI). Antidotes have been widely discussed in the context of non-mental

dispositions to explain away apparent cases of falsifying exceptions to dispositions.[13] A case of an antidote is a case in which something has a disposition, the condition of manifestation of the disposition obtains, and there is no manifestation of the disposition. But an interfering factor explains why this does not simply constitute a case of a falsifying exception.

To fix ideas, consider the following example: suppose that a mushroom is fatally poisonous (e.g. an amanita phalloides): if you ingest it, it will kill you. However, if you ingest it and immediately afterwards take an antidote, it will not kill you. A good explanation of what goes on in this example is that the mushroom retains its disposition throughout (it is fatally poisonous), the condition of manifestation of the disposition obtains (you ingest it), but the antidote blocks the manifestation.

A defender of (DTI) could similarly say that an antidote interferes with your manifestation of (ST1) in (Ice-Cream). Thus, you form your initial beliefs P, and if P, then Q (the condition of manifestation obtains), and so you should come to believe Q. But you come to believe not-Q instead, which prevents you from believing Q. Coming to believe not-Q is your antidote, whose presence explains why you do not manifest (ST1) while preserving the intuition that you still have the disposition – it is not destroyed in this process.

The upshot of appealing to antidotes to preserve the intuition that (ST1) is not lost despite its lack of manifestation is that the condition of manifestation turns out not to obtain normally or ideally or typically.[14] Other things are *not* equal: there is an interfering factor. In normal conditions of manifestation, the fatally poisonous mushroom would kill you; in normal conditions of manifestations, you would infer Q from P and if P then Q. With antidotes, conditions of manifestation have to be abnormal for the disposition not to manifest itself.

I now consider three problems with appealing to antidotes in the case of (DTI) and (Ice-Cream).

1. It is intuitively incorrect to say that the condition of manifestation of (ST1) isn't *normal*, especially given that (ST1) is an account of your knowledge of MP. If you do not infer Q, intuitively there need not be anything *abnormal* with the conditions in which you exercise your knowledge of MP.

2. According to the antidote account, in (Ice-Cream) you do *not* exercise your knowledge of MP *at all*, because you do not manifest the disposition – you are prevented from manifesting it. But that still doesn't seem right: although you do not infer according to MP, intuitively you exercise your knowledge of MP in (Ice-Cream). The problem here is that according to (DTI) the only way to exercise your knowledge of MP is by inferring according to MP. But an adequate account of the interaction between reasoned change in view and logical knowledge requires that there should be other ways to exercise such knowledge.

3. Cases of reasoned change in view are widespread; for some people they might even be the norm: perhaps more often than not, people do not infer according to the logical principles they know but revise their beliefs instead. Those cases will be systematically

[13] See for instance Bird 2007 and Fara 2005 for discussion.

[14] These are of course not synonyms. They are all qualifications used in discussions of (different sorts of) dispositions. In what follows I will mainly use the qualification 'normal'. However, choosing any other qualification would not alter the discussion in any substantive way.

treated by the antidote account as cases in which other things are not equal. This is counterintuitive. MP might be a norm of reasoning, knowledge of which tells you which ways to reason are allowed, but that doesn't mean that in the relevant circumstances reasoning according to MP has to be statistically the norm. Dispositional accounts do not seem to be able to capture this difference, and are committed to expressing the normative force of principles of logic in these statistical terms.

Then again, requirement (R) is not met: there is a conflict between reasoned change in view and knowledge of logical rules. However, this time the issue is not that the latter may destroy the former. The conflict is that reasoned change in view and exercise of knowledge of logical rules are *incompatible*: the former *prevents* you from exercising your knowledge of MP in any way whatsoever. On this account either you exercise your knowledge of MP by inferring according to it or you don't exercise it at all.

Notice here that including a restriction in the condition of manifestation in the statement of (DTI) would be of no help. Consider the following:

> **(ST1*)** Being disposed to believe Q, from believing Q and if P, then Q, when the conditions are normal (ideal, typical)/when other things are equal.

For one thing, it is difficult to specify what these conditions might be: there is no unique general reason why one might not infer Q if one believes both P and if P then Q, but many specific ones, which might not be finitely specifiable.[15] Also giving a general specification of these conditions might in the end boil down to saying that you have a disposition to infer except when you do not infer (or except when there is an interfering factor). This is uninformative and circular. Finally, the problems raised in 1. and 2. above would still hold.

V. ii. Habituals

I have not outlined any specific account of dispositions so far. But it was implicit in the discussion that dispositions would connect in some way with some sort of conditional statement: (other things being equal) if you ingested a fatally poisonous mushroom, it would kill you; (other things being equal) if you believed both P and if P, then Q, you would infer/come to believe Q. It might be thought that a less stringent account of dispositions would be better at accounting for knowledge of MP.

Thus consider the habitual account. If dispositions are habituals, they are generalisations that tolerate exceptions: the lack of manifestation of a disposition when its condition of manifestation obtains need entail neither that it has a falsifying exception nor that the condition of manifestation is abnormal.[16] Indeed, defenders of the habitual account have claimed that the great advantage of the account is that it solves the problems posed by cases of masking or antidotes to conditional accounts: other things *can be* equal when the condition of manifestation obtains and there is no manifestation. (See Fara, 2005, p. 71.)

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[15] This objection is not specific to (ST1*). It points to a general difficulty in handling cases of masks or antidotes by including restrictions in the statement of the conditions of manifestation of the disposition. A dispositionalist could say here that, since it is just part of the way dispositions work that the restrictions in the conditions of manifestations need not be finitely specifiable, this fact should not count against an account of a particular disposition such as (ST1*).

[16] Here my account of dispositions as habituals follows Fara's in his 2005.

Michael Fara, who defends the habitual account of dispositions, thinks that habituals can be stated using generic sentences.[17] Examples of generic sentences are: 'Alice sings in the shower' or 'Alice walks to school'. These sorts of sentences express generalisations about Alice's behaviour which need not be universal and can thus tolerate exceptions: these exceptions are not falsifying exceptions. If generic sentences are apt to state habituals, the disposition at issue in (DTI) may be stated using the following generic sentence:

(1) S infers Q when S believes both P and if P, then Q.

And that of a fatally poisonous amanita phalloides mushroom:

(2) Amanita phalloides mushrooms are fatally poisonous.

The way Fara states his truth-conditions has it that:

(1) it true iff in *most* cases S infers Q when S believes both P and if P, then Q.

(2) is true iff in *most* cases people die when they ingest such mushrooms.

Thus although the generic used to state the relevant disposition has to be true on most occasions, it can tolerate exceptions.

I now consider objections to Fara's own habitual account. I will then consider and reject the suggestion that the generic in (1) could be understood as a generic that is satisfied in *fewer than most* cases, as some generics are.

Fara's final account of dispositions as habitual is this:

> **(Habitual)** An object x is disposed to M when C iff it has an intrinsic property in virtue of which x Ms when C. (See Fara, 2005, p. 70.)

The reference to an intrinsic property is necessary to capture the specific way in which the generic sentence on the right-hand side 'x Ms when C' is true; for a generic sentence could be made true by accident. For instance, if true, the sentence 'The stock-market goes down when Alice yawns' would in all likelihood be true by accident. However the generics that state dispositions should not be true by accident or for reasons that intuitively have nothing to do with the object's possessing a dispositional property.

Consider antidotes again. One advantage of the habitual account of dispositions is that it takes off some of the pressure of specifying in the statement of a disposition the cases in which there is no manifestation of the disposition when its condition of manifestation obtains; this was a problem for (ST1*). However, it does not take off *all* of the pressure. As Fara stresses, the habitual account has to appeal to the notion of a *permissible exception* to a habitual sentence: an exception such that, if it occurs, the generic sentence remains true.

Of course some exceptions will not be permissible and will thus falsify the relevant generic sentence: if just any exception were permissible, the generic sentence would be, as Fara puts it, 'contentless' (Fara, 2005, pp. 66ff.). For instance the truth of 'Mary smokes when she

[17] Notice here that not all generic sentences state dispositions; for instance 'Alice holidays in Scotland' does not seem to state a disposition: it does not seem right to paraphrase it as 'Alice has a disposition to holiday in Scotland'. Also, it is unclear that all dispositions can adequately be stated as habituals. For instance, fragility is arguably not a disposition that can be stated using a generic sentence: fragile objects are not in the *habit* of breaking – they only break once. (I'll come back to this issue shortly). But see Fara (2005, pp. 72ff.) for arguments that dispositions of this sort can be adequately stated using generic sentences.

gets home from work' is compatible with there being occasions on which she does not smoke when she gets home from work (e.g. she is out of cigarettes, has a sore throat, ...). But if she comes home, has plenty of cigarettes, is in the mood to smoke, and if generally all is as it should be (and, e.g., there is no quantum mechanical blip), then if she does not smoke on such an occasion, it is false to say that she smokes when she gets home from work. That is to say, the antidotes that create problems for conditional accounts of dispositions would have to be amongst the permissible exceptions for the habitual account to constitute any improvement on the conditional ones. For instance, a permissible exception to an amanita phalloides not killing you when you ingest it would be the relevant medicine.

Applied to our case the habitual account goes as follows:

> **(Habitual MP)** S is disposed to infer Q when S believes both P and if P then Q iff S has an intrinsic property in virtue of which S infers Q when S believes both P and if P, then Q.

I set aside from the discussion some aspects of this proposal: for instance, what the intrinsic property might be in the case of a disposition to infer according to MP, and what 'in virtue of which' might mean. Rather, I want to focus on a problem which arose when discussing antidotes in the previous section.

So, the proposal entails that a case in which S does not manifest the disposition although its condition of manifestation obtains need not be seen as a case of a falsifying exception to the disposition or a falsification of the generic sentence.

Still, the account will face serious problems when reasoned change in view is considered.

First, and this is a point already mentioned when discussing antidotes, reasoned change in view may be statistically the norm: perhaps more often than not S does not infer according to MP once S believes both P and if P, then Q. Moreover, it seems that if cases in which S doesn't infer are cases in which there is for instance no irrationality involved, that is, if they are cases of reasoned change in view, they will all have to be amongst the permissible exceptions. Indeed, if they were not to be amongst the permissible exceptions, (Habitual MP) would be falsified: (1) would be false. And that would mean that S has lost the disposition. So it might be the case that dispositions such as (ST1) are most of the time or habitually not manifested, when their conditions of manifestation obtain.

If (ST1) is habitually not manifested, the relevant generic sentence is false; and this means that the relevant ascription of disposition is false. That is, if in most cases S does not make the inference – e.g. in most case S doesn't infer Q – we would have to say that S's disposition has eventually been destroyed or that eventually other things have stopped being equal. And thus exercising your logical knowledge is incompatible with reasoned change in view. So we're back to where we were at the end of the section on antidotes.

Secondly, it is still a consequence of the account that when we have a case of a permissible exception – as for instance in (Ice-Cream): you do not exercise your knowledge of MP at all because your disposition is not manifested. And that seems wrong.

To sharpen the point here, consider a famous case of masking proposed by Johnston (1992): a fragile glass cup which is disposed to shatter when dropped is carefully protected by

packing material. Suppose that this cup is thus protected throughout its career, such that it will never break.

In this case, the dispositional claim is true:

(3) The cup is disposed to break when struck.

But the conditional claim is false:

(4) If the cup were struck, it would break.

According to Fara, the generic claim should also be true:

(5) The cup breaks when struck.

However, (5) doesn't seem true: it isn't true if the cup will never break, even if it is struck most of the time. Perhaps the oddity here comes from the fact that generics don't seem apt to state dispositions that an object could manifest only once in a lifetime. So consider a variation on this example. Suppose that an engine has a disposition to beep when struck and suppose that it is wrapped in such a way that you could not make it beep if you struck it.

In this case, the dispositional claim is true:

(6) The engine is disposed to beep when struck.

The conditional claim is false:

(7) If the engine were struck, it would beep.

According to Fara, the generic claim should also be true:

(8) The engine beeps when struck.

But (8) will be false if most of the time the engine does not beep when struck or if it never does. When Fara discusses examples of masks or antidotes, he has in mind cases in which 'there are some occasions', or it 'occasionally' is the case that there is no manifestation of the disposition (See Fara, 2005, pp. 72 ff.). But the fact is that (6) is true even if whenever the engine is struck it does not beep, but this is not so for (8). So an account in terms of habituals cannot solve the problem posed by antidotes – for there might habitually be an antidote that prevents the manifestation of a given disposition. The case of reasoned change in view is a case in hand.

At this point, it might be objected that not all generic sentences ought to be true in most cases in order to be true. The fact is that some generic sentences seem to be true even if they have a large number of exceptions. Indeed some such sentences seem to be true even if the general property ascribed does not apply in the majority of cases. Standard examples are:

(9) Chickens lay eggs.
(10) Cats suckle their young.
(11) Bees reproduce.

In the case of (9) only hens lay eggs, in the case of (10) only female cats suckle their young, and in the case of (11) only the queen bee reproduces, and so the vast majority of the bee population does not.

In a similar way, it could be suggested that (1) could be true even if not inferring Q when you initially believe both P and if P, then Q, was the norm/what is habitually the case.

However, this suggestion is implausible – and indeed (9)-(11) are actually very unlike (1):

Firstly, (9)-(11) do not express habituals: it is not true that cats are in the habit of suckling their young. So what is true of (9)-(11) might not be true of (1).

Secondly, (9)-(11) ascribe a property to a kind or collection, and not to an individual. If the relevant generic property were applied to individuals belonging to the kinds, most of the resulting generic sentences would be false. There might be all sorts of reasons why, when we talk about a kind, some generic sentences need not even be true of most of the individuals in the group. Perhaps it is clear from the context that only a subset of the group is concerned, or that the generality has to be somehow restricted. But these reasons do not apply to cases in which we want to ascribe a habitual to an individual.

So it seems that the ascription of an habitual to characterise a disposition as in (Habitual MP) will indeed require that the generic used for that ascription is true in most cases.[18] And that means again that the habitual account is inadequate to characterise knowing MP.

V.iii. Weakening (DTI)

One might argue that so far the wrong dispositions have been considered to account for your disposition to infer according to MP. The right sort of disposition would be a disposition to *be willing* or *ready to* or *having the intention to* infer according to MP – a disposition to form a pro-attitude towards inferring – and not a disposition actually to perform any inference, as stated in (DTI). Thus consider the following proposal:

> **(Disposition to Pro-Attitude)** Knowing MP requires having a disposition to form a pro-attitude towards: believing Q, from believing both P, and if P, then Q.

The aim in construing the disposition in this way is to build something (more) cognitive into it so that it is less brutally causal. For instance, it makes it easier to see how the disposition could help explain how inferring according to MP might be performing an intentional action: being willing to infer comes close to having the intention to infer.

Now it might be thought that (Disposition to Pro-Attitude) would not be defeated in (Ice-Cream) because, unlike with (DTI), manifesting the disposition does not require inferring. Thus, what happens in (Ice-Cream) is that you form your initial beliefs that P and that if P, then Q, and then you form a pro-attitude towards inferring Q. When you further come to believe not-Q, you cease to have this pro-attitude, and you go on to reject P.

But this really is no improvement on (DTI). For given (Disposition to Pro-Attitude), if you do not form a pro-attitude towards inferring Q once you believe both P and if P, then Q, the disposition has failed to manifest itself when its condition of manifestation obtains. But why should you form a pro-attitude towards believing that you will miss your train? In (Ice-Cream), it does not have to be the case that you were at all willing to infer. Such a pro-attitude might just not have been formed. If that makes the case more convincing, you can suppose that rather than contemplating forming the belief that you will miss your train, you were contemplating forming the belief that you will go to hell. It does not seem that you would form a pro-attitude towards going to hell just because you know MP and have the

[18] The connection between dispositions, habituals and generics is complex. I cannot do justice here to its intricacy, which would deserve another paper.

relevant initial beliefs. So it is not the case that whenever you believe both P and if P, then Q, you should form a pro-attitude towards inferring Q. Sometimes you might not, and whether you do will be very sensitive to the context and the content of the beliefs that figure in your reasoning. It will not merely be due to the fact that you know MP, and have the relevant beliefs.

It is easy to see that an explanation in terms of either antidotes or habituals would not help more than they did with (DTI) because the problem is structurally the same. So going for (Disposition to Pro-Attitude) is not going to help the dispositionalist meet requirement (R).[19]

This closes the discussion of accounts of the disposition required for knowing MP that take it to be a single-track disposition along the lines of (DTI). I now turn to multi-track dispositions.

V. (DTR) and Reasoned Change in View

(DTR) is a multi-track disposition that allows for different manifestations of the disposition so that so that if, as in (Ice-Cream), you do not infer once you believe both P and if P, then Q, that need not count as an inadequate or abnormal way to reason.

Now, as stated in section III, (DTR) won't do, and this for two reasons:

Firstly, as noted in section IV, when discussing stubborn dispositionalism, inferring Q, and rejecting either P or if P, then Q, are not the only things which you might do once you believe both P and if P, then Q. You might also do nothing whatsoever: neither infer nor reject. If we are really going to be serious about going multi-track to capture the different things you might do once you believe both P and if P, then Q, doing nothing ought to be included as a possible manifestation of the disposition.

Secondly, it was stressed in section V. i. that there is no general property that all antidotes to inferring have in common: there is no general reason why you might not infer Q given that you believe both P and if P, then Q, but many different ones. Thus, *merely* believing P, and believing if P, then Q, is not *as such* going to equally bring about believing Q or rejecting P or rejecting if P, then Q or doing nothing. In particular, simply believing both P, and if P, then Q is not going to bring about rejecting P. To get a rejection of P, types of stimuli different from believing both P and if P, then Q will have to be factored in. If anything, it is rejecting Q and believing if P, then Q that will bring about rejecting P. So if the disposition really has to be multi-track, different types of stimuli will have to be factored in to explain the different types of manifestation.

I will set aside the first point, and focus on how to modify (DTR) so that it clearly states how different types of stimuli trigger the different types of manifestation of inferring and rejecting. So there is no attempt at completeness here. Boghossian's (DTR) should really look like (DTR*), below, which states that knowing MP requires having a multi-track disposition with different types of manifestation for different types of stimuli:

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[19] For instance, the same problems would arise if the weaker dispositions were framed in probabilistic terms, where a disposition would not necessitate the manifestation of the disposition given the right condition of manifestation but merely raise the chance of its manifestation. So for instance the disposition to infer according to MP would be such that believing P and believing if P, then Q, would raise the chance of believing Q as a result. However, it is again possible that this would not generally be the case.

Disposition to Reason* (DTR*) Knowing MP requires having a disposition to reason according to MP, i.e. it requires:

(ST1) Being disposed to believe Q from believing P and believing if P, then Q.
(ST2) Being disposed to reject P from believing if P, then Q and believing not-Q.
(ST3) Being disposed to reject if P, then Q from believing P and believing not-Q.
…….

Notice here a couple of things in passing.

First, provided that rejecting P amounts to believing not-P, (ST2) boils down to a disposition to infer according to Modus Tollens:

MT: Not-Q, and if P then Q, together imply not-P.

And so if (DTR*) is required for knowing MP, that means that knowing MP requires having a disposition to infer according to MT. And if, further, (DTR*) is required for understanding 'if, then', that means that understanding 'if, then' requires having a disposition to infer according to MT. Some will find this entirely congenial and some will take it as a reason to reject the account. But I do not pursue this here.

Second, note that the disposition to reason according to MP really has to be stated in a way like (DTR*) – as a multi-track disposition. For instance, anything like (Big ST) would be inadequate:

(Big ST) Being disposed to reason according to MP is being disposed to manifest the following types of manifestations:

[believing Q $\vee$ rejecting P $\vee$ rejecting if P, then Q $\vee$ rejecting both P and if P, then Q $\vee$ …]

in response to the following types of stimuli:

[believing P and believing if P, then Q $\vee$ believing not-Q and believing if P, then Q $\vee$ believing P and believing not-Q $\vee$ …].

(Big ST) is inadequate because it is not the case that any of the possible types of stimuli can bring about any of the possible types of manifestations. So the disposition to reason really ought to be a complex of single-track dispositions – a multi-track disposition.

Now the problem is this. Consider (Ice-Cream) again. It is easy to see that the presence of (ST1) in the statement of (DTR*) is going to cause trouble. Of course (ST1) is needed as one of your dispositions that count towards knowing MP. If anything, this is the paradigmatic way of exercising your knowledge of MP. However, (ST1) creates exactly the same problem as before, when we were considering (DTI). In (Ice-Cream), you start with the beliefs P, that you will get an ice-cream and if P, then Q, that if you get an ice-cream, then you will miss your train. Given (DTR*), at this stage (ST1) is activated. So you should form the belief Q, that you will miss your train – that would be the appropriate manifestation at this point. However, you do not do this and come to believe not-Q instead.

So (DTR) has a falsifying exception in the exact same way as (DTI) had. Given that the problem is structurally similar, the problem is not going to be fixed by considering modifications of (DTR) of the sort that were considered with (DTI). So requirement (R) will

not be met either: either your knowledge of MP is destroyed or its exercise is incompatible with reasoned change in view.

One way of thinking of (DTR) and (DTR*) is as attempts to make your knowledge of MP dynamic by covering the different things you might do once you believe both P and if P, then Q. And so far as I can see, the only advantage of (DTR*) over (DTI) is that it can in some sense capture aspects of a reasoning *similar* to that involved in (Ice-Cream) in terms of your disposition to reason according to MP. According to (DTR*), you start with your beliefs P, and if P, then Q. (ST1) then gets activated. You infer Q. But you then also form the belief not-Q. You reach a contradiction. This means that you have to give up something. You definitely want to give up Q. So that leaves you with believing P, if P, then Q and not-Q. Something else has to go. You want to hold on to if P, then Q and not-Q. Thus (ST2) gets activated and you reject P.[20]

But this reasoning is not the reasoning in (Ice-Cream). And so the fact that the former can be captured in this way does not take away the fact that (DTR*) conflicts with the reasoning in (Ice-Cream). There is no denying the fact that (ST1) is violated. Multi-track dispositions such as (DTR*) are ill-suited to track your reasoning in (Ice-Cream). And equally, your reasoning in (Ice-Cream) cannot be captured *merely* in terms of the deployment of your knowledge of MP.

After close examination, it appears that neither (DTI) nor (DTR), nor any variants of these, can help the dispositionalist meeting requirement (R); that is neither single-track nor multi-track dispositions can give an account of knowing MP whereby it does not conflict with (Ice-Cream).

VII. Propositional Knowledge of MP

We need an alternative to the dispositional account of knowing logical principles. An alternative that meets requirement (R): where knowledge of logical principles does not conflict with reasoned change in view.

In this last section, I outline a proposal that satisfies this requirement. Of course, there are many other considerations that would have to be looked at to motivate a given account of knowledge of logical principles: how exactly such principles are known, whether they are a priori, etc. A thorough discussion here would require another paper. So the aim here is merely to show that this alternative account is better than the dispositional one at accounting for logical knowledge when reasoned change in view is considered.

First, lessons need to be learned from the failure of the dispositional account which suggest two constraints on an account of knowing a logical principle such as MP:

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

[20] Notice here that this sort of reasoning might in some sense mimic a proof of not-P in natural deduction from the assumption that if P, then Q. In that case, one would assume P, derive a contradiction (Q and not-Q) and then conclude not-P.

It should not be the case that a failure to infer *eo ipso* counts as an inadequate response to the situation, or demands that the context in which the reasoning takes place is treated as abnormal. Sometimes, and perhaps more often than not, it is an adequate response.

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.

Here is a more open-ended way of drawing these lessons. I said in section IV that, intuitively, if you know MP and believe both P and if P, then Q, it can be a perfectly good way to exercise your knowledge merely to see or consider or be sensitive to the fact that Q follows – to be sensitive to what these beliefs commit you to – without inferring Q or forming a pro-attitude towards inferring Q. If we construe your knowledge of MP as requiring dispositions, the problem is that these initial beliefs really are stimuli – things on which you ought to act in the way stated by the disposition. It is desirable to have an account of knowing MP that does not bind you in this way, where your initial beliefs count towards inferring according to MP, but they do not bind you to do so.

So here is a proposal: knowing a logical principle is knowing a proposition – it is having propositional knowledge of that principle. In particular, knowing MP is knowing a proposition, which, as a first approximation, could be characterised as follows:

(Propositional) Knowing MP is knowing that P and if P, then Q, together imply Q.[21]

Given (Propositional), a situation in which you believe both P and if P, then Q but do not infer Q, is not one in which your response is inadequate. There is no conflict here. If you know a proposition of this sort, that will of course give you a good reason to infer in a certain way, but that need not bind you to infer in that way. There is nothing binding about a bit of propositional knowledge. If you know MP that will be a consideration that has some influence on your reasoning, but it is not going to bind you to infer Q, once you believe P and if P, then Q.

One objection which the dispositionalist will make against this propositional account of knowing MP is that it will not be able to account for blameless but blind reasoning. Indeed, it was suggested in section II that a dispositional account of knowing MP would be superior to a propositional one at explaining the possibility of blameless but blind reasoning. The perceived difficulty here for a propositional account will concern mainly the fact that it is not obvious how it could account for the blindness of the reasoning – whose validity cannot be articulated by the reasoner. The objection would be that if the reasoning is explained in terms of your propositional knowledge of MP, you should possess the relevant concepts (e.g. 'imply') that figure in MP, and thus be in a position to articulate such knowledge. But that is too demanding.

Let me address these difficulties briefly before returning to the dispositional account. It is indeed possible that the word 'imply', or a cognate one, cannot be understood by a young child. Perhaps, as the dispositionalist seems to suggest, it is much harder to understand 'imply' than it is to understand 'if, then', and so we can count as understanding the latter without understanding the former. We count as understanding the latter when we have a

[21] This need not be thought of as a final characterisation of the proposition that is the object of propositional knowledge of MP. But it seems to be the simplest way to state it. One issue with it is that it is really a schema, and so not quite a full-fledged proposition. I do not pursue this interesting issue, which is worthy of discussion, here.

certain set of dispositions. Against this, note first that it is far from obvious that implication is harder to understand than the material conditional – especially given how connected they are.[22] Also, this objection will have any force only if we accept two assumptions made by the dispositionalist: first, that young children, for instance, reason according to MP; second, that it is necessary to have an exact grasp of the concepts used to state MP to count as having propositional knowledge of MP – for instance the concept of implication.

Neither of these assumptions goes unchallenged. First, it may well be that reasoning according to MP actually takes some hard learning and only arises at a relatively late stage. This is especially the case if we are talking here of reasoning according to MP in the sort of reliable or safe way needed to count as *knowing* MP. If reasoning according to MP takes some learning, it is acceptable to say that young children may not count as knowing it.

Second, suppose that a propositionalist subscribes to the division of linguistic labour. She could then argue that people with partial or shallow grasp of (meta-)logical concepts could still count as understanding them (just as Putnam understands 'elm' and 'beech' but cannot tell elms and beeches apart). They would understand them deferentially. Maybe they would not be very good at explaining these concepts, at telling a valid inference from one that's not, and they would sometimes commit fallacies. But on that picture of understanding, which is otherwise widely accepted, there would be no obstacle to saying that someone who does not exhibit a great deal of conceptual sophistication when it comes to logical concepts could count as understanding them. And if they understand them in this way, there would be no obstacle in principle to saying that they have propositional knowledge of logical principles.

This is just to say that a propositionalist is likely to operate with a very different picture of logical knowledge from the dispositionalist's, a picture that rejects some fundamental assumptions of the dispositionalist account. Without such assumptions, there is no obvious reason why propositional knowledge of logical principles would be conceptually too demanding for ordinary people, and even children, to have.

Further, there is no difficulty of principle with propositional knowledge being implicit or unconsciously explicit: we have a lot of knowledge which is like that (e.g. Alice's might know that there are more than a thousand stars in the sky, but she has never explicitly entertained that proposition). Some of our propositional knowledge is so implicit that it might take a lifetime to articulate it (e.g. Clara might know that she was abused as a child, but block that thought from the surface of her consciousness). Thus, at least in principle, a propositional account of knowing MP could account for blind reasoning.

Another motivation for the dispositionalist account of blind reasoning could be the strangely widespread view that logical reasoning is in some sense *automatic*: it is perhaps something that happens to a subject rather than something that is done by a subject – it is like a second nature. And dispositions of course sit nicely with this view. However, as cases of reasoned change in view precisely highlight, there is no such automatism. You might change your

[22] You might perhaps object to this that 'imply' is modal, but 'if, then' is not; and so argue that in this respect the former is harder to understand than the latter. However, note first it is not obvious that 'imply' is modal, and second that this aspect of meaning might not need to be appreciated to count as understanding 'imply', as the remarks below about the division of linguistic labour suggest. See Tarski 1936 for a non-modal account of logical implication.

view rather than perform the logical inference. If there is no automatism of this sort, then there is no reason to appeal to dispositions on this ground.

So there is no principled reason why a propositionalist cannot account for the blindness of logical reasoning. Turning to blamelessness, it appears that a propositional account explains better than a dispositional account the blamelessness of many sorts of pieces of reasoning. On a dispositional account of the sort of (DTI) or (DTR), if you know MP and believe both P and if P, then Q, and your reasoning goes to believing Q, that reasoning is of course going to be blameless.

But it is unclear what we should say about cases such as (Ice-Cream). We have seen that a dispositional account violates (R) – knowing a logical rule conflicts with revised change in view: as we have seen one way in which there is conflict is that the latter destroys the former. This way of violating (R) entails that the reasoning is blameworthy. Clearly one cannot be blameless in engaging in ways to reason that destroy one's knowledge: knowledge-destroying ways to reason cannot be ways to reason we are entitled to engage in.[23] The other way in which there is a conflict arose from attempts to make the disposition apt to be overridden, as in the antidote account: in this case the conflict is that reasoned change in view is incompatible with exercise of knowledge of logical rules. Perhaps reasoning in ways that prevent exercise of your knowledge of logical rules is not blameworthy. But it is clear that it does not give us a satisfactory picture of ordinary reasoning – it systematically prevents logical knowledge from being exercised.

However, it is easy to see how your reasoning in (Ice-Cream) might be blameless on the suggested propositional account. On this account, your propositional knowledge does not bind you to infer Q if you believe both P, and if P, then Q. And so not inferring Q is not going to count as an incorrect exercise of your knowledge of MP. It is also compatible with you exercising your knowledge of a logical principle when you do not infer according to this principle.

Although your propositional knowledge of MP is non-binding, there is certainly some kind of normative relationship between believing P and if P, then Q on the one hand, and believing Q on the other. There are many ways in which this relationship could be captured on a propositional account. Here, for instance, is a natural way to think of such non-binding propositional knowledge of MP: it would be natural I think to develop the propositional account by appealing to *reasons*. For one thing, propositions naturally connect with reasons. In particular, it is natural to think that your propositional knowledge of MP *gives* you a reason to infer according to MP: it gives you a reason to infer Q, if you believe both P and if P then Q. A good way to think of reasons in this context is as normative reasons that are not binding, i.e. that are defeasible – considerations which have genuine weight, and might have some influence on your reasoning, but that can be overridden by other considerations.[24]

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[23] Obviously this cannot be a final diagnosis. Much depends on what sort of account of knowledge one is working with. On some accounts (e.g. where knowledge of logical rules is non-defeasible), the case could not be described as a case of destroyed knowledge; for that would be impossible.

[24] Such reasons are typically referred to as 'pro-tanto' reasons. See Kagan, 1989, pp. 17ff. for an excellent discussion of pro-tanto reasons. I remain tentative on the connection between propositional knowledge and reasons. Although I believe it gives us the right picture of the way logical knowledge connects to reasoning, the topic of reasons is far too intricate to be addressed thoroughly here. For instance one looming problem here would be some kind of bootstrapping problem – if we took P and if, P then Q to automatically give you a reason to infer Q. See Bratman, 1999, pp. 23-27, and Broome 2001, for classic discussions of reasons and bootstrapping.

Notice that some of Harman's remarks (1986, pp. 11ff.) are congenial to this appeal to (normative) reasons here. For instance he says that to capture the relevance of logic to reasoning, one might put forward the following principle: 'Logical Implication Principle: The fact that one's view logically implies P can be a reason to accept P'. He immediately adds that such a principle would be defeasible so as to be compatible with reasoned change in view. But it should be stressed here that talk of defeasibility and (normative) reasons is more at home with propositions than it is with it is dispositions.

So I suggest that a good way to characterise the reasoning in (Ice-Cream) is this: in (Ice-Cream), your knowledge that P and if P, then Q, together imply Q, gives you a reason to believe that you will miss your train given that you believe both that you will buy an ice-cream and that if you buy an ice-cream, you will miss your train. But that reason is overridden by another consideration, namely that you do not want to miss your train.[25] And so you do not infer that you will miss your train, but give up the ice-cream instead. Here again, that piece of reasoning is completely unproblematic on a propositional account: it is not in any way in conflict with your logical knowledge.

VIII. Concluding Remarks

It is a requirement that an account of logical knowledge does not entail that your logical knowledge conflicts with reasoned change in view. Dispositional accounts of knowledge of logical principles do not meet this requirement – and this, no matter how we construe the relevant dispositions. And so we should not characterise knowledge of logical rules as requiring having dispositions.

An alternative account, according to which knowing a logical principle is having a bit of propositional knowledge, can meet this requirement. In suitable circumstances, this bit of knowledge gives one a defeasible reason to infer according to that principle. Such an account can thus adequately account for the role played by knowing a logical principle in cases of reasoned change in view. This is a very strong reason to opt for a propositional account: whatever ordinary reasoning is about, it is wrong to see it as conflicting with logic and it is wrong to see it as conflicting with our logical knowledge. Of course much more would have to be done to provide a complete defence of a propositional account of knowledge of logical principles. But so far as the connection between logic and ordinary reasoning goes, the propositional account gets it just right – as a peaceful one.[26]

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[25] The way I see it, your knowledge of MP gives you a reason to infer according to MP in certain circumstances – e.g. when you believe both P and if P, then Q. It does not give you in general a reason to infer according to MP – or to promote such inferences.

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