Conditional Belief and Conditional Assertion*

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In the literature on indicative conditionals, nothing is more cliché than beginning a paper with this quote from Ramsey:

> If two people are arguing 'If p, then q?' and are both in doubt as to p, they are adding p hypothetically to their stock of knowledge and arguing on that basis about q... We can say that they are fixing their degree of belief in q given p.

Ramsey's intuitive thought here might be taken to motivate various proposals about the exact connection between indicative conditionals and the corresponding conditional probabilities. But there are two proposals, or classes of proposals, that have overwhelmed the discussion. One is usually called *Adams's Thesis*. Crudely this is the idea that the "assertability" or "acceptability" of an indicative conditional $A \rightarrow C$ "goes by" the conditional probability $Pr(C|A)$.[1] The other is usually called *Stalnaker's Thesis*. This is the (clearer) idea that the probability of the proposition expressed by an indicative conditional $A \rightarrow C$ equals $Pr(C|A)$.[2] Ramsey's reflections are widely taken to provide motivation for some version of these theses. Further, there appears to be a widespread impression that if there is any theoretically interesting precisification of the 'Ramsey test' idea, it will boil down to some version of one of these two theses. In fact sometimes Ramsey is read as essentially suggesting one of these two theses himself in the passage above.[3]

In this note I want to draw out a third option—a way of understanding, and then developing, what Ramsey is saying that implies neither Adams's Thesis

*Rough and unfinished draft. Various citations and arguments missing.

[1] Hájek [2012] is an extensive investigation of the prospects for stating a precise version of Adams's Thesis. More on this thesis below. (Note that where it doesn't matter, I will be loose about use and mention. I will generally assume that probability measures are defined over propositions, not sentences, though to spare the reader notational ennui I will allow myself shortcuts not apt to confuse (hence I write $Pr(C|A)$ rather than $Pr([\![C]\!]|[\![A]\!])$, etc.).

[2] So-called because of the sustained attention paid to it in Stalnaker [1970]—though the idea was not original with Stalnaker, and Stalnaker abandoned it long ago. This thesis has also been called 'Stalnaker's Hypothesis', 'The CCCP', 'PCCP', 'The Equation', and (alas) 'Adams's Thesis'.

[3] For example, [Edgington, 1995, 264] interprets Ramsey as suggesting a version of Stalnaker's Thesis. [Bennett, 2003, 57-8] too seems to take this reading, though he also seems to understand Adams's theory as vindicating Stalnaker's thesis (104)—arguably a questionable interpretation of Adams's theory, for reasons detailed by Hájek [2012]. [Khoo, 2016, 2] calls Stalnaker's thesis "Ramsey's Observation", taking it to be the "core idea" of the Ramsey passage cited above.

nor Stalnaker Thesis. This third option involves recognizing some important asymmetries between conditional belief and conditional assertion. I draw especially on Hawthorne, Rothschild, and Spectre [2016], Bledin and Lando [2016], and Beddor and Goldstein [2017].

1 Isolating Ramsey's Thesis

Consider the following idea:

> Ramsey's Thesis.
>
> Whether one believes that if A, then C is a matter of one's conditional credence in C given A.

By 'credence' I mean *degree of belief*, as theorized by the probabilist. One's 'conditional credence in C given A' is the credence one assigns to the proposition C conditional on the proposition A—write as $Cr(C|A)$, where Cr is a probability function of the standard sort and conditional probability is defined in terms of unconditional probability in the usual way.

Ramsey's Thesis can be taken as a modeling proposal, a suggestion to theorize in a certain way. The lefthand side uses some ordinary language to pick a familiar sort of mental state out, and the righthand side locates that state from within a certain sort of theoretical context. The thesis could also be expressed with the "what it is" locution: what it is to think that if A, then C just is for one's conditional credence $Cr(C|A)$ to be a certain way.

The relevant sort of identification the thesis offers is of course incomplete: it doesn't say what the relevant "certain way" is. It doesn't say exactly what property one's credence in C given A must have in order that one come out as believing that if A, then C. It just says that matters of conditional believing are (somehow) matters about conditional credences. Ramsey's Thesis is like the claim that whether something is red is a matter of the wavelengths of light it is apt to reflect. That doesn't yet tell you *which* wavelengths make for red, so it doesn't tell a full story about what it is to be red. Still, it entails quite a lot about what it is to be red.

I suggest we view Ramsey's Thesis as the key takeaway from the famous passage quoted at the start.[4] Ramsey's Thesis is of course compatible with both Adams's Thesis and Stalnaker's Thesis. But it entails neither. Ramsey's Thesis can survive if both of those theses are false. Since both Adams's Thesis and Stalnaker's Thesis face a variety of well-known threats, the point is worth bringing into focus.

To see that Ramsey's Thesis does not entail Stalnaker's Thesis, observe that Ramsey's Thesis does not require that indicative conditionals express propositions (understood as *inter alia* the sorts of things a credence function is defined on). An indicative conditional construction does appear in the thesis, but it is

[4] My primary interests are not exegetical; this suggestion is supposed to be justified by its fruitfulness.

within an attitude ascription. Ramsey's Thesis by itself does not require that we analyze complex predicates of the form 'believes that if A, then C' as expressing relations to conditional propositions. That is of course a standard kind of analysis, and one that many, including especially fans of Stalnaker's Thesis, will tend to assume; but there are other possible directions of analysis, some of which we will meet below.

Seeing that Ramsey's Thesis does not entail Adams's Thesis is less easy, because of the relative obscurity of Adams's Thesis. Consider first the "assertability" versions of Adam's Thesis, on which it is a claim about the conditions under which indicative conditionals are assertable. This seems to be the dominant way of understanding Adams's Thesis. It is easy to see that Ramsey's Thesis says nothing about the conditions under which indicative conditionals are assertable. For all Ramsey's thesis says, the evidential standards one must satisfy to be in position to *assert* 'If A, then C' might typically be much higher than the standards one must satisfy in order to properly *believe* that if A, then C. (Indeed, I will suggest as much below.)

Consider next glosses of Adams's Thesis in terms of "acceptability". Talk of "acceptability" might be just another way of talking about what it takes to believe something, which is obviously what Ramsey's Thesis concerns. However, it is important to stress that Adams's Thesis, even when framed in terms of "acceptability", is standardly understood to involve the idea that indicative conditional sentences (if not propositions) can be rather directly associated with some sort of theoretically important *quantity*, such that the value of this quantity is identical to the corresponding conditional probability. And Ramsey's Thesis does not make a claim of this sort.

Let me expand. Although Adams appears to have stopped stressing assertability by the time of Adams [1975], he continued to speak of the "probability of conditionals" throughout his career (including as late as Adams [1998])—though by this he did not mean "probability of truth", since in the face of the triviality results of Lewis [1976], he rejected the idea, required by Stalnaker's Thesis, that indicative conditionals have truth-conditions. In the context of his probability logic, it is obvious why Adams was driven into speaking of such "probabilities": his logic defines validity in terms the uncertainties of the premises and the conclusion, and where indicative conditionals are concerned, these quantities are to be calculated via the corresponding conditional probabilities. Lewis [1976] rightly complained that if the "probabilities" of conditionals so understood "do not obey the standard laws, I do not see what is to be gained by insisting on calling them 'probabilities'" (304). The problem is not just about what to call these quantities; it is about what they are, such that they have a special significance. Jackson [2002] suggested calling the relevant quantity "intuitive probability", which is "... defined functionally: it is that property of indicative conditionals that plays the role that subjective probability of truth plays for sentences like 'Grass is green'. [Adams's thesis] is then the thesis that the intuitive probability of 'If P then Q' is the probability of Q given P..." (54).[5] This gives us:

[5]Somewhat surprisingly, in the next breath Jackson re-glosses in terms of assertability: "...

Jackson's Adams's Thesis.

$IP(\text{if } A, \text{ then } C) = Pr(C|A)$

Hájek [2012] complains that intuitive probability cannot play the role for indicatives that subjective probability plays elsewhere, "for it is part of that role to be exactly as fine-grained as probability of truth elsewhere" (160), but triviality results show that IP must be strictly more fine-grained than Pr.

In any case, the present point is just that this is the usual kind of way that theorists have tried to clarify Adams's Thesis: they have sought to offer some sort of 'important quantity' associatable with indicative conditionals such that

$ImporantQuantity(\text{if } A, \text{ then } C) = Pr(C|A)$

Stalnaker's Thesis can be read as saying that the relevant 'important quantity' is just probability. Adams's Thesis is usually taken to be saying that it is something else somehow closely related to probability. Ramsey's Thesis, by contrast, does not entail that there is *any* 'important quantity' which could vindicate an equation of this shape.[6]

The logical point that Ramsey's Thesis entails neither Stalnaker's Thesis nor Adams's Thesis (as usually understood) is pretty obvious. Still, one might think that those are the two main roads open for developing Ramsey's Thesis—so that if those two roads are blocked, Ramsey's Thesis is in a bad way. How could Ramsey's Thesis be true if both Stalnaker's Thesis and Adams's Thesis are false? What view of conditionals could square with Ramsey's Thesis in the absence of one or the other of these two theses?

2 Believing is (approximately) believing likely

To start to get a sense of how life could go on with Ramsey's Thesis but without Stalnaker's Thesis or Adams's Thesis, return to the topic of assertability. In this section I want to compare asserting to believing in general (i.e., in abstraction from conditionals), drawing on insights from Hawthorne et al. [2016] and Beddor and Goldstein [2017]. I circle back to conditionals in the next section.

There is some tendency, especially in discussions of Adams's Thesis, to embrace a background assumption to the effect that the conditions that make

or, in other words, [Adams's Thesis] is the interesting (and I hold true) claim that, in the case of indicative conditionals, that which plays the role in governing assertion typically played by (subjective) probability of truth is played instead by the probability of the conditional's consequent given its antecedent" (54).

[6]Some readers may insist that what I am calling 'Ramsey's Thesis' nevertheless just is what they have always intended, or understood, by 'Adams's Thesis'. I hope such readers will join me it finding it unfortunate that 'Adams's Thesis' is in fact not reliably used to denote Ramsey's Thesis in the literature, and that it is therefore useful to give this claim a distinct label, isolating it from all the things that have been called 'Adams's Thesis'. (Of course I don't mean to present Ramsey's Thesis as a new idea—on the contrary, again, I take to be implicit in what is probably the most cited passage in the conditionals literature.)

something correctly assertable line up with the conditions that make it correctly believable, and vice versa.[7] But as Hawthorne et al. [2016] show, this assumption is incorrect. It appears that (as they put it) "belief is weak" as compared to assertion, in the sense that the evidential standards one must meet in order to correctly assert something are generally nontrivially higher than the standards one must meet in order to correctly to believe it.[8] Hawthorne et al. [2016] draw this point out in a few ways. Consider first this contrast:

(1) ?? It's raining but I'm not sure it's raining.

(2) I believe it's raining, but I'm not sure it's raining.

If the standards for assertion were close to those for belief, we would expect these to comparable in respect of felicity. They are not. The infelicity of (1) suggests that to assert something, you need, in some ordinary sense of 'sure', to be sure of it.[9] This is evidently not a requirement on believing, however: one can correctly believe something without being certain of it, a point widely taken for granted. This is suggested by the fact that (2) does not intuitively describe a normatively defective state of belief. Similarly, consider:

(3) ?? It's raining, but I know it might not be.

(4) I believe it's raining but I know it might not be.

Note that the modals here are epistemic. Evidently "one can believe p even if one has not ruled out the doxastic possibility that p is false", though normally "one cannot assert p in these circumstances" (1396).

Lottery cases also seem to recommend the "belief is weak" thesis. You have one ticket in a fair hundred ticket lottery. The lottery occurs, but you don't know who won. It would be odd to say 'I lost' before seeing the results (cf. Dudman [1992]), though the probability that is true is .99. However, it would seem fine to say 'I think I lost' or 'I believe I lost'.[10] In answer to the question 'Do you think you lost?', you can say 'yes'; in answer to the question 'Did you lose?' You can say 'I don't know', or 'probably', but not 'yes'.

Hawthorne et al. [2016] also make a number of observations which suggest that believing seems to be about as weak as a number of states that might naively seem to be weaker than it, such as *being of the opinion that* and *suspects*. A variation on one of their examples:

[7] Lewis [1976], for instance, takes it for granted that "Assertability goes by subjective probability" (129).

[8] Here we are using 'believes' in the ordinary English sense, not a stipulated technical sense, so that ordinary intuitions about sentences involving 'believes' are probative.

[9] Or, more weakly, sure of it conditional on what is already being presupposed in the conversation.

[10] I will take it throughout this paper that 'think' has a salient reading basically equivalent to 'believes', and so I will use them interchangeably; see Hawthorne et al. [2016] for discussion and defense.

(5) ?? I suspect Bill is at the party, though I don't think he's there.[11]

If the epistemic standards for correctly merely suspecting were nontrivially lower than the standards for correctly believing, one would expect this sentence to be felicitous.

Based on these and related considerations, Hawthorne et al. [2016] suggest that "believing a proposition merely requires thinking it likely, but that thinking that a proposition is likely does not entitle one to assert it" (1393). I want to focus on their suggestion that:

> Believing is Believing Likely.
>
> To believe that P is to believe it is likely that P.

This idea is supported by the various examples so far considered, and also by sentences like

(6) ?? I think that Bill is probably at the party, but it's not that I think he's at the party.

The idea is roughly in the spirit of versions of the 'Lockean Thesis' according to which to believing something is to have a level of confidence or credence above a threshold, where that threshold is usually or always below full credence. The idea is not (or not necessarily) the syntactic thesis that there is a covert 'probably' underneath 'believes'; rather the idea is that to believe just is to believe-likely.

Hawthorne et al. [2016] make some clarifications about this idea. Let me mention two. First they consider a worry to the effect that believing P might be possible even when the relevant proposition is judged to be less likely than its negation:

> One standard view, the threshold view, is that you are entitled to believe p just in case you are entitled to have a sufficiently high credence in p. Usually it is thought that the threshold must be at least above 50%. Observations by Swinburne (1983) and Jeremy Goodman (p.c.) suggest that this is not right. To take Goodman's example, consider a three-horse race. Assume that horse A is more likely to win than horse B which in turn is more likely to win then horse C (so the probabilities of winning could be known to be 45%, 28%, 27%). In this case it seems fine to say 'I think horse A will win' or 'I believe horse A will win'.

[11] One might worry here that 'I don't think' can be understood to mean 'I think it's not the case that' (the phenomenon of neg-raising), so that the infelicity here is explained by the infelicity of 'I suspect Bill is at the party, though I think he's not there'. However, as Hawthorne et al. [2016] note, the neg-raised interpretation is not generally obligatory. An interpretation with the negation scoped over the attitude verb should therefore be available; and if that reading were felicitous, it would be the preferred reading.

As Hawthorne et al. [2016] then immediately go on to note, if Goodman is right, this is in fact compatible with the thesis that believing is believing likely. It would be a case of the 'alternative outcomes' effect observed by Windschitl and Wells [1998] and discussed in connection with probability operators by Yalcin [2010]. The apparent empirical fact is that speaker judgments about whether something is 'likely' or 'probable' are sensitive to the contextually salient partition of alternative outcomes. The relevant threshold for the probability operator is sensitive to this partition, and with the right choice of partition, the threshold may in fact be less than .5.[12] If speaker judgments about belief ascriptions were to manifest a similar sort of partition-sensitivity, this would actually be evidence *in favor* of the 'believing is believing likely' thesis, not evidence against it.

Second, Hawthorne et al. [2016] note in a footnote that

> If we accept this equivalence of thinking p and thinking p likely a new problem arises. For in this case believing that p is likely would require believing that p is likely is itself likely. This iteration effect might seem to make belief even weaker than we propose. One option is to adopt a non-standard semantics for belief attributions according to which believing p is likely just requires having a belief state that makes p likely, e.g. Yalcin [2010] and Rothschild [2012]. (1401)

The idea in Yalcin and Rothschild (see also Yalcin [2007, 2012a]) is the idea of understanding a sentence like:

(7) John believes that it is probably raining.

as true just in case John's credence in the proposition that it's raining is above some (perhaps contextually set) threshold. They do not construe (7) as saying that John is belief-related a proposition, the proposition that it is probably raining. On their view, there is no such proposition. The proposition John is being related by this ascription is just the proposition that it's raining. In (7) John is being credence-related, as it were, to that proposition. The 'probably'

[12] Here is an example of the effect taken from Yalcin [2010]:

> (9) Bloggs is probably the winner of the lottery.
>
> Suppose the lottery in question is a fair one, with a single ticket chosen as the winner out of 1000 possible tickets. Now consider the following two possible sets of additional background facts:
>
> Background A: Bloggs has 420 tickets, and another player, Smith, has the remaining 580 tickets.
>
> Background B: Bloggs has 420 tickets, and 580 other players have one ticket each.
>
> The probability that Bloggs is the winner of the lottery is the same—.42—against both backgrounds. However, native speakers judge (9) differently, depending on which background facts they are given. Against Background A, they robustly judge it false; against Background B, they robustly judge it true. (931)

is playing something like an adverbial role, qualifying how the believing is being done. Yalcin [2011] styles this sort of view as 'nonfactualist' or 'expressivist', inasmuch as the embedded 'it is probably raining' is not understood as fixing a condition on possible worlds, a way the world might be (cf. Veltman [1996] on 'might'). Rather, what it semantically determines is a condition on states of information, which in the case of doxastic attitudes we can think of as modeled by a probability space.[13]

Given this conception of what believing-likely ascription say, the thesis that believing is believing likely is the idea of understanding

(8) John believes that it is raining.

as true just in case John's credence in the proposition that it is raining is above some (perhaps contextually set) threshold. This is basically the Lockean idea (though one might understand the threshold to be set in myriad ways, so we still have a big tent of views here). I take this conception on board in this paper.

One example of a view about the compositional semantics of 'believes' in this vein is that of Beddor and Goldstein [2017]. Their motivating considerations are complementary to those of Hawthorne et al. [2016]. They are (inter alia) concerned to reconcile the fact that 'concessive belief attributions' are generally acceptable:

(9) I think that the movie starts at 7pm. But (I think) it's possible it starts at 8pm.

with the fact that sentences of the form 'I believe $(\phi \wedge \Diamond\neg\phi)$' are comparatively much less felicitous:

(10) ?? I think that the movie starts at 7pm and that it might not.

At first glance, (10) seems like evidence against the 'belief is weak' thesis, since it seems to suggest that believing the movie starts at 7pm is in tension with also believing it might not. Beddor and Goldstein [2017] argue, however, that the balance of considerations favors the view that belief does not require certainty, and that lack of certainty in a proposition puts one in position to believe that it might not be the case. They offer a semantics which predicts felicity for concessive belief attributions but infelicity for belief ascriptions directly embedding epistemic contradictions (sentences of the form $(\phi \wedge \Diamond\neg\phi)$). On their analysis, (10) is not evidence that belief isn't weak. Rather, it is evidence that epistemic modals are quite sensitive to local contexts, a point repeatedly suggested in the literature (see for instance Groenendijk et al. [1996], Veltman [1996], Aloni [2001], Hacquard [2006], Yalcin [2007, 2015], Klinedinst and Rothschild [2012], Anand and Hacquard [2013]).

One could also modify the semantics for 'believes' assumed Yalcin [2007] in the direction of Goldstein and Beddor's analysis, in order to yield the result that (7) and (8) are equivalent.[14]

[13]The nonfactualist view just described doesn't entail that 'probably' is entirely incapable of factual construals. Rather, it merely requires the availability of the nonfactual construal.

[14]Explain

To be sure, there are cases that do not perfectly fit the thesis that believing is believing likely. There are ways that an ascription with an overt probability operator will differ in communicative impact than its probability operator-free counterpart. For example, there is a felt difference between:

(11) Bill thinks the cake is delicious.

(12) Bill thinks the cake is probably delicious.

For many speakers, (11) conveys that Bill has tasted the cake, while (12) conveys that Bill arrived at his view in some way other than tasting it. This fact seems tied, both to the evidential quality of epistemic modals (something explored in the literature especially in connection with epistemic 'must'; see von Fintel and Gillies [2010], Mandelkern [2017]) and to the 'acquaintance inference' attaching to taste predicates and related perceptual verbs (Ninan [2014]).

Second and related, the explicit appearance of 'probably' in the scope of 'believes' seems to trigger something like a scalar implicature to the effect that the relevant subject is not in fact certain. Compare:

(13) Bill thinks he was born in Brooklyn.

(14) Bill thinks he was probably born in Brooklyn.

(14) tends to convey that Bill isn't certain, whereas (13) seems to fit comfortably with the possibility that Bill is certain—though notably, if 'thinks' in (13) is focused, the gap between (13) and (14) diminishes considerably. We would not want to pack lack of certainty into the truth-conditions of (14)—surely what we are certain of we take to be likely.[15] Thus belief ascriptions with overt probability operators are apt to differ from their counterparts without probability operators at least in respect of their implicatures.

Relatedly, given the direction I plan to go, it might be okay if 'A believes that ϕ' is subject to certain norms of evaluation that 'A believes that probably ϕ' isn't. For example, one might have the feeling that if 'Bill thinks he was born in Brooklyn' is true, and he wasn't born there, then we can say that Bill is wrong, or that he believes something wrong; whereas if 'Bill thinks he was probably born in Brooklyn' is true, and he wasn't born there, then it's less fine to say that Bill is wrong, or that he believes something wrong.[16] The thesis that belief is weak does not automatically entail the Lockean reduction of 'binary' belief to credence, and strictly, I don't need to assume such a reduction. The thing to underline is just the relative weakness of between belief as compared to assertion. The Lockean view seems to be rather close to what is needed, so that it's useful to run with this view for the duration of a paper, but there presumably are systematic reasons attitude ascriptions embedding explicit epistemic

[15] A: "Do you think it's likely that the coin will come up either heads or tails?" B: "Of course—in fact I'm certain."

[16] Thanks to Jack Spencer for pressing this point.

modals trigger potentially different norms of assessment, connected to related asymmetries of assessment in the unembedded case.

Also, given the direction I plan to go, I don't actually require the assumption that instances of 'A believes that ϕ' and 'A believes that probably ϕ' are perfectly truth-conditionally equivalent. The threshold for 'believes', or the way it is calculated, needn't be exactly equivalent to the one for 'probably'; there might be some divergence. It could be that 'believes' expresses something intermediate between 'believes likely that' and ' is certain that', for instance.

With these qualifications, the thesis that believing is, approximately, believing likely seems interesting enough to make it worthwhile to see what might follow from it if something in that ballpark is true. What asymmetries there are between believing and asserting are key to the import of Ramsey's Thesis, as that is a thesis about believing, not asserting.

3 Conditional believing is (approximately) believing conditionally likely

Now I want to suggest that the thesis that belief is weak remains plausible when conditionals enter the scene. We have an analogous pattern of data. (15) has a Moore-paradoxical ring, whereas (16) is fine; likewise *mutatis mutandis* (17) and (18):

(15) ?? Steve is there if Sally is, but I'm not sure Steve is there if Sally is.

(16) I think that Steve is there if Sally is, but I'm not sure [that Steve is there if Sally is].

(17) ?? I know only Sally might be there, but Steve is there if Sally is.

(18) I know only Sally might be there, but I think that if Sally is there, Steve is.

As (18) suggests, 'concessive conditional belief attributions' are acceptable:

(19) I think that if Sally is there, Steve is, though it might be that only Sally is there.

Lottery considerations also favor the view that conditional belief is weak. Suppose your friend may or may not have bought you a ticket in a fair hundred ticket lottery. The lottery occurs, but you don't know who won, or even if you have a ticket. In this sort of case it would be odd to say 'If I have a ticket, I lost'; however it would be acceptable to say 'I think that if I have a ticket, I lost—though I realize there's a slim chance I won'. Asked 'Do you think you lost if you have a ticket?', you could reasonably answer 'yes'. Asked 'If you have a ticket, did you lose?', 'yes' does not seem like an acceptable answer from someone in your epistemic predicament.

If believing is believing likely, then believing if A, then C is thinking it is likely that if A, then C. This is worth indenting:

Conditional Believing is Believing Conditionally Likely.

To believe that if A, then C is to believe that it is likely that if A, then C

Here is a good moment to repeat an observation that has frequently been made in the literature.[17] There is a felt equivalence between pairs like these:

(20) Probably, if Sally is there, Steve is.

(21) If Sally is there, Steve probably is.

Where the 'probably' appears on the surface seems not to make a difference to truth-conditions. So far as I can tell, these sentences are also intersubstitutable in embedded contexts. E.g.:

(22) John thinks that probably, if Sally is there, Steve is.

(23) John thinks that if Sally is there, Steve probably is.

This suggests the following would be an equivalent way to put our thesis about conditional belief:

Conditional Believing is Believing Conditionally Likely.

To believe that if A, then C is to believe that if A, then probably C

We should underline the asymmetries with assertion. Conditional asserting is definitely not asserting that something is conditionally likely. Note the contrast between (19) and (24) on the one hand and (25) on the other:

(19) I think that if Sally is there, Steve is, though it might be that only Sally is there.

(24) It's likely that if Sally is there, Steve is, though it might be that only Sally is there.

(25) ?? If Sally is there, Steve is, though it might be that only Sally is there.

In the pair (19) and (24) we observe that 'I think' patterns with probability operators. If we are looking for constructions that pattern with not-explicitly-modalized conditional asserted in (25), we should reach for knowledge operators, certainty operators, or epistemic 'must':

(26) ?? I know that if Sally is there, Steve is, though it might be that only Sally is there.

(27) ?? I'm certain if Sally is there, Steve is, though it might be that only Sally is there.

[17] An early glimmer of the point is [Van Fraassen, 1976, 272-3]. For more recent discussions, see von Fintel [2007], Egré and Cozic [2011], Yalcin [2012b], Rothschild [2013].

(28) ?? It must be that if Sally is there, Steve is, though it might be that only Sally is there.

(29) ?? If Sally is there, Steve must be, though it might be that only Sally is there.

These differences highlight some hazards we face in attempting to draw conclusions about the compositional semantics or assertoric content of conditionals from reflection on the conditions under which they may be felicitously ascribed to believers. As has often been observed, asserting that if A, then C seems equivalent to asserting that if A, then it must be that C. But *believing* that if A, then C is not equivalent to believing that if A, then it must be that C; rather, it is equivalent to believing that if A, then probably C.

This is one of the key points of the present paper, so let me dwell on it with another example. A marble is under one of a hundred cups. Ninety of the cups are red, nine are blue, and one is green. You know the marble has been placed randomly under a cup, but not where. You can say:

(30) If the marble is not under a blue cup, it's probably under a red one.

You are not quite in position to say:

(31) If the marble is not under a blue cup, it is under a red one.

(32) If the marble is not under a blue cup, it must be under a red one.

—After all, it might be under the green cup. On the other hand, if you say:

(33) I think that if the marble is not under a blue cup, it is under a red one.

what you say seems fine, and we don't have the intuition that you are reporting a defective state of belief.[18] For instance, your full discourse might have been:

(34) I think that if the marble is not under a blue cup, it is under a red one. But of course I know it might be under the green one.

On the other hand, the corresponding discourse which drops 'must' into the embedded conditional yields something less felicitous:

(35) ? I think that if the marble is not under a blue cup, it must be under a red one. But of course I know it might be under the green one.

It sounds here as if the speaker is reconsidering her position. In a similar spirit, this discourse is felicitous:

[18] Nevertheless, you may feel some preference for: 'I think that if the marble is not under a blue cup, it is *probably* under a red one'. If that sentence, but not (33), produces a scalar implicature to the effect that you are *not certain* that the marble is under a red cup if it's not under a blue one, then your preference for this sentence is (not incompatible with, but) predicted by the account I am recommending, since the sentence with the implicature would transfer a greater amount of relevant information.

(36) I think that if the marble isn't under the blue cup, it's under a red one. But it's not that I think that if the marble isn't under the blue cup, it *must* be under a red one. It might be under the green one.

If 'I think if A, then C' and 'I think if A, then it must be that C' were equivalent, we'd expect this discourse to suggest that the speaker is an in incoherent belief state. But this is not the impression it produces.

On the face of it, these data taken altogether present a puzzle about compositionality. Unembedded, 'If A, then C' seems equivalent to 'If A, then it must be that C' (or: 'It must be that if A, then C'). That creates pressure to construct a semantics wherein the sentences end up with the same compositional semantic contribution. In the scope of a belief operator, however, 'If A, then C' seems equivalent to 'If A, then probably C' (or: 'It is likely that if A, then C'). *That* creates pressure to construct a semantics wherein *those* sentences end up with the same compositional semantic contribution. But obviously we cannot satisfy both of these desiderata: 'It must be that if A, then C' and 'It is likely that if A, then C' clearly don't mean the same thing. Which, then, is '$A \rightarrow C$' equivalent to? It is not easy to see what semantics for a dyadic conditional operator $\rightarrow$ could do the work needed.

4 If-clauses as restrictors

Readers familiar with Lewis [1975], Kratzer [1979, 1981, 1986], and Heim [1982] will have a suggestion here. Suppose we reject the idea that there is any dyadic conditional operator in natural language. Rather, embrace the virtual consensus in linguistic semantics that if-clauses are restrictors. Sometimes they serve to restrict quantifiers or adverbs of quantification, as Lewis showed. But sometimes their role is to restrict modals, as Kratzer has argued.

Lewis construed sentences containing adverbs of quantification as three-part constructions, analyzing roughly along the following lines:

(37) If you hit the bell, it usually rings.

Usually [you hit x and x is a bell] [x rings]

An adverb of quantification like 'usually' is a dyadic unselective quantifier expressing quantification over 'cases'. The first argument to the operator is marked by 'if'. It picks out a restriction on the domain of quantification for the operator. The quantification expressed by adverb is restricted to cases satisfying this property.

Kratzer approaches modal language as Lewis approaches adverbs of quantification. She proposes that if-clauses often serve to restrict modal operators. A modal expresses some kind of quantification over possible worlds or situations. The if-clause marks a restriction on the quantification to possibilities where the proposition expressed by the if-clause is true. Kratzer has a binary branching syntax with the if-clause adjoining to the modal. She will analyze along these lines:

(38) If Sally is at the party, Steve must be.

[Must [Sally is at the party]] [Steve is at the party]

(39) If Sally is at the party, Steve might be.

[Might [Sally is at the party]] [Steve is at the party]

(40) If Sally is at the party, Steve probably is.

[Probably [Sally is at the party]] [Steve is at the party]

What of indicative conditionals without any overt modal operators? Where there is an if-clause, there must be something it is restricting. Kratzer suggests bare indicative conditionals have unpronounced modal operators. Outside of generic constructions, this unpronounced modal will usually be epistemic 'must'. Thus 'If Sally is at the party, Steve is' gets essentially the same logical form as 'If Sally is at the party, Steve must be':

(41) If Sally is at the party, Steve is.

[Must [Sally is at the party]] [Steve is at the party]

Once we have the idea that if-clauses can restrict modal operators, then (as Kai von Fintel pointed out to me) it is a short step to the idea that they might restrict attitude verbs, too. There is of course the tradition stemming from Hintikka [1962] of treating attitude verbs like 'believes' as functioning like modal operators, expressing quantification over possibilities. If doxastic attitude verbs are like modal operators and modal operators are restrictable by if-clauses, then perhaps doxastic attitude verbs are restrictable by if-clauses as well. This idea would provide a way out of the puzzle sketched at the end of the last section. For we could analyze 'John believes that if Sally is at the party, Steve is' as follows:

(42) John believes that if Sally is at the party, Steve is.

[Believes$_{John}$ [Sally is at the party]] [Steve is at the party]

Here the if-clause does not restrict a covert modal—rather, it restricts the quantification introduced by the (overt) attitude verb. Superficially, (42) seems to embed (41). But on the analysis just sketched, it does not. (41) is not a constituent of (42). The if-clause in (41) restricts a covert epistemic necessity modal. In contrast, the if-clause in (42) restricts the quantification introduced by 'believes'—which, we have seen, is relevantly analogous in meaning to probability operators like 'probably' or 'likely'. (That is, 'John believes ϕ' seems to mean something like: 'It is likely, according to John's beliefs, that ϕ'.) In this way, (42) is parallel in important respects to (40).

Note that the simple fact that

(42) John believes that if Sally is at the party, Steve is.

even has a reading which is not equivalent to

(43) John believes that if Sally is at the party, Steve must be.

but which is instead tantamount to

(44) John believes that if Sally is at the party, Steve probably is.

itself provides some limited evidence for the view that the modality introduced by attitude verbs can be restricted by if-clauses. For the apparent consensus in the literature is that the only epistemic modal which can appear covertly in bare conditionals is an epistemic necessity modal. (That assumption is what would explain why the bare conditional (41) does not have any reading equivalent to (39) or (40), but just one equivalent to (38).) Holding that assumption fixed, if the if-clause appearing in (42) cannot restrict the attitude verb, then it seems the only option is for it restrict a covert epistemic necessity modal. But that would yield the prediction that (42) can only mean what (43) means. And that prediction appears to be false. (See again discourses like (36), which help to bring this out.) But if if-clauses are restrictors, there must be something getting restricted in (42). So, it seems, we have some evidence that if-clauses can restrict attitude verbs directly.

5 If-clauses as updaters

There is one hitch in the preceding. Following Kratzer, we have spoken of if-clauses restricting probability operators. This talk presupposes that probability operators are quantifiers—or at least, that they are modal operators semantically interpreted with quantification over possibilities in the semantic metalanguage. But it is quite unclear whether probability operators are quantifiers or modals in this sense. Rather, they seem basically to be gradable adjectives, as they interact with all the morphology usual to such adjectives (Yalcin [2007, 2010]). (That is, we say things like: 'more likely than', 'as likely as', 'very probably', etc., just as we say 'taller than', 'as tall as', 'very tall', etc.) If 'probably' does not express quantification over possible worlds, what could it even mean to "restrict" it with an if-clause? When we talk about restrictions, we are talking about restrictions on quantifier domains. But if 'probably' isn't a quantifier, there doesn't seem to be a quantifier domain around to be restricted.

But perhaps there is a more general perspective we can take. In the Lewis-Kratzer picture, if-clauses effectively take a quantifier domain and 'update' it, replacing it with the maximal subdomain whose elements all satisfy the restrictor clause. In the case of the if-clauses in interaction with probability operators or with belief operators, we can see them too as acting to 'update' something—not (or not only) a quantificational domain, but instead the probabilistic body of information the relevant probability operator or belief operator is sensitive to. The natural idea, of course, is that they act to conditionalize this body

of information on the antecedent, so that the relevant operators are assessed relative to this updated body of information.

To talk through this with an example, take again:

(42) John believes that if Sally is at the party, Steve is.

[Believes$_{John}$ [Sally is at the party]] [Steve is at the party]

The idea would be that semantically, the belief operator contributes something like a probability space—here, John's credence function at the world of evaluation for the whole sentence. The belief operator serves to that express the proposition expressed by its nuclear scope—here, the proposition that Steve is at the party—is likely according to that credence function. Belief operators can be optionally restricted by if-clauses. Here, the operator is restricted by 'if Sally is at the party'. Restriction of belief operators by if-clauses is understood to conditionalize the probability measure associated with the belief state on the propositional content of the if-clause.

Compositional implementation of these ideas might proceed in a few ways. One natural idea is to build on the dynamic semantics of Beddor and Goldstein [2017], who already show how to interpret a belief operator in a dynamic semantics in roughly the spirit of the Lockean thesis. The next two paragraphs assume familiarity with dynamic semantics. Readers not interested in these details can skip it.

The semantics of Beddor and Goldstein [2017] looks like this:[19]

$$s[B_A\psi] = s \cap \{w : Pr^w_A(s^w_A[\psi]) > t\}$$

This clause displays how an update function $[B_A\psi]$ associated with the belief ascription $B_A\psi$ operates on an arbitrary information state (set of worlds) s to yield an updated information state (a new set of worlds). Basically the effect of the update is to intersect the input information state with a proposition which is true just in case A's credence function assigns the proposition associated with ψ high enough probability (probability above some threshold t).[20] Pr^w_A is A's credence function in w (a probability measure) and s^w_A is A's set of doxastically accessible worlds at w. $s^w_A[\psi]$ is the result of updating this set of worlds with $[\psi]$. (If ψ = 'Steve is at the party', for instance, then $s^w_A[\psi]$ is simply the set of A's doxastically accessible worlds where Steve is at the party.)

Now one way to represent the idea that 'believes' can be optionally restricted by an if-clause is to model it as expecting a restrictor argument, in basically the way that quanitificational determiners are canonically theorized to. We model 'A believes that if ϕ, then ψ' as $B^{\phi}_A\psi$, with ϕ the restriction argument. When there is no if-clause, we can take the restriction to be trivial: 'A believes that ψ' is just $B^{W}_A\psi$. Then the conditionalizing semantics for 'believes' would be:

[19] Beddor and Goldstein [2017] also discuss a modification of this semantics that incorporates the version of Lockeanism developed in Leitgeb [2014].

[20] I restrict attention to the case where ψ is an ordinary factual claim, rather than an epistemically modalized one. See Beddor and Goldstein [2017] for a nice discussion of how this semantics handles embedded epistemic modals.

$$s[B_A^{\phi}\psi] = s \cap \{w : Pr_A^w(s_A^w[\psi]|s_A^w[\phi]) > t\}$$

It should go without saying that much more would have to be done than I can do here to prove that this approach is empirically adequate. For now I have to settle for this sketch of a 'possibility proof', the objective being to say enough to clarify what a fully compositional story would have to do.

6

At the outset we brought into focus:

> Ramsey's Thesis.
>
> Whether one believes that if A, then C is a matter of one's conditional credence in C given A.

The question was how to vindicate this idea without Stalnaker's Thesis or Adams's thesis. We followed Hawthorne et al. [2016] in endorsing the Lockean idea that:

> Believing is Believing Likely.
>
> To believe that P is to believe it is likely that P.

We embraced the 'nonfactualist' view according to which believing that it is likely that P is a matter of one's credence in P. We then extended the idea from Hawthorne et al. [2016] to indicative conditionals:

> Conditional Believing is Believing Conditionally Likely.
>
> To believe that if A, then C is to believe that if A, then probably C

We suggested that it is possible for if-clauses to restrict doxastic verbs, and suggested construing this as triggering conditionalization. This allowed us to state a theory according to which whether one believes that if A, then probably C is a matter of one's conditional credence in C given A.

(We stressed along the way here the asymmetries between indicative conditionals (superficially seeming to appear) under 'believes' and straight assertions of indicative conditionals. 'A believes if ϕ then ψ' is parallel in semantically important ways to 'Probably if ϕ then ψ'. Unembedded, straight assertions of indicative conditionals, on the other hand, are parallel in semantically important ways 'It must be that if ϕ then ψ'.)

All this together gets us the Ramseyian idea that whether one believes that if A, then C is a matter of one's conditional credence in C given A. And it does so without presupposing anything like Stalnaker's Thesis or Adams's Thesis.

To see the big picture, it helps here to compare indicative conditionals to ordinary probability operators. A second, simpler Ramseyian thesis we might have framed explicitly is the following: to believe it is likely that P is a matter

of one's credence in P. Now, one way for this to be correct would be for there to be some proposition—the proposition that it is likely that P—such that one's credence in this proposition correlates in some systematic way with one's credence in P. But there is obviously a much simpler idea to be had here, which abandons the assumption that one's believing something is likely must be a matter of one being credally related to a proposition to the effect that that something is likely. The simpler idea, of course, is just the idea behind the nonfactualist conception of the role of 'likely' in this kind of construction, sketched already above. To believe it is likely that P is a matter of one's credence in P because to say that one believes it is likely that P just is to situate the believer as having high-enough credence in P. There is no proposition that it is likely that P playing any mediating role—whether in the compositional semantics of the sentence, or in the reality described by it.

The same is true for indicative conditionals on the view we have stated. To believe that if A, then C is a matter of one's conditional credence in C given A, but this is not because there is some indicative conditional proposition playing a mediating role; there is no such conditional proposition.

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