The Fall of "Adams' Thesis"?

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Abstract

The so-called 'Adams' Thesis' is often understood as the claim that the assertibility of an indicative conditional equals the corresponding conditional probability—schematically:

(AT) $As(A \rightarrow B) = P(B \mid A)$, provided $P(A) \neq 0$.

The Thesis is taken by many to be a touchstone of any theorizing about indicative conditionals. Yet it is unclear exactly what the Thesis *is*. I suggest some precise statements of it. I then rebut a number of arguments that have been given in its favor.

Finally, I offer a new argument against it. I appeal to an old triviality result of mine against 'Stalnaker's Thesis' that the *probability* of a conditional equals the corresponding conditional probability. I showed that for all finite-ranged probability functions, there are strictly more distinct values of conditional probabilities than there are distinct values of probabilities of conditionals, so they cannot all be paired up as Stalnaker's Thesis promises. Conditional probabilities are too fine-grained to coincide with probabilities of conditionals across the board. If the assertibilities of conditionals are to coincide with conditional probabilities across the board, then assertibilities must be more fine-grained than probabilities. I contend that this is implausible—it is surely the other way round. I generalize this argument to other interpretations of '*As*', including 'acceptability' and 'assentability'.

Introduction

Conditionals are to philosophers what Rush Limbaugh is to Democrats: an ongoing irritant. In fact, even worse than Limbaugh, they have been irritating philosophers for over 2000 years. Indicative conditionals alone are troublesome enough. The material conditional analysis has well known problems; yet possible worlds analyses have not found many advocates. Indeed, do indicative conditionals have truth conditions at all? What is their relationship to counterfactuals? Why are some iterations of them natural (right-nestings) while others are unnatural (left-nestings)? Why are some Boolean combinations of them natural (e.g. conjunctions), while others are unnatural (e.g. disjunctions)? What are we to make of 'Sly Pete' pairs of conditionals with the same antecedent and contradictory consequents, both assertable? And what about so-called "biscuit conditionals" ("there are biscuits on the sideboard if you want some"), and "Dutchman conditionals" ("if Palin becomes president then I'm a Dutchman")? It's enough to make a philosopher turn to something easier, like solving the mind-body problem or the problem of free will.

Adams (1965, 1975) pioneered an important approach to the semantics of indicative conditionals[1] by denying that they have truth conditions, and fitting them into a probabilistic framework for assessing the cogency of arguments. His goal was to supplement the traditional truth-conditional notion of validity of arguments with his notion of "probabilistic soundness". ("Probabilistic *validity*" would be more apt.) Roughly, a probabilistically sound argument is one for which it is impossible for the premises to be probable while the conclusion is improbable. And while Adams was happy to interpret the probability of a conditional-free premise or conclusion as the probability of its truth, he handled conditionals differently. A conditional of the form $A \rightarrow B$ could still be assigned a "probability", but its value was the corresponding conditional probability $P(B \mid A)$. Adams argued that the resulting scheme respected intuitions about which inferences were reasonable and which not.

Said this way, his proposal sounds like the so-called *Stalnaker's Thesis* that the probabilities of conditionals are the corresponding conditional probabilities—schematically:

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1 Henceforth, when I speak just of "conditionals" (without qualification), I will mean "indicative conditionals".

(ST) $P(A \rightarrow B) = P(B \mid A)$, provided $P(A) \neq 0$.

(See Stalnaker 1970.) However, Adams' “probabilities” of conditionals do not conform to the usual probability calculus of Kolmogorov—hence my caginess in enclosing the word in scare quotes. They do not attach to Boolean combinations of sentences in the usual ways. As he writes in his (1975): "we should regard the inapplicability of probability to compounds of conditionals as a fundamental limitation of probability, on a par with the inapplicability of truth to simple conditionals" (35).

In earlier writings, he spoke instead of their “assertabilities”. Thus, the so-called ‘Adams’ Thesis’ is often understood as a claim about the assertability of an indicative conditional—schematically:

(AT) $As(A \rightarrow B) = P(B \mid A)$, provided $P(A) \neq 0$.

Adams’ Thesis has assumed such an important status in the conditionals literature that it is taken by many to be a touchstone of any theorizing about indicative conditionals—see e.g., Jackson (1987), McGee (1989), and Bennett (2003).

However, I have a number of misgivings about the Thesis—some I will raise only in passing, but one I will develop in some detail. A seemingly happy consequence of Adams’ flight from genuine probability assignments to conditionals is that it is immune to various 'triviality results' that eventually beset Stalnaker's Thesis, and that assume more probability theory than Adams will allow. Nonetheless, I will parlay an old triviality result of mine against Stalnaker’s Thesis into a new argument against Adams’ Thesis, on various understandings of it.

So how should we understand it?

What *is* Adams' Thesis?

Despite the centrality of Adams' Thesis in the conditionals literature, it is unclear exactly what it is. Adams (1965) used the term "assertability", so he invited the interpretation of his Thesis that has become prevalent. However, all talk of assertability disappears from his writings by the time of his (1975) book, and it remains absent in his (1998) book, which I take to be the definitive statement of his final views. Instead, we find the Thesis stated once more in terms of "probability", again with the rider that it is not probability à la Kolmogorov, because of the prohibition on Boolean compounds involving conditionals. I would prefer a less firmly entrenched term.[2] Adams informed me (personal communication) that what he had in mind involved reasonableness of belief more than appropriateness of utterance (which the term 'assertability' evokes). Some authors—e.g. Bennett 2003, Leitgeb MS—use the term 'acceptability' for this purpose. Or a new term could be minted—perhaps 'assentability'. More on that later.

If truth is inapplicable to simple conditionals, as Adams claims, one wonders how probability can be applicable to them (or acceptability or assentability, for that matter). After all, surely the probability of a sentence is the probability of the sentence's *truth*: the probability of *X* is the probability of *X being true*. If *X* is not truth-apt, then nor is it probability-apt. How are we to understand a locution like '*X* is probable, but it is not probably true'? It's probably *what*, instead?[3] Or make *X* the

[2] To be sure, I don't want to insist on a slavish adherence to Kolmogorov's usage of the term—indeed, I depart from Kolmogorov in my preferred approach to conditional probability as a primitive notion (see my 2003). But this prohibition on Boolean compounds is so severe that I believe it departs too far from familiar theories of probability to deserve the name. See Lewis (1976) for a similar reaction, calling Adams' quantities "probabilities only in name" (303).

[3] Hannes Leitgeb and Leon Leontyev have suggested to me (independently) the following Edgington-style reply. The "probably" in "probably, if *A* then *B*" qualifies the truth of the consequent, *B*, and thus has a propositional argument; but this is not so unconditionally, but rather conditionally, under the supposition of the antecedent, *A*.

object of a 'that' clause: 'It is probable that *X*, but it is not probable that *X* is true.' What is it about *X*, then, that is probable? Indeed, Adams is committed to claims such as: ''if *A* then *B*' is probable, but it is guaranteed that it is *not true*', whenever $P(B \mid A)$ is high. The probability of a sentence cannot float free of its truth, as I believe the oddness of these statements shows.

Or consider paradigmatic cases of sentences that lack truth values—for example, imperatives. 'Shut up!' is just not the sort of thing that has a truth value. For that very reason it is just not the sort of thing that one can assign a probability either. To the extent that a sentence is appropriate to be the content of a belief-like attitude (such as degree of belief), it must have truth conditions, and the attitude concerns those conditions being met. To assign a probability to a sentence that lacks a truth value seems like a category mistake. In that case, it would seem that by Adams' lights, probability should be inapplicable not only to compounds of conditionals as he claims, but also to the conditionals themselves. Obviously this would be disastrous for his program.[4] This gives us further reason not to regard his "probabilities" of conditionals as probabilities at all.

This is surely the best reply on behalf of Adams. But a minor strike against it is the fact that it does not reflect the surface grammar, according to which "probably" takes wide scope. More seriously, we can do many things with conditionals: we can believe them, remember them, remind people of them, and so on. Consider: "I believe that if I take the pill, it will erase my beliefs; so I am careful never to take it." This cannot be construed as my having a conditional belief about something (the pill's ill effect) under the supposition that I take the pill. On the contrary, it is exactly when I take the pill that I *lose* my beliefs! Rather, I unconditionally believe something, which happens to be a conditional; and I believe it thanks to my *not* taking the pill. The content of this belief is itself a proposition, contra Adams' no-truth-value theory of conditionals. So it goes with knowing conditionals, remembering them, reminding people of them, etc.; we could construct similar counterexamples to construals of them as conditional knowings, conditional rememberings, and conditional remindings of their consequents. And so it goes, I claim, with attaching high probabilities to them; these are not to be construed as conditional assignments of high probabilities to their consequents. Consider: "I assign high probability to: if I take the pill, it will erase my probability assignments."

[4] Note that by Adams' lights, conditionals are even more anomalous than imperatives from the point of view of orthodox probability theory. For at least imperatives enter into Boolean combinations straightforwardly (e.g. "Shut up or go outside!").

On the other hand, it is a little more plausible that sentences that lack truth values can nonetheless be more or less reasonably uttered. “Advance!” might be an appropriate command by a general with a superior battalion to his enemy’s, the more so the greater the superiority. Perhaps it is not too much of a stretch to speak of “assertabilities” attaching even to truth valueless sentences: figures of merit measuring their appropriateness of utterance. This may suggest, then, Adams would have done better to stick with his original proposal of attaching assertabilities to conditionals after all.

However, while the quantity on the left-hand side of (AT) may now be defined, the new problem is that it is implausible that this quantity equals the corresponding conditional probability on the right-hand side. Utterances of conditionals can be inappropriate in ways that will not show up in conditional probabilities—they can be long-winded, uninformative, undiplomatic, and so on, even though the corresponding conditional probabilities may be high. And appropriateness is surely context-sensitive in a way that conditional probability is not. So ‘assertability’ cannot simply be a matter of appropriateness of utterance if it is to figure in Adams’ Thesis.

Be that as it may, the Thesis has taken on a life of its own as one concerning ‘assertability’, and that’s the version that has been endorsed by Lewis (1976) and Jackson (1987)—soon we will see how Jackson gives the term a proprietary sense (and spelling). In any case, it’s a thesis worthy of our attention.

So what *is* ‘assertability’? For (AT) to play such a pivotal role in our theorizing about conditionals, we had better have a good grip on it. Well, do we? There is a somewhat unhappy consequence of switching from the ‘probability’ of Stalnaker’s Thesis to ‘assertability’: while at least the formal theory of 'probability' is comparatively well-understood, there is apparently no such theory of 'assertability' (although Adams' Thesis itself may be regarded as a good start). And while the interpretation of probability is a fraught issue, we do have some handle on the notion of subjective probability, or credence, that is relevant here. We can appeal to the usual betting interpretation, or better, the representation theorem of some version of expected utility theory, to give us some insight into the notion. (I did not say "an analysis of the notion".) But we have nothing comparable for assertability.

Jackson (1987), who probably has defended Adams' Thesis as much as anyone, apart from Adams himself, distinguishes "assertability" (with an "a"), and "assertibility" (with an "i"), and casts the Thesis in terms of the latter. He explains it thus:

> The aspect of a sentence's usage which tells us something about its meaning are the conditions governing when it is justified or warranted—in the epistemological sense, not in a purely pragmatic one—to assert it, or, as this comes in degrees, to what extent it is justified to assert it in various circumstances. (8)

Assert**i**bility is "the justifiability of what is said" (11), while assert**a**bility concerns more the appropriateness of what is said. But notice that Jackson's casting of the Thesis still involves *saying*, rather than merely accepting or assenting.

My qualms above about attaching belief-like attitudes to truth valueless sentences now return as qualms about attaching assert**i**bilities to them. "Justifiability of what is said" sounds like a measure of how much evidence there is for what is said; but it is unclear how there can be evidence for something that lacks a truth value. If *X* is not truth-apt, then nor is it apt to enter into evidential relations. How are we to understand a locution like '*E* is evidence for *X*, but it is not evidence for *X*'s truth'? It's evidence for *what* about *X*, instead? And what sense can we make of ‘‘if *A* then *B*’ is well supported by evidence, but it is guaranteed that it is *not true*’?

Perhaps no-truth-value theorists about conditionals would do better to attach assert**a**bilities to them (much as I can make more sense of attaching assert**a**bilities to imperatives than attaching assert**i**bilities to them), although again Adams’ thesis then appears to be implausible. At least my qualms do not apply to Lewis and Jackson, who think that indicative conditionals do have truth conditions.

So let’s understand the ‘*As*’ of (AT) as assert**i**bility in Jackson’s sense. His statement of Adams’ Thesis is exactly (AT), so understood. But (AT) has a number of free variables: *As*, *A*, *B*, and *P*. *P* of course ranges over probability functions, and presumably *As* ranges over assertibility functions. *A* and *B* apparently range over sentences (although this is not obvious, as they could be taken to range over propositions instead). (AT) does not make a genuine statement—these variables await quantifiers to bind them. Again, getting the quantifiers right is surely important for a thesis that is to do so much philosophical work. And the quantification is not obvious, so we could use some help in filling it in. Jackson obviously intends all the quantifiers to be universal, with no further restriction on their domains. (The only restriction that he mentions is “to cases where $P(A) > 0$”, which (AT) already takes care of.) But there be demons.

For starters, presumably Adams’ Thesis concerns *rational* assertibility and probability functions. We should restrict our quantification over *As* and *P* accordingly. (Stalnaker imposes a similar restriction on his Thesis.) Moreover, the assertibility function must surely be tied to the probability function. If Adams’ Thesis universally quantified over assertibility functions without any regard to the probability function on the right-hand-side, then it would be obviously false—e.g., *your* assertibility for A → B need not equal *my* P(B | A)! We had no such problem with the statement of Stalnaker's Thesis, since the same probability function appeared on both sides of (ST).

We also have to be careful about which *A* and *B* we quantify over. If *P* is a genuine probability function, its domain must be an algebra, whereas if we impose Adams' prohibition on Boolean compounding of conditionals, the domain of *As* is not an algebra. In that case *As* and *P* must have different domains. So we cannot blithely let *A* and *B* range over all sentences in the domain of *As and* all sentences in the domain of *P*. We must therefore restrict our quantification over sentences somehow—but how? Note that again we had no such problem in stating Stalnaker's Thesis—the same function *P* appeared on both sides of (ST), so there was no danger of this sort of mismatch between the arguments of the functions on the two sides.

We might follow Adams in restricting the scope of (AT) to *simple* (uniterated) conditionals, so that *A* and *B* are themselves conditional-free. Or we might follow Jackson, being more permissive about our quantification over *A* and *B*: they can presumably be any sentences (including conditionals, and iterated conditionals). Then we can simply take the domain of *As* to be the same as that of *P*.

We thus face two important choice points, according to how we answer these two questions:

- Do conditionals have truth values? Jackson says yes, Adams says no.
- Do conditionals enter into Boolean combinations unrestrictedly? Jackson says yes, Adams says no.

Logical space allows for a position that follows Adams at the first choice point but Jackson at the second: someone could give a compositional semantics for conditionals, despite their lacking truth values. Presumably rules could be given for the behavior of Boolean combinations involving them, albeit not the usual truth-functional rules. (Meta-ethical expressivists have gone some way to providing such semantics for ethical claims, in response to the famous Frege-Geach problem.) But this threatens to be a daunting project. McGee (1989), for example, has provided rules for some limited combinations, but this avowedly falls well short of doing so for all combinations. So it comes as no surprise that this position in logical space has not been occupied by anyone. And logical space presumably does not allow in any natural way for a position that that follows Jackson at the first choice point but Adams at the second: if conditionals have truth values, then presumably they combine unrestrictedly in the familiar ways.

With all this ground-clearing behind us, it seems that there are two versions of Adams' Thesis that are especially worthy of our attention: the first follows Adams, while the second follows Jackson. The first is restricted to simple conditionals, while the second is unrestricted, as follows.

For each probability function P that could represent a rational agent's credences and associated assertibility function As_P:

(AT for Simple Conditionals) $As_P(A \rightarrow B) = P(B \mid A)$, for all A and B in the domain of As_P, if $P(A) > 0$ and A and B are conditional-free.

(AT Unrestricted) $As_P(A \rightarrow B) = P(B \mid A)$, for all A and B in the domain of As_P, if $P(A) > 0$.[5]

Let these be our two official statements of Adams' Thesis.

[5] We can envisage various intermediate versions, which allow various iterations of conditionals, but not unrestricted iterations. For example McGee (1989) offers a version (stated in terms of probabilities rather than assertibilities) that allows right-nested, but not left-nested conditionals.

Notice that these versions involve two functions, As_P itself a function of *P*. Stalnaker's Thesis was simpler in this regard: both sides of *its* equation of probabilities of conditionals with conditional probabilities involved a single probability function *P*. As such, Adams' Thesis does not have the immediate appeal that Stalnaker's Thesis does. After all, surely the best reason to believe Stalnaker's Thesis is that all of its instances *sound right.* 'The probability that I fall asleep if I go to a curriculum committee meeting is high' seems to say the same thing as 'the probability that I fall asleep given that I go to a curriculum committee meeting is high'. And so on for all probability assignments to all conditionals. But switching the first 'probability' to 'assertibility' deprives the thesis of this immediate intuitiveness. Moreover, if Adams' Thesis seems intuitively correct to you, ask yourself whether you are instead intuiting the correctness of Stalnaker's Thesis (in which it really is *probability* that figures in the left-hand side of the equation). But *that* intuition should be jettisoned, as the many triviality results against that Thesis show us. (See Hájek and Hall 1994 for a survey.)

Why believe Adams' Thesis?

Jackson makes the best case for Adams' Thesis of which I am aware, and while he does not distinguish the two versions of (AT) as I have, it is surely the Unrestricted version that he has in mind. One of his arguments derives from 'Ramsey's test'. Ramsey (1965) suggests that you evaluate the conditional 'if *A*, then *B*' as follows: first, hypothetically add *A* to your system of beliefs, minimally revising what you currently believe in order to do so; second, evaluate *B* on the basis of your revised body of beliefs. In my notation, $As_P(A \rightarrow B)$ measures how well the conditional performs on Ramsey's test by the lights of your probability function *P*. But apparently *P*(*B* | *A*) does too. For conditioning on *A* prima facie seems to capture the notion of 'minimally revising what you currently believe in order to accommodate *A*'; and your evaluation of *B* in your new belief state *P*(_ | *A*) is just *P*(*B* | *A*).

Another of Jackson's arguments is from "case-by-case evidence":

> Take a conditional which is highly assertible, say, 'If unemployment drops sharply, the unions will be pleased'; it will invariably be one whose consequent is highly probable given the antecedent. And, indeed, the probability that the unions will be pleased given unemployment drops sharply is very high. Or take a conditional with 0.5 assertibility, say, 'If I toss this fair coin, it will land heads'; the probability of the coin landing heads given it is tossed is 0.5 also. Or take a conditional with very low assertibility, say, 'If I spend this afternoon trying to solve Fermat's last theorem, I will succeed'; the probability of my solving it given I spend this afternoon on it is correspondingly very low. (12)

Jackson cites as more evidence for Adams' Thesis our attitude to pairs of 'divergent' conditionals: (*A* → *B*) and (*A* → not-*B*):

> When A is consistent, there is something quite generally wrong with asserting both (*A* → *B*) and (*A* → not-*B*). We cannot assert in the one breath 'If it rains, the match will be cancelled' and 'If it rains, the match will not be cancelled'. This conforms nicely with [AT]; for, by it, we have *As*(*A* → *B*) = 1 – *As*(*A* → not-*B*), from the fact that *P*(*B*/*A)* = 1 – *P*(not-*B*/*A*). Thus, the fact that (*A* → *B*) and (*A* → not-*B*) cannot be highly assertible together when *A* is consistent is nicely explained by [AT] as a reflection of the fact that *P*(*B*/*A*) and *P*(not-*B*/*A*) cannot both be high when *A* is consistent. Indeed, [AT] explains the further fact that (*A* → *B*) and (*A* → not-*B*) have a kind of 'see-saw' relationship. As the assertibility of one goes up, the assertibility of the other goes down. (12)

Finally, Jackson gives this argument involving conditional assertion:

> There is also evidence for [Adams' Thesis] from the fact that, by and large, an assertion of a conditional is a conditional assertion in the following sense: to assert 'If *A*, then *B*' is to commit oneself *ceteris paribus* to asserting *B* should one learn *A*... [Adams' Thesis] explains this connection between asserting conditionals and conditional assertions because, by and large, the probability of *B* given *A* is high just when learning *A* makes the probability of *B* high. (13)

Why not believe Adams' Thesis?

Adams' Thesis is not a stipulative definition of a new term of art, 'assertibility'. If it were, it would make no sense to argue *either* for it or against it, any more than one can sensibly argue about whether 'the material conditional' picks out a connective with a particular truth table. Rather, Adams' Thesis is supposed to be a substantive claim concerning two notions that we antecedently understood—assertibility and probability. (It is not, for example, a claim about some hitherto unfamiliar quantity, 'schmassertibility', which we can stipulate to behave however we like.) In particular, we are supposed to understand the idea of assertibilities coming in the various numerical degrees in the [0, 1] interval, as probabilities do. But I am not sure that we do. Assertibility seems to be more of an on/off notion, or at best a comparative notion. For example, if *knowledge* is the norm of assertion, as Williamson (2000) argues, then assertibility may not come in intermediate degrees at all. To be sure, knowledge had better *not* be the norm of assertion for conditionals by the lights of Adams' no-truth-value account. After all, knowledge of *X* implies *X*'s *truth*. The link between knowledge and truth is even surer than those between probability and truth, and between evidence and truth, which I insisted upon earlier. But again, far from saving his account, I take this to be another strike against it, for conditionals are surely fit to be the contents of factive attitudes, such as knowledge. I know that if Collingwood wins this Saturday, they will win the premiership.[6]

Or even allowing that we can order various conditionals according to their assertibilities, can we really assign these assertibilities *real numbers*? Again, if you intuit that they do, ask yourself whether your intuition is really about *probabilities*

[6] Note added subsequently: they did, and they did!

instead; and again, we know that *probabilities* of conditionals cannot in general be identified with conditional probabilities.

But let's allow that assertibilities can be assigned real numbers, as Jackson would have it. Let's go through his arguments that these numbers align with corresponding conditional probabilities.

The argument from the Ramsey test assumes that $As_P(A \rightarrow B)$ measures how well the conditional performs on Ramsey's test by the lights of your probability function P. But does it? At least as plausibly, it is $P(A \rightarrow B)$ that does so. But then we are unhappily led to Stalnaker's Thesis rather than Adams' Thesis.

It is not clear to me that Jackson's subsequent arguments support anything stronger than merely a qualitative version of Adams' Thesis that replaces (AT Unrestricted) with

(Qualitative AT Unrestricted) $As_P(A \rightarrow B)$ is high/middling/low iff $P(B \mid A)$ is high/middling/low, for all A and B in the domain of As_P, if $P(A) > 0$.

Or at most they support a comparative version of the Thesis that replaces (AT Unrestricted) with:

(Comparative AT Unrestricted) $As_P(A \rightarrow B) > As_P(C \rightarrow D)$ iff $P(B \mid A) > P(D \mid C)$ for all A, B, C and D in the domain of As_P, if $P(A) > 0$ and $P(C) > 0$.

We may agree that the cases of high assertibility and of low assertibility that he discusses conform to Adams' Thesis, but no more so than they conform to the Qualitative version. As for the case of the coin landing heads, I wonder whether we have grounds for thinking that the conditional has 0.5 assertibility apart from a prior appeal to Adams' Thesis—so I wonder whether that judgment counts as evidence for Adams' Thesis at all, rather than Adams' Thesis being evidence for it. In fact, I am more inclined to say that the assertibility of the conditional is *very* *low*. This is surely the case if assertion is governed by a knowledge norm: you clearly do not *know* the conditional to be true. But we need not appeal to this putative norm to make the point. Since I am well aware of the fair coin toss's chanciness, the following conditional seems maximally assertible by my lights: 'If I toss this fair coin, it *might not* land heads'. Yet it seems highly *unassertible* to add in the same breath: ''If I toss this fair coin, it *will* land heads'. But the justifiability of saying this has not changed—the conditions governing how justified or warranted it is in the epistemological sense remain the same. So the assertibility of the latter conditional is presumably very low all along. Note that I am not assuming here that that the 'will' and 'might not' conditionals are incompatible—just that they are not co-assertible.

Finally, the Comparative version of Adams' Thesis explains as well as Adams' Thesis does the connection Jackson posits between asserting conditionals and conditional assertions, and the fact that $A \rightarrow B$ and $A \rightarrow \neg B$ cannot both be asserted in the one breath. But the latter datum can be redescribed in a way that is uncongenial to Adams' Thesis, and even to the qualitative and comparative versions: for some A and B, *neither* of these conditionals can be asserted individually, still less both of them in the one breath. Indeed, I submit that this is exactly the situation in the coin example: *neither* 'If I toss this fair coin, it *will* land heads' *nor* 'If I toss this fair coin, it *will not* land heads' is assertible. (For the latter, consider the high assertibility of 'If I toss this fair coin, it *might* land heads'.) This calls into question the putative 'see-saw' relationship that such divergent pairs have. *Contra* (AT), and even *contra* its Qualitative and Comparative counterparts, I submit that divergent pairs of conditionals with overtly chancy consequents both are highly unassertible, at least where the chances are middling.[7]

So I believe that the Comparative version is just as well supported as Adams' Thesis is, and even the Comparative version's support is questionable. Moreover, the latter version does not commit us to assertibilities that are as finely grained as Adams' Thesis requires them to be. After all, such sensitive assertibilities appear not to be detectable in linguistic usage. And yet Jackson himself writes: "A theory of indicative conditionals is a theory about a fragment of ordinary language. Accordingly, it is—unlike a theory of electrons or of the mind—*peculiarly* responsive to the linguistic intuitions and practices of ordinary speakers." (8) With this I completely agree—but far from supporting Adams' Thesis, I think that it is a reason to be suspicious of it, for it commits us to a notion of assertibility that apparently outruns our intuitions and practices.

At this point one might agree that the data generated by our linguistic intuitions and practices may only be qualitative or comparative, but that we may *represent* them numerically. Think of how decision theory represents preferences that are qualitative with numerical utility and probability functions. Assertibilities, then, may be theoretically fruitful quantities, much as utilities and probabilities are.

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[7] The situation is rather like that for middling degrees of belief. When you assign credence 0.5 to the coin landing heads, you definitely *do not believe* that the coin will land heads, and you also definitely *do not believe* that it will not land heads—0.5 credence definitely does not suffice for belief. (Thanks here to Wolfgang Schwarz.) And you are definitely not justified in asserting something that you definitely do not believe.

As David Etlin and Hannes Leitgeb have pointed out to me, there is a less committal qualitative version of Adams' Thesis that can handle this case:

$As_P(A \rightarrow B)$ is high iff $P(B|A)$ is high,
for all A and B in the domain of As_P, if $P(A) > 0$.

Neither 'if I toss this fair coin, it *will* land heads' nor 'if I toss this fair coin, it *will not* land heads' has high assertibility, since neither of the corresponding conditional probabilities is high; they are merely 0.5. My arguments do not scathe this qualitative version of the Thesis. But of course Adams and Jackson are committed to much stronger versions. In particular, they also cover conditionals of low assertibility.

They may figure, moreover, in the best explanation of the Comparative or Qualitative versions of the Thesis.

I think this is the best prospect for a Jackson-style rendition of Adams' Thesis. However, as it stands it is at best a promissory note: one would like to see proven a *representation theorem* for numerical assertibilities, paralleling the ones that we find in various formulations of decision theory. And perhaps the promissory note promises too much. To drive home this point, I will appeal to an old triviality result of mine against Stalnaker's hypothesis. It will turn out that for Adams' Thesis to be tenable, assertibility will need to be *peculiarly* nuanced. The same is true of acceptability or assentability, should we wish to couch the Thesis in those terms.

Why disbelieve Adams' Thesis? The 'wallflower' argument

Consider a fair 3-ticket lottery, and the Boolean algebra generated by the three sentences 'ticket i wins' for i = 1, 2, 3. Let P be the natural function defined on this algebra that assigns probability 1/3 to each of these sentences. It follows that each member of the Boolean algebra has a probability that is a multiple of 1/3. However, various conditional probabilities are not a multiple of 1/3—for example, P(ticket 1 wins | ticket 1 wins or ticket 2 wins) = ½. So there are conditional probabilities that find no match among the unconditional probabilities. On the other hand, every unconditional probability trivially has a match among the conditional probabilities: for all X, $P(X) = P(X \mid T)$, where T is a tautology. So P has more distinct conditional probability values than distinct unconditional probability values.

In my (1989) I showed that this result generalizes: any non-trivial finite-ranged probability function has more distinct conditional probability values than distinct unconditional probability values. This means that the function's unconditional probabilities cannot all be matched with its conditional probability values. A fortiori, this means that its unconditional probabilities *of conditionals* cannot all be matched with its conditional probability values (given that probabilities of conditionals are probabilities of their truth). There will always be some conditional probability that finds no match among the unconditional probabilities, and this will be a counterexample to Stalnaker's Thesis: it will be a conditional probability of the form $P(B \mid A)$ that does not equal $P(A \rightarrow B)$ (or indeed anything of the form '$P(X)$').

We may picture the situation poignantly as follows. Take any non-trivial probability function P with finite range. Imagine a dance, for which various men and women have entry tokens. Suppose that for each distinct value of $P(\_ \mid \_)$, there is exactly one man with that value written on his token, and that for each distinct value of P(□ → □), there is exactly one woman with that value written on hers. There are no other men or women at the dance. It is a rule that for any couple that dances, the woman must have the same number on her token as her partner does. (I assume here that each couple consists of a woman and a man.) Stalnaker's Thesis promises that everyone has a partner to dance with. The result shows that this is not so—there is at least one unmatched man who must remain a wallflower. For example, in the dance corresponding to the lottery above, the man with ½ on his token will be a wallflower. (This picture was inspired by a 'Waltz Night' at Princeton's Graduate College, at which wallflowers among the men *abounded*.)

Either version of Adams' Thesis implies that if we replace the unconditional probabilities of conditionals with their assertibilities, then there will be no such wallflowers: every conditional probability will find a partner. This in turn implies that the assertibilities of conditionals must be more fine-grained than the unconditional probabilities: there are not enough partners to go round among the unconditional probabilities, but there are among the assertibilities. Previously I questioned whether assertibilities come in intermediate degrees at all. Now we see that Adams' Thesis implies not only that they do so, but that they come in even *more* intermediate degrees than unconditional probabilities—indeed, even assertibilities just of *indicative conditionals* do so.

I think this creates a problem for Jackson's version of Adams' Thesis. Again, it is the unrestricted version:

For each probability function P that could represent a rational agent's credences and associated assertibility function As_P:

(AT Unrestricted) $As_P(A \rightarrow B) = P(B \mid A)$, for all A and B in the domain of As_P, if $P(A) > 0$.

Take a particular P that represents the credences of a particular rational agent. These credences are associated with a raft of dispositions of the agent: to believe, to revise beliefs, to suppose, to infer, to hope, to regret, to act, … —and to assert. But offhand, assertibilities are associated with just one such disposition: to assert.[8] How do they get to be richer than credences? Offhand, one would expect them if anything to be more impoverished. Assertibilities have far fewer functional roles than credences do.

[8] Here I am indebted to discussion with Hannes Leitgeb.

Now, perhaps this 'offhand' picture of assertibilities sells them short. Perhaps they are associated with these various dispositions after all. (They may not *fully determine* dispositions to regret, to hope, or to act, but then nor do credences, which only do so in tandem with desires/utilities.) Still it seems that assertibilities cannot undergird all these dispositions to the extent that credences can. Recall that according to Jackson, assertibility is "the justifiability of what is said". Arguably much of what we believe to varying degrees *cannot be said*, and some of these dispositions depend on such ineffable contents. For example, I cannot articulate the full content of my visual experience at the moment, but arguably I believe it to have the content that it has, and various inferences that I am disposed to make arguably depend on this content. But we need not enter such treacherous territory in the philosophy of mind to see that credences should outrun assertibilities, rather than the other way round. More simply, credences attach not only to what is said, but also to what is privately thought. Credences are realized in more ways than assertibilities; I find it mysterious how the latter could be more nuanced than the former.

The wallflower problem for Stalnaker's Thesis arises because there is just one algebra involved on both sides of its equation: that of P. Perhaps Adams' Thesis can be saved by ensuring that As_P's algebra is richer than that of P. Now regarding distinct values of As_P as corresponding to distinct women at the dance, it's as if more women have been invited, or fewer men have been invited![9] If the numbers work out just right, then they will pair up perfectly with their male partners. Adams' version of the Thesis promises that this is the case. Here are two ways this general strategy might work.

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[9] I am grateful here for discussion with Wolfgang Schwarz.

Jackson might rewrite (AT) so that *sentences* appear on the left-hand side, and *propositions* appear on the right-hand side.[10] We could understand *A* and *B* to be sentence variables on the left, and replace them on the right with the propositions expressed by them. While this is a modification of Adams' Thesis, it might be considered a natural one: arguably, assertibilities attach naturally to utterances, while conditional credences attach to propositions. Since any given proposition may be expressed in many different ways, the domain of As_P may be larger than that of $P(\_ \mid \_)$. This is only a start, however; after all, it's the *ranges* of these functions that matter, and we need some assurance that As_P's range is just the right size.

Interestingly, Adams' version of the Thesis may already provide another way to implement this general strategy. Here it is again:

For each probability function *P* that could represent a rational agent's credences and associated assertibility function As_P:

(AT for Simple Conditionals) $As_P(A \rightarrow B) = P(B \mid A)$, for all *A* and *B* in the domain of As_P, if $P(A) > 0$ and *A* and *B* are conditional-free.

Let *A* and *B* be sentence variables on both sides, as before. The restriction to conditional-free *A* and *B* gives us hope that there are fewer distinct conditional probabilities to worry about: fewer men are invited to the dance than we might have thought! Think of the unconditional probabilities over a restricted conditional-free algebra. Now it is perhaps not so problematic that there are more assertibilities of conditionals than those. These conditionals provide *new contents* for assertibilities that are unavailable to the probabilities over the restricted algebra.

[10] Thanks here to Wolfgang Schwarz.

That said, I still wonder whether assertibilities can keep up with something as fine-grained as conditional probabilities, even when these are restricted to a conditional-free algebra. As before, these conditional probabilities undergird a raft of dispositions that assertibilities do not, and the conditional probabilities are realized in ways that are unavailable to assertibilities. But for all that I have said, the shift to a different set of contents with the shift to assertibilities may counterbalance this, ensuring that there are just enough assertibilities to go round.

However, this apparent benefit of Adams' version of the Thesis comes at a cost. The latter's restriction to simple conditionals limits its scope in a way that had no analogue for Stalnaker's Thesis. Yet ordinary English takes various iterations of conditionals in its stride. Consider: "If Djokovic beats Federer in their semi-final, then if Nadal makes it to the final, Djokovic will win the tournament". This is an iterated conditional that I submit we can easily understand. Indeed, I would go further, and insist that we can even easily judge it to be *false* of the 2010 US Open, contra no-truth-value theorists. After all, Djokovic *did* beat Federer in their semi-final, Nadal *did* make it to the final, and yet Djokovic did *not* win the tournament![11] And conditionals that characterize dispositions seamlessly allow multiple iterations—for instance, 'if your boss will be angry if you are a minute late, then he'll be *really* angry if you are an hour late!' Or better still: 'if your boss will be angry if you are a minute late, and if he'll be *really* angry if you are an hour late, then he'll be downright FURIOUS if you are a day late!!'

[11] As I noted before, Adams' Thesis can be supplemented with further rules to handle some of these cases—for example, the 'Import-Export' rule reduces such a right-nested conditional to a simple conditional with a conjunctive antecedent. (See McGee 1989.) But as I also pointed out, this supplementation has so far fallen well short of handling all cases; indeed, the examples that immediately follow remains problematic.

The problem for Adams' version of the Thesis, then, is that it is incomplete. But I think this isn't just the benign sort of incompleteness of a theory that simply bids us to work harder to complete it. For my wallflower argument suggests that *this* incompleteness is here to stay. As Adams' restrictions on his Thesis are lifted, the associated values of a finite-ranged probability function threaten to be correspondingly enriched. For example, if we allow conditionals to appear as arguments of the conditional probability function, then assertibilities no longer have them as proprietary contents. Suddenly the doors have opened to more men at the dance; it will be correspondingly harder for the women to keep up. In the limiting case in which the doors are opened wide, and there is no restriction on which contents are allowed, we have Jackson's version of the Thesis, and my wallflower argument against it applies.

Earlier I noted various unclarities in the literature over exactly what Adams' Thesis is, beginning with the quantity on the left-hand side that is sometimes called "probability", and sometimes "assertability". I suggested that it might better be called "acceptability" or "assentability". This seems more in keeping than "assertability" with Adams' professed intention that his Thesis should govern reasonableness of belief, and as such may have nothing to do with a sentence's usage. My wallflower result has similar consequences for the Thesis understood those ways: it would imply that acceptabilities or assentabilities of indicative conditionals are more fine-grained than unconditional probabilities. Again, I wonder how this is possible—even more so, in fact, since these notions seem more purely cognitive than assertibilities, and thus more akin to unconditional credences. And so I think that my result casts doubt on formulating Adams' Thesis in terms of any of these '*a*'-words. (Indeed, I think it even casts doubt on the Thesis stated in terms of assert**a**bility, and its associated '*a*'-word: *appropriateness* of utterance—but I won't pursue that further here.) Whatever these figures of merit amount to, I doubt that they yield richer profiles than good old unconditional credences.

But if I am wrong, my result still places a constraint on the fineness of grain of assertibility, or acceptability, or assentability, or what have you. This might even be regarded as part of the positive theory of these quantities. In that case, I urge proponents of the Thesis, however it is formulated, to give us more details about what determines these quantities that are its starting point. Much theorizing about conditionals, which takes the Thesis as *its* starting point, apparently awaits these details.[12]

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[12] I am grateful to very helpful discussion with especially Rachael Briggs, John Cusbert, David Etlin, Hannes Leitgeb, Leon Leontyev, Aidan Lyon, John Maier, and Wolfgang Schwarz. Thanks also to Ralph Miles for editorial assistance.

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