

On Scope Relations between Quantifiers and Epistemic Modals

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Abstract

This paper presents and discusses a range of counterexamples to the common view that quantifiers cannot take scope over epistemic modals. Some of the counterexamples raise problems for ‘force modifier’ theories of epistemic modals. Some of the counterexamples raise problems for Robert Stalnaker’s theory of counterfactuals, according to which a special kind of epistemic modal must be able to scope over a whole counterfactual. Finally, some of the counterexamples suggest that David Lewis must countenance ‘would’ counterfactuals in which a covert ‘would’ scopes over the whole consequent of the counterfactual, including an overt ‘might.’

1. Introduction

By a *modal wide-scope view* I mean any view that is committed to

WS: At the level of logical form, a given modal M must take wide scope over any quantifiers in any clause in which M appears.

Many theories of epistemic modals are committed to WS. And VON FINTEL & IATRIDOU 2003 argue directly for the “descriptive generalization” that “a quantifier cannot have scope over an epistemic modal” (174). Even stronger, CINQUE 1999 claims that “Epistemic modals are located higher in clausal structure than root modals, in fact higher than T(Past)/T(Future) (and negation)” (78; see also CINQUE 2006, 144). Many important theories of conditionals are also committed to WS for epistemic modals. Here I discuss several counterexamples and some of their implications.

2. Epistemic modals

Epistemic modals can help speakers communicate about content that is not for them the object of a full belief. For example, if a speaker does not want to put a particular claim forward with the usual amount of commitment and authority, but she

still wants to raise the possibility that it is true, she might use an epistemic possibility modal like ‘might’ or ‘could.’ Many theorists have taken these observations to support the thesis that a given epistemic modal simply “applies to assertions and indicates the extent to which the speaker is committed to the truth of the proposition” (BYBEE et al. 1994, 179). For example, John Lyons writes that “Subjective epistemic modality is nothing other than ... the locutionary agent’s qualification of his epistemic commitment” to the proposition expressed by the modal’s complement (1981, 238). Huw Price writes that “the distinctive feature of the meaning of utterances of the form ‘It is probable that ...’ ... [is] a matter of their having a distinct force, rather than a distinct sense” (1983a, 362). And Janneke Huitink writes that “subjective *may* functions as a down-toner, which weakens that speech act into conjecture” (2008, 2086).¹ For convenience I call views in this family *force modifier* views.

Force modifier views straightforwardly explain how an epistemic modal attenuates the speaker’s expressed commitment to its complement. Their advocates take this to be an important advantage over truth-conditional theories of epistemically hedged sentences. According to truth-conditional theories, in asserting ‘*Might* φ ’ a speaker expresses full commitment to a modalized proposition, not attenuated commitment to the proposition that φ . This raises what Price calls “the confidence problem”: how is it that a full belief in the proposition putatively expressed by, say, “It is 60% likely that q ” always goes hand in hand with credence of 0.6 in the proposition that q simpliciter? Full beliefs and partial beliefs play such different roles in our doxastic lives that it is hard to see what could underwrite this connection (PRICE 1983b, 397; see also FORREST 1981, 44 and SWANSON 2006, 38–39 and 2010, 2–5). But on a force modifier view, “It is 60% likely that q ” simply expresses the proposition that q with an appropriately “down-toned” force. Force modifier views thus offer a straightforward account of the relation between a hedged assertion and the kind of doxastic state that that assertion expresses and is intended to instill. Force modifier views are also modest in the sense that they leave ordinary truth-conditional semantics largely untouched: the modal does nothing more than modulate the force with which the speaker asserts its complement. Just as an English speaker might use one kind of rising intonation to attenuate force non-semantically, according to force modifier views a non-semantic way for an English speaker to attenuate the force of certain assertions is to head them with ‘it might be that,’ ‘it is probable that,’ and so on.

Force modifier views are committed to WS because they hold that quantifiers operate at the level of semantic content and epistemic modals operate at a level that determines what’s done with that content: epistemic modals influence only the force

¹See also TOULMIN 1950; BOYD & THORNE 1969; HALLIDAY 1970; COOK 1978; PALMER 1979, 2001; JACOBSSON 1979; FORREST 1981; COATES 1983; PRICE 1983b; HOLMES 1984; ANDERSON 1986; STUBBS 1986; KIEFFER 1987; HUDDLESTON & PULLUM 2002; BUTLER 2003; YALCIN 2005; and DAVIS et al. 2007.

with which a given proposition is expressed. But this separation is not tenable. Consider the differences between (1) and (2), which wide-scopes the modal in (1):

- (1) “Every moment you spend with your child could be the one that really matters” (RUSSET 2006, xv–xvi).
- (2) It could be that every moment you spend with your child is the one that really matters.

(1) says that for any given moment you spend with your child, *that moment* could have a property that at most one moment could have: being the moment that really matters. The anomalous (2), by contrast, says that it could be that *every* moment you spend with your child has a property that at most one moment could have.² Similar examples are easy to find. From a Russian language news site:

- (3) “Každyj priëm kokaina mozet stat’ poslednim.”³
Every dose of cocaine could become the last.
‘Every time you take cocaine could be your last.’

How can we be sure that a particular use of a modal targets epistemic modality? Sometimes it is hard to say what other modal flavor a modal might sensibly be used to target. It is implausible that the possibility modals in (1) and (3) target alethic, bouletic, circumstantial, deontic, dispositional, dynamic, jurisprudential, metaphysical, nomological, rational, or root modality. And there are also positive reasons to think these modals are epistemic. For example, a rough paraphrase of (1) is:

- (4) No moment you spend with your child can be known not to be the one that really matters.

Moreover, one might use (1) to object to a contrary assertion:

- (5) A: The moment we walked into Disneyland was the one that really mattered.
B: You don’t know that. Every moment you spend with your child could be the one that really matters.

²SWANSON 2006 and 2010 offer more examples. TANCREDI 2005 argues that ‘each’ can scope over epistemic modals, but that ‘every’ cannot. HUITINK 2008 argues that quantifiers scope over epistemic modals only when the modal “depend[s] on accessible, quantifiable evidence” (2084), and she too holds that ‘every’ “just cannot take scope over an epistemic modal” (2088; see also HUITINK 2006).

³<http://podrobnosti.ua/health/2010/01/13/657737.html>, accessed February 7, 2010. Note that on one reading (3) says that every time you take cocaine could—given what you know at the time you take the cocaine—be your last. This reading is hard to reconcile with ABUSCH 1997’s claim that epistemic modals “... directly pick up the local evaluation time as a modal perspective” (23). Thanks to Daniel Altshuler and Natalia Kondrashova for their judgments about this example.

(5)-B is a relevant, appropriate way to contest (5)-A. But (5)-B would be irrelevant as a response to (5)-A if its ‘could’ did not target epistemic modality.

Here are two more examples. Eager to solve the crime, Watson infers that the thief must be the gardener. Holmes responds by pointing out flaws in Watson’s argument. He shows that the evidence establishes at most that *someone* here—they know not whom—is the thief. Holmes summarizes his objections by saying that

(6) Given only what we can be certain of, no one here has to be the thief.

(6) simply isn’t relevant as a response to Watson unless ‘has to’ is read epistemically. And again, wide-scoping the epistemic modal yields the wrong truth conditions. Finally, after painting the ceiling I might use (7) to warn you to walk carefully. But I would not thereby commit myself to (8).

(7) Almost every square inch of the floor might have paint on it.

(8) It might be that almost every square inch of the floor has paint on it.

And again, (7) can be a good way to contest a claim that the floor doesn’t have paint on it. So (1), (3), (6), and (7) all show that quantifiers can scope over epistemic modals.

The rhetoric that I quoted earlier indicates that force modifier theorists take themselves to be wide-scopist about epistemic modals. But perhaps commitment to WS is not really essential to their views. What would a force modifier account that was not committed to WS look like? The difficulties with (7) are striking: the meaning of (7) is roughly that of a big disjunction of conjunctions, the conjuncts of which say, for each region that includes almost all of the squares, of each square in that region that that square might have paint on it. The force modifier theorist who abandons WS must explain how epistemic modals interact with quantifiers, in a way that vindicates this paraphrase. And so force modifier views that are not committed to WS cannot prescind from the details of the semantic interpretation function. Building on KRIFKA 2001 and 2004, KRIFKA 2009 explores the idea that we can quantify into speech acts. But Krifka argues that “disjunction is not a plausible combination of speech acts” (4) and that because “non-universal quantifiers, as e.g. *most*, also require disjunction as [a] basic operation ... they are not suitable for quantification over speech acts” (5). Indeed, he appeals to this restriction in explaining unrelated phenomena. So Krifka’s approach does not help the force modifier theorist with (7).

3. Conditionals

In *Counterfactuals* David Lewis argues against the conjunction of two principles:

Conditional Excluded Middle: Either ‘If it had been that φ , it would have been that

ψ is true or 'If it had been that φ , it would have been that $\neg\psi$ ' is true.

Counterfactual Duality: 'If it had been that φ , it might have been that ψ ' is true iff 'If it had been that φ , it would have been that $\neg\psi$ ' is false (1973, 80–81; BIGELOW & PARGETTER 1990, 103 and BENNETT 2003, 192 are also advocates).

Conjoined, these principles efface the distinction between 'would' and 'might' counterfactuals: 'If it had been that φ , it would have been that ψ ' and 'If it had been that φ , it might have been that ψ ' get the same truth value (79–81). Here is the biconditional's surprising direction. Suppose that "If it had been that φ , it might have been that ψ " is true. By this and Counterfactual Duality it follows that "If it had been that φ , it would have been that $\neg\psi$ " is false. By Conditional Excluded Middle either this or "If it had been that φ , it would have been that ψ " is true. So the latter is true.

Robert Stalnaker endorses Conditional Excluded Middle, and so he must explain why Counterfactual Duality appears to be valid without committing himself to its validity. One might try to explain its apparent validity by holding that the 'might' in a 'might' counterfactual takes wide scope and is epistemic though the 'would' in a 'would' counterfactual is not epistemic. On this hypothesis, a speaker who asserts 'If it had been that φ , it might have been that ψ ' would convey that it is epistemically possible for her that 'If it had been that φ , it would have been that ψ ' is true, and hence (by Conditional Excluded Middle) that it is epistemically possible for her that 'If it had been that φ , it would have been that $\neg\psi$ ' is false. This would make it inappropriate for her to say 'If it had been that φ , it would have been that $\neg\psi$.' And a speaker who asserts 'If it had been that φ , it would have been that ψ ' would convey that it is not epistemically possible for her that 'If it had been that φ , it would have been that $\neg\psi$ ' is true, making it inappropriate for her to say 'If it had been that φ , it might have been that $\neg\psi$.' This would constitute a pragmatic explanation of the data that suggest that Counterfactual Duality is valid.

Lewis anticipates this move. He tries to block it by arguing that such approaches have trouble explaining the reading of (9) on which it is false if there was no penny in my pocket—given that for all we know there was a penny in my pocket (1973, 80).

(9) If I had looked in my pocket, I might have found a penny.

In response, Stalnaker holds that the 'might' in (9) can be read "quasi-epistemically" relative to "what would be compatible with [my knowledge] if I knew all the relevant facts" (1980, 101). Wherever the 'might' in (9) takes scope, if it is read quasi-epistemically (9) is false in the situation Lewis describes.

Prima facie, it might seem that quasi-epistemic 'might' counterfactuals would again collapse into 'would' counterfactuals, so that this move hasn't improved Stalnaker's position in the dialectic at all. But Stalnaker maintains a distinction between

these two kinds of counterfactuals by holding that

If there is some indeterminacy in the language, there will still remain some different possibilities, even after all the facts are in, and so [quasi-epistemic] possibility will not collapse into truth. Propositions that are neither true nor false because of the indeterminacy will still be possibly true in this sense. (101)

By allowing that a ‘might’ counterfactual is true when its quasi-epistemic ‘might’ takes scope at LF over an indeterminate ‘would’ counterfactual, Stalnaker arrives at an account of quasi-epistemic ‘might’ counterfactuals that is “very close to Lewis’s. It agrees with Lewis’s account that *If A, it might be that B* is true if and only if *If A it would be that not-B* is not true” (101). This principle is close enough to Counterfactual Duality to help explain why Counterfactual Duality seems valid. But it is not so close that endorsing it together with Conditional Excluded Middle would efface the distinction between ‘would’ and quasi-epistemic ‘might’ counterfactuals.

For example, Stalnaker holds that (10) is neither true nor false, since its antecedent leaves it indeterminate what Verdi’s home country would have been. And everyone agrees that (11) is true on all its readings.

(10) If Bizet and Verdi had been compatriots, Verdi would have been French.

(11) If Bizet and Verdi had been compatriots, Verdi might have been French.

Given that (10) is neither true nor false, and that ‘might’ in (11) in effect takes wide scope over (10), the ‘might’ can pick up on (10)’s indeterminacy and make the quasi-epistemic reading of (11) true. By taking wide scope, the ‘might’ can target indeterminacy in the whole counterfactual (101). If, contrary to Stalnaker, the ‘might’ stayed in situ, it would be able to target indeterminacy only in ‘Verdi would have been French.’ Stalnaker makes a strong case that there is relevant indeterminacy in (10); it is less plausible that there is relevant indeterminacy in (10)’s consequent.

Unfortunately, Stalnaker’s treatment does not generalize. Sometimes the quasi-epistemic ‘might’ of a true ‘might’ counterfactual cannot take wide scope over an indeterminate ‘would’ counterfactual without changing the meaning of the ‘might’ counterfactual. Here is an example. Suppose that if any two of Bizet, Verdi, and Wagner had been compatriots, it is indeterminate what country they would have called home. Then the quasi-epistemic reading of (12) seems true.

(12) If exactly two of Bizet, Verdi, and Wagner had been compatriots, every one of them might have been French.

But if the ‘might’ in (12) took wide scope, we would get the self-contradictory (13).

- (13) It might be that if exactly two of Bizet, Verdi, and Wagner had been compatriots, every one of them would have been French.

On the other hand, if the ‘might’ in (12) stayed in situ there would be no indeterminate ‘would’ counterfactual in its scope. Stalnaker might argue that there is enough indeterminacy in the open sentence ‘ $\lambda x.x$ would have been French’ in (12) to sustain a distinction between who (quasi-epistemically) might have been French if exactly two of Bizet, Verdi, and Wagner had been compatriots and who would have been French. (Again, that distinction matters because although every one of them might have been French it’s indeterminate, on Stalnaker’s view, who would have been French.) \neg † But it’s not clear where the requisite indeterminacy would come from.

The initial worry was that the conjunction of Conditional Excluded Middle and Counterfactual Duality collapses the distinction between ‘would’ and quasi-epistemic ‘might’ counterfactuals. So a Stalnakerian might be tempted to put (12) to the side, holding that the threat of collapse has been allayed because Counterfactual Duality is invalid if quasi-epistemic ‘might’ *ever* takes wide scope over an indeterminate ‘would’ counterfactual. But a more targeted duality principle would still make trouble.

Counterfactual Duality at LF: The LF [If it had been that φ [it might have been that ψ]] is true iff the LF [If it had been that φ [it would have been that $\neg\psi$]] is false.

(12) entails (14). From Counterfactual Duality at LF and (14), (15) follows; and from Conditional Excluded Middle and (15), (16) follows.

- (14) [If exactly two of Bizet, Verdi, and Wagner had been compatriots, [it might have been that Wagner was French.]]
- (15) It’s not the case that if exactly two of Bizet, Verdi, and Wagner had been compatriots, Wagner would not have been French.
- (16) If exactly two of Bizet, Verdi, and Wagner had been compatriots, Wagner would have been French.

Similarly, we could derive (e.g.)

- (17) If exactly two of Bizet, Verdi, and Wagner had been compatriots, Wagner would have been Italian.

Stalnaker would most plausibly object to the inference from (14) to (15). To block that inference he would have to explain why Counterfactual Duality at LF is only apparently valid for quasi-epistemic readings. In effect, he would have to explain how quasi-epistemic ‘might’ counterfactuals like (12) can be true although it’s indeterminate who would have been French if Bizet, Verdi, and Wagner had been compatriots.

Unlike Stalnaker, Lewis allows quantifiers to scope over ‘might’ counterfactuals. But he still has problems. Wide-scoping the quantifier in (18) yields (19), which unlike (18) presupposes and entails that there is a mural eligible for definite reference.⁴

- (18) If there had been a mural on the floor, every square inch of the mural might have had paint on it.
- (19) Every square inch of the mural is such that if there had been a mural on the floor, that square inch might have had paint on it.

Scoping ‘every square inch of the mural’ below Lewis’s putative ‘if ... might’ unit yields (20), which also clearly differs from (18) in meaning.

- (20) If there had been a mural on the floor, it might have been that every square inch of the mural would have paint on it.

These issues suggest that we shouldn’t count (18) as a Lewisian ‘might’ counterfactual.

The only alternative open to Lewis is holding that (18) is really a ‘would’ counterfactual, where the ‘would’ is covert and scopes over the overt consequent:

- (21) [If there had been a mural on the floor, [~~it would have been that~~ [every square inch of the mural might have had paint on it.]]]

This analysis is to some degree reminiscent of Lewis’s later suggestion that “perhaps” (22) has a “‘would-be-possible’” reading, as (23):

- (22) If Nixon had pressed the button, there might have been a quasi-miracle.
- (23) If Nixon had pressed the button, it would be that: a quasi-miracle is possible.

But in that discussion Lewis is explicit that he means ‘possible’ to target not epistemic possibility but objective chance (1986, 63–64). The analysis is still closer to those of GEURTS 2004 and LESLIE 2009, according to which indicative conditionals with overt modals in their consequents may also contain covert higher modals that are restricted by the conditional’s antecedent. Indeed, Lewis’s need to posit a covert modal in (18) broadens the base of support for views like Geurts’s and Leslie’s.

⁴There is a similar problem for indicative conditionals: the presuppositions carried by ‘every square inch of the mural’ in ‘If there is a mural on the floor, every square inch of the mural might have paint on it’ do not project. So the entire consequent must scope below the antecedent. And although Stalnakerians might handle (12) by scoping ‘every one of them might’ over ‘If exactly two of Bizet, Verdi, and Wagner had been compatriots, x would have been French,’ this strategy fails for ‘If exactly two of Bizet, Verdi, and Wagner had been compatriots, every Francophile among them might have been French,’ because ‘every Francophile among them’ needs to be evaluated relative to antecedent worlds.

I have tried to make two broad points in this section. First, because a quantifier sometimes locks in situ the modal in the consequent of a conditional, we must think seriously about the semantics of conditionals that embed such modals. For example, Stalnaker must handle quasi-epistemic readings without wide-scoping. Second, if we endorse Kratzer's influential hypothesis that conditionals are really just modals (1981, 1986), we must think seriously about modals that themselves embed epistemic modals, because the epistemic 'might' in (18) cannot take scope outside the conditional itself.

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