<center>**Epistemic *must* is not evidential, it's epistemic**</center>

Thesis of the talk *must* ϕ's felicity conditions are best understood in terms of knowledge, not evidence. *must* ϕ is felicitous only if the conjunction of the speaker's knowledge does not entail or contradict ϕ.

Background: reduced confidence [Ka72] observes that (1a) feels weaker than (1b). [Kr91] analyzes *must* ϕ as indicating that all the most stereotypical epistemically accessible worlds are ϕ-worlds. Since the actual world could be a non-stereotypical world in which $\neg\phi$, *must* ϕ can be true even when ϕ is not. Therefore, [Kr91] explains [Ka72]'s intuition by predicting that *must* ϕ is weaker than ϕ.

(1) H: Is it raining?
        a. S: It must be raining.   (*must* ϕ)
        b. S: It's raining.   (ϕ)

[vF10] rebrand [Ka72]'s intuition about (1): (1a) feels less confident than (1b). They note that S cannot say (1a) when directly observing the rain, and they capture this behavior as a presupposition: *must* ϕ is defined only if S does not have direct evidence for some ψ that entails or contradicts ϕ. [vF10] analyze *must* ϕ as indicating that every epistemically accessible world is a ϕ-world, and since epistemic accessibility is reflexive, *must* ϕ entails ϕ. Their presupposition and semantics together mean that the S who truthfully utters *must* ϕ does not have direct evidence for ϕ, but deduces ϕ **indirectly**, and this indirectness, they claim, explains our intuitions of reduced confidence in (1a). After demonstrating problems for [vF10]'s evidential account, I will propose the epistemic account, which will explain the reduced confidence intuition.

Challenges for the evidential account Suppose A and B have identical direct perceptions and no trustworthy reports that settle the prejacent ϕ. Since the evidential account predicts that two utterances of *must* ϕ made by A and B respectively will either both be felicitous or both be infelicitous, a counterexample is furnished if our felicity judgments of A's and B's *must* ϕ utterances differ (example inspired by [Kr11]).

(2)   a.   A is a bird expert. She sees a bird that she knows is a cardinal because only cardinals are bright red with black masks. # "That must be a cardinal."
        b.   B is not a bird expert but her father is. She sees a bird that she thinks is a cardinal because it seems similar to those her father has pointed out to her. "That must be a cardinal."

Since A and B have the same direct perceptions and no trustworthy reports that directly settle the prejacent, the evidential account predicts that we should have the same felicity intuitions about their utterances, contrary to fact. For the evidential account to work, we would have to claim that A directly perceives the cardinal while B does not, but it is not clear on what basis we could make this claim. Another counterexample:

(3)   a.   A is cooking dinner for his family. He temps the chicken and tastes the peas, and they are both ready. It's time to let everyone know. # "Dinner must be ready."
        b.   A is cooking dinner for his family. He had to step out, and asked B to take over. She temps the chicken and tastes the peas, and they are both ready. She wonders whether A was planning to make anything else, for example a salad, but he didn't say anything. "Dinner must be ready."

(2) and (3) pose the following problem: A and B have identical direct perceptions, yet B can felicitously say *must* ϕ while A cannot, so the evidential account cannot account for the difference. Intuitively, the crucial factor is that A knows some things that B does not: A knows how to identify a cardinal and what is being made for dinner. A's knowledge combined with her direct perceptions, the same ones she shares with B, leads A to know the prejacent ϕ. B shares A's perceptions but not her knowledge, and so fails to know ϕ.

In (2) and (3), we held A's and B's evidence for the prejacent ϕ constant at **indirect**, and manipulated knowledge so that A knows ϕ while B does not. This time, let's hold evidence constant at **direct**.

(4)   a.   A sees falling rain out the window. # "It must be raining."
        b.   B sees falling rain out the window. She received an e-mail that morning saying that a Hollywood movie would be filmed outside, and if it didn't rain they would be making fake rain, though it isn't supposed to start until 5 pm. The clock reads 4:50 pm. "It must be raining."

Again, A and B have identical direct perceptions, therefore the evidential account predicts we should have the same judgments about the felicity of their *must* ϕ utterances, but intuitively A cannot say *must* ϕ while

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B can. Again, the relevant factor seems to be that A knows that it's raining while B does not. [Gi15] also claim that knowledge is the relevant factor for epistemic *must*, not evidence. However, in their examples they do not fully cross knowledge (*know* vs. *not-know*) against evidence (*direct* vs. *indirect*) as I do in (2)-(4) above, therefore this talk offers new evidence to distinguish between epistemic and evidential accounts of $must\ \phi$.

The epistemic account In light of the empirical data, I propose the epistemic account: $must\ \phi$ is defined only if the conjunction of S's knowledge does not entail or contradict ϕ. Given the role that knowledge plays, a clear idea of what it means for a speaker S to know ϕ is required.

(5)   [Kr02]: S knows ϕ iff (i) there is a fact f that exemplifies ϕ, (ii) S believes ϕ *de re* of f, and (iii) S can rule out relevant possible alternatives of f that do not exemplify ϕ.

The distinguishing factor between A and B in the examples above is (5iii), which [Kr02] points out is based on [Le96]. In (2a) and (2b), there is a fact exemplifying the prejacent, the cardinal itself, and both A and B believe the prejacent *de re* of the fact. But they differ in that A can rule out relevant possible alternatives to the prejacent while B cannot because A is an expert. Similarly in (3), A rules out alternatives that B cannot. In (4), A rules out possibilities in which it is not raining by ignoring those in which the rain is fake. Due to her extra information, B cannot ignore those possibilities: e.g. the Hollywood crew could be running early.

   A prediction: if knowledge fails in skeptical contexts (cf. [Le96]), then $must\ \phi$ will be felicitous.

(6)   [vF10; p. 370]: An epistemologist, even when on vacation in Seattle, might be tempted to say: "Well, I am getting the kind of visual input that is only consistent with rain, so it must be raining."

A ignores farfetched possibilities in which the rain is fake in (4a). But as [Le96] says (p. 561), "[The skeptical epistemologist] never ignores much of anything." (6) can be explained in terms of [Le96]'s context dependent knowledge. The felicity of $must\ \phi$ tracks the epistemologist's knowledge.

The epistemic account explains reduced confidence (1a) seems less confident than (1b) because an utterance of $must\ \phi$ requires that S does not know ϕ while an S who utters ϕ frequently does know ϕ.

A problem for both accounts $must\ \phi$ appears to be felicitous in the conclusion of a deduction of ϕ. Since a deduced ϕ is known, the epistemic account incorrectly predicts an utterance like (7) (adapted from [La14] p. 4) to be unacceptable. I will call these deduction proof contexts (DPCs).

(7)   Teacher to student: "If x is prime and even, then x is 2. x is prime. x is even. So, x *must* be 2."

It seems that (7) favors the evidential account, but DPCs are also problematic for the evidential account:

(8)   Suppose A from (4a) is talking to her sister on the phone. Her sister denies that it is raining and demands repeatedly that A explain how she knows that it is raining. At her wits' end, A says: "If light enters your brain through your eyes in such a way that it looks like rain, then it is raining. Light is entering my brain through my eyes in such a way that it looks like rain. Therefore, it *must* be raining."

(8) is problematic for both accounts. A possible solution is that DPCs indicate that S either does not yet know ϕ, or S didactically pretends not to so as to explain an available inference to an interlocutor who does not see it. I note a tendency to stress *must* in DPCs, which may be related to the shift in acceptability.

Conclusion $must\ \phi$ is felicitous only if the conjunction of S's knowledge does not settle ϕ. The epistemic account is compatible with the weak semantics of [Kr91], or [La14] who argues against [vF10]'s arguments for strength, but who claims it is empirically unclear whether $must\ \phi$ is veridical. The epistemic account could be compatible with a veridical semantics, just not [vF10]'s which predicts that ϕ is known. Crucially, general reasoning conditionals (cf. [M15]) need to be in an ordering source, and not in the epistemic modal base, if we are to explain how the inference to ϕ indicated by $must\ \phi$ does not produce knowledge of ϕ.

References: [Gi15] **Giannakidou & Mari**, Biased modality and epistemic weakness with the future and *must*. (to appear) [Ka72] **Karttunen**, *Possible* and *must*. [Kr91] **Kratzer**, Modality. [Kr02] **Kratzer**, Facts. [Kr11] **Kratzer**, Projecting modal domains (slides). [Le96] **Lewis**, Elusive Knowledge. [vF10] **von Fintel & Gillies**, *Must…stay…strong!*. [L14] **Lassiter**, The weakness of *must*. [M15] **Matthewson**, Evidential restrictions on epistemic modals.