## I can't believe it's not lexical: Deriving distributed factivity

**Introduction**. While complement selection is typical assumed to be local, some clausal-embedding predicates, like *be certain*, which normally do not admit interrogative complements, can do so under negation (Mayr 2017, van Gessel et al. 2018)–an apparent kind of nonlocal selection. This talk examines a similar sort of behavior in English *believe*. Though *believe* can ordinarily select only declarative clauses (Hintikka 1962 *et seq*), it admits interrogative complements under *can't*:

(1) Eleanor *(can't) believe which candidate won the election.

Furthermore, *can't believe* has a **factive** interpretation: it presupposes the truth of its complement.

(2) Eleanor can't believe that Fran won the election.
∴ Fran won the election.

Why should *can't believe* be factive and interrogative-embedding, when *believe* on its own is not? We argue that *believe* lexically selects for question-like semantic objects, following Theiler et al. (2018), and the interpretation of *can't believe* is fully compositional. The particular combination of *believe*, negation, and *can* conspires to render *can't believe q* acceptable, despite the ordinary unacceptability of *believe q*.

We also argue that *can't believe* is truly factive only with interrogative complements, and this factivity arises from an excluded middle presupposition, which reduces to factivity when the complement of *believe* is interrogative. Ultimately, we argue the factivity of *can't believe* and its interrogative-embedding behavior are derived compositionally, and that factivity can be derived from multiple lexical items as opposed to always being a presupposition packaged with a clausal-embedding predicate wholesale.

***Can't believe* across languages.** While it is tempting to treat *can't believe* as an idiom is on the basis of English alone, this pattern is strikingly robust across languages. In Estonian (6) and French (7), for instance, *believe* only factive with *can* plus negation, much like English. Indeed, we have not yet found a language which lacks this construction, suggesting this pattern is deeper than a lexical quirk of English and demands a compositional explanation.

**Why *believe*?** Although *believe* and *think* often receive similar semantic treatments, *can't think* does not have a factive interpretation. We propose that what is special about *believe* is the combination of its doxastic semantics and aspectual flexibility. Unlike *think*, *believe* can receive a change-of-state interpretation indicating face-value acceptance of a proposition (Sæbø 2007):

(3) *Mildred and Horace are discussing their neighbor, Gertrude. Mildred doesn't know that Gertrude is on vacation, but she is known to be an extensive world traveler.*
Horace: Gertrude is in Tahiti again this week.
Mildred: I believe that./#I think that.

Among modals, only abilitative *can* and *will* with negation license factive *believe*. This is relevant because abilitative *can* and *will* may only modify (lexically or coerced) change-of-state predicates (Hackl 1998). In Bulgarian (4), this requirement of telicity is explicitly grammaticized, as factive *can't believe* requires a perfective aspectual prefix.

(4) *Context: Maria just arrived, to everyone's surprise. John says:*

Ne moga da *(po)-vyarvam, che Mariya e tuk.
NEG can I PERF-believe that Mariya is here
'I can't believe that Maria is here!'

We remain agnostic to the precise nature of the precise nature of the aspect ASP in English *can't believe*, but it must at least encode change of state.

**Non-exclamative complements**. The complement of *can't believe* is frequently assumed to be exclamative (Elliott 1971, Grimshaw 1979, Zanuttini & Portner 2003), on the basis of its mirative character and certain limitations on its complement. However, the complement of *can't believe* can include multiple *wh* and *wh*-words without degree interpretations (5), both of which are banned in matrix exclamatives (Huddleston 1993, Rett 2011).

(5) Shauna can't believe who is going out with who.

**Analysis**. Our analysis leverages two independently-motivated assumption from Inquisitive Semantics (Ciardelli et al. 2013): (i) that both declarative and interrogative clauses denote 'issues' (sets of sets of propositions), and (ii) that issues are downward closed: for every element $s$ in an issue, that issue also contains every proper subset of $s$. *Believe P*, then, indicates that the attitude holder's doxastic state is a member of $[\![P]\!]$. Negation of $P$, then, takes an issue and returns the issue containing every world which is not contained in any member of $P$ (8-b). We also assume here the denotation of *believe* from Theiler et al. (2018), in which *believe* takes complements of type $\langle st, t\rangle$, i.e., sets of sets of worlds, and carries an **excluded-middle** presupposition: namely, *believe p* presupposes that the attitude holder either believes $p$ or its complement (Gajewski 2007).

Because an interrogative clause denotes a partition $P$ on $W$, the inquisitive negation of $P$ is $\emptyset$, because every possible world is contained within one cell of that partition. Therefore, the excluded middle presupposition of *believe* reduces to its assertion when believe takes an interrogative complement–a systematic triviality which Theiler et al. argue results in unacceptability.

However, combined with ability *can*, the assertion of *believe q* is no longer redundant with the presupposed content. Following Hackl (1998), we define ability *can* as asserting that in all worlds accessible from $w$ compatible with the subject's abilities, they bring about an acutality in which the complement of *can* holds. *X can't believe q* presupposes that $x$ believes some answer to $q$, but that under ordinary circumstances, she would be unable to form such a belief, perhaps because the true answer is very unlikely. This also naturally results in a mirative interpretation: we presuppose that $x$ forms a belief about the true answer to $q$ while simultaneously asserting the deck was stacked against them to do so. A sample derivation of (1) is given in (10).

**Conclusion**. We have argued that the factivity of *can't believe* with an interrogative complement is derived from its excluded middle presupposition in combination with negation and an ability modal. Narrowly, the data support a lexical semantics for *believe* that is compatible with interrogative complements. Broadly, we demonstrate that factivity need not be a property of a solitary lexical item: instead, particularly properties of multiple lexical items may conspire to derive a factive interpretation–which may relate to the deep connection between interrogative-embedding capabilities and factivity (Spector & Egré 2015).

(6) Jaan ei suuda uskuda, kes võidujooksu võitis.
Jaan not can believe who race won
'Jaan can't believe who won the race.' *Estonian*

(7) Jean ne peut pas croire qui a gagné la course.
Jean NEG can NEG believe who has won the race
'Jean can't believe who won the race.' *French*

(8) Denotations for *believe* and inquisitive negation $\neg_?$ from Theiler et al. (2018)

a. $[\![\text{believe}]\!]^w = \lambda P_{\langle st,t\rangle}\lambda x_e : \underline{\text{DOX}_x^w \in P \vee \text{DOX}_x^w \in \neg_? P}.\ \text{DOX}_x^w \in P$

b. $\neg_? P := \{p | \forall q \in P : p \cap q = \emptyset\}$

(9) Denotations for change-of-state aspect ASP and ability *can*

a. $[\![\text{ASP}]\!]^{w,t} = \lambda P.\exists s.[s = P \wedge \exists t' < t[[\![s]\!]^{w,t'} = 0 \wedge \nexists t''[t' < t'' < t]]]$

b. $[\![\text{CAN}_{abil}]\!]^w = \lambda x_e.\lambda P_{\langle st,t\rangle} : \forall w' \in W[$if *w'* is compatible with x's abilities in *w*, $P(x)(w') = 1]$

(10) Sample derivation for *Eleanor can't believe which candidate won the election* with presupposed content underlined
Assumed LF: [$\neg_?$ [Eleanor$_i$ [can$_{abil}$ [t$_i$ ASP believe which candidate won the election]]]]

a. $[\![\text{which candidate won the election}]\!]^{w,t} = \{\{\text{A won}\}^\downarrow, \{\text{B won}\}^\downarrow, ...\}$

b. $[\![\text{believe which candidate won the election}]\!]^{w,t}$
$= \lambda x : \underline{\text{DOX}_x^w \in \{\{\text{A won}\}^\downarrow, ...\} \vee \text{DOX}_x^w \in \neg_?\{\{\text{A won}\}^\downarrow, ...\}}.\text{DOX}_x^w \in \{\{\text{A won}\}^\downarrow, ...\}$
$= \lambda x : \underline{\text{DOX}_x^w \in \{\{\text{A won}\}^\downarrow, ...\}}.\text{DOX}_x^w \in \{\{\text{A won}\}^\downarrow, ...\}$

c. $[\![\text{ASP believe which candidate won the election}]\!]^{w,t}$
$= \lambda x : \underline{\text{DOX}_x^w \in \{\{\text{A won}\}^\downarrow, ...\}}.\exists s.[s = \text{DOX}_x^w \in \{\{\text{A won}\}^\downarrow, ...\} \wedge$
$\exists t' < t[[\![s]\!]^{w,t'} = 0 \wedge \nexists t''[t' < t'' < t]]]$

d. $[\![\text{Eleanor(t) ASP believe which candidate won the election}]\!]^{w,t}$
$= \underline{\text{DOX}_E^w \in \{\{\text{A won}\}^\downarrow, ...\}}.\exists s.[s = \text{DOX}_E^w \in \{\{\text{A won}\}^\downarrow, ...\} \wedge \exists t' < t[[\![s]\!]^{w,t'} = 0 \wedge \nexists t''[t' < t'' < t]]]$

e. $[\![\text{Eleanor can}_{abil}\ \text{t}_i\ \text{ASP believe which candidate won the election}]\!]^{w,t}$
$= \underline{\text{DOX}_E^w \in \{\{\text{A won}\}^\downarrow, ...\}}.\forall w' \in W[$if *w'* is compatible with E's abilities in *w*, $\exists s.[s = \text{DOX}_E^w \in \{\{\text{A won}\}^\downarrow, ...\} \wedge \exists t' < t[[\![s]\!]^{w,t'} = 0]]]$

f. $[\![\neg_?\ \text{Eleanor can}_{abil}\ \text{ASP believe which candidate won the election}]\!]^{w,t}$
$= \underline{\text{DOX}_E^w \in \{\{\text{A won}\}^\downarrow, ...\}}.\forall w' \in W[$if *w'* is compatible with E's abilities in *w*, $\nexists s.[s = \text{DOX}_E^w \in \{\{\text{A won}\}^\downarrow, ...\} \wedge \exists t' < t[[\![s]\!]^{w,t'} = 0]]]$

**Selected References** Grimshaw, J. 1979. Complement selection and the lexicon. • Hackl, M. 1998. On the Semantics of "Ability Attributions". • Huddleston, R. 1993. Remarks on the Construction, "You won't believe who Ed has married". • Mayr, C. 2017. Predicting polar question embedding. • Spector, B. & P. Egré. 2015. A uniform semantics for embedded interrogatives: *an* answer, not necessarily *the* answer. • Theiler, N., F. Roelofsen, & M. Aloni. 2018. A uniform semantics for declarative and interrogative complements.