Argument saturation and the syntactic status of embedded clauses

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Introduction

A puzzle

Many English clausal-embedding predicates can also take content DPs, like *the claim* and *the rumor*, as objects:

(1) a. Lucretia believes/denies/confirmed [that she is Elena Ferrante]$_{CP}$.
b. Lucretia believes/denies/confirmed [the rumor/claim/story/lie (that she is Elena Ferrante)]$_{DP}$.

A subset of these verbs can also take non-content DPs as objects, in which case the DP is roughly interpreted as the 'source' of the attitude (Djärv 2019):

(2) Lucretia believes the seer/the book/Maude.
≈ Lucretia believes {the seer/the book/Maude}**'s claim**

A puzzle

Verbs which are allowed in (2), like *believe* (*trust*, *agree (with)*, *doubt*...) can take both non-content DPs and CPs at the same time.

Crucially, for these verbs, V-DP-CP entails V-CP:

(3) Lucretia believes [the seer]$_{DP}$ [that she will inherit a great fortune]$_{CP}$.
$\models$ Lucretia believes that she will inherit a great fortune.

Small question: What is the structure of (3) such that its entailment pattern arises compositionally?

Bigger question: What can verbs which 'take' both a DP and a CP tell us about how verbs semantically compose with embedded clauses?

This talk

Empirical claim: In *believe-DP-CP*, the CP acts as a modifier of the verb; in *believe CP* the CP is an argument of the verb.

Proposal

Embedded *that*-clauses are flexibly-typed and can function as arguments of transitive predicates or modifiers of intransitive ones, **or transitive predicates with a filled argument slot**

Believe-type verbs provide evidence that both modes of composition are available for embedded clauses, even for the same verb in the same language (cf. Kratzer 2006, Moulton 2015, Elliott 2017, Özyıldız 2020)

The Syntax of V-DP-CP

Word order

The DP in the V-DP-CP construction always precedes the CP:

(4) a. She believes [the reporter]$_{DP}$ [that it will snow tomorrow]$_{CP}$.
b. *She believes [that it will snow tomorrow]$_{CP}$ [the reporter]$_{DP}$.

Stacking 2 DPs or 2 CPs is also ruled out:

(5) a. *She believes [the reporter]$_{DP}$ [the rumor]$_{DP}$.
b. *She believes [that it will snow tomorrow]$_{CP}$ [that today is Saturday.]

Constituency

When the DP is non-content-denoting, the postverbal DP and the CP do not form a constituent:

(6) *Fragment Answer*
A: What/who does Lucretia believe?
B: *Maude/the book that it's raining. (cf. the rumor that it's raining)

(7) *Clefting*
*It is Maude/the book that it's raining that Lucretia believes.

(8) *Pseudoclefting*
*Maude/the book that it's raining is what Lucretia believes.

Comparison with content nominals

Recent evidence has pointed to content DPs composing with clauses intersectively (Kratzer 2006, Moulton 2009, 2015)

(9) $[\![$the claim that it's raining$]\!]=$
$\iota x_e[\textbf{claim}(x) \wedge \text{CON}(x) = \lambda w_s.\textbf{rain}(w)]$

The CP in V-DP-CP has a similar distribution to the CP taken by content DPs, suggesting the mode of composition is the same.

External distribution

CP proforms (Moulton 2015):

(10) a. Hobart believes so/it/that.
b. *Hobart's belief so/it/that
c. *Hobart believes Mildred so/it/that.

***About*-PPs** (Rawlins 2013):

(11) a. *Hobart believes about the rain.
b. Hobart's belief about the rain.
c. Hobart believes Mildred about the rain.

Obligatory overt C:

(12) a. Hobart believes (that) it's raining.
b. Hobart's belief *(that) it's raining
c. Hobart believes Mildred *(that) it's raining.

Islandhood

The CP in V-DP-CP constructions is also an island; this is not so if the DP is absent.

Object DPs block A' extraction from the embedded CP

(13) a. What$_i$ do you believe (??Maude) that she ate t_i?
b. [the kiwi]$_i$ that Hugh believes (*Maude) that she ate t_i

→ This suggests this CP is not in a syntactic argument position.

Summing up

The CP in *believe*-DP-CP has a largely 'peripheral' syntactic status:

- It does not form a constituent with the adjacent DP
- It has the external distributional of a semantic modifier
- It is an (adjunct)-island
- It is optional

...all ways it is *unlike* the embedded CP when the object DP is not present with the same V, **suggesting the CP has a fundamentally different status when the object DP is present vs. when it is not.**

Analysis

When clauses are modifiers

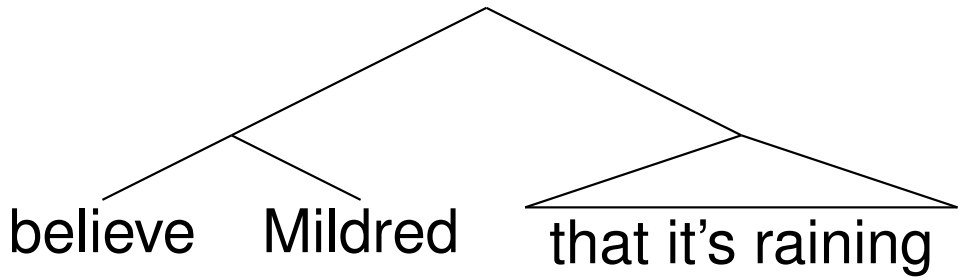
In *believe-DP-CP*, the DP is an internal argument of *believe* while the CP modifies the content of the believing eventuality.

This is achieved via a type asymmetry between *that*-clauses and contentful individuals:

- (Content) DPs denote **contentful individuals** and compose via FA
- *That*-clauses denote **predicates of eventualities** and compose via PM

Believe DP that CP constructions have the following LF:

(14)



The meaning of *believe*

I propose that *believe* denotes a Kratzer (1996)-style function from contentful individuals to properties of eventualities (type $\langle e, vt \rangle$):

(15) $[\![\text{believe}]\!] = \lambda x_c \lambda e_v.\textbf{believe}(e) \wedge \mathscr{F}_{cont}(x) = \mathscr{F}_{cont}((e))$

Believe takes a contentful individual x_c ($D_c \subseteq D_e$), and equates its content to that of a believing eventuality.

This is a departure from a more total neo-Davidsonian approach to lexical semantics, whereby all arguments are severed from the verb (e.g. Elliott 2017)

Extracting content from individuals

A non-content DP like *Maude* cannot saturate the individual argument of *believe* on its own.

We need a mechanism to turn it into a contentful individual of the relevant sort, which I cash out with the operator CLAIM, inspired by Uegaki (2016):

(16) $[\![\text{CLAIM}]\!]^w = \lambda y_e.\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(y)(w))]$

CLAIM denotes a function from individuals to the unique contentful individual with the same content as their claim in w

Composing with the CP

I assume that *that*-clauses denote predicates of eventualities (Rawlins 2013):

(17) $[\![\text{that it's raining}]\!]^w = \lambda e_v.\mathscr{F}_{cont}(e)(w) = \lambda w'_s.\textbf{rain}(w')$

Because *that*-clauses and *believe DP* denote the same type of formal object, they must compose intersectively, via a mechanism like Restrict (Chung & Ladusaw 2004):

(18) For type α and type β such that $\beta = \langle\beta_1\langle...\langle\beta_n t\rangle\rangle\rangle$ for some $n \geqslant 0$,
$Restrict(A_{\langle\alpha\beta\rangle}, B_{\langle\alpha t\rangle}) = \lambda x \in D_\alpha.\lambda y_1 \in D_\beta...\lambda y_n \in D_\beta.A(x)(y_1)...(y_n) \wedge B(x)$

Putting the pieces together

Example VP: *believe Maude that it's raining*

Procedural steps

1. Compose *Maude* with CLAIM via FA
2. Compose the CLAIM-DP with *believe* via FA
3. Compose *believe*+CLAIM-DP with the embedded CP via Restrict.

(19) ⟦believe Maude that it's raining⟧
$\lambda e_v.\textbf{believe}(e) \wedge (\mathscr{F}_{cont}(e) = \mathscr{F}_{cont}(\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w))])) \wedge \mathscr{F}_{cont}(e) = \lambda w'_s.\textbf{rain}(w')$

(Roughly, 'believe Maude's unique claim and believe that it's raining'; See Appendix for full derivation.)

When clauses are arguments

A problem: sentences with an embedded *that*-clause and no DP:

(20) Lucretia believes that it's raining.

This composition cannot proceed given our assumptions because of the type mismatch between *believe* ($\langle e, vt \rangle$) and the *that*-clause (vt)

Solution: Permit *that*-clauses to be coerced into contentful individuals so that they may saturate verbal arguments

Coercing *that*-clauses

There is a close kinship between eventualities and contentful individuals; many authors treat the former as a subset of the latter (Lasersohn 1995, Hacquard 2006, Elliott 2017).

I leave them typewise distinct, but propose that *that*-clauses can flexibly denote a unique contentful individual, independently proposed by Potts (2002).

(21) $[\![\text{that it's raining}]\!] = \iota x_c[\mathscr{F}_{cont}(x_c) = \lambda w_s.\textbf{rain}(w)]$

(22) $[\![\text{believes that it's raining}]\!] =$
$\lambda e_v.\textbf{believe}(e) \wedge \mathscr{F}_{cont}(e) = \mathscr{F}_{cont}(\iota x_c[\mathscr{F}_{cont}(x_c) =$
$\lambda w_s.\textbf{rain}(w)])$

Conclusion

Wrapping up

I've proposed that embedded *that*-clauses live a double life:

- They can **denote contentful individuals** and saturate content arguments of transitive predicates...
- ...or **denote predicates of eventualities** and modify event arguments of transitive predicates whose argument has been saturated.

This compositional flexibility is achieved by allowing *that*-clauses a degree of denotational flexibility.

Upshot: *Believe* adds to a growing body of evidence that CPs can, at least sometimes, modify clausal-embedding predicates, and that there are multiple paths to composing with embedded clauses.

Looking ahead

Much remains to be understood:

- Given the semantic generalizations among verbs which permit V-DP-CP, what implications are there for the lexical semantics-syntax interface?
- What can the cross-linguistic picture tell us? (See Appendix)
- Are there clear interpretive differences when a CP denotes an individual vs. a predicate of eventualities?
- What is the source of ungrammaticality when the CP in *believe-DP-CP* is questioned?

(23) *What did you believe Maude?

Thank you!

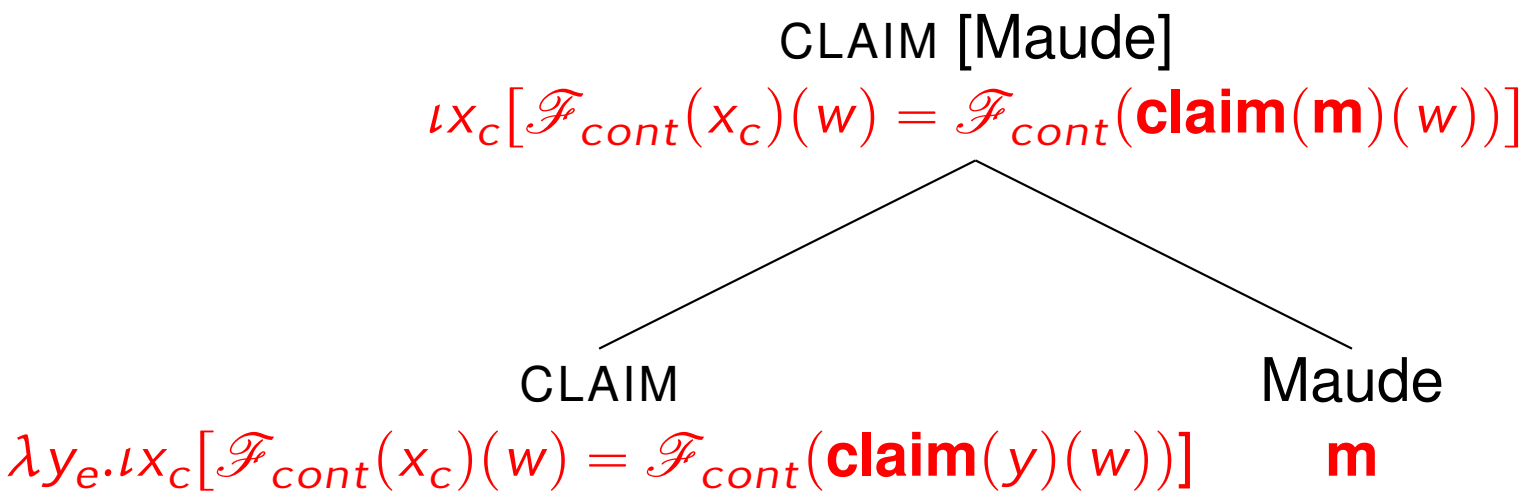
Deriving *believe-DP-CP*

Derivation

Example: *believe Maude that it's raining*:

Step 1

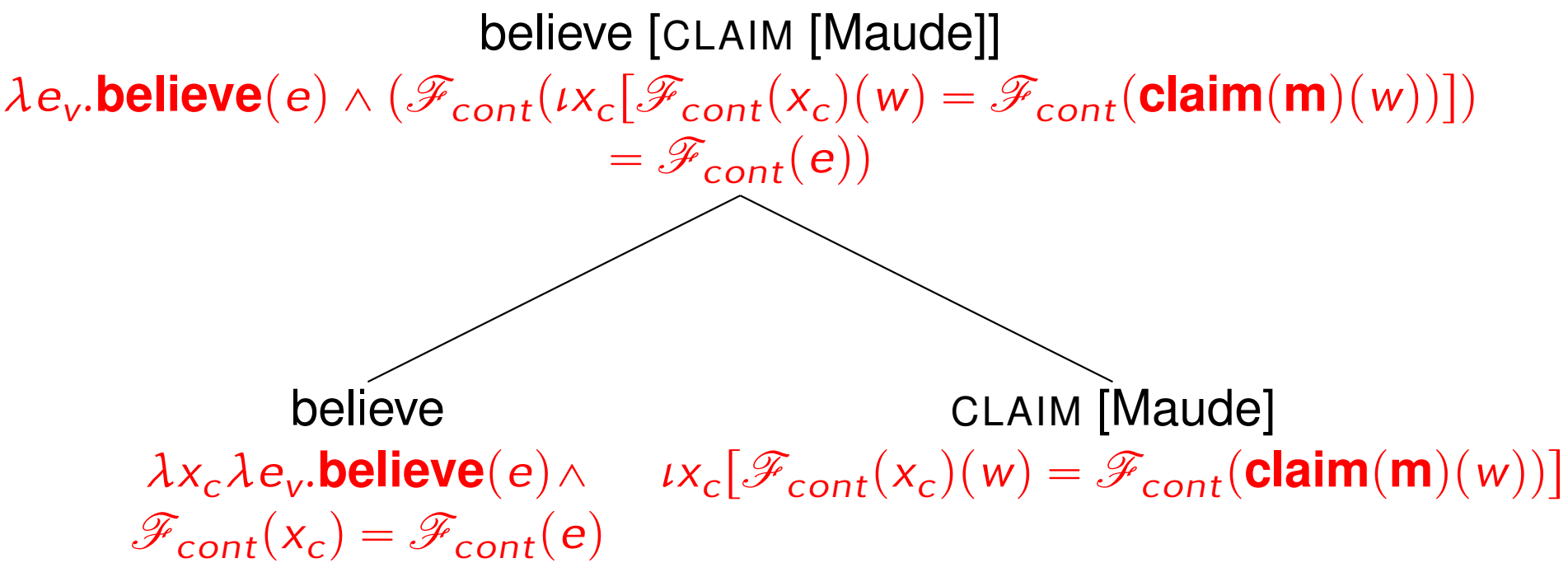
Compose *Maude* with CLAIM via FA



Derivation

Step 2

Compose the CLAIM-DP with *believe* via FA



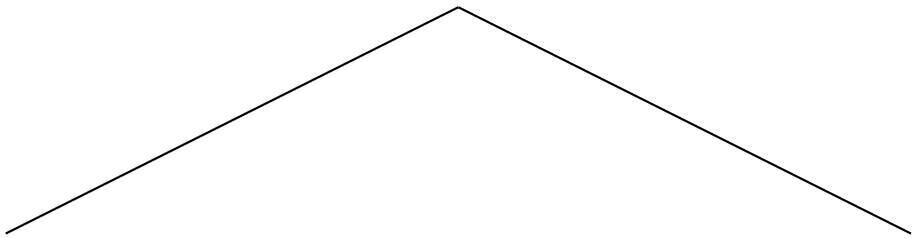
Derivation

Step 3

Compose *believe*+CLAIM-DP with the embedded CP via Restrict.

believe [CLAIM [Maude]] that it's raining

$$\lambda e_v.\textbf{believe}(e) \wedge (\mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w)) = \mathscr{F}_{cont}(e)) \wedge \mathscr{F}_{cont}(e) = \lambda w'_s.\textbf{rain}(w')$$



believe [[CLAIM] Maude]

$$\lambda e_v.\textbf{believe}(e) \wedge (\mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w)) = \mathscr{F}_{cont}(e))$$

that it's raining

$$\lambda e_v.\mathscr{F}_{cont}(e) = \lambda w'_s.\textbf{rain}(w')$$

Why DP-CP?

Why can't CPs be stacked?

Given that a CP can denote an argument or a modifier of *believe*, we need an explanation for why we can't stack CPs:

(24) *Mathison believes [that Ulysses is in Moldova]$_{CP}$ [that it's raining ice cream]$_{CP}$.

This yields the denotation below:

(25) $\lambda e_v.\textbf{believe}(e) \wedge (\mathscr{F}_{cont}(e) = \lambda w_s.\textbf{in-Moldova}(\textbf{u})(w))) \wedge (\mathscr{F}_{cont}(e) = \lambda w_s.\textbf{rain-ice-cream}(w))$

Assuming that e corresponds to a single believing eventuality (Elliott 2017), it has incoherent content corresponding to two different propositions.

The thematic role of the DP

The problems with CLAIMing

The use of CLAIM to turn non-content DPs into content DPs generates at least two problems:

- **Overgeneration**: Clearly, we cannot turn *John* into [CLAIM *John*] in most contexts
- **Claimhood**: Not every entity which can be *believed* makes claims.

(26) a. The jury believed the photograph that the defendant is guilty.
b. I trust the recording that there is a grand conspiracy.

An alternative: Sourcehood

We could treat the DP object of *believe* as a *source* argument, (cf. Djärv 2019). This would solve the second problem, since both claims and non-claims can presumably be sources of beliefs.

Though as Djärv herself notes, we do not want to say that *believe* s-selects a source, because *believe CP* imposes no source requirement in the absence of an object DP.

(27) I believe that it's raining, even though no one claimed that.

Having a flexible content argument for *believe* circumvents this issue. However, we probably want the semantics of the object DP to be essentially that of a source; this could be achieved with fine-tuning the denotation of CLAIM.

Beyond English

Other languages with *believe-DP-CP*

Believe-DP-CP is not unique to English, as (Djärv 2019) observed for German. It is also licit in Estonian:

(28) **Estonian**

Ma usun Liisi, et koroonaviirus on ohtlik.
I believe Liis.PART that coronavirus is dangerous
'I believe Liis that coronavirus is dangerous.'

Languages which prohibit *believe-DP-CP*

In some languages, *believe* can take a DP or a CP, but not both at once:

(29) **Canadian French**

Marie croit Gaston (*qu'il a cambriolé une banque).
Marie believes Gaston that.he has robbed a bank
'Marie believes Gaston (*that he robbed a bank).'

(30) **Turkish** (Deniz Özyıldız, p.c.)

Anna Brian'a (*Brian'in partide oldugun-a) inaniyor.
Anna Brian.DAT Brian.GEN party.LOC be.NMZ-DAT believe
Anna believes Brian (*that Brian was at the party).

The dative/applicative connection

Djärv (p.235) motivates an analysis of German *glauben* in which the source argument is introduced by an applicative head, in part because it is obligatorily dative.

(31) Ich glaube ihm/*ihn, dass Hans Maria das Buch gab.
I believe him.DAT/ACC that Hans Maria the book gave
'I believe him that Hans gave Maria the book.'

In Turkish (30), both the (nominalized) embedded clause and the source on their own must be dative-marked; their inability to co-occur could therefore be chalked up to Case restrictions.

The dative/applicative connection

However, we should be wary about putting all our eggs in the dativity basket:

- Canadian French *croire* object DPs are not dative, but CPs are not allowed
- Estonian *uskuma* allows DP+CP combinations, but the object DP is not dative (read: oblique)

The connection between dative case and the (in)ability to form *believe-DP-CP*-like constructions merits much further investigation (and on many verbs in many languages!)

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