What embedded sentences do

Clausal embedding: Intro to puzzles galore

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Clausal embedding: intro

Predicates which denote mental states or speech acts, such as *believe*, *hope*, and *wonder*, can embed clauses:

(1) a. Kira **believes** that the aliens are prophets.
b. Ben **hopes** that he can protect the wormhole.
c. Jadzia **wonders** whether they will succeed.

Sentences like (1), (minimally) consisting of an clausal-embedding (CE) predicate and an embedded clause: **attitude reports**

Main focus of this week:

- What is the distribution of different kinds of embedded clauses?
- How do(n't) their interpretations vary under different embedders?

Distribution of embedded clauses

CE predicates also differ in the *types* of clauses they can embed.

Ex: some predicates embed only declaratives (2), some embed only interrogatives (3), and some either (4):

(2) a. The Federation **hopes/thinks** that victory will come.
b. *The Federation **hopes/thinks** when victory will come.

(3) a. *The Federation **investigated/wondered** that victory will come.
b. The Federation **investigated/wondered** when victory will come.

(4) a. The Federation **knows/said** that victory will come.
b. The Federation **knows/said** when victory will come.

Types of attitudes

Notational shorthand (courtesy of Lahiri 2002):

	Embeds declaratives	**Embeds interrogatives**
Anti-rogative	✓	✗
Rogative	✗	✓
Responsive	✓	✓

A major question: What is responsible for this pattern?

Other variation in clauses

Clause type is not the only way in which attitudes are restricted in the sorts of complements they take.

(5) a. Portia hopes/*wants that Desmond will come to the party.
b. Portia *hopes/wants Desmond to come to the party.

Clausal **mood**, e.g. in Spanish (Villalta 2009)

(6) a. Victoria cree que hará/*haga buen tiempo.
Victoria believes that makes.IND.FUT/SUBJ good weather
'Victoria believes that it will be good weather.'
b. Victoria quiere que Marcela *vendrá/venga al picnic.
Victoria wants that Marcela comes.IND.FUT/SUBJ to-the picnic
'Victoria wants Marcela to come to the picnic.

Inferences with embedded clauses

Veridicality/factivity inferences: *know* vs. *believe* vs. *be correct*

(7) a. Consuela believes that it's raining.
$\not\rightarrow$ It's raining.
b. Consuela knows/is correct that it's raining.
$\rightarrow$ It's raining.

(8) a. Consuela doesn't believe/isn't correct that it's raining.
$\not\rightarrow$ It's raining.
b. Consuela doesn't know that it is raining.
$\rightarrow$ It's raining.

Neg-raising inferences: *believe* vs *be certain*

(9) a. Consuela doesn't believe that it's raining.
$\rightsquigarrow$Consuela believes that it's not raining.
b. Consuela isn't certain that it's raining.
$\not\rightsquigarrow$Consuela is certain that it's not raining.

Overview of the course

- **Day 1**: What is clausal embedding and intro to some major puzzles
- **Day 2**: Who embeds what?
- **Day 3**: Factivity, neg-raising, and other lexical (?) inferences
- **Day 4**: Nominals and the Kratzer-Moulton-Elliott hypothesis
- **Day 5**: MECORE database, conducting your own research, and tying up loose ends

What *is* clausal embedding?

Selection

Predicates differentially *select for* syntactic arguments, specified in their lexical entry.

⇒ PSRs tell you what kind of patterns are available at the scale of the language, not necessarily for individual predicates

Subcategorization: what kinds of arguments a particular lexical item selects and their syntactic label

(10) a. Guinevere ate the steak tartare.
b. Guinivere ate.
c. *eat* [NP ___ (NP)]

(11) a. Guinevere devoured the steak tartare.
b. *Guinivere devoured.
c. *devour* [NP ___ NP]

Is subcategorization syntactic?

Problem articulated by Grimshaw (1979): syntax not enough to capture patterns in clausal embedding

(12) a. Zelda hoped [that the world was ending]$_{CP}$
b. Ebenezer wondered [which planet would be safest to move to]$_{CP}$

Proposal: predicates *also* subcategorize for semantics.

(13) a. hope [___ CP]; [___ P]
b. wonder [___ (CP)]; [___ Q]

$\rightarrow$ Combining a lexical item with something it does not semantically subcategorize ('select') = impossible derivation

(Grimshaw 1979; Pesetsky 1982, 1991)

Do we need both kinds of selection?

Can semantic type (e.g. *question*) be dissociated from syntactic category?
Grimshaw: yes.

(14) a. Joan asked [**how tall the building is**].
b. Joan asked [**the height of the building**].
c. ?Joan wondered [**the height of the building**].

NPs that are interpreted as questions: 'concealed questions'

Opening another can of worms: what question is a CQ interpreted as?

(15) a. Joan asked [where the capital of Vermont is]. (from Nathan 2006)
b. Joan asked [what the capital of Vermont is].
c. I helped Joan cheat on her geography test by telling her [the capital of Vermont].
d. #I helped Joan find her way around New England by car by telling her [the capital of Vermont].

Semantic selection with embedded clauses

Nowadays, we have a more articulated view of semantic selection.

Standard view: Declarative clauses denote propositions (type st) & interrogative clauses questions (type $\langle st, t \rangle$) (Karttunen 1977, *et seq.*)

Reverse-engineering: what should the types of *hope* and *wonder* be (modulo intensionality)?

(16) a. $[\![\text{hope}]\!] = \lambda p_{st} \lambda x_e . \mathbf{hope}(p)(x)$

b. $[\![\text{wonder}]\!] = \lambda q_{\langle st,t \rangle} \lambda x_e . \mathbf{wonder}(q)(x)$

Additional problems for the selectional view

This idea is not sufficient to account for variation in CE predicates for several reasons:

- CE predicates with similar meanings have similar properties within/across languages (Bolinger 1968; Cattell 1978; Heim 1992, a.o.)
- Responsive predicates like *know* can embed both declaratives and interrogatives (Karttunen 1977; Groenendijk & Stokhof 1984; Lahiri 2002, a.o.)
- Many CE predicates embed both nominals and clauses (Vendler 1972; Ginzburg 1995; King 2002; Moltmann 2013; Uegaki 2016; Djärv 2019, a.o.)

In other words, selection alone does not really tell us the 'why' of variation in CE predicates.

For that, we need to understand the **lexical semantics** of CE predicates and how they relate to embedded clauses.

A semantics for attitudes

Hintikka semantics

Hintikka: (1962, 1969): Attitude predicates express relations between **attitude holder** and **sentences**

- Declarative clause denotes set of worlds (propositions not atomic types)
- Attitude contributes universal quantification over possible worlds
- Different attitudes quantify over different sets:
  believe: 'doxastic', *want*: 'bouletic', etc.

(17) Jaakko believes [that Tom is Dutch].
$\forall w \in \textsc{dox}_j : \textbf{dutch}(t)(w)$
'In each world compatible with what Jaakko believes, Tom is Dutch in that world'

(18) Jaakko wants [Tom to be Dutch].
$\forall w \in \textsc{boul}_j : \textbf{dutch}(t)(w)$
'In each world compatible with what Jaakko wants, Tom is Dutch in that world'

What Hintikka semantics gets us

Uniform template for attitude predicates: we can pinpoint lexical differences in the meaning of DOX, BOUL, etc.

Unified treatment of attitude predicates with modals.

(19) Tom is so tall. He must$_{\text{EPIS}}$ be Dutch.
$\forall w$ s.t. w is epistemically accessible to Sp: $\mathbf{dutch}(t)(w)$

Explanation for Frege's puzzle (and variants):

(20) a. Renee believes that she saw Clark Kent enter a phone booth.
b. Renee believes that she saw Superman enter a phone booth.

(Is it possible in some of Renee's belief worlds that CK and Superman are not the same?)

Problems for Hintikka

But! Many reasons to desire a richer semantics than Hintikka provides

Problem 1: Epistemic modals in complement clauses (Anand & Hacquard 2014)

(21) a. John {believes, argued, assumed} that the Earth might be flat.
b. *John {hopes, wishes, commanded} that the Earth might be flat.

Problem 2: Embedded interrogatives; 'issue-oriented' attitudes

(22) John wondered whether the Earth might be flat.

Not easily amenable to quantification over propositions instead: (22) $\not\models$ For all answers to the question 'the Earth might be flat', John wonders that answer

Problem 3: Responsive predicates

(23) John knows that/whether the Earth might be flat.

Inconsistent meanings

Finally, there is a question of what *attitude* each particular predicate should be associated with.

Chimeras (my term): Predicates which seem to convey different attitudes depending on features of the complements

(24) **Navajo *nisin*** (Bogal-Allbritten 2016)

a. Nahałtin nisin.
AREALS.rain.IMP 1SG.NISIN.IMP
'I think it is raining.'

b. Nahodoołtįįł nisin.
AREALS.rain.FUT 1SG.NISIN.IMP
'I want it to rain.' (**Not**: 'I think it will rain.')

c. Alice nahółąą' lágo
Alice ARealS.rain.OPT hope.not
nizin.
3S.NISIN.IMPF
'Alice hopes it will rain.'

More chimeras

Estonian *mõtlema* (Roberts 2018, 2021)

(25) a. Liis mõtleb, et sajab vihma.
Liis MÕTLEMA that falls rain
'Liis thinks that it's raining.'
b. Liis mõtleb, kas sajab vihma.
Liis MÕTLEMA Q falls rain
'Liis wonders whether it's raining.'

What attitude is being expressed by *mõtlema*? What contribution is being made by the embedded clauses?

Summary

Loci of variation among complements of clause-embedding predicates:

- Possible clause types
- Mood/finiteness
- Veridicality/factivity/neg-raising inferences
- Syntactic strategy (complementizer, nominalization)
- Variability of interpretation

What is the role of the *meaning* of the embedding predicate itself in this variation? Is it stable across languages? Stay tuned.

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