

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.
→ It's raining.
- b. Consuela knows/is correct that it's raining.
→ It's raining.
- (8) a. Consuela doesn't believe/isn't correct that it's raining.
↗ It's raining.
- b. Consuela doesn't know that it is raining.
→ It's raining.

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

- (9) a. Consuela doesn't believe that it's raining.
↗ Consuela believes that it's not raining.
- b. Consuela isn't certain that it's raining.
~~↗~~ 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]

→ 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. $\llbracket \text{hope} \rrbracket = \lambda p_{st} \lambda x_e. \mathbf{hope}(p)(x)$
 - b. $\llbracket \text{wonder} \rrbracket = \lambda q_{\langle st, t \rangle} \lambda x_e. \mathbf{wonder}(q)(x)$

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].

$\forall w \in \text{DOX}_j : \text{dutch}(t)(w)$

'In each world compatible with what Jaakko believes, Tom is Dutch in that world'

(18) Jaakko wants [Tom to be Dutch].

$\forall w \in \text{BOUL}_j : \text{dutch}(t)(w)$

'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_{EPIS} be Dutch.

$\forall w$ s.t. w is epistemically accessible to Sp : **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. Nahattin nisin.
AREALS.rain.IMP 1SG.NISIN.IMP
'I think it is raining.'
- b. Nahodootjįt nisin.
AREALS.rain.FUT 1SG.NISIN.IMP
'I want it to rain.' (**Not:** 'I think it will rain.')
- c. Alice nahótąą' lágo
Alice AREalS.rain.OPT hope.not
nizin.
3S.NISIN.IMPF
'Alice hopes it will rain.'



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.

References

Bogal-Allbritten, Elizabeth. 2016. *Building Meaning in Navajo*: UMass Amherst dissertation.

Bolinger, Dwight. 1968. *Aspects of Language*. New York: Harcourt, Brace, and World.

Cattell, Raymond. 1978. On the source of interrogative adverbs. *Language* 54. 61–77.

Djävrv, Kajsa. 2019. *Factive and assertive attitude reports*: University of Pennsylvania dissertation.

Ginzburg, Jonathan. 1995. Resolving questions. *Linguistics and Philosophy* 18. 459–527(Part I) and 567–609 (Part II).

Grimshaw, Jane. 1979. Complement selection and the lexicon. *Linguistic Inquiry* 10(2). 279–326.

Groenendijk, Jeroen & Martin Stokhof. 1984. *Studies on the Semantics of Questions and the Pragmatics of Answers*: University of Amsterdam dissertation.

Heim, Irene. 1992. Presupposition projection and the semantics of attitude verbs. *Journal of Semantics* 9. 183–221.

Karttunen, Lauri. 1977. Syntax and semantics of questions. *Linguistics and Philosophy* 1(1). 3–44. doi:10.1007/BF00351935.

King, Jeffrey C. 2002. Designating propositions. *The Philosophical Review* 111. 341–371.

Lahiri, Utpal. 2002. *Questions and Answers in Embedded Contexts*. Oxford Studies in Theoretical Linguistics.

Moltmann, Friederike. 2013. *Abstract Objects and the Semantics of Natural Language*. Oxford: Oxford University Press.

Pesetsky, David. 1982. *Paths and Categories*: Massachusetts Institute of Technology dissertation.

Pesetsky, David. 1991. Zero syntax: vol. 2: Infinitives. Ms., MIT.

Roberts, Thomas. 2021. *How to make believe: Inquisitiveness, veridicality, and evidentiality in belief reports*: University of California, Santa Cruz dissertation.

Roberts, Tom. 2018. Responsive predicates are question-embedding: Evidence from Estonian. In Uli Sauerland & Stephanie Solt (eds.), *Sinn und Bedeutung* 22, 271–288.

Uegaki, Wataru. 2016. Content nouns and the semantics of question-embedding. *Journal of Semantics* 33(4). 623–660.

Vendler, Zeno. 1972. *Res Cogitans: An Essay in Rational Psychology*. Cornell University Press. Ithaca, New York.