What embedded sentences do

The responsive puzzle

Tom Roberts

Utrecht University

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An issue from yesterday

Issue: *Wonder* and universal quantification

(1) a. John wonders [which party won the election.]
$[\![$which party won$]\!]$ = {Party A won, Party B won,...} = q
$\forall p \in q$: John has some attitude towards p

This template is not enough. Why?

Two issues from yesterday

Issue 2: Limitations on concealed questions

(2) a. I helped Joan cheat on her geography test by telling her [the capital of Vermont]. (**Available**: *what the capital of Vermont is*)

b. #I helped Joan find her way around New England by car by telling her [the capital of Vermont]. (**Unavailable**: *where the capital of Vermont is*)

Could this be because [the capital of Vermont] is a DP, and *where*-questions cannot be substituted by a DP?

(3) a. #Ann knows [the carburetor].

b. #Alex guessed [Kim's nose]. (Frana 2006)

c. #Max found out [Sam's brick]. (Barker 2016)

(4) a. Ann knows [the melting point of cesium].

b. Alex guessed [the winner of the election].

c. Max found out [Sam's true hair color].

Responsive predicates (ResPs): recap

(5) **Anti-rogatives**

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

(6) **Rogatives**

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

(7) **Responsives**

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

Which predicates are(n't) responsive?

Embedding behavior sensitive to some (fairly) robust semantic categories.

Some responsive predicates:

- Factive predicates, which presuppose the truth of a declarative complement
  - *know*, *regret*, *find out*, *be happy*, *be amazing*, *be surprised*, ...
- Saying predicates
  - *say*, *yell*, *tell*, ...
  - BUT: *ask*
- Relevance predicates
  - *be relevant*, *care*, *matter*, ...
- Prediction predicates
  - *guess*, *predict*, ...

Problems in a nutshell

- If declaratives and interrogatives are typewise distinct, how do we analyze responsive predicates?
- Can we connect the intuitive semantic classes of responsive predicates to their embedding behavior?
- Do responsive predicates combined different clause type complements have related meanings? What is that relation?

Establishing the hypothesis space

Option 1: q-to-p shifting

Idea: Shift meaning of ints to meaning of decls under ResPs, e.g. with left-periphery operators in the downstairs clause

(8) a. $[\![\text{true-ans}]\!] = \lambda q_{\langle st,t\rangle}.\iota p[p \in q \wedge p = 1]$
'given question q, returns the unique true answer to q'
(by assumption, q denotes a total partition of W)

b. $[\![\text{some-ans}]\!] = \lambda q_{\langle st,t\rangle}.\iota p \in q[p \in q \wedge \text{context'd}(p)]$
'given question q, returns some contextually determined answer to q'
(schematic, made-up notation)

Fact to be explained: Why anti-rogative predicates like *believe* cannot then embed interrogatives

$\Rightarrow$ Type-shifting needs to otherwise be constrained

Why shift *q* to *p*?

What does ResP + interrogative mean?

(9) [*Context: Gemma's secret admirer is Imogen*.]
Gemma knows/is happy/regrets who her secret admirer is.
∴ Gemma knows/is happy/regrets that her secret admirer is Imogen.

(10) [*Context: Gemma's secret admirer is Imogen in reality, but she mistakenly believes it is Lorelei.*]
#Gemma knows/is happy/regrets who her secret admirer is.

Tentative generalization: *know, be happy,...* + *Q* entails *know, be happy, ...* + the **true answer to** *Q*

Confound: *know*, *happy*, *regret* are all factive!

Reducing q to p

Spector & Egré (2015): This is not quite right. We need *an* answer, but not necessarily the true one.

(11) The receptionist told us what her name was. But she lied about her real name because she's in witness protection.

S&E's generalization:

(12) For any responsive predicate V, a sentence of the form $x\ V\ q$ with attitude holder x and question q is true iff $x\ V\ p$ is true for some $p \in q$. [*paraphrased, simplified*]

This suggests that the meaning of interrogatives embedded under ResP's can be interpreted propositionally $\Rightarrow$ a point in favor of q-to-p reduction

Uegaki & Roelofsen's generalization

A related generalization:

(13) P-TO-Q ENTAILMENT (Uegaki & Roelofsen 2021)
For a ResP predicate *V*, given a question *q*, if it is true that *x V p* for some answer *p* to *q*, it is also true that *x V q*

This is true for many predicates, but not universal:

(14) a. Ma mõtlen, et Aloysius tuli peole.
I MÕTLEMA that Aloysius came to.the.party
'I think that mõtlema came to the party.'

b. Ma mõtlen, kes tuli peole.
I MÕTLEMA who came to.the.party
'I wonder who came to the party.'
(**can be false if (a) is true)**

Mõtlema remains a problem for *q*-to-*p* accounts, since *mõtlema q* is not obviously reduced to some *mõtlema p*

Option 2: p-to-q shifting

Idea: Shift the meaning of interrogatives to the meaning of declaratives

(15) $[\![\text{p-to-q}]\!] = \lambda p_{st}.\{p\}$

Fact to be explained: Why rogative predicates like *wonder* cannot then embed declaratives.

Caveat: Not much to say here; this is functionally equivalent to just adopting Alternative Semantics, to be discussed shortly.

Option 3: No typewise distinction

Idea: Dispense with the assumption of type distinction to begin with

Denotation of declarative clause p: $\{p\}$
Denotation of interrogative clause q: $\{p_1, p_2, ..., p_n\}$

- Something we might want for independent reasons in our theory anyway
- Assumption of Alternative Semantics (Hamblin 1973, Groenendijk & Stokhof 1982) and Inquisitive Semantics (Ciardelli et al. 2018)
- Need additional explanation for existence of predicates that compose only with one type of clause (both rogatives & anti-rogatives)

A solution for uniform clauses

Perhaps anti-rogatives (*believe*) and rogatives (*wonder*) have additional meaning restrictions which rule out combining with the 'wrong' clause type

- Nothing wrong with *believe* and *wonder* composing with both clause types in terms of types; unacceptability comes from elsewhere

What links *wonder*, *investigate*, etc.? **ignorance/agnosticism**

(16) **Non-triviality presupposition of inquisitive verbs** (Uegaki 2016)
⟦wonder/ask/inquire⟧(q)(x) is defined iff the following proposition is compatible with x's beliefs: $\lambda w.\exists p \in q[p(w)] \wedge \exists p \in q[\neg p(w)]$
at least two possible answers to q are compatible with x's beliefs; x does not know answer to q

Does a presupposition link *believe*, *be true*, etc.? (Think about this for tomorrow.)

Option 4: Systematic ambiguity/polysemy

Another alternative: responsive predicates are *ambiguous*/*polysemous* between declarative and interrogative-embedding versions

- Polysemy: Two related senses of a word (*newspaper* as a building vs. an artifact)
- Ambiguity: Two unrelated senses which happen to have same form (*bank* as a side of a river vs. *bank* as a financial institution)

(17) a. $[\![\text{know}_{decl}]\!] = \lambda p_{st} \lambda x_e . \textbf{know}_1(p)(x)$

b. $[\![\text{know}_{int}]\!] = \lambda q_{\langle st,t \rangle} \lambda x_e . \textbf{know}_2(q)(x)$

- Polysemy more plausible than ambiguity: 'versions' of the CE predicate are clearly semantically related
- Theoretical feather-ruffling: why are they both *know*? Do we see a language that unambiguously lexicalizes this distinction?

Diagnosing polysemy

Zeugma test: two different senses of a word cannot be expressed with a single use of that word.

(18) #Nellie subscribes to and ran her pickup truck into the newspaper.

(19) Lucretia told me [that she was the murderer] and [which maids were her accomplices].

(20) *Context: Your computer won't turn on. You think the problem is the hard drive, but you aren't completely sure, so you take it to a repair shop. Later, you tell your friend:*

Ma mõtlen, et mu kõvaketas on katki ja kas nad saavad selle
I MÕTLEMA.1SG that my hard.disk is broken and Q they can.3PL it.GEN
korda.
fix.INF
'I think [that my HDD is broken]$_{\text{DEC}}$ and I wonder [if they can fix it]$_{\text{INT}}$.'

Conclusion: Two versions of ResP's are not likely to be polysemes

‘Twin relations’ theory

Middle ground from George (2011): ResP’s associated with two templatic lexicalized meaning postulates

- Intuition: *know* (etc.) can be understood as a conjunction of existential and universal quantifiers over propositions
- *know q* = ‘*x* knows some answer *p* to *q* and every answer *p* to *q* that *x* believes is true’

(21) a. $[\![\text{know}_{\exists}]\!] = \lambda p.\lambda x(\textbf{know}(p)(x))$

b. $[\![\text{know}_{\forall}]\!] = \lambda p.\lambda x(\textbf{believe}(p)(x) \rightarrow p)$

Twin relations in action

Proposal: all ResPs have these two meaning parts, combined templatically:

(22) a. $[\![\mathrm{R}_p]\!] = \lambda p.\lambda x.(R_\exists(p)(x) \wedge R_\forall(p)(x))$
'x has the $R_\exists$ and $R_\forall$ relations to p'

b. $[\![\mathrm{R}_q]\!] = \lambda q.\lambda x.(\forall p \in q[p \rightarrow R_\forall(p)(x)] \wedge \exists p' \in q[p' \wedge R_\exists(p')(x))])$
'x has the $R_\exists$ relation to some true answer to q and has the $R_\forall$ relation to every true answer to q'

- Not clearly polysemy per se, but requires multiple lexical entries for predicates
- Explanatory burden for ResP puzzle shifted onto explaining how the lexicon is structured
- Why do *know*, *forget*, etc. have two lexical entries, but *believe* and *wonder* do not?

Is responsivity lexical?

Thinking, believing, and hoping whether

Inferences like (23) seem robust:

(23) *Veronica thinks/hopes/believes/fears whether the Earth is flat.

Or do they?

(24)
a. I **fear whether** I'll have use of my arms/hands by age 55 or 60. (White 2021: ex. 25c))
b. With no word from Rockstar Games, fans are left **hoping whether** the highly awaited trailer will release as it was once rumored or if the rumors were unfounded.
c. I'm **thinking whether** I should break up with my deadbeat boyfriend.

Aspect and clausal embedding

Özyıldız (2021): *Think* is not exactly anti-rogative; it can embed interrogatives when interpreted as an activity (as opposed to a state).

(25)
a. Glenn thought that it was raining. ✓state, ✓activity
b. Glenn thought what to make for the cocktail party. *state, ✓activity
c. Glenn is thinking what to make for the cocktail party.
d. Glenn thinks what to make for the cocktail party.
(only has habitual/narrative reading)

⋆ Why is stative *think* allergic to embedded interrogatives? Does it illustrate a general pattern?

(26)
a. ??Fans hope whether the highly awaited trailer will release.
b. Fans are hoping whether the highly awaited trailer will release.

Summary

Several ways, in principle, to account for responsive predicates:

- Assume they invoke a type shifting operator to turn declarative meaning into interrogative meaning or vice versa
- Assume they are the default, and (anti-)rogative predicates have special semantic status that limits combinatorics
- Assume they are polysemous/ambiguous

Tomorrow: Digging into the lexical semantic patterns of clausal embedding