

Nothing’s wrong with believing (or hoping) whether*

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Abstract Theories of clause selection that aim to explain the distribution of interrogative and declarative complement clauses often take as a starting point that predicates like *think*, *believe*, *hope*, and *fear* are incompatible with interrogative complements. I give corpus evidence that this is not the case, thereby substantially weakening the generalizations these theories are founded on.

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1 Introduction

Some of the most well-developed theories of clause selection aim to explain the distribution of embedded interrogative and declarative clauses—specifically, which lexical properties condition whether a predicate takes only interrogative complements, only declarative complements, or both (Hintikka 1975, Karttunen 1977a, Zuber 1983, Berman 1991, Ginzburg 1995, Lahiri 2002, Egré 2008, George 2011, Uegaki 2015, Theiler et al. 2017, 2019, Elliott et al. 2017, White & Rawlins 2018a; but see Mayr 2018 and see Uegaki 2019 for broader background on interrogatives). A canonical contrast in this literature is that between predicates like *think*, *believe*, *hope*, and *fear*—which are often judged worse with interrogative complements than with declaratives (1a)—and *know*—which is often judged fine with both (1b).

- (1) a. Jo {thinks, believes, hopes, fears} (*whether) Bo left.
b. Jo knows (whether) Bo left.

This contrast, which is corroborated by experimental evidence (White & Rawlins 2016, White et al. 2018), forms the basis for various generalizations that authors then attempt to derive. Some of these generalizations concern whether all predicates in some class select both interrogatives and declaratives—i.e. are *responsive* (Lahiri 2002)—and others concern whether all predicates in some class select only declaratives—i.e. are *antirogative*. But most invoke properties that some subset of the predicates in (1a) have; and they do so in such a way that, insofar as these

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predicates are compatible with interrogative complements, these generalizations are substantially weakened.

Against this backdrop, I give corpus-based evidence that sentences like (1a) do not indicate a fundamental incompatibility between these embedding predicates and interrogative complements.¹ Following Egré (2008) and others, I focus on these predicates' compatibility with polar (specifically, *whether*) interrogatives, as their distribution appears to be more constrained than constituent interrogatives.

2 Thinking and believing whether

Egré (2008) proposes that a predicate *V* is responsive iff it is veridical—i.e. iff $X V S$ entails *S*.² *Think* is not veridical—(2a) does not entail (2b)—and thus it should not be responsive. And because it take declaratives, it should not take interrogatives.

- (2) a. Jo thinks Bo left.
b. Bo left.

Theiler et al. (2017, 2019), following Zuber (1983), propose a generalization with similar consequences: a predicate is antirogative if it is neg-raising—i.e. if one tends to infer from $X \text{ not } V S$ that $X V \text{ not } S$. *Think* is therefore also neg-raising—from (3a), one tends to infer (3b)—and thus it should not take interrogatives.

- (3) a. Jo doesn't think Bo left.
b. Jo thinks Bo didn't leave.

But *think* is certainly attested with interrogative complements in transcribed speech (4), periodical text (5), and internet text (6).

- (4) a. The image of having the members of one branch of government standing up[...]cheering and hollering while the court[...]has to sit there, expressionless[...]is very troubling. And it does cause you to **think whether** or not it makes sense for us to be there.
b. [...]the righteousness is unbelievable and people[...]will have to **think whether** they want four more years of that.
- (5) a. When Jan Brown completed her safety briefing for the passengers, she tried to **think whether** she had covered everything.
b. I'm trying to **think whether** I'd have been a star today or not.

1 All examples come from searches of the [Corpus of Contemporary American English \(COCA\)](#) and the [iWeb Corpus](#) and can be replicated using the query form [VERB] [WHETHER].

2 Egré attributes a similar generalization to Hintikka 1975—a predicate is responsive iff it is factive (see also Berman 1991, Ginzburg 1995). This generalization is not stated outright in that work—though it is a reasonable interpretation. It also predicts that *think* and *believe* are antirogative.

Nothing's wrong with believing (or hoping) whether

- (6) a. [O]ften, when listening to some other players (especially beginners) I start to **think whether** there's an unwritten law for guitarists to never play an interval bigger than the major third.
- b. [...]he wanted a domain that was memorable, brandable, keyword-rich, and relatively short. That's tough and he started to **think whether** it was worthwhile to look into other TLDs.

In at least a subset of these examples, one might attempt to save the generalizations by arguing that *think* is in fact veridical or is not in fact neg-raising in these contexts (see Spector & Egré's (2015) approach to predicates like *tell*). For example, *think* in (5a) might be paraphrased using *remember*, and *think* in (5b) might be paraphrased using *figure out*, both of which are neither veridical nor neg-raising. But with respect to veridicality, this move is somewhat suspect for (4) and (6), wherein reasonable paraphrases seem to involve the predicate *consider*. Now, *consider that* may well have a veridical sense—roughly, *consider the fact*, in contrast to *consider the possibility*—but that sense does not appear to be the one active in at least (4b), wherein the speaker seems to be encouraging consideration of a possible desire.

These examples may be less problematic for the neg-raising generalization, since proponents might argue that *think* is not neg-raising in (4)-(6). An example of this sort of argument is laid out by Theiler et al. (2019) for *believe*, which is normally taken to be a neg-raising predicate. They point out (fn. 11) that *believe* can take interrogative complements in certain constructions (7), and when it does, they argue that it is not neg-raising on the basis that strong negative polarity items (strong NPIs; Zwarts 1998), like *in ages*, cannot occur in the complement (Gajewski 2007).

- (7) You won't believe who called (*in ages)!

This argument has the downside that it requires one to posit that *believe* is ambiguous between a neg-raising and non-neg-raising variant, but it has some support from the fact that converting the interrogative to a declarative does not yield a sentence that supports the neg-raising interpretation.

- (8) *You won't believe that Mary called in ages!

I take this interrogative-to-declarative test to be a somewhat clearer reflection of whether a neg-raising predicate has a non-neg-raising variant, since it hews closer to the standard definition of neg-raising in terms of declarative complements.

Applying this test to corpus examples like (9), one finds that there are contexts where both *think whether* and neg-raising *think* are possible: the strong NPI *until Jo got back from lunch* is fine in (10).

- (9) I was **thinking whether** there was a way to[...]help more than one person.

- (10) I wasn't thinking there was a way to help more than one person (at a time) until Jo got back from lunch.

This form of argument is slippery, since the *think* in (9) still might be a different *think* from the one in (10); but such a polysemy is otherwise unmotivated, unless one aims to analyze other responsive predicates, like *know*, as similarly polysemous—e.g. as in George 2011 (see also Karttunen 1977a, Nathan 2006). I take this to be a reasonable line, but it importantly presupposes that *think* is indeed responsive and that its account is analogous to the account of non-neg-raising predicates.

Of course, to posit a regular polysemy of this form, it would be necessary to see other predicates showing similar behavior. *Believe* is such a predicate. It certainly is compatible with interrogative complements—seen in (7) and corroborated by (11).

- (11) a. [...]I didn't believe the Bible growing up, I wasn't a Christian growing up, I struggled to **believe whether** I could trust the Scriptures[...]
 b. We can choose to **believe whether** the word of God is true[...]or not.
 c. I am torn between **believing whether** or not Jagex can detect the RSBot client.

But unlike (7), at least some of these examples pass the interrogative-to-declarative test. For instance, in the context of (12a), the strong NPI *either* in (12b)—analogous to (11b)—is clearly good.

- (12) a. We can choose not to believe the teachings of the Buddha are true.
 b. We can choose not to believe the word of God is true either.

One property that all of the sentences in (11) share is that, in context, they apparently do not trigger an opinionatedness inference (Bartsch 1973, Gajewski 2007)—i.e. in at least (11b) and (11c), the opinionatedness inference does not go through. This inference is implicated in the derivation of the neg-raising inference in some approaches, and so this fact could then be used to save the generalization by denying that the conditions for neg-raising are met in these contexts. But this move already substantially weakens the predictive power of the relevant generalization, and it is furthermore not possible for all sentences, such as (13).

- (13) **Believing whether** certain individuals within Washington D.C. had an MCA policy is not the same as proving there was such a policy.

Here, it is presupposed that someone has an opinion and then asserted that having said opinion is not the same as proving that opinion to be true. This example also provides a nice argument against the veridicality generalization, since it draws a contrast between the nonveridicality of *believe* and the veridicality of *prove*.

Nothing's wrong with believing (or hoping) whether

3 Hoping and fearing whether

The responsiveness of *think* and *believe* is irrelevant for generalizations focused on preferential predicates, such as *hope* and *fear*. One such generalization is proposed by Uegaki & Sudo (2019): a predicate *V* is antirogative if it is nonveridical and preferential—i.e. if focus in the scope of the predicate has a truth conditional effect. *Hope* and *fear* are not veridical—(14a) does not entail (14b)—but they are preferential under this definition—e.g. a change in the focus structure of *hope*'s complement clause results in a truth conditional effect (15)—and thus they should be incompatible with interrogative complements.

- (14) a. Jo {hopes, fears} Bo left.
b. Bo left.
- (15) *Natasha does not like to teach logic, and prefers to teach syntax, but she is not allowed to teach both. This year, it is likely that she needs to teach logic, and if so, she prefers to do so in the morning, as she prefers to have all her teaching in the morning.* (Uegaki & Sudo's Ex. 11)
- a. Natasha hopes that she'll teach logic in the MORning. TRUE
b. Natasha hopes that she'll teach LOGic in the morning. FALSE

This incompatibility is not borne out: *hope* is attested with interrogative complements in both speech transcripts (16) and internet text (17).³

- (16) This Trump/Carson boom really has people like Bush, Walker, Rubio, and others wondering and **hoping whether** history will repeat itself and whether Republicans will return back to focusing on the establishment choices but it's all about outsider candidates right now.
- (17) a. I was **hoping whether** you are able to guide me[...]
b. I have done a quite a bit of research on using a Limited Co but was **hoping whether** someone with more experience could confirm my understanding of a few points[...]

A potential worry with at least the sentences in (17) is that they seem paraphrasable using *hope that*—evoking Karttunen's (1977b) observation that declarative and polar interrogative complements appear interchangeable for responsivenesses like *doubt*.

- (18) Jo doubts that Bo left. \approx Jo doubts whether Bo left.

³ I was unable to find examples in periodical text, though I suspect this has to do with the lower frequency of *hope* compared to *think* as well as the small size of the COCA periodicals corpus.

While this may be, it cannot be because the interrogative is somehow different from the interrogative found under other predicates: note that, in (16), *hope* is coordinated with *wonder*, which is standardly taken to be an interrogative-selecting predicate. Thus, even if one argues that *hope that* and *hope whether* are in some sense interchangeable, this explanation cannot presume that this is due to the interrogative embedded under *hope* having a distinct semantics.

Similar examples can be found for *fear*.

- (19)
- a. Interstellar space is so vast that there is no need to **fear whether** stars in the Andromeda galaxy will accidentally slam into the Sun.
 - b. I **fear whether** this test would run safely on the oxygen sensor as it has a lot of drawback when compared with the others.
 - c. [...]I **fear whether** I'll have use of my arms/hands by age 55 or 60.
 - d. I know parents who seriously **fear whether** their children will ever hold a meaningful job.

And while examples like (19a) might fall under the system Mayr (2018) proposes—tying interrogative embedding for some predicates, like *be certain*, to downward entailing contexts—this move is not available for at least (19b)-(19d).

4 Conclusion

The proposals discussed here pursue the laudable goal of associating selection with independently motivated lexical properties, such as veridicality, neg-raising, and preferentiality. This means that the generalizations on which these proposals rest are predictive and thus falsifiable. The data presented here place all of them in jeopardy of falsification; but this does not mean that the goal of explaining clause selection as a function of semantic selection (Grimshaw 1979) should be abandoned, as Mayr (2018) argues. Rather, I suggest that a reorientation is necessary. Instead of searching for lexical properties that are only defined for clause-embedding predicates—as much prior work has done—I suggest, following White & Rawlins (2018a,b), that it is more fruitful to search for lexical properties that all predicates are defined for—thus, potentially enabling a unified theory of semantic selection across the entire lexicon. A natural place to look are event structural properties—such as stativity, durativity, and telicity—which have long shown promise in explaining nominal selection (see Levin & Rappaport Hovav 2005 and references therein) and which have shown initial promise in explaining clause selection (White & Rawlins 2018a,b; see also Elliott et al. 2017). Such a reorientation would not only serve to deepen the theory of the semantics of embedded clauses but also to further reveal the analogies between clausal and nominal semantics (Kratzer 2006, Moulton 2009, Bogal-Allbritten 2016).

Nothing's wrong with believing (or hoping) whether

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