

A source-based ambiguity for *believe*¹

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Abstract. I propose that the English propositional attitude verb *believe* shows an ambiguity that is based on whether or not its meaning implicitly involves the presupposition of a source for the belief. The posited ambiguity is inspired by recent accounts (Roberts, 2021; Djärv, 2023) that propose a semantics for the optional overt source argument that can co-occur with *believe*. Roberts (2021) proposes that the lexical entry for *believe* includes an argument slot for a source, but the argument slot may be covertly existentially closed. Djärv (2023) argues that the source is introduced by an optional covert functional head. I propose a synthesis of the two accounts. Specifically, I propose that sources are introduced by an optional functional head as in Djärv (2023), but that when present the optional head can be covertly saturated, like in Roberts (2021). This means that even when there is no overt source, there can still be a source-based ambiguity in *believe*. Evidence is presented from the interaction of *believe* with propositional anaphors, neg-raising and negative polarity items.

Keywords: belief, source, neg-raising, propositional anaphora.

1. Introduction

I propose that the English propositional attitude verb *believe* shows an ambiguity that is based on whether or not its meaning implicitly involves the presupposition of a source for the belief. The posited ambiguity is inspired by recent accounts (Roberts, 2021; Djärv, 2023) that propose a semantics for the optional overt source argument that can co-occur with *believe*. Roberts (2021) proposes that the lexical entry for *believe* includes an argument slot for a source, but the argument slot may be covertly existentially closed. Djärv (2023) argues that the source is introduced by an optional covert functional head. I propose a synthesis of the two accounts. Specifically, I propose that sources are introduced by an optional functional head as in Djärv (2023), but that when present the optional head can be covertly saturated, like in Roberts (2021). This means that even when there is no overt source, there can still be a source-based ambiguity in *believe*. Evidence is presented from the interaction of *believe* with propositional anaphors, neg-raising and negative polarity items.

2. The argument structure of *believe*

In English, the attitude verb *believe* is compatible with a number of complement structures. First, *believe* can embed declarative clauses, both finite and non-finite. In the non-finite case, ECM is possible, though a PRO subject is not.

- (1) a. I believe that there will be a storm.
- b. I believe them to be students.
- c. *I believe PRO to be attractive.

In addition, *believe* is compatible with a single nominal complement. On first inspection, there

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are two kinds of nominals that can serve as complements. The first kind denotes an intentional entity, like a claim, that is in part composed of propositional content. The second kind is an individual that is not composed of propositional content but can be associated with propositions through its actions, like assertion.

- (2) a. Mary believes the report/the story/the lie.
- b. Mary believes Fred/the president/the committee.
- c. #Mary believes the tree/Antarctica/a circle.

Importantly, *believe* can co-occur with both a nominal and a finite clausal component. The nominal can be of either kind mentioned above. A non-finite clause complement may not co-occur with a nominal complement.

- (3) a. Mary believes the report that there will be a storm.
- b. Mary believes Fred that there will be a storm.

- (4) *Mary believes Fred them to be students.

In the case of (3b), it is clear that the nominal and the clause do not form a constituent. At the very least, they cannot dislocate together. Note, however, that in the presence of the nominal, the otherwise mobile clause cannot dislocate.

- (5) a. That there will be a storm, Mary believes.
- b. There there will be a storm is widely believed.
- (6) a. *Fred that there will be a storm, Mary believes.
- b. *Fred that there will be a storm is widely believed.
- (7) a. *That there will be a storm, Mary believes Fred.
- b. *That there will be a storm is widely believed Fred.
- (8) Fred/The report is widely believed (?that there will be a storm).

By contrast, in the case of (3a), the constituency is unclear. The nominal *report* can be modified by the following CP and the two can move together.

- (9) a. The report that there will be a storm, Mary believes.
- b. The report that there will be a storm is widely believed.

This suggests that (3a) can have two different structures: one analogous to (2a) with a single nominal complement and one analogous to (3b) with a nominal followed by a separate clausal constituent.

- (10) Mary believes the report that there will be a storm
- a. Mary believes [_{DP}the report] [_{CP}that there will be a storm.]
- b. Mary believes [_{DP}the report [_{CP}that there will be a storm.]]

The first constituency is supported by cases of proper names referring to contentful objects. Importantly, the Mueller Report contains many assertions unrelated to Comey.

(11) Mary believes the Mueller Report that Comey was fired improperly.

(12) *The Mueller Report that Comey was fired improperly is widely believed.

Another potential support for this constituency would be a pronoun occurring in the position before the clause. Unfortunately, I find these somewhat degraded.

(13) Mary showed me the secret report_{*i*}.

a. I believed it_{*i*}.

b. ?I believed it_{*i*} that there had been a crime committed.

Below, we will revisit the question of whether there is a true distinction between the two types of nouns in (2). For now, note that in English the two cannot occur.

(14) a. *Mary believed Bill the report.

b. *Mary believed the report Bill.

3. Previous accounts

There are two recent insightful analyses of the ability of *believe* to take both a nominal and a finite clausal complement together: Djärv (2019, 2023) and Roberts (2021).

3.1. Djärv 2019, 2023

Djärv's account is based on the idea that when a nominal and a clausal complement co-occur with *believe*, the nominal is introduced by an optional functional head that is modeled on the low source applicative head as proposed in Pylkkänen (2008). On Pylkkänen's view, the low applicative head occurs below the main verb and directly relates the indirect and direct objects. The relation predicated of two objects is that the direct object has been transferred to the possession of the indirect object.

(15) a. Mary gave Fred the book.

b. Mary gave [_{AppIP} [_{DP} Fred] Appl^o [_{DP} the book]]

c. $\llbracket \text{Appl}^o \rrbracket = \lambda x. \lambda y. \lambda F. \lambda e. F(e, x) \wedge \text{Theme}(e) = x \wedge \text{TO-THE-POSSESSION-OF}(x, y)$
Pylkkänen (2008)

Analogously, Djärv (2019, 2023) proposes that there is a head that introduces the nominal argument of *believe* and directly relates it to the proposition denoted by the clause. Djärv dubs this head *Asst*, for reasons we will make clear in a moment.

(16) Mary believes [Fred *Asst*^o [that there will be a storm]]

Djärv argues that the relation that *Asst* predicates of the object and the proposition is similar to the relation contributed by a low source applicative. English does not have source applicatives, but other languages like German do:

- (17) Sie stahl ihr den Schlüssel
 She stole him the key
 ‘She stole the key from him.’

In this construction, the indirect object is the source of the direct object. In a similar way, the nominal object that precedes the clausal complement appears to be the ‘source’ of the proposition. Djärv (2023) analyzes the sense in which the nominal is the source for the clause in the following terms. *Asst* presupposes that the nominal denotes an individual who has asserted the proposition denoted by the clause.

- (18) $\llbracket \text{Asst}^\circ \rrbracket = \lambda p_{\langle s,t \rangle} . \lambda x_e . \lambda F_{\langle \langle s,t \rangle, \langle e,t \rangle \rangle} : \exists e [\text{Assert}(e) \wedge \text{Agent}(e)=x \wedge \text{Goal}(e) = c \cap p] . F(p)$
 Djärv (2019, 2023)

The claim that the content of *Asst* is presuppositional is supported by its projection through negation and questions.

- (19) a. Mary doesn’t believe Fred that there will be a storm.
 b. Does Mary believe Fred that there will be a storm?

A consequence of Djärv’s account is that the denotation of the indirect object must be able to serve as the agent of an assertion event. On the face of it, this would be problematic for inanimate nominals like *the report*. However, as Djärv observes, following Anand and Hacquard (2009), inanimate nominals that denote repositories of information can serve as the subject of speech act verbs in English.

- (20) The report says/claims/argues that the law was violated.

3.2. Roberts 2021

Roberts (2021) presents an alternative view of the argument structure of *believe*. Roberts departs from Djärv on a few points. First, empirically, Roberts argues that a broader range of nominals can occupy the indirect object position of *believe*. Specifically, Roberts argues that the indirect object must denote a contentful object or an agent capable of making a contentful assertion. Crucially for Roberts, not all contentful objects make assertions. Consider photographs, which Roberts calls depictive artifacts.

- (21) The jury believed the photograph that the defendant is guilty. (Roberts, 2021)

- (22) #The photograph said/claimed/argued that the defendant was guilty.

I will just note here that I find (21) degraded.

Roberts (2021) further departs from Djärv (2023) in arguing that there is a semantically specified connection between the subjects belief and the contentful object. Note that in Djärv’s entry (18), no mention is made in the presupposition of the subject or the subject’s belief in *p*. So, in principle, it is compatible with Djärv’s semantics that the subject is in no way acquainted with the indirect object or the indirect object’s assertion.

- (23) *Context: Bill has said that there will be a storm tomorrow. Mary is not acquainted with Bill, nor does she know that he has asserted this. Mary happens to also believe that there will be a storm.*
 #Mary believes Bill that there will be a storm tomorrow.

In scenario like (23), the best we can say is that Mary agrees with Bill, but not apparently that she believes him. Roberts (2021) presents the related context below in which the subject is acquainted with the indirect object('s assertion) but already had a prior belief.

- (24) *Context: Mordecai tells John that Mary left, but John already knew that.*
 #John believes Mordecai that Mary left.

On the basis of these observations, Roberts (2021) presents an alternative account. These are the main features of the account: (i) The lexical entry of *believe* always includes an argument slot for the source - in contrast to Djärv's optional functional head. (ii) The only semantic requirement on the source is that it must be contentful object. (iii) The presupposition about the source relates it directly to the subject and the subject's beliefs.

I reproduce Robert's lexical entry for *believe* below. The truth conditions say simply that the subject believes the embedded clause. Informally, the presupposition says that (i) the subject is acquainted with the indirect object, (ii) the content of the indirect object is the embedded clause and (iii) if the subject weren't acquainted with the indirect object, the subject would not believe the embedded clause. Roberts uses Inquisitive Semantics, so the embedded clause denotes a downward closed set of sets of worlds (type T). $AcQ(x)(y)$ means that x is acquainted with y . $CONT$ is a function from contentful objects (in $D_c \subset D_e$) to (downward closed) propositions. Finally Roberts encodes the connection between the object and subject's beliefs through a counterfactual in the style of Lewis and Kratzer.

- (25) $\llbracket \text{believe} \rrbracket^w = \lambda y_c. \lambda p_T. \lambda x_e. DOX_x^w \in p$
 defined if
- $DOX_x^w \in p \vee DOX_x^w \in \neg p$ Excluded Middle
 - $AcQ_w(x)(y)$ Acquaintance
 - $CONT_w(y) \in p$
 - $\forall u [u \in \max_{w, \leq} (\{v: \neg AcQ_v(x)(y)\})] DOX_x^u \notin p$ Causal dependence
(Roberts, 2021)

This lexical entry is not compatible with indirect objects, like Fred, that do not denote contentful objects. To address this, Roberts (2021) introduces a type shifter *CLAIM* that maps agents to salient assertions they have made. So, Roberts analyzes sentences (26a) as implicitly being (26b).

- (26) a. Mary believes Fred that there will be a storm.
 b. Mary believes Fred's claim that there will be a storm.

Given that Roberts includes the source in the basic lexical entry, he must explain sentences that lack an overt indirect object. Roberts claims that these are cases of indefinite object drop and that the source argument slot is simply existentially closed. Djärv (2023) has argued that when an indirect object is absent there is no presupposition of an assertion of the embedded clause.

On the contrary, Roberts (2021) argues that his semantics is compatible with this evidence. His semantics does not presuppose an assertion, but only a contentful object the subject is acquainted with. Roberts argues that this is semantically innocent and amounts merely to a presupposition that the subject has evidence for their belief. Roberts says this is so because contentful objects may range over not only reports and photos, but ‘perhaps also smells from the kitchen’ (Roberts, 2021: p.141).

At the same time, Roberts acknowledges (p.143) that *smells from the kitchen* cannot serve as an overt indirect object.

(27) #Mary believes the smells from the kitchen that Jack is home.

I think it may be sufficient if the embedded clause is an assertion of the indirect object and the subject’s belief is dependent on that assertion though the subject is unaware of this.

(28) Context: Mary read that $e = mc^2$ in a textbook and believes it. She has never heard of Einstein and is unfamiliar with his publications.
Mary believes Einstein that $e = mc^2$.

3.3. Discussion

I believe that both accounts have pros and cons and propose to formulate a synthesis of the two. I agree with Djärv’s characterization of the class of DPs that can serve as indirect objects. They track well with those DPs that can serve as the subjects of speech act verbs. Thus, I reject Robert’s claim that the class of contentful objects can fill this slot. One possible argument in favor of this view is that there are DPs that can serve as agents of speech act verbs and as sources, but do not as subjects of copular sentences with clausal predicates. This class of DPs is the set of media artifacts.

(29) a. I believe this book that birds are dinosaurs.
b. The book says that birds are dinosaurs,
c. The claim/*book is that birds are dinosaurs

Such copular sentences are one way to diagnose contentful objects, though see Rawlins (2013) for a broader view. Along with that, I must then side with Djärv that the presupposition associated with the source need not be present when there is no overt indirect object. On the other hand, I agree with Roberts that the lack of a semantic connection between the source’s assertion and the subject’s belief is a defect of Djärv’s account.

From Roberts, however, I adopt the idea that the source can be implicit. Though Roberts argues that the implicit source must be existentially closed, I will countenance the possibility that it is covert but anaphoric.

4. Evidence of ambiguity

In this section, I present evidence for an ambiguity in the semantics of *believe* that is based on whether or not a source is implied. Evidence comes from the ways in which the meaning and

use of *believe* interacts with propositional anaphors, neg-raising and NPIs.

4.1. Propositional anaphors

Believe is unique among attitude verbs in English in allowing both pronouns and *so* in propositional anaphora. As frequently observed, there are differences in the environments in which each is acceptable.

- (30) Otto said there will be a storm tomorrow.
 a. And he really believes it.
 b. He really believes so.

- (31) a. *And he really thinks it.
 b. He really thinks so.

- (32) a. And Fred knows it.
 b. *And Fred knows so.

In particular, it has been observed that there is a distinction in the use of *believe* combined with *so* compared to *believe* combined with *it*. Cushing (1972) argues that the follow up to (33) with *so* indicates that Carol simply has ‘a certain opinion or disposition,’ but that the follow up with *it* indicates that Carol is ‘taking a position on Paul’s opinion.’ I note that the latter case corresponds closely to the continuation in (33c) with a source object referring to Paul.

- (33) Paul_i thinks that complementation is partly semantic. And
 a. Carol believes so, too.
 b. Carol believes it, (too). Cushing (1972)
 c. Carol believes him_i.

On the basis of such observations, Lindholm (1969) argues that *believe* is ambiguous between meaning ‘have the opinion that’ and ‘accept the claim that’. Cushing built on Lindholm’s suggestion and proposed that there was a formal feature [$\pm$ stance] that distinguished between predicates. He further argued that *believe* could take either value. On the [+stance] value, it corresponded to Lindholm’s ‘accept the claim’ and, on the [-stance] value, to ‘have the opinion.’ He then claimed that *so* is only compatible with the [-stance] value and *it* with the [+stance] value.

Notice that *believe so* and *believe it* also behave differently in response to (embedded) yes/no questions (Cushing, 1972; Needham, 2012; Meijer, 2022).

- (34) Q: Will there be a storm tomorrow?
 A: I believe so/*it/*you

- (35) George asked me whether deep structure exists. And I said
 a. *I believed it.
 b. I believed so. (Cushing, 1972)
 c. *I believed him (that it does).

This makes sense if something like the Lindholm/Cushing view is correct. A question does not make a claim about its main clause. Thus, a respondent is not in position to accept a claim. I will suggest that this ambiguity is best analyzed in terms of the presence vs. absence of the source introducing head. The simplest support for this view would be to see which anaphor form is used when an overt source is present. Unfortunately, for reasons that remain unclear, neither form is acceptable. When a source is present, the anaphor to a previous proposition must be unpronounced, (36). This is especially surprising given that *believe* does not generally allow a null complement, (37).

(36) George said he would go snowboarding, and Martha said she would, too.
I believe Martha *(so/it).

(37) George said there will be a snowstorm #and I believe.

We can hypothesize that for some reason Src can license one null argument, either the source or the proposition, but cannot license two.

4.2. Neg-raising and NPIs

It is well known that *believe* participates in the neg-raising phenomenon. When *believe* is negated while embedding a full tensed clause that denotes a proposition *p*, the sentence can be interpreted as claiming that the subject believes the negation of *p*.

(38) a. I don't believe that there will be a snowstorm.
b. I believe there will **not** be a snowstorm.

An influential view on neg-raising suggests that the lower clause understanding of negation arises from an assumption of the Excluded Middle (Bartsch, 1973). This can be seen as an assumption that the subject is opinionated about the embedded clause.

(39) a. I don't believe that there will be a snowstorm.
b. Excluded Middle: I believe there will be a storm OR I believe there will not be a storm.
c. ∴ I believe there will **not** be a snowstorm.

The neg-raised reading is typically regarded as optional. The high negation may only signal negation of the embedding predicate. How this ambiguity is allowed for depends on how one implements the neg-raising inference. On views that treat neg-raising as resulting from a presupposition (Gajewski, 2005, 2007), the non-neg-raised reading comes about through cancellation of the presupposition. On views that treat neg-raising as implicature-based (Romoli, 2013), the ambiguity arises from the common defeasibility of implicatures. Though see Jeretič (2022) for a view that some NR-related implicatures are obligatory. The non-neg-raised reading can be brought out with a continuation asserting the subject's lack of an opinion, as in (40).

(40) I don't believe that there will be a snow storm. I have no opinion.

The non-neg-raised reading can be supported by narrow focus on negation or the attitude verb.

These may indicate that the context involves a QUD that includes the high negation proposition as an answer.

The neg-raised reading is typically diagnosed with the presence of strict NPIs such as *in years*, *either*, punctual *until* or *stop at anything* (Lakoff, 1969). Only neg-raising predicates can license these NPIs in an embedded clause with a higher clause negation; and they only license these NPIs on their neg-raised reading.

- (41) a. I don't believe that there has been a storm here in years.
b. *I didn't say that there has been a storm here in years.
- (42) a. I don't think he will stop at anything to get out of here.
b. *I'm not certain that he will stop at anything to get out of here.

Lindholm (1969) argued that the neg-raised and non-neg-raised readings of *believe* could be controlled for with the propositional anaphors discussed in the previous section. In particular, he argued that *it* was incompatible with the application of neg-raising, cf. (43b).

- (43) a. Bill believes that John won't come until later and I don't believe so, either.
b. *Bill believes that John won't come until later and I don't believe it, either.
- Lindholm (1969)

4.2.1. Overt sources block neg-raising

I observe here that adding an overt source to *believe* blocks neg-raising inferences. By this I mean that it is clearly the case that the negated belief sentence with a source in (44) does not entail the corresponding sentence with the negation displaced into the lower clause (44b).

- (44) I don't believe Tim that there will be a snowstorm.
a. $\Rightarrow$ I don't believe Tim.
b. $\Rightarrow$ I believe Tim that there will **not** be a snowstorm.

The lack of neg-raising is confirmed by the impossibility of strict NPIs when there is an overt source with a negated instance of *believe*.

- (45) a. *I don't believe Tim that there has been a snowstorm in years.
b. *I don't believe Tim that Sue will stop at anything to get out.

I will argue that the presence vs. absence of the source introducing head is one source of the non-neg-raising reading of *believe*, although there may be other sources as well.

4.2.2. Neg-raising in the attitude component

A question remains about whether there might still be neg-raising in a limited sense with respect to the complement clause. In particular, one might wonder whether (46a) entails (46b).

- (46) a. I don't believe Tim that there will be a snowstorm tomorrow.
b. I believe there won't be a snow storm tomorrow.

A few pieces of evidence appear to suggest that this is not the case. The first piece of evidence concerns the possibility of an anaphor referring back to the negation of the embedded clause. Lindholm (1969) observes that the the pronoun *it* can pick up the negation of the clause embedded under a negated neg-raising predicate in the prior sentence. This suggests that negated neg-raising predicates make a discourse referent available for the negation of the proposition denoted by their embedded clause. See for an analysis.

- (47) I don't think Bill paid his taxes and Mary is quite sure of it.
'Mary is quite sure that Bill did **not** pay his taxes.'

This kind of anaphora appears to be much more difficult when the negation of *believe* is accompanied by an overt source DP.

- (48) I don't believe Sue that Bill paid his taxes. And Mary is quite sure of it.
'Mary is quite sure that Bill did **not** pay his taxes.'

The second piece of evidence comes from discourses in which a speaker is weighing two distinct sources for a single proposition. It seems perfectly consistent to assert both of the statements in (49).

- (49) a. I don't believe Otto that there will be a snowstorm.
b. But I believe NOAA (that there will be a snowstorm).

These two sentences merely indicate which source the speaker considers a reliable basis for their belief in the embedded proposition. This certainly shows that it is easy to access a non-neg-raised meaning, but may not mean a neg-raised reading is not available.

5. Analysis

In this section, I present my analysis of the phenomena discussed in the previous section: the contrast in pragmatics associated with different propositional anaphors and the incompatibility of neg-raising and strict NPI licensing with sources. I begin by sketching the synthesis of Djärv (2023) and Roberts (2021) informally suggested in Section 3.

5.1. Sources

I will follow Djärv (2023) in assuming that sources are introduced by a functional head. I follow both Djärv (2023) and Roberts (2021) in assuming that the contribution of the source is presuppositional. I will adopt the relatively standard semantics for *believe* in (50) which incorporates an excluded middle presupposition. On this view, attitude verbs are relations between individuals and propositions. Embedded clauses denote propositions as in (51).

- (50) a. $\llbracket \text{believe} \rrbracket^w(p)(x)$ is defined only if $\text{Dox}_x^w \subseteq p \vee \text{Dox}_x^w \subseteq \bar{p}$
b. When defined,
 $\llbracket \text{believe} \rrbracket^w(p)(x) = 1$ iff $\text{Dox}_x^w \subseteq p$

- (51) $\llbracket \text{that there will be a snow storm} \rrbracket^w = \lambda u. \text{there will be a storm in } u$

Given these assumptions, the source introducing head, which I will call Src, must take a number of arguments. First, it takes the complement proposition, then the source individual, then the (intension of the) attitude verb and finally the subject of the attitude verb. Though its meaning references more arguments directly, Src is still the same type that Djärv attributes to it (modulo the intensionalization of the third argument). Src's presupposition says that there is an event *e* of the source individual *y* asserting that *p* and that the subject *x* is acquainted with *e* and that *x*'s attitude *F* toward *p* depends on *e*. Its assertion simply says that *x* holds the attitude *F* in *w* towards *p*.

- (52) a. $\llbracket \text{Src} \rrbracket^w = (p)(y)(F_{\langle s, \langle st, et \rangle \rangle})(x)$ is defined only if
 $\exists e[\text{Assert}_w(e, y, p) \wedge \text{Acq}_w(x, e) \wedge \text{Dep}_w(x, F, p, e)]$
 b. When defined,
 $\llbracket \text{Src} \rrbracket^w = (p)(y)(F_{\langle s, \langle st, et \rangle \rangle})(x) = 1$ iff $F(w)(p)(x) = 1$

We can analyze the dependence predicate further in the manner of Roberts (2021) saying that *x*'s attitude *F* in *w* toward *p* depends on *e* if and only if for every world *u* maximally similar to *w* such that *x* is not acquainted in *u* with *e*, *x* doesn't hold attitude *F* in *u* toward *p*.

- (53) $\text{Dep}_w(x, F, p, e)$ iff
 $\forall u[u \in \max_{w, \leq} \{ v : \neg \text{Acq}_v(x, e) \}] : F(u)(p)(x) \neq 1$

Here I assume that a single event can exist across possible and that by default event descriptions transfer across worlds, cf. Hacquard (2010)

This semantics for the head Src can be inserted by hypothesis into the structures below, where $\emptyset$ represents an implicit anaphoric argument.

- (54) Available Structures
- | | |
|---|----------------------------|
| a. believe CP | No source |
| b. believe [DP [Src CP]] | Overt DP source |
| c. believe [$\emptyset_i$ [Src CP]] | Covert source |
| d. believe [DP [Src $\emptyset_i$]] | DP source w/ covert clause |
| e. *believe [$\emptyset_i$ [Src $\emptyset_j$]] | *covert source and clause |

These structures correspond to the following sentences.

- (55) a. I believe that there will be a storm.
 b. I believe Tim that there will be a storm.
 c. I believe $\emptyset_i$ that there will be a storm.
 d. I believe Tim $\emptyset_i$.
 e. *I believe.

5.2. Analysis of propositional anaphors

My account of the contrasts in the use of propositional anaphors with *believe* involves three assumptions. First, I assume that the pronoun *it* can be a true pro-CP that denotes a proposition, while *so* is a polarity operator that marks the edge of an elided clause, cf. Kramer and Rawlins

(2009), Gajewski (2025, 2026). Second, I assume that *so* and the source head Src cannot occur in the same structure. There are several reasons why this might be so. For example, the source head Src could be viewed as part of the left periphery of the embedded clause. It would be natural to associate Src with the JP in Krifka's 2023 analysis of the extended projections of the left periphery. For Krifka, JP is the locus of epistemic modality and evidentiality. Perhaps the position of *so* at the left edge interferes with the licensing of the DP in the Spec of SrcP by the verb. Finally, I assume that the structures with *believe* and Src compete with the the structures with *believe* without Src. Since Src is purely presuppositional, the competition is mediated by Maximize Presupposition (Heim, 1991).

Consider a context like the one established by the sentence below.

(56) George_i said [that deep structure exists]_j.

This sentence entails that there has been an event of assertion and that George is the agent of that event and that the content of the event is that deep structure exists. If it is reasonable to assume that Paul is acquainted with this event of assertion and that the event caused Paul to believe that deep structure exists, then the presupposition of Src is met and it must therefore be inserted.

- (57) a. Paul believes [$\emptyset_i$ Src [_{CP} it_j]]
 b. Paul believes [him_i Src [_{CP} $\emptyset_j$]]

The use of *so*, on the other hand, triggers an implication characteristic of Maximize Presupposition interactions. In particular, using *so* in the context of a sentence like (56) implies that the presupposition of Src is not met. Since (56) clearly indicates a relevant assertion has been made, the only way the presupposition could fail is either that Paul is not acquainted with George's assertion or that Paul's belief is independent of George's assertion.

(58) Paul believes [so [~~deep structure exists~~]] (too)

This seems a reasonable approach to the facts discussed in (33). Now consider again the contexts involving questions.

(59) Will there be a snowstorm tomorrow?

One thing is clear. Posing a question alone does not meet the presupposition of Src. A question is not an assertion. So, nothing blocks the use of *so* as the anaphoric form here. That is to say, Maximize Presupposition does not come into effect since Src is not felicitous. This, however, does not in itself block the use of *it*.

- (60) a. I believe so.
 b. #I believe it.

There are two avenues to explore. One path is to stipulate that there is a preference for *so* when the presupposition of Src is not met. The other is to suggest that *believe* cannot license the pronoun *it* by itself but must do it through the head Src.

It is worth pointing out that we find the opposite pattern with imperatives. In the discourse below, A poses a question about a proposition *p*. This indicates A's ignorance and lack of a

reliable source for *p* (or not-*p*). Since A posed their question to B, B is positioned as a potential source for A's beliefs about *p*. And by issuing an imperative to A, B appears to accept the status as a source.

- (61) A: Is there going to be a storm?
B: (You better) Believe it/#so! [B: Don't believe it/#so!]

This suggests two possible structures for the acceptable imperative. In one case, B may surmise that there is a prior assertion that there will be a storm that motivated A's question. In that case, there is a covert source picking up on the motivation for the question. In this case, the source may be existentially closed as in Roberts (2021). In the other case, B may intend themselves as the source.

- (62) a. [IMP [pro_{2nd} believe [$\exists$ [Src it_p]]]]
b. [IMP [pro_{2nd} believe [$\emptyset_{speakr}$ [Src it_p]]]]

Now, the presupposition of Src is not obviously satisfied in (62b) at the time the imperative is uttered. After all, the speaker has not directly asserted that there is going to be a storm. Nevertheless, I think it is plausible that the utterance of the imperative is a signal to the hearer to accommodate the speaker's public commitment to the proposition *p*. If this is on the right track, it can explain why *so* is not acceptable, since the conditions of Maximize Presupposition are met by accommodation. A potential problem for this view is that apparently one cannot choose to pronounce the source argument and leave the proposition covert in response to a question. The response in (63a) sounds incomplete.

- (63) a. B: #Believe them/me!
b. [IMP [pro_{2nd} believe [them/me [Src $\emptyset_p$]]]]

On the other hand, when the proposition is pronounced, the response becomes acceptable.

- (64) a. B: Believe me that there will be!
b. Believe me: There will be!

To my ear, the responses in (61) suggest that B is telling A to trust the source whose assertion motivated A's question. In (64), by contrast, B wants to shift A's attention to B as a source, but in that case, B must specify what proposition they are taking responsibility for.

5.3. Analysis of neg-raising

In this section, I offer an analysis of neg-raising in structures with *believe* and *Src*. For simplicity, I adopt an approach to neg-raising based on the lexical inclusion of an excluded middle presupposition (Bartsch, 1973). This was already incorporated in the presupposition in (50) that we borrowed from Roberts (2021). Together, these do not suffice to derive downward inferences with *believe* if the structure includes Src. That is to say, the inference in (65) does not hold.

- (65) a. Deb doesn't believe Tim that there will be a storm.
b. $\Rightarrow$ Deb doesn't believe Tim that there will be a snow storm.

The reason the inference fails is laid out below. P3 is a premise from the presupposition of Src. C3 is the part of the conclusion from the presupposition of Src. It is C3 that does not follow from the combination of P1-P3. (**storm** stands for the proposition that there will be a storm, and **storm** for the proposition that there will be a snowstorm.)

- (66)
- | | |
|-------|--|
| (P1) | $\text{Dox}_{Deb}^w \not\subseteq \mathbf{storm}$ |
| (P2) | $\text{Dox}_{Deb}^w \subseteq \mathbf{storm} \vee \text{Dox}_{Deb}^w \subseteq \overline{\mathbf{storm}}$ |
| (P3) | $\exists e[\text{Assert}_w(e, \text{Tim}, \mathbf{storm}) \wedge \text{Acq}_w(\text{Deb}, e) \wedge$
$\text{Dep}_w(\text{Deb}, \lambda w. [\text{believe}]^w, \mathbf{storm}, e)]$ |
| <hr/> | |
| (C1) | $\text{Dox}_{Deb}^w \not\subseteq \mathbf{snowstorm}$ |
| (C2) | $\text{Dox}_{Deb}^w \subseteq \mathbf{snowstorm} \vee \text{Dox}_{Deb}^w \subseteq \overline{\mathbf{snowstorm}}$ |
| (C3) | $\exists e[\text{Assert}_w(e, \text{Tim}, \mathbf{snowstorm}) \wedge \text{Acq}_w(\text{Deb}, e) \wedge$
$\text{Dep}_w(\text{Deb}, \lambda w. [\text{believe}]^w, \mathbf{snowstorm}, e)]$ |

Premises 1 and 2 entail that Deb believes there will not be a storm. Premise 3 indicates that Tim asserted that there will be a storm and that Deb is acquainted with this assertion. Furthermore, it says that if Deb weren't acquainted with this assertion, she wouldn't believe there was a storm. But of course she already doesn't believe this (by P1). Both C1 and C2 follow from P1 and P2. C3 on the other hand is the reason the inference does not go through. Nothing in P1-P3 indicates that Tim made an assertion that there would be, specifically, a *snow* storm.

In this way, the presence of Src blocks downward inferences in the embedded clause of a negated *believe*. Notice, however, that the environment is Strawson downward entailing, cf. von Stechow (1999). That is, if the presuppositions of the conclusion (C2-C3) are added to the premises of the argument in (66), the conclusion does indeed follow. This explains why weak NPIs are licensed in the clausal complement of *believe* by a superordinate negation.

- (67) Deb doesn't believe Tim that there were **any** storms yesterday. / that he has **ever** gone skiing.

Furthermore, on a theory of strong/strict NPI licensing like Gajewski (2011), the lack of strict downward entailing inferences explains why strong NPIs like *in years* are not licensed.

This also suggests an account of Lindholm's claims about the interaction of pronominalization and neg-raising in (43), repeated below. We have argued that *so* is incompatible with the insertion of Src. Thus, there is no presupposition present to block strict neg-raising inference. However, on the strong interpretation of the theory above on which *it* requires the presence of Src, neg-raising will be blocked by the presupposition of the functional head in the structure.

- (68) a. Bill believes that John won't come until later and I don't believe so, either.
b. *Bill believes that John won't come until later and I don't believe it, either.

Finally, while we cannot present a full account here, there are some additional facts that point in the same direction. *Believe* can be combined with an ability modal like *can* that gives rise to a surprising reading. For example, (69) suggests that it is true that there was a tornado in CT and the speaker knows this - nevertheless they cannot accept that this is true. Gunlogson and Wolter (2008) dub this the 'incredible' reading of *believe*.

- (69) I can't believe that there was a tornado in CT!

They observe furthermore that this incredible reading is incompatible with neg-raising, see also Lindholm (1969); Horn (1975).

- (70) I can't believe that somebody locked the backdoor, too.
 ≠ I can believe that somebody didn't lock the backdoor, too.
 Gunlogson and Wolter (2008)

This tracks with the observation that the incredible reading cannot combine with *so*, but does combine with *it*.

- (71) a. A: There was a tornado in CT
 B: I can't believe it/*so! cf. Lindholm (1969)

6. Conclusion

In this paper, we have discussed the semantics of *believe* inspired by Djärv (2023) and Roberts (2021) analyses of overt source DPs with *believe*. I have proposed that *believe* exhibits a covert ambiguity that derives from the presence/absence of the covert functional head that introduces the source. I argued that this can explain some facts concerning the meaning and use of combinations of *believe* with different anaphoric forms, namely the pronoun *it* and the ellipsis marker *so*. Specifically, I argued that *so* is incompatible with the covert source head and tentatively suggested that *it* must be accompanied by the source head. Furthermore, I investigated how overt DP sources interact with neg-raising and strong NPI licensing. This suggested that one source of non-neg-raised meanings for *believe* may be the presence of the covert source head. In some sense, the paper has been very limited in focus, since we have only been investigating the properties of one word, *believe*. The reason for this focus is the unique combination of properties that *believe* shows: compatibility with both *it* and *so* and the ability to take an overt source DP along with a clausal complement. The long-term goal of the project is to extend the findings for *believe* to other classes of attitude predicates. Roberts (2021) draws an explicit connection between his analysis of source DPs with *believe* and the meaning of response-stance verbs, cf. Cattell (1978), Kastner (2015). A natural extension would be to investigate the functional structure of response stance verbs from the perspective of the present analysis.

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