The Pragmatics and Semantics of Embedded Polar Responses with English *so*

A. Marlijn Meijer

1. Introduction

The present paper concerns the use of *so* in embedded responses in English. Some examples of embedded responses are given in (1). In response to a question such as (1-A), a speaker may for instance respond affirmatively with *so* embedded under *think*, see (1-B$_1$), or with an embedded *that*-clause, see (1-B$_2$). The rejecting counterparts of these responses, which also involve *so* and a *that*-clause, are shown in (1-C). For simplicity, I will focus on the affirming responses here.

(1)   A: Did you remember to lock the door?
         B$_1$: I think so.   C$_1$: I don't think so.
         B$_2$: I think that I did.   C$_2$: I <don't> think that I did<n't>.

In the literature, it is often assumed that *so* is anaphoric to a salient proposition in the context, i.e. that *so* in (1-B$_1$) refers to a proposition introduced by A's question (see e.g. Kiparsky and Kiparsky 1971, Cushing 1972, Cornish 1992, Needham 2012). Similar to *that*-clauses, *so* is usually analyzed as a CP (see e.g. Moulton 2015). One might say that the response with *so* in (1-B$_1$) is the anaphoric counterpart of the response with the *that*-clause in (1-B$_2$). However, *so* is known to behave differently from *that*-clauses. It has been noted that *so* is mostly used in response to questions (Gast and König 2008, Needham 2012). In addition, it seems that simple *I think so*-responses to assertions like (2-A) are dispreferred to responses involving a *that*-clause, see (2-B).

(2)   A: John is coming to the party.
         B: Yeah, I think {?so | he is}.

Kiparsky and Kiparsky (1971) further pointed out that *so* cannot occur with factive predicates, as shown in (3) (in contrast to e.g. *it*). The authors contribute this to the syntax of factive complements.

(3)   Bill invited John to the party. He will not regret {#so | it}.

However, Bhatt (2010) has shown that *so* can in fact occur with semi-factive *know*, as we see in (4). A perhaps more frequent use of *know so* is shown in (5-B). In this dialog, speaker A challenges speaker B, who in turns responds with stress on *know*, indicating that s/he is certain.

(4)   Bill is coming to the party. I know so, because he told me.

(5)   A: Do you really think so?
         B: I KNOW so.

Furthermore, it is not the case that *so* can occur with all non-factive predicates. Sailor (2012) showed that *so* cannot occur with *ask*, *doubt* or *want*, see (6). We thus cannot use only factivity to account for *so*.

(6) A: Did Bob kiss Mary?
     B: #I {asked | doubt | want} so.

Moulton (2015) in addition shows that *so* may occur with *admit*[1] or *convince*, see (7)-(8). Besides, *so* can occur with *claim*, see (9).[2]

(7) Gebara further asserted that politically 'advanced' priests and nuns favor decriminalization, but admit so only in "very restricted circles".   (Moulton 2015)

(8) Each of the stories is about a 'real' person; we are convinced so because their presence is faithfully recorded in photographs.   (Moulton 2015)

(9) A: Is he in the market for a bride?
     B: He claims so.

Note furthermore that the use of *so* is highly discourse sensitive. To see this, let us reconsider (4). If speaker A asserts the first proposition and speaker B affirms it, A cannot continue with *know so*. The discourse in (10) illustrates this.

(10) A: Bill is coming to the party.
      B: Yes.
      A: I know {#so | this}, because he told me.

A's second discourse move, defending his first claim, may be perceived as odd in the light of B's affirmation. However, A's response is considered less odd if we replace *so* with *this*, see (10-A).

   To account for the use of *so*, Cushing (1972) suggested that *so* can only occur with predicates that do not indicate a definite stance of the speaker (e.g. *believe* or *think*, but not *doubt*). Cornish (1992) argued that *so* is used if speakers do not want to suggest that the proposition that *so* refers to is true. Needham (2012) argued that *so* is anaphoric to a polar question under discussion (QUD) and that the speaker of the *so*-utterance does not commit to the referent of *so*. In a talk handout, Sailor (2012) suggested that *so* might be a proform of a projection relating to polarity. However, the use of *know so* in (4)-(5) is problematic for the first three proposals, as the speaker is clearly committing to the referent of *so* in this example.[3] In addition, the discourse sensitive use of *so* appears difficult to explain for all previous accounts. Besides, the preferred use of *so* in response to questions does not seem to follow straightforwardly from them.

   Recall that we started out with the observation that the use of *so* in embedded responses appears similar to those with *that*-clauses. Yet, we saw that *so* differs from *that*-clauses in several ways. It must also be noted that *so* seems to move differently from *that*-clauses. Whereas *that*-clauses that do not associate with a DP gap cannot move (as is shown in (11-a-b)), *so* seems able to move in such cases (see (11-c)) (see Moulton 2015 and references therein).

(11) a. Albert boasted {that the results were fantastic | *it}.
      b. *That the results were fantastic, Albert boasted.   (Moulton 2015)
      c. So boasted Alfred.

In this paper, I present a proposal that captures the properties of *so* in embedded responses in a unified way. I will not consider other kinds of *so*'s (e.g. the degree modifier in *so much* or the anaphor *do so*) - I refer the reader to Needham (2012) for a overview of the different *so*'s. For the *so* under discussion here, I will make two claims. First, I argue that its use is defined if the referent of *so* is the top item on the

---

Table T^c in a context c, i.e. that the referent is still under discussion at the speech time (in the framework by Farkas and Bruce 2009). Second, in order to account for the semantic type of *so* and the movement in (11), I suggest that *so* is not simply a propositional anaphor, but a predicate modifier that supplies an anaphoric argument for the predicate. I will tackle these claims in sections 2 and 3 respectively.

2. Claim (i): The discourse pragmatics of *so*

The first claim concerning the discourse pragmatics of *so* is shown in (12). In order to understand what (12) means, let us consider what it means for a proposition to be on the Table.

(12) $[\![\mathbf{so}]\!]^{c,w}$ is defined if the referent of *so* is the top item on the Table T^c in the context c at the speech time.

2.1. The discourse model: Farkas and Bruce (2009)

In Farkas and Bruce's (2009) discourse model, it is assumed that discourse participants keep track of the questions under discussion (QUDs) (following e.g. Roberts 1996). These QUDs, the at-issue propositions, form a stack: the Table. Assertions made and questions asked enter the Table before they can become CG. The goal of the conversation is to remove items from the Table and enlarge the CG. For 'default' assertions p and questions p?, Farkas and Bruce assume that they place the issue p on the Table. In both cases, the interrogative or assertive sentence p is placed on the Table together with a denotation, $\{p, \neg p\}$ for questions and $\{p\}$ for assertions. If a speaker makes an assertion, s/he commits her/himself to the proposition denoted by that assertion. If a speaker asks a polar question, s/he does not express commitment. This leads to a crucial difference regarding the 'time line' of the acceptance of assertions and answers to questions as CG. Farkas and Bruce (2009:24) point out that if a speaker answers a polar question, neither the sentence radical of the question nor the answer automatically become CG. The asking party first has to signal agreement with the answer. As soon as this is done, the answer becomes CG. Note that this agreement might be implicit, but it can only be signaled *after* the answer has been given. For assertions, this is different. If a speaker asserts something, s/he commits him/herself to the corresponding proposition. If interlocutors now (implicitly) agree, the proposition becomes CG.

Farkas and Bruce (2009) only consider default polar questions and default assertions (e.g. *Is Sam home?/Sam is home.*), but their framework can be extended to more complex assertions and questions. In the following, I will discuss two other ways in which issues might be raised. We will see that these are relevant for the use of *so* in section 2.2. I do not attempt to provide an exhaustive definition of what can(not) enter the table. First, I assume that unembedded statements involving an operator like *might* put their prejacent on the Table. I follow Yalcin's (2011) account of epistemic possibility markers (cf. Veltman's 1996 approach to epistemic modals). Roughly, Yalcin suggests that such items signal that the prejacent of the modal is compatible with the information available to the speaker. Thus, if I say *it might be raining in Amsterdam*, this means that the proposition *It is raining in Amsterdam* is compatible with the information available to me. This is a way to raise an issue (Yalcin 2011:313). We may thus say that the prejacents of such statements are added to the Table, as well as the statements themselves. Second, Simons (2007) argues that the complements of attitude verbs might be the main point of the assertion, i.e. they might be at-issue. She suggests this is the case in the following example:

(13)   A: Who was Louise with last night?
        B: Henry {thinks | suggested | is convinced} that she was with Bill.   (Simons 2007:1036)

In (13-B), the complement clause provides the answer to the question that A placed on the Table. Therefore, according to Simons, this complement clause is at-issue. In such dialogs, the complement clause is thus placed on the Table as well.

Recall that I suggested that *so* is anaphoric to the top item on the Table. This means that the referent of *so* is thus still under discussion at the speech time of the *so*-utterance. The top item of the Table is the lastly added item (Farkas and Bruce 2009). However, if one discourse move may raise several issues to the Table (as I suggested above), there might not be a unique proposition that is the top item. I assume

that the proposition *so* targets depends on the context and the predicate *so* occurs with. I will leave further exploration of the Table and the top item in contexts like the ones sketched above for future research.

From the analysis of *so* in (12), several predictions arise. For reasons of space, I can only discuss two predictions in detail. For both, I will provide corpus data from the Corpus for Contemporary American English (COCA, Davies 2008) to show that they are born out.

2.2. Prediction I: Dialogs so occurs in

The first prediction the proposal in (12), that the referent of *so* is still on the Table, i.e. under discussion, at the speech time, makes concerns dialogs with *so*, see 1.

1. A *so*-utterance, referring to ϕ, and its antecedent discourse move, introducing ϕ, never both entail ϕ, such that they do not lead to acceptance of ϕ as CG, i.e. we expect that:
    a. *so*-responses are fine in response to questions (recall that answers must be 'approved' (implicitly) (Farkas and Bruce 2009:24));
    b. *so*-responses to assertions only occur in particular discourses (because assertions can be accepted as CG implicitly), i.e. we expect *so* in response to assertions:
        (i)   to target embedded propositions or prejacents of possibility modals or negative operators - as *think(ϕ)*, *might(ϕ)* or *not(ϕ)* do not entail ϕ;
        (ii) to be fine in rejecting responses.

In order to verify this prediction and its subpredictions a corpus study was conducted. 100 *think so*-responses and their antecedents from the COCA were considered.[4] The results are shown in Table 1. The second column shows the *so*-responses to questions. The third column shows the *so*-responses to assertions. Rows (i)-(iii) show whether the antecedents of *so* were (i) embedded propositions or (ii) propositions scoping below a modal/negative operator or (iii) neither of the two. Rows (iv)-(vi) show whether the *so*-utterances involved (iv) negation or (v) a modal item or (vi) no such operator.

Antecedents ϕ	questions ($n = 68$)	assertions ($n = 28$)	Example
(i) embedded prop.	9	8	*John {thinks that | asks if} ϕ*
(ii) prop. below NEG/MODAL	6 (+1?[5])	7	*Perhaps [John is ill]$_\phi$*
(iii) remaining	52	13	*[John is ill]$_\phi$*
***so*-utterances**			
(iv) involving negation	41	19	*I don't think so*
(v) involving modality	5	5	*I might think so*
(vi) no modal/negation	23	5	*I think so*

Table 1: Corpus study in COCA, search: *think so .*, $n = 100$, including 4 false hits.

The corpus study shows us that *so*-responses mostly occur in response to questions (68 out of 96 times). This replicates the finding by Needham (2012). 15 (+1?) out of 68 *so*'s targeted an embedded proposition or one below a modal or negative operator. 41 out of 68 *so*-utterances involved negation and thus were rejecting responses (e.g. *I don't think so*). (14) shows an example of a rejecting *so*-utterance, targeting an embedded question.

(14) You're wondering whether [she's driven him into becoming delusional]$_\phi$? I don't think so$_\phi$. His fear is real. (COCA 2015)

Matters are different for *so*-responses to assertions. 15 out of 28 *so*'s were anaphoric to embedded propositions or propositions scoping below a negation or a modal. This proportion is much higher than for the *so*-responses to questions (for which I found 15 (+1?) out of 68). Furthermore, most *so*-responses

---

[4] The search was *think so . .* The '.' excluded other uses of *so* (e.g. the degree modifier in *think so much*), but also occurrences like *I think so too*. A more exhaustive corpus study should include these. I leave this for future research.
[5] The unclear antecedent was a proposition in the scope of *would*.

to assertions involved a negation and/or modal. (15) illustrates this. One response involved both a modal and a negation, thus in total 23 out of 28 responses involved a negation and/or modal.

(15)   I wasn't [thinking about Sam]$_\phi$, even though you might think so$_\phi$.   (COCA 2015)

Let us zoom in on the five responses to assertions that did *not* involve a negation or a modal. Two of these referred to a proposition in the scope of one or more operators (according to the judgment of a native speaker), see (16)-(17). The remaining three all had quantified subjects, see (18)-(20).

(16)   A: Jack seems like he might [think that was pretty funny]$_\phi$.
        B: Oh, I think so$_\phi$.   (COCA 2015)

(17)   A: I think he wants to get treated right. He's black, right? So maybe [this message is to white
             people]$_\phi$.
        B: I think so$_\phi$.   (COCA 2015)

(18)   [Psychology is a science]$_\phi$: at least some students think so$_\phi$.   (COCA 2015)

(19)   And [he just may pull it off]$_\phi$. Even some of the department's most vocal and longtime critics
        think so$_\phi$.   (COCA 2015)

(20)   [The tree of life might seem like a stable design, appropriate for indelible ink]$_\phi$. Plenty of people
        think so$_\phi$.   (COCA 2015)

It thus seems that the prediction, that the discourse move introducing the referent of *so* and the *so*-utterance do not lead to acceptance of *so*'s referent as CG, is verified by this small sample.[6,7] In response to questions, the referent of *so* remains on the Table because answers must be approved. In response to assertions, either *so* seems to refer to propositions in the scope of an operator, or the *so*-utterance involves an operator. We can now explain the preferred use of *so* in response to questions.

    However, note that some predicates in the past tense pose a problem for the generalization sketched above. Responses like *I told you so* usually are uttered if the proposition the speaker refers to is CG. I assume that these uses are strategic. By using past tense predicates with *so*, speakers may signal that they correctly predicted the way the discourse would develop in the past. That is, when I tell you *I told you so* after we both discover that the proposition *so* refers to turns out to be true, I am informing you that I already predicted this proposition to be true in the past.

2.3. Prediction II: Predicates so occurs with

    The second prediction made by (12) regards the predicates *so* can occur with, see 2.

  2.   *So* only occurs with predicates that are compatible with their complement being on the table T^c at
      the utterance time.

    Let us consider the use of *so* from the speaker's perspective. If a speaker signals that something is still on the table, s/he does so according to information available to him/her. A speaker may know whether something is CG or can be accepted as such, or s/he may not. Thus, the information available to a speaker is relevant for the use of *so*. If speakers evaluate propositions in T^c without settling them, there must be some sort of disagreement or uncertainty, due to which some proposition remains unsettled. To account

---

6   Note that *think(ϕ)* never entails ϕ and therefore, prediction 1. may seem unfalsifiable in this sample. Yet, we see that even with such a weak predicate, if *think so* is uttered in response to an assertion, then either it targets propositions in the scope of operators like *believe/maybe* or *think so* is taking scope below an operator itself.

7   It was pointed out to me that I did not provide a baseline for the ratio between embedded vs non-embedded/negated vs non-negated/modalized vs non-modalized sentences in COCA. However, if such a baseline were available and not statistically different from the antecedents of *so* found in the study presented here, I am not sure if it would affect my argument. Note that I did find simple assertions (e.g. *Psychology is a science* in (18)) but these were always followed up by a *so*-utterance involving some operator (e.g. *at least some* in (18)). There thus is a correlation between the kind of discourse move introduce a referent for *so* and the *so*-utterance itself that would be ignored by such a baseline study. I leave these issues for future research.

for uses of *so* in which the speaker is not the attitude holder (e.g. *he claims so* in (9)), we thus need two information states. First, the information state of the speaker of the *so*-utterance, in order to evaluate the CG-status of the proposition *so* refers to. Second, the information state of the attitude holder, according to whom the proposition holds or not. Note that the speaker might also be the attitude holder.

Anand and Hacquard (henceforth A&H, 2013) make a distinction between attitude verbs that is relevant for the present discussion. They suggest that representational attitudes (e.g. *believe*, *think*) supply an information state, i.e. *believe* introduces the beliefs of the attitude holder. Non-representational attitudes (e.g. *command*, *want*) do not supply such an information state. Instead these predicates are concerned with the ordering of preferences. (21) illustrates a contrast between representational *hope* and non-representational *want*. If a speaker knows that it isn't raining, s/he cannot say s/he hopes it is. The complement of *hope* must be epistemically possible for the attitude holder (although *hope* also expresses a preferences for the complement to be true) (Scheffler 2008, apud A&H 2013). The same does not hold for non-representational *want*, as is shown below. If one knows it is not raining, one may still want it to rain. Only representational predicates can embed the epistemic modal *might*, see (22). A&H (2013) suggest epistemics require an information state to quantify over, explaining the incompatibility of e.g. *command* and *might* in (22).

(21)   It isn't raining. {#I hope it is raining. | I want it to be raining.}   (A&H 2013)

(22)   John {believes | thinks | #commands | #wishes} that Bill might be the murderer.

In addition, non-representational attitudes usually take subjunctive complements in Romance languages, whereas representational attitudes do not (see A&H 2013 and references therein). For reasons of space, I cannot consider the difference between the two types of attitudes in more detail.

Returning to *so*, we expect that the use of *so* is only felicitous with representational attitudes, which, in the context they occur in, are compatible with their complement being on the table. In order to verify this prediction, the COCA was consulted again. I categorized the predicates searched for in COCA into the following groups: predicates that do not occur with *so*, predicates that occur with *so* fewer than 20 times and predicates that occur with *so* more often. Table 2 shows for each predicate how often it was found with *so* and the total number of its occurrences. It should be noted that I am not arguing that certain predicates can never occur with propositional *so*, but that the searches in the corpus did not provide hits.[8] Non-propositional uses of *so* were excluded.[9] In the following, I will not take into account the occurrences of *see* with *so* (in brackets in the second row). These were generally judged bad by native speakers,[10] in contrast to the other predicates in the second row.[11]

---

[8] The searches were *[predicate] so .* , such that the entire paradigm of each predicate was taken into account. The '.' excluded other *so*'s (like *so much*). For *tell*, I ran two searches, one included an additional variable for a pronoun, such that utterances like *I'm telling you so* would be taken into account.

[9] This lead to the exclusion of the only two occurrences of *[prove] so*, that were interpreted by native speakers as being anaphoric to an adjective rather than a proposition (e.g. *You are not guilty unless proven so.*).

[10] Out of four informants, only one liked one occurrence of *see so*, namely (iii) in footnote 12. The others were bad for him. The other informants considered all the occurrences of *see so* bad. The judgments of the first speaker might be due to dialectal differences. An acceptability judgment task may shed light on this issue. I leave this for future research and focus on the majority here.

[11] Out of five informants, one disliked *convince so*. Another did not like the occurrences of *claim so* and *convince so*, but thought these were better than the occurrences of *see so*. Two informants disliked the occurrences of *claim* and *argue* which involved non-animate subjects ((i) *rumor claims so*; (ii) *the success of avenue Q would argue so*). Their judgments improved when the subjects were replaced with animate ones, suggesting that the non-animate subjects and not the predicates were problematic. The other informants thought these were fine.

n hits with *so*	Predicates searched for in COCA - Underlined predicates cannot select *it*
n > 20	*appear* (32/129736), *assume* (32/45888), *believe* (405/228502), *hope* (1399/155179), *know* (21/1213856), *say* (1640/2545469), <u>*seem*</u> (98/280331), *suppose* (182/20311), *tell* (559/511579), <u>*think*</u> (7456/987224)
0 < *n* < 20	*argue* (1/65282), *admit* (1/44499), *claim* (1/93399), <u>*convince*</u> (1/21822), (*see* (3/932664))[12]
n = 0	*acknowledge* (0/28889), *comprehend* (0/3838), *confirm* (0/26386), *demonstrate* (0/39348), *deny* (0/33110), *doubt* (0/46253), *exclaim* (0/4314), *ignore* (0/34915), *figure out* (0/23790), *notice* (0/61768), *realize* (0/81684), *regret* (0/12424), *resent* (0/3732)

Table 2: The predicates searched for, categorized according to the amount of occurrences with *so*.

The remaining predicates in the two top rows are all representational. We can split these up into two groups: doxastics and assertives (following A&H 2008, 2014). Doxastic predicates give insight into the attitude holder's private mental state (A&H 2014). Assertives (or 'profferings') 'report discourse moves, which attempt to settle an issue' (A&H 2008:43). The group of predicates that occur with *so* more than 20 times consists mostly of doxastics (note that A&H analyze *hope* as an emotive doxastic, i.e. a doxastic predicate that also expresses a preference). The predicates in the second row, as well as *say* and *tell*, are assertives. I want to propose that in certain uses, these predicates can be read as simply giving insight into a private mental state as well.[13] In for instance (23)-(24), the predicates inform us about the information states of the attitude holders, through their commitments. Thus, we can paraphrase (23)-(24) in terms of information states. In (23), according to John's information state he is in the market for a bride. In (24), according to the information state of the speakers these stories are about a real person.

(23) A: Is John in the market for a bride?
      B: He claims so.

(24) Each of the stories is about a 'real' person; we are convinced so because their presence is faithfully recorded in photographs.   (Moulton 2015)

These predicates thus seem to behave like doxastics here. In such uses, they can occur with *so*.

A little more needs to be said about factives and semi-factives. For factives, we would expect them to never occur with *so*, as they presuppose their complements (Kiparsky and Kiparsky 1971). However, semi-factives need not presuppose their complement and hence, we would expect that they might be compatible with *so* in certain contexts or uses at least. In addition, A&H (2013) suggest they are representational. Yet, (25) shows that *so* cannot occur with e.g. *realize*.

(25) A: Is John coming to the party?
      B: Yesterday, I realized {#so | he is} and it made me sad.

Now, it is important to take into account that *realize* is an event-related semi-factive, in contrast to *know*. Some event made the attitude holder realize that the complement is true. Furthermore (25-B) contains perfective aspect, which has been suggested to presuppose that the event occurred in the actual world (Arregui 2007). And if speaker B was involved in such a 'realization' event, it would be odd for him/her to signal that the complement is still on the table by using *so*.

Now, we would predict that uses of *realize* with *so* improve if let *realize so* scope below *would*, i.e. move the realization and the referent of *so* away from the actual world. This seems to be the case indeed. (26-B) in its context is judged better than (25-B) - although it would still be better with *it*.

---

[12] There were 4 hits for *[see] so* .. One was uttered by a non-native speaker of English (this was clear from the context and his further speech); therefore it was excluded. The other three hits were: (i) *if I may <u>saw so.</u>*; (ii) *And now you have prostrate devices controlled by thought that we've <u>seen so.</u>*; (iii) *It's a wonderful environment, except when you start working in it, you obviously are stirring it up, so that there is a difficulty in terms of them <u>seeing so.</u>*

[13] I assume that the occurrences of *so* with non-animate subjects are cases of coercion.

(26)   John is getting married to Mary, but A and B strongly suspect that he actually loves Suzy; however, he does not seem to realize this.

    A: John still has feelings for Suzy.

    B: If he would only realize so before the wedding.

Assuming that *it* presupposes that its referent is familiar or known (cf. Cornish 1992, Gundel et al. 2003), it makes sense for *it* to be favored over *so* with predicates like *realize* - even in contexts like (26).

It seems that the prediction spelled out above is borne out. However, the representational non-factive predicate *doubt* poses a problem, as it cannot occur with *so*. The same holds for *deny*. A&H (2013) suggests that *doubt* is representational, but also involves a preference component - just like *hope*. Note that these 'hybrid' predicates cannot embed necessity epistemic modals, in contrast to representational predicates without a preferential component (A&H 2013). However, *hope* can easily occur with *so*, as was shown in Table 2. The difference between the two predicates is that *hope* indicates the attitude holder prefers the complement proposition to be true, whereas *doubt* signals that the attitude holder considers the complement proposition unlikely (A&H 2013:25, 36). It might be the case that this unlikelihood somehow conflicts with the idea that the complement is also still unsettled, as I argued *so* presupposes. I leave this matter and the incompatibility of *deny* and *so* for future research.

Concluding, we see that *so* is found with representational predicates, that do not presuppose their complement. These predicates that give us insight into the attitude holder's information state. I consider this evidence for the second prediction.

To summarize, we saw that (i) a *so*-utterance and its antecedent discourse move introducing the referent of *so* did not lead to acceptance of the referent as CG in our sample; (ii) *so* only occurs with predicates that do not presuppose that their complement is CG in the context the *so*-utterance occurs in. I take these two findings to provide arguments for the claim that *so* refers to the top item on the table.

3. Claim (ii): The type of *so*

The second claim made in this paper is that *so* is not simply a propositional anaphor but a predicate modifier that supplies an anaphoric argument for the predicate. In the following, I first sketch the framework on attitude verbs that I assume. Second, I show what false predictions an analysis of *so* as a propositional anaphor of type $\langle s, t \rangle$ makes. Third, I propose an alternative account of *so*.

3.1. Attitude verbs and complementation

I will analyze *so* in the framework for attitude verbs and *that*-clauses that was proposed by Kratzer (2006) and Moulton (2009, 2015). Kratzer (2006) suggests that attitude verbs like *believe* take arguments of type e, as shown in (27).

(27) $[\![\textbf{believe}]\!]^{c,w} = \lambda x_c.\lambda e.\ \text{believe}(x_c)(e)$ (cf. Kratzer 2006)

These arguments denote propositional content, i.e. the content corresponding to a proposition. In this framework, *that*-clauses denote properties of such content. The *that*-clause in (28) thus corresponds to the set of entities with the content *Bob is a fraud*. The complementizer plays an important role; see (29). It takes a proposition as its argument and returns the set of entities with the content corresponding to the proposition.

(28) $[\![\textbf{that Bob is a fraud}]\!]^{c,w} = \lambda x_c.\lambda w.\ \text{CONT}(x_c)(w) = \lambda w'.$ Bob is a fraud in w' (Moulton 2015)

(29) $[\![C]\!]^{c,w} = \lambda p.\lambda x_c.\lambda w.\ \text{CONT}(x_c)(w) = p$ (Moulton 2015, after Kratzer 2006)

In the Kratzer-Moulton framework, we can pursue a unified account of *that*-clauses as modifiers of content nouns, such as *idea*, or as arguments of attitude verbs, see (30).

(30)   {John believes | The idea} that Bob is a fraud.

There are several theories of complementation within the present framework on *that*-clauses (see e.g. Kratzer 2013, Moulton 2015). For the present purposes, I will not commit to one of these theories.

3.2. So as a propositional anaphor

In the previous literature, it is often assumed that *so* is a propositional anaphor of a propositional type $\langle s, t \rangle$.[14] Needham (2012) for instance argues that *so* is interpreted as the proposition corresponding to a QUD, which would be something of type $\langle s, t \rangle$. The evidence for such an analysis seems compelling, as *so* can occur in several environments that are usually assumed to take propositional arguments, e.g. in conditional clauses, with sentential adverbs and instead of *that*-clauses. Note that if we were to follow this line of research and still pursue the Kratzer-Moulton framework on attitude verbs, we would be forced to assume that there is a covert complementizer in those propositions in which *so* occurs with an attitude verb. As was suggested above, attitude verbs select an argument of type e, whereas propositions are of type $\langle s, t \rangle$. Now, a covert complementizer could take a proposition or *so* as its argument and return a set of entities with the content of the proposition referred to. (31) illustrates what this looks like structurally. I dub this the *covert complementizer analysis*.

(31)   I think [$_C$ so].

The covert complementizer analysis makes two false predictions within the present framework. First, it predicts that the complex consisting of *so* and the covert complementizer cannot be topicalized, because covert complementizers cannot be topicalized (see e.g. Bošković and Lasnik 2003), see (32).

(32)   [$_{CP}$ *(That) [$_{IP}$ John likes Mary]] Jane didn't believe.   (Bošković and Lasnik 2003:529)

If *so* must occur with a covert complementizer in embedded responses, we expect that *so* cannot be topicalized either. However, we know that *so* can be topicalized, see (33) for another example.

(33)   A: My father gave his life so that we may have a chance to defeat this.
        B: So you've told us.   (from Star Wars Rogue One)

Second, if *so* is always accompanied by a covert complementizer, we expect the complex [$_C$ so] to be of the same semantic type as *that*-clauses. However, *so* cannot modify content nouns, whereas *that*-clauses can (Hallman 2006, Moulton 2015). The difference is illustrated in (34).

(34)   my {belief | claim | fear} {*so | that pigs fly}.   (Moulton 2015)

It thus seems that within the Kratzer-Moulton framework, we cannot analyze *so* as being of type $\langle s, t \rangle$.

Now the question arises if we could analyze *so* as a propositional anaphor in a more traditional Hintikkan framework of attitude verbs (in which attitude verbs select for arguments of type $\langle s, t \rangle$). In such a framework, there are still two problems. First, we falsely predict that *so* can be used as a response particle.[15],[16] Second, if *so* is similar to *that*-clauses in terms of types, we would expect it to show similar movement patterns. However, as we saw in (33), *so* can be topicalized, but in section 1, we saw that *that*-clauses cannot always be topicalized.

3.3. So as an anaphoric adverb

Instead of analyzing *so* as a propositional anaphor, I want to argue for an adverbial analysis of *so*. In a talk handout, Gast and König (2008) suggest that the *so* under discussion here derived from the manner adverb *so*. They suggest that preverbal *so* still has a manner feature and provide the example in (35):[17]

---

[14] Cornish 1992 is an exception. He suggests that *so* is adverbial, but does not provide a concrete analysis.

[15] I thank Angelika Kratzer for pointing this out to me.

[16] Manfred Krifka (p.c.) suggested to me that *yes* and *so* might be competitors and *yes* differs from *so* in being assertive (Krifka 2013). This may explain why a bare *so* is not felicitous. This should be explored in future research.

[17] It seems that *so* in (35) might not bear the same presupposition as the *so* at issue in this paper. If the latter cannot occur preverbally, the *so* in (11) would in fact also be the manner *so*. Yet, the argument presented there still holds. Predicates like *seem* also cannot select DPs, but allow topicalization with *so*: *so it seems* (see e.g. Moulton 2015).

(35)   'I'll be jiggered and no mistake.' And so saying he went into ...   (Gast and König 2008:3)

I propose the analysis in (36-b). As (36-a) shows, *so* modifies an attitude verb such as *think*, which has the type $\langle e, st \rangle$.[18] It presupposes that there is a proposition p_i, which is the top item on the table T^c. Furthermore, it provides the argument x_c for the predicate. The content of x_c corresponds to the proposition p_i. The complex *think so* further takes an eventuality and a world argument.

(36)   a. $[\![\textbf{so}]\!]([\![\textbf{think}]\!])$
         b. $[\![\textbf{so}_i]\!] = \lambda Q.\lambda e.\lambda w\colon p_i \text{ is } top(T^c)\ .\ \exists x_c[Q(x_c)(e)(w) \wedge \text{CONT}(x_c)(\text{w}) = p_i]$

Thus, in the present proposal, *so* modifies an attitude verb and introduces and existentially binds the content argument of that verb.

    With this analysis, we do not run into the problems of the propositional account. First, we do not predict that *so* is a response particle. Second, we do not expect *so* to move similarly to *that*-clauses, because *so* is not similar to *that*-clauses. Instead, *so* is predicted to like adverbs. A prediction that seems to be borne out, as is shown by the adverbial movement in (37):

(37)   <Softly> Mary spoke <softly>.

A further welcome consequence of (36-b) is that we can account for the observation that adverbial *not* seems have a distribution similar to *so*'s - they are both adverbs. Finally, we can bring the use of *so* central to this paper closer to the (perhaps somewhat archaic) manner adverb shown in (35), as well as to cognates of this manner adverb, Dutch and German *zo* and *so* 'like this/that'.

4. Conclusion

    In this paper, I made two claims concerning embedded responses in English with *so*. First, I argued that the use of *so* in embedded responses in English is defined if the referent of *so* is still on the table at the utterance time. With this analysis of *so*, we can account for (i) the restricted set of predicates that *so* can occur with; (ii) the preferred use of *so* in response to questions; and (iii) the discourse-sensitive behavior of *so*. Second, I argued that we run into problems if we analyze *so* as a propositional anaphor of type $\langle s, t \rangle$ in the Kratzer-Moulton framework on attitude verbs and *that*-clauses. Several problems remain if we assume a Hintikkan framework instead. I suggested that we should analyze *so* as an anaphoric adverb that modifies a propositional attitude verb and provides an argument for the verb.

    Future research on *so* should investigate the infelicity of *so* with *doubt* and *deny* in more detail. It should take into account uses of *so* with sentential adverbs and in conditional clauses as well. In addition, the present proposal should be couched in a more dynamic account of anaphoricity.

References

Anand, Pranav & Valentine Hacquard (2008). Epistemics with attitude. Friedman, Tova & Satoshi Ito (eds.), *Proceedings of SALT*, vol. 18, 37–54.

Anand, Pranav & Valentine Hacquard (2013). Epistemics and Attitudes. *Semantics & Pragmatics* 6, 1–59.

Anand, Pranav & Valentine Hacquard (2014). Factivity, Belief and Discourse. *The Art and Craft of Semantics: A Festschrift for Irene Heim* 1, 69–90.

Arregui, Ana (2007). When aspect matters: the case of would-conditionals. *Natural Language Semantics* 15:3, 221–264.

Bhatt, Rajesh (2010). Comments on "Referential CPs and DPs: An operator movement account". *Theoretical Linguistics* 36:2/3, 173–177.

Bošković, Željko & Howard Lasnik (2003). On the distribution of null complementizers. *Linguistic Inquiry* 34:4, 527–546.

Cornish, Francis (1992). *So Be It*: The Discourse–Semantic Roles of *So* and *It*. *Journal of Semantics* 9:2, 163–178.

Cushing, Steven (1972). The semantics of sentence pronominalization. *Foundations of Language* 9.

Davies, Mark (2008-). The Corpus of Contemporary American English (COCA): 520 million words, 1990-present. Available online at http://corpus.byu.edu/coca/.

---

[18] I am assuming here that an additional layer, e.g. Kratzer's (1996) VoiceP, adds an attitude holder.

Farkas, Donka & Kim Bruce (2009). On reacting to assertions and polar questions. *Journal of Semantics* p. ffp010.

Gast, Volker & Ekkehard König (2008). Sentence anaphora in English and German. Talk given at the First Meeting of the International Society for the Linguistics of English at the University of Freiburg. Freiburg, October.

Gundel, Jeanette, Michael Hegarty & Kaja Borthen (2003). Cognitive status, information structure, and pronominal reference to clausally introduced entities. *Journal of Logic, Language, and Information* 12:3.

Hallman, Peter (2006). On a Categorial Distinction between Stative and Eventive Verbs. Davis, Christopher, Amy Rose Deal & Youri Zabbal (eds.), *Proceedings of NELS 36*, Amherst, Massachusetts: GLSA.

Kiparsky, Carol & Paul Kiparsky (1971). Fact. *Bierwisch, Manfred-Heidolph, Karl Erich (a cura di), Progress in Linguistics (A Collection of Papers), The Hague, Mouton* 143–173.

Kratzer, Angelika (2006). Decomposing Attitude Verbs. Talk given in honor of Anita Mittwoch at The Hebrew University of Jerusalem. Jerusalem, July.

Kratzer, Angelika (2013). Modality and the semantics of embedding. Slides from presentation at the Amsterdam Colloquium. Amsterdam, December.

Krifka, Manfred (2013). Response particles as propositional anaphors. Snider, Todd (ed.), *Proceedings of SALT*, vol. 23, 1–18.

Moulton, Keir (2009). *Natural Selection and the Syntax of Clausal Complementation*. Ph.D. thesis, University of Massachusetts, Amherst.

Moulton, Keir (2015). CPs: Copies and compositionality. *Linguistic Inquiry* 46:2, 305–342.

Needham, Stephanie M. (2012). *Propositional Anaphora in English: The relationship between so and discourse*. Master's thesis, Carleton University Ottawa.

Sailor, Craig (2012). On embedded polar replies. Handout from the Workshop on the Syntax of Answers to Polar Questions, Newcastle University, UK.

Simons, Mandy (2007). Observations on embedding verbs, evidentiality, and presupposition. *Lingua* 117:6, 1034–1056.

Veltman, Frank (1996). Defaults in update semantics. *Journal of philosophical logic* 25:3, 221–261.

Yalcin, Seth (2011). Nonfactualism about epistemic modality. Egan, Andy & Brian Weatherson (eds.), *Epistemic Modality*, Oxford University Press, 295–332.

Proceedings of the 35th West Coast Conference on Formal Linguistics

edited by Wm. G. Bennett, Lindsay Hracs, and Dennis Ryan Storoshenko

Cascadilla Proceedings Project   Somerville, MA   2018

Web access and citation information

This entire proceedings can also be viewed on the web at www.lingref.com. Each paper has a unique document # which can be added to citations to facilitate access. The document # should not replace the full citation.

This paper can be cited as:

Meijer, A. Marlijn. 2018. The Pragmatics and Semantics of Embedded Polar Responses with English *so*. In *Proceedings of the 35th West Coast Conference on Formal Linguistics*, ed. Wm. G. Bennett et al., 269-279. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #3398.