

## NEG-raising via Proform

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Abstract: Whether NEG-raising should be handled in syntax or semantics/pragmatics has been hotly debated in the literature; one crucial difference between the two analyses is the presence/absence of syntactic NEG extraction out of an embedded clause. This squib tackles on the debate, investigating interactions between NEG-raising and clausal *so* anaphora. Specifically, the novel data introduced in this squib shows that syntactic NEG extraction does not take place out of an embedded clause, thus being only compatible with the semantic/pragmatic analysis of NEG-raising.

Keywords: NEG-raising, proform, ellipsis, extraction

### 1. Introduction

In this squib, I investigate NEG-raising in English, a construction where certain predicates, e.g. *think* and *believe*, validate instance of the inference schema in (1), a typical example of which is given in (2).

(1) Not [ Pred [ S ] ]  $\Rightarrow$  Pred [ Not [ S ] ]=

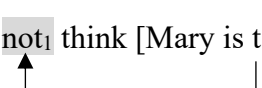
(2) a. Bill does not think Mary is here.  $\Rightarrow$

b. Bill thinks Mary is not here.

(cf. Bill does not claim Mary is here.  $\nRightarrow$  Bill claims Mary is not here.)

In (2a), the negative marker *not* is located in a matrix clause but is interpreted as if it were located in an embedded clause. In other words, (2a) is usually interpreted not as a statement about what Bill does not think but as a statement about what Bill does think, i.e. (2b).

In the literature, it has been controversial whether NEG-raising, e.g. the inference from (2a) to (2b), should be treated syntactically or semantically/pragmatically. Under the syntactic analysis, (2a) is analyzed as in (3) (Fillmore 1963, Ross 1973, Collins and Postal 2014, among others).

- (3) a. Bill thinks [Mary is not here]  
 b. Bill not<sub>1</sub> think [Mary is t<sub>1</sub> here]
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Here, negation is base-generated within an embedded clause as in (3a) and then moves to a matrix clause, crossing a clausal boundary as in (3b), which is taken to result in the inference in question.

By contrast, under the semantic/pragmatic analysis, (2a) is analyzed, e.g. as in (4) (Bartsch 1973, Horn 1978, 1989, Heim 2000, Gajewski 2005, 2007, among others).

- (4) <Bartsch's 1973 Logic-based Analysis>
- a.  $a$  does not believe that  $p$
  - b. Truth Condition:  $\neg \forall w(w \in B_a \rightarrow w \in P)$
  - c. Presupposition:  $\forall w(w \in B_a \rightarrow w \in P) \vee \forall w(w \in B_a \rightarrow w \notin P)$
  - d.  $\neg \forall w(w \in B_a \rightarrow w \in P)$
  - $\forall w(w \in B_a \rightarrow w \in P) \vee \forall w(w \in B_a \rightarrow w \notin P)$
  - e.  $\therefore \forall w(w \in B_a \rightarrow w \notin P) = a$  believes that not- $p$

That (4a) can be interpreted as if it meant (4e) follows from its truth condition (4b) and its Excluded Middle (4c) by *modus ponens tollendo* as illustrated in (4d–e). Of importance for us here is that the semantic/pragmatic analysis does not utilize syntactic NEG extraction

out of an embedded clause to derive the NEG-raising inference, in contrast to the syntactic analysis.

The main goal of this squib is to provide a new argument for the semantic/pragmatic analysis of NEG-raising on the basis of novel data on an interaction between NEG-raising and clausal *so* anaphora. The following discussions are organized as follows. In section 2, I will first introduce a distinction between proform and ellipsis (deep anaphora and surface anaphora in Hankamer and Sag's 1976 sense). Then, I will exploit a well-established diagnostic for ellipsis, i.e. the extraction possibility, showing that clausal *so* anaphora in English is an instance of proform. In section 3, I will investigate a situation where NEG-raising and clausal *so* anaphora interact, demonstrating that it provides us with novel supporting evidence for the semantic/pragmatic analysis. Section 4 concludes the paper.

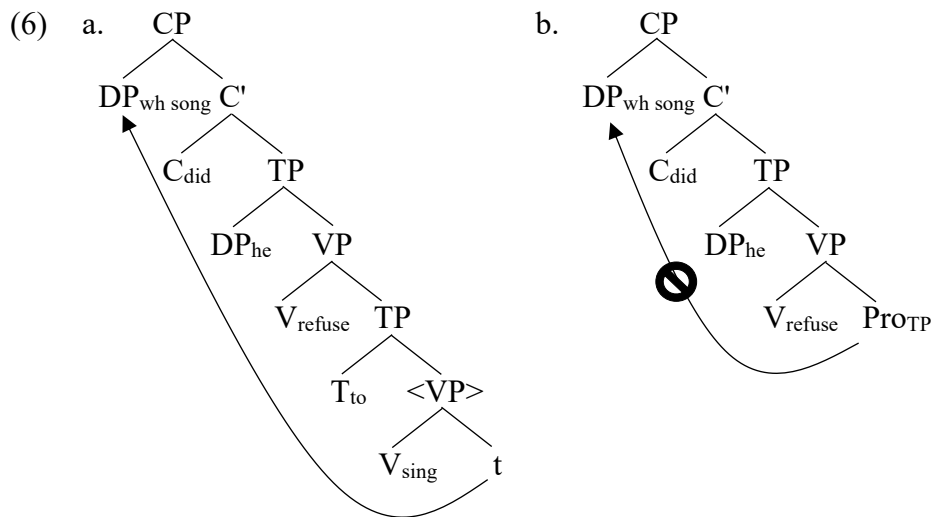
## 2 Clausal *So* Anaphora = Proform

### 2.1 Proform vs. Ellipsis

It has been standardly assumed since Hankamer and Sag's (1976) seminal work that there are two types of anaphora in natural languages: proform and ellipsis. A number of diagnostics have been proposed in the literature (Bresnan 1971, Grinder and Postal 1971, Hankamer and Sag 1976, Sag 1976, Sag and Hankamer 1984, Depiante 2000, Johnson 2001, among many others), but one of the most reliable diagnostics for the distinction in question is considered to be the possibility of extraction (Merchant 2013). For example, consider (5).

- (5) a. Which *song*<sub>1</sub> did he agree to sing *t*<sub>1</sub>, and *which song*<sub>2</sub> did he refuse to  $\Delta_{VP}$ ?  
b. \*Which *song*<sub>1</sub> did he agree to sing *t*<sub>1</sub>, and *which song*<sub>2</sub> did he refuse  $\Delta_{NCA}$ ?

The above contrast shows that syntactic extraction, here *wh*-movement, is possible out of a VP-ellipsis site but is impossible out of a Null Complement Anaphora (NCA) site. The difference here is claimed to follow from the hypothesis that a VP-ellipsis site involves hidden structure, thus being able to accommodate a position for a trace as in (6a), while a NCA site is a silent proform, being atomic and thus unable to do so as in (6b).



In (6a), the VP-ellipsis site is silently structured so that there is an appropriate original position, i.e. the complement position of the verb *sing*, for the *wh*-phrase *which song*. On the other hand, the NCA site in (6b) is occupied by Pro, a silent proform (Depiante 2000), which makes it impossible for us to implement *wh*-movement out of it, leading (5b) to be ungrammatical.

In the literature, it has been shown that not only *wh*-movement but also other instances of movement, including null operator (Op) movement and QR, can be used as a diagnostic for ellipsis (with hidden structure) vs. proform (without hidden structure) (Depiante 2000, Johnson 2001, Merchant 2013, among others). Consider the following examples.<sup>1</sup>

- (7) a. I always eat anything *Op* that he does  $\Delta_{VP}$ .  
 b. \*I always eat anything *Op* that he volunteers  $\Delta_{NCA}$ .  
 (Depiante 2000:59)
- (8) a. Some boy admires every teacher, and some girl does  $\Delta_{VP}$  too.  
 (Fox 2000:4)  
 b. Some doctor volunteered to visit every patient, and some nurse also  
 volunteered  $\Delta_{NCA}$ .  
 (Depiante 2000:59)

The contrast between (7a) and (7b) shows that *Op* movement involved in a relative clause is possible out of a VP-ellipsis site but is impossible out of a NCA site. In (8), although both sentences are grammatical, the availability of the inverse scope interpretation differs: only (8a) allows such a scope reading. This also indicates that extraction is allowed only out of an ellipsis site; specifically, a VP-ellipsis site involves full-fledged silent structure, so the QP *every teacher* within the VP-ellipsis site can undergo QR out of its domain, yielding an inverse scope interpretation in (8a), whereas a NCA site is atomic, thus being unable to accommodate a position for a trace of QR, which leads to the absence of inverse scope in (8b).

## 2.2 Extraction out of Clausal *So* Anaphora

In the above discussions, I introduced a distinction between ellipsis vs. proform, showing that the two types of anaphora can be distinguished on the basis of the possibility of extraction. Specifically, it has been observed that extraction is uniformly possible out of an ellipsis site (e.g. VP-ellipsis) but is uniformly banned out of a proform site (e.g. NCA and

*do it*). Keeping the dichotomy in question in mind, let us consider whether clausal *so* anaphora in English should be classified into an instance of ellipsis or proform. (9) illustrates typical examples of the construction in question.

(9) a. Bill thinks [<sub>Clause</sub> that Mary is here]. John thinks [<sub>Clause</sub> so], too.

b. You believe [<sub>Clause</sub> John to have kissed Mary]. I believe [<sub>Clause</sub> so] too.

In (9), the embedded clause in the second sentence is replaced by *so*, being anaphoric on the embedded clause in the first sentence. The data here show that both a finite embedded clause and a non-finite one selected by a NEG-raising predicate can be replaced by *so*.

Let us then investigate the extraction possibility out of a clausal *so* anaphora site. Consider the following examples.

(10) a. A: Who<sub>1</sub> does Bill believe [<sub>Clause</sub> that John kissed t<sub>1</sub>]?  
B: Mary.

A: \*Then, *who* does Tom believe [<sub>Clause</sub> so]?  
B: Mary.

b. A: Who<sub>1</sub> does Bill believe [<sub>Clause</sub> John to have kissed t<sub>1</sub>]?  
B: Mary.

A: \*Then, *who* does Tom believe [<sub>Clause</sub> so]?  
B: Mary.

(11) a. John<sub>1</sub> is believed [<sub>Clause</sub> t<sub>1</sub> to have kissed Mary].  
b. \*Bill is believed [<sub>Clause</sub> so] too.

(12) a. This is the book Op<sub>1</sub> that you believe [<sub>Clause</sub> that Nancy has read t<sub>1</sub>].  
b. \*This is the book *Op* that I believe [<sub>Clause</sub> so].

(13) a. This is the book Op<sub>1</sub> that you believe [<sub>Clause</sub> Nancy to have read t<sub>1</sub>].  
b. \*This is the book *Op* that I believe [<sub>Clause</sub> so].

(14) a. Some boy believes [<sub>Clause</sub> Sue to marry everyone].  $\exists \forall \forall \forall \exists$

b. Some girl believes [<sub>Clause</sub> so] too.  $\exists \forall \forall \forall \exists$

That the examples in (10)–(13), where syntactic extraction has been implemented out of a clausal *so* anaphora site, are all ungrammatical indicates that syntactic extraction, i.e. *wh*-movement, passive movement, and Op movement, is uniformly disallowed out of a clausal *so* domain. Though (14b) is grammatical, the inverse scope interpretation is unavailable, which indicates that QR is also impossible out of a clausal *so* site (Note that (14a) by itself can yield the inverse scope interpretation; cf. Kennedy 1997, Fox 2000, among others). Given the above facts, we can conclude that clausal *so* anaphora in English is an instance of proform, which is atomic and uniformly disallows syntactic extraction out of its domain.<sup>2</sup>

### 3 NEG-raising via Clausal *So*

In this section, I will investigate an interaction between clausal *so* anaphora and NEG-raising. Recall that syntactic extraction is uniformly banned out of a clausal *so* site, and this leads us to make the following prediction with respect to NEG-raising.

(15) In the context where an embedded clause selected by a NEG-raising predicate is replaced by *so*, i.e. *not* [ *think/believe* [ *so* ] ], the NEG-raising inference should not be available under the syntactic analysis, whereas it should be under the semantic/pragmatic analysis.

This prediction holds because syntactic extraction, here syntactic extraction of *not*, must take place out of a clausal *so* domain under the syntactic analysis, whereas no syntactic extraction is necessary under the semantic/pragmatic analysis (e.g. through Bartsch's 1973

Logic-based analysis; cf. (4)). Given that the prediction in (15) is on the right track, let us consider (16).


(16) [Context: Jane has just got her driver's license, and I was helping her to practice driving, sitting on the passenger seat. Because she was driving very slowly, the police pulled her over. Following the police, she took a breath alcohol test.]

a. I do not think [<sub>Clause</sub> that Jane is drunk], and the police do **not** think [<sub>Clause</sub> so], either. So it's OK for her to drive.

b. I do not believe [<sub>Clause</sub> Jane to be drunk], and the police do **not** believe [<sub>Clause</sub> so], either. So it's OK for her to drive.

Here, the second conjuncts of the first sentence, *The police do not think so / believe so*, yields the inference in (1), **Not** [ Pred [ S ] ]  $\Rightarrow$  Pred [ **Not** [ S ] ], i.e. the police thinks/believes not-*p* (*p*: Jane is drunk). This can be confirmed by the fact that the second sentence, *So it's OK for her to drive*, can felicitously follow the first one under the above context. Crucial for us here is that given (15) the availability of the relevant inference in (16) means that syntactic extraction has not been implemented out of a clausal *so* site. To be more specific, if NEG-raising is conducted through syntactic NEG extraction out of an embedded clause as the syntactic analysis assumes, (16a) and (16b) are analyzed as illustrated in (17).

(17) ..., and the police do **not** think/believe [<sub>Clause</sub> so]



The diagram shows a horizontal line with a bracket underneath, starting from the word 'so' and ending at the word 'not'. An arrow points upwards from the line to 'not'. A large 'X' is drawn over the arrow, indicating that this syntactic extraction is prohibited.

Given the proform nature of clausal *so* anaphora, i.e. that syntactic extraction is uniformly banned out of the domain in question, the syntactic analysis of NEG-raising predicts the NEG-raising inference to be unavailable in (16a) and (16b), contrary to the fact. On the



other hand, the semantic/pragmatic analysis does not face such a problem. Therefore, the availability of the NEG-raising inference in (16a) and (16b) provides us with a novel argument for the semantic/pragmatic analysis over the syntactic analysis.

#### 4 Conclusion

In this squib, I examined a hitherto unnoticed interaction between NEG-raising and clausal *so* anaphora, showing that the semantic/pragmatic analysis of NEG-raising is favored over the syntactic analysis. Specifically, I first showed that clausal *so* anaphora is an instance of proform based on the impossibility of extraction out of its domain. Then, I demonstrated that the NEG-raising inference is available even under the context where an embedded clause selected by a NEG-raising predicate, e.g. *think* and *believe*, is replaced by *so*, which is shown to argue for the semantic/pragmatic analysis of NEG-raising. Although NEG-raising and clausal *so* anaphora have been hotly debated in the literature, little attention has been paid to their interactions, which I have shown provide us with a consequence for the proper analysis of NEG-raising.<sup>3</sup>

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#### Notes

<sup>1</sup> It has been observed that passive movement can also be adopted as a diagnostic for ellipsis, but it cannot be tested here since such movement is independently banned in the context

involved in NCA. However, it is well-known that other cases of deep anaphora, e.g. *do it*, disallow passive movement out of their domain, as shown in (ib).

- (i) a. This dog<sub>1</sub> was adopted t<sub>1</sub>, but that one was not  $\Delta_{VP}$ .
- b. \*This dog<sub>1</sub> was adopted t<sub>1</sub>, but that one was not *done it*.

<sup>2</sup> That clausal *so* anaphora has phonological matrix does not ensure that it is an instance of proform; see e.g. Aelbrecht 2010 for cases where overt anaphora allows extraction out of its domain.

<sup>3</sup> As one of the reviewers pointed out, most of the arguments for the syntactic analysis of NEG-raising, e.g. in Collins and Postal 2014, have been challenged in the literature (cf. Romalli 2013, Zeijlstra 2017, among others), but what Collins and Postal refer to as Horn-clauses have not been properly handled under the semantic/pragmatic analysis. For example, consider the following example.

- (i) I don't think that ever before have the media played such a major role in a kidnapping.
- (Horn 1975:283)

Crucially, the embedded clause containing an NPI in its edge triggers Negative Inversion in (i). Under the syntactic analysis, (i) can be analyzed as follows.

- (ii) I not<sub>1</sub> think that [t<sub>1</sub> ever before] have the media played such a major role in a kidnapping.

Since negation is originally located within an embedded clause, the Negative Inversion in question is correctly predicted to occur. On the other hand, it is not quite clear how the semantic/pragmatic analysis of NEG-raising accounts for Negative Inversion in (i); specifically, it is not clear how Negative Inversion in (i) is triggered without syntactic

extraction of *not* out of an embedded clause. Thus, I have to leave how the conclusion in this squib, i.e. that the semantic/pragmatic analysis of NEG-raising is favored over the syntactic analysis in light of clausal *so* anaphora, would become compatible with Horn-clauses such as (i) for future research.

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