

Polarity reversals under sluicing¹

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Abstract. This paper presents novel English sluicing data that challenge even the most successful existing theories of the relationship between antecedent and elided content in sluicing constructions. The data supply robust evidence for a previously unobserved phenomenon in which the elided content and the antecedent content in a sluiced construction contain opposite polarity. The phenomenon challenges current accounts of identity conditions on ellipsis by demonstrating that a greater mismatch between antecedent and elided content is possible than previously thought; specifically, the paper shows that the identity condition for sluicing must be sensitive to pragmatic as well as to semantic content. This observation motivates a proposal in which sluicing is treated as a pragmatics-sensitive phenomenon licensed by local contextual entailment.

Keywords: ellipsis, sluicing, dynamic semantics, formal pragmatics, polarity

1. Introduction

Sluicing, first noted by Ross (1969), is an ellipsis phenomenon in which the TP of an interrogative is elided under some identity condition, stranding an overt *wh*-phrase in the CP domain. An example is given in (1) below.

- (1) Bernie knows that someone in Iowa voted for Trump, but he doesn't know who_i
[TP ~~*t_i in Iowa voted for Trump*~~].

This paper discusses the previously unobserved phenomenon of polarity reversals² under sluicing. The phenomenon I am calling *polarity reversal* is that in which the antecedent and elided material in a sluicing construction contain opposite polarity. For example, the antecedent content (A) in (2), *Trump will comply*, has positive polarity while the elided content (E), *Trump won't comply*, has negative polarity.

- (2) I don't think that [Trump_i will comply]_A, but I don't know why [TP ~~*he_i won't comply*~~]_E.³

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²I use this label pre-theoretically and for convenience. As we will see, no actual "reversal" of polarity takes place between an antecedent and elision site.

³Note that there is a reading in which the antecedent includes the matrix clause, but this reading is pragmatically odd.

I show that data like (2) require a shift in current beliefs about the identity conditions that license sluicing constructions. I propose a theory of sluicing that builds on the advances made in previous accounts while allowing for greater mismatches between antecedent and elided content in order to accommodate the newly observed data.⁴

The paper proceeds as follows. Section 2 provides an overview of Merchant's (2001) theory of e-GIVENness and demonstrates that it fails to predict the polarity reversal data. Section 3 proposes an alternative theory and steps through its predictions for three polarity reversal examples. Section 4 addresses the concern of overgeneration that arises for pragmatic accounts of sluicing, and Section 5 concludes.

2. e-GIVENness

Numerous theories of sluicing have been proposed since the original syntactic isomorphy approach given in Ross (1969). The dominant semantics-based account of sluicing is Merchant's (2001) theory of e-GIVENness, which imposes a bidirectional semantic entailment identity condition on ellipsis. More recent theories have constrained the e-GIVENness account in various ways (Merchant 2005; Chung 2006, 2013; Barker 2013; AnderBois 2014). As these accounts are designed to be *more* restrictive than Merchant's original account, the objection outlined here that e-GIVENness undergenerates the polarity reversal data applies equally to these theories.⁵

2.1. Bidirectional semantic entailment

Merchant (2001) proposes that sluicing constructions are formed via wh-movement of a remnant constituent and subsequent deletion at PF of the remaining TP. e-GIVENness is a modification of Schwarzschild's (1999) GIVENness, which itself is a theory of focus and deaccenting. Schwarzschild proposes, drawing upon Rooth's (1985, 1992) theory of focus, that an expression can be deaccented if it is GIVEN, where GIVENness is defined as follows:

Formal GIVENness Condition:

An utterance B counts as GIVEN iff it has an antecedent A and:

$$\forall \langle w, g \rangle \in c \quad \exists h \quad [\text{ExClo}(\llbracket A \rrbracket^g)(w) \rightarrow \text{ExClo}(\llbracket B \rrbracket^{g,h})(w)]$$

Informally, GIVENness says that an expression can be deaccented if the existential focus closure of the expression is contextually entailed by the existential closure of an antecedent.⁶

⁴A methodological aside on the data used throughout: The corpus examples given here were identified by undergraduate annotators trained on the Santa Cruz Ellipsis Consortium. The properties of the sluices, including the provided pre-sluices, are those given by (at least) two independent annotators. After the annotation process, the judgments were verified by (an average of) ten trained linguists, including faculty and graduate students, in consultation with naïve speakers. Many of the examples presented here have more than one possible interpretation for the pre-sluice. The claim here is not that the pre-sluices provided for these examples are the *only* interpretation available for these examples, but merely that they are a felicitous, freely available interpretation in the context in which the sluice was found or constructed.

⁵Barros (2014) and Ginzburg and Sag (2001) take a different approach, combining syntactic and pragmatic constraints. See Kroll (in prep) for a discussion of these theories.

⁶Existential closure is a type-shifting operation that raises expressions to type $\langle t \rangle$ by existentially binding unfilled arguments.

Because Schwarzschild was concerned with deaccenting, his theory does not discuss ellipsis. However, Merchant draws upon the idea from Rooth (1992) and Romero (1997) that the licensing conditions for deaccenting and ellipsis are related, the strong version of which is to say that ellipsis is just an extreme version of deaccenting. Merchant notes, though, that the theory of GIVENness runs into a problem if applied faithfully to cases of ellipsis. Specifically, it fails to rule out impossible sluices such as (3), in which the elided content is entailed by the labelled antecedent (assuming *calling x an idiot* $\rightarrow$ *insulting x*), but is not judged to be a possible interpretation of the sluiced sentence.

(3) [Abby called someone an idiot]_A, but I don't know who [~~Abby insulted t~~]_E.

Based on such examples, Merchant proposes that GIVENness alone is not strong enough to act as a licensing condition for ellipsis. Merchant therefore strengthens GIVENness by requiring that the entailment relationship between the antecedent and elided expression be bidirectional instead of unidirectional. The account is given as follows:

Focus condition on TP-ellipsis: A TP α can be deleted only if α is e-GIVEN.

e-GIVENness: An expression E counts as e-GIVEN iff E has a salient antecedent A and, modulo $\exists$ type-shifting, i) A entails F-clo(E), and ii) **E entails F-clo(A)**.

Note that condition (ii) is the novel aspect of the theory. Note also that the entailment requirement here is that of semantic entailment and, unlike GIVENness, does not leave room for contextual entailment.

The bidirectional entailment requirement of e-GIVENness will correctly rule out the problematic example given in (3), repeated below, as the elided expression does not entail the F-closure of the antecedent expression.

(3) [Abby called someone an idiot]_A, but I don't know who [~~Abby insulted t~~]_E.

A entails F-clo(E): Yes.

A = $\exists x$. Abby called x an idiot

F-Clo(E) = $\exists x$. Abby insulted x

E entails F-clo(A): No.

E = $\exists x$. Abby insulted x

F-Clo(A) = $\exists x$. Abby called x an idiot

2.2. e-GIVENness predictions

The semantic identity condition of e-GIVENness is permissive enough to allow for certain observed syntactic mismatches between sluiced clauses and their antecedents, such as tense (Merchant 2001); however, the bidirectional entailment requirement is too restrictive to allow for polarity mismatches. Let's look again at (2), repeated below as (4).

(4) I don't think that [_{TP} Trump_i will comply]_A, but I don't know why [_{TP} ~~he_i won't comply~~]_E.

Applying e-GIVENness to A and E yields the following:

A entails F-clo(E): No.

A = **comply**(t)

F-Clo(E) = $\neg$ **comply**(t)

E entails F-clo(A): No.

E = $\neg$ **comply**(t)

F-Clo(A) = **comply**(t)

Neither the antecedent expression nor the elided expression in (4) entails the other. An alternate possibility is to include the matrix clause in the antecedent, thereby capturing its negation in the antecedent expression. This is given in (5).

(5) [TP I don't think that Trump_i will comply]_A, but I don't know why [TP ~~he_i won't comply~~]_E.

A entails F-clo(E): No.

A = $\neg \forall w [w \in W_{\text{dox}, s} \rightarrow \text{comply}(t)(w)]$

F-Clo(E) = $\{w: \neg \text{comply}(t)(w)\}$

E entails F-clo(A): No.

E = $\{w: \neg \text{comply}(t)(w)\}$

F-Clo(A) = $\neg \forall w [w \in W_{\text{dox}, s} \rightarrow \text{comply}(t)(w)]$

As (5) shows, expanding the antecedent to include the matrix negation does not yield entailment in either direction. Indeed, my lacking a belief that Trump will comply does not semantically entail that Trump will not comply, as my lack of beliefs about an event does not entail any truth about the event itself. Notice that even if one argues that the stronger neg-raised interpretation of the antecedent, e.g. along the lines of Gajewski (2007) (see §3.1), counts as semantic content, we still do not have mutual entailment, as my thinking that Trump will not comply does not entail that he won't, as I can have false beliefs. Similarly, it will not work to take the matrix as antecedent, and the complement of *but* as the potential elided phrase,⁷ as my thinking that Trump will not comply does not semantically entail my not knowing why he won't, as I may indeed know the reason he won't. I leave it to the reader to confirm the formal predictions here.

In summary, bidirectional semantic entailment accounts such as e-GIVENness are too restrictive and fail to predict the existence of polarity reversal data. The next section proposes an alternative account that builds off the insights of both GIVENness and e-GIVENness.

3. A modified account

This section presents a theory of sluicing that abandons semantic identity in favor of pragmatics-based entailment. The spirit of the proposal is indebted to those accounts already discussed and to the contextual entailment allowance that was included, though not given an exposition, in Schwarzschild's GIVENness. Informally, I propose that the TP of an interrogative can be elided if and only if the proposition expressed by the TP, modulo existential closure, is entailed by the context in which the proposition would be uttered. Formally, Local Givenness is expressed as follows:

⁷If one wanted to argue that, similar to focus licensing (Rooth 1985, 1992), one can have a larger expression license the deletion of a smaller contained expression.

Local Givenness (Preliminary): A TP α can be deleted iff $ExClo(\llbracket \alpha \rrbracket^g)$ expresses a proposition p such that $c_L \subseteq p$.

The relevant notion of context we are concerned with is the local context, c_L , in which p is expressed. The local context of a proposition p is more constrained and therefore not necessarily identical to the global context of the discourse in which p is uttered. For Stalnaker, the context set is updated as propositions are entered into the discourse and accepted by speakers as true for the purposes of the discourse (2002). However, propositions can be entered into local contexts without being entered into the context set, i.e. without being accepted as true of the actual world by the speakers of the discourse. Note that this means that, throughout a discourse, c_L is not a continually narrowing set of worlds. Instead, c_L is the set of worlds compatible with the presuppositions of the local proposition. While the account presented here is compatible with a range of dynamic theories, I assume the following basic formal reasoning (Kadmon 2001 and citations within):

Context update:

- a. If c_L entails the presuppositions of p , then $c_L + p = \{c_L \cap p\}$
- b. If c_L does not entail the presuppositions of p , then either:
 - i. undefined, or
 - ii. the presuppositions of p are accommodated, $c_L + p = \{(c_L \cap ps(p)) \cap p\}$

The following sections apply Local Givenness to three categories of polarity reversal sluices.⁸

3.1. Neg-raising polarity reversals

One class of polarity reversal sluices contains neg-raising verbs. For example, (2) is repeated below as (6):

- (6) [I don't think that Trump_i will comply]_A, but I don't know why [TP ~~he_i won't comply~~]_E.

That neg-raising is the relevant property in (6) can be seen by swapping the neg-raising verb *think* with the non-neg raising verb *hope*, as in (7a). Example (7a) cannot receive the polarity reversal interpretation; the only available interpretation is that in which the matrix clause acts as antecedent, given in (7b).

- (7) a. Mary doesn't hope that Trump_i will comply, and she can't explain why [~~# he_i won't comply~~].
 b. Mary doesn't hope that Trump will comply, but she can't explain why [she_i ~~doesn't hope that Trump will comply~~].

Neg-raising verbs are clause-embedding verbs that when negated allow a reading in which matrix negation takes scope in an embedded clause. As it is arguably the dominant approach

⁸See Kroll (in prep) for derivations of polarity reversal examples containing *until*, *doubt*, and *say*.

in the literature, I use here the account of neg-raising given in Gajewski (2007).⁹ Gajewski's account draws importantly on an idea from Bartsch (1973) that the inference from the literal interpretation of a neg-raising sentence like (6_A), where negation takes matrix scope, to the neg-raised interpretation, where negation takes embedded scope, is a pragmatic inference. Specifically, Bartsch argues that neg-raising verbs license an excluded middle presupposition as a pragmatic inference. For a sentence like (6_A) that contains the neg-raising verb *think*, the presupposition is that the subject either believes that the proposition expressed by the complement of the verb is true, or believes that it is false. The assertion of (6_A) combined with this presupposition then pragmatically entails that the speaker in (6) has a belief that Trump will not comply. The pragmatic nature of the reasoning involved explains how negation comes to be interpreted low and also explains why the neg-raised reading is cancellable in context. The criticism leveled against Bartsch's original account is that no principled reason is given for why some verbs are neg-raising verbs and others are not (Horn 1978). For example, no explanation is given for why the verb *think* can neg-raise while the epistemically stronger verb *know* cannot, or why neg-raising verbs are idiosyncratically distributed across different languages.

Gajewski proposes to alleviate this objection by categorizing the excluded middle presupposition of neg-raising verbs as a soft-trigger presupposition in the sense of Abusch (2005). Abusch's soft-trigger presuppositions are presuppositions that are easily cancellable in context and as such are distinct from hard-trigger presuppositions, which are not. Soft-trigger presuppositions are carried by predicates that invoke lexically-stipulated alternatives as a matter of convention. The invocation of these alternatives triggers a pragmatic presupposition that one of the alternatives is true. In the case of neg-raising verbs, the alternatives invoked are the literal interpretation of the sentence and the neg-raised interpretation of the sentence.

To summarize this discussion, Gajewski proposes to treat neg-raising predicates as soft triggers that invoke a pragmatic excluded-middle presupposition. This captures the behavior described in Bartsch's account while providing a more principled explanation for why some verbs allow neg-raising and others do not.

With this theoretical background in place we can now return to example (6). I have proposed that the assertion of (6_A) combined with the excluded-middle presupposition invoked by the verb *think* entails that the speaker in (6) has the belief that Trump will not comply. Formally, this is expressed as follows:

(6) [I don't think that Trump_i will comply]_A, but I don't know why [~~he won't comply~~]_E.

(6') $\llbracket \text{I don't think that Trump will comply} \rrbracket_A^{w,g} = \neg \forall w [w \in W_{\text{dox}, s} \rightarrow \text{comply}(t)(w)]$

Via the excluded middle presupposition conventionally associated with the verb *think*, A presupposes the following:

Excluded Middle Presupposition of (6_A):

$[\forall w [w \in W_{\text{dox}, s} \rightarrow \text{comply}(t)(w)] \vee \forall w [w \in W_{\text{dox}, s} \rightarrow \neg \text{comply}(t)(w)]]$

⁹I ask my syntactically-inclined readers to please preview §3.2 to assuage objections to this choice.

The denotation of *think* assumed here can therefore be given as follows:

$$\llbracket \text{think} \rrbracket^{w,g} = \lambda p. \lambda x: [\forall w [w \in W_{\text{dox}, x} \rightarrow p(w)] \vee \forall w [w \in W_{\text{dox}, x} \rightarrow \neg p(w)]].$$

$$[\forall w [w \in W_{\text{dox}, x} \rightarrow p(w)]]$$

Because A expresses that the first disjunct of the excluded middle presupposition is false, the presupposition of A and the assertion of A together entail the second disjunct of the presupposition. This entailment produces the stronger reading that the speaker uttering (6) has a belief that Trump will not comply.

Local Givenness requires that the proposition elided in (6)—Trump will not comply—is entailed in its local context; however, as discussed, the strengthened neg-raising reading in (6)—that the speaker believes that Trump will not comply—does not semantically entail the elided proposition, as the speaker can have false beliefs. I argue here that the speaker's assertion of her belief of *p* can, in context and under certain conditions, be taken to assert *p* itself. This move relies on the proposal that, while doxastics such as *think* primarily report on the private mental state of an individual and therefore do not directly reference the common ground (or context), *think p* can be used in conversation to pragmatically assert *p*, as proposed in Anand and Hacquard (2014, 84).

The following steps apply Local Givenness to (6).

- i. Starting Context:

$$c = W$$

- ii. (6_A) asserts that it is not true that the speaker believes that Trump will comply.

Semantic Denotation of (A):

$$\llbracket A \rrbracket^{w,g} = \neg \forall w [w \in W_{\text{dox}, s} \rightarrow \text{comply}(t)(w)]$$

- iii. The pragmatic excluded middle presupposition of (6_A)—conventionally associated with the verb *think*—requires that the speaker either believes that Trump will comply or believes that Trump will not comply.

Excluded Middle Presupposition of (A):

$$[\forall w [w \in W_{\text{dox}, s} \rightarrow \text{comply}(t)(w)] \vee \forall w [w \in W_{\text{dox}, s} \rightarrow \neg \text{comply}(t)(w)]]$$

- iv. Steps (ii) + (iii) derive the strengthened neg-raised interpretation: Because (ii) asserts that it is not true that the speaker believes that Trump will comply, it follows from (iii) that the speaker believes that Trump will not comply. The utterance of (6_A) thus asserts the strengthened meaning given below.

Strengthened Neg-Raised Interpretation of (A):

$$\forall w [w \in W_{\text{dox}, s} \rightarrow \neg \text{comply}(t)(w)]$$

- v. The assertion in step (iv) creates a local context c_L in which the worlds under consideration are only those compatible with the speaker's doxastic state, namely those worlds in which Trump does not comply.

$$c_L \text{ for E: } W \cap \{w: w \in W_{\text{dox}, s}\} = \{w: \neg \text{comply}(t)(w)\} = c_{LE}$$

- vi. Semantic Denotation of (E):
 $\{w: \neg \text{comply}(t)(w)\}$

- vii. The local context includes only those worlds in which Trump will not comply, which entails the elided proposition that Trump will not comply (in fact there is mutual entailment between the world sets).

Local Givenness:

$$c_{LE} \subseteq \text{ExClo}(\llbracket E \rrbracket)^{w, g} = \{w: \neg \text{comply}(t)(w)\} \subseteq \{w: \neg \text{comply}(t)(w)\}$$

The entailment satisfies the Local Givenness requirement that the elided proposition be entailed by its local context, and we predict felicitous elision of the proposition expressed by (6E).

3.2. Polarity reversals over *remember*

The reader may, at this point, raise an objection that the previous example wrongly dismissed the possibility of a syntactic account of neg-raising as an explanation for the inference from $\neg\phi p \rightarrow \neg p$. Indeed, the classic analysis of neg-raising—originally advanced by, among others, Fillmore (1963) and Ross (1973) and revived recently by Collins and Postal (2014)—argues for a syntactic explanation. However, I show in this section that an appeal to a syntactic account of neg-raising will not save a semantic entailment account of sluicing. Instead, the inference $\neg\phi p \rightarrow \neg p$ must, at least in some cases, be purely pragmatic in nature.

Example (8) is a corpus polarity reversal sluice containing *remember*.

- (8) [corpus example 91594, Santa Cruz Ellipsis Project]

Context: [O]n the day the Japanese invaded Pearl Harbor, Hummel was rounded up and locked in an internment camp along with about 2,000 other foreigners... So he and a British friend engineered an escape with the help of Nationalist guerrillas concealed nearby. He crawled over barbed-wire and walked most of the night and the next day. He was 20 and had no military training. But he was handed a small Belgian pistol, and he had little choice but to stay and help, harassing Japanese patrols by night and trying to defend a small patch of land against a communist takeover.

Sluice: “I don’t know why [~~I wasn’t scared~~], but I really can not remember being scared,” [Hummel] said. “It all seemed like great fun.”

Example (8) is illustrative in that it appears to behave like the neg-raising examples; specifically, $\neg \text{remember } p$ is interpreted in context as entailing $\neg p$. However, *remember* is

not classified as a neg-raising verb in the literature and, indeed, the inference is more contextually dependent than that carried by neg-raising verbs. For example, A's utterance in (9) is perfectly acceptable, while A's utterance in (10) is grammatical but a bit unwieldy.

(9) I don't remember being scared, but apparently I was!

(10) ?I don't think that John went to the party last night, but that's because I don't know anything about his whereabouts last night.

Karttunen (1971) classifies *remember* as an *implicative* verb. As such, *remember* has the following properties when taking an infinitival complement: *remember* $p \rightarrow p$, $\neg$ *remember* $p \rightarrow \neg p$. For example, in (11) below there is a strong intuition that the assertion of the sentence commits the speaker to believing that she did not shut the door.

(11) I didn't remember to shut the door.

Higginbotham (2003) proposes that *remember* (along with *imagine*) in its usage with a gerund complement carries an obligatory *de se* reading when the embedded subject is PRO. For example, while (12) has both a possible *de re* and a possible *de se* reading, (13) carries only the *de se* reading, under which John remembers he himself going to the movies.

(12) John remembered his going to the movies.

(13) John remembered going to the movies. [Higginbotham 7&10]

Based on these discussions, I propose that the licensing of the inference $\neg$ *remember* $p \rightarrow \neg p$ in (8) is licensed by two defeasible contextual assumptions. The first assumption is that the speaker has a memory about the particular event represented by p .¹⁰ I argue that this assumption is stronger in cases in which the subject of *remember* is remembering their own experience of the particular event, as in Higginbotham's *de se* examples. The second assumption is based on the idea that insofar as our memory of eventualities track with our beliefs about those eventualities, a speaker's memory represents the speaker's beliefs about the way the actual world was in the past. An assertion of memory can therefore in context be taken as doxastic evidence for or against a description of a particular eventuality and license inferences from memory to belief. These assumptions are defeasible in that a speaker can have the reliability of her memory challenged.

The following steps apply Local Givenness to (8).

(8) I don't know why [~~I wasn't scared~~]_E, but [I can not remember being scared]_A.

¹⁰I abstract away here from concerns about negative events, and assume that the event in question in (8) exists and that it was either an event of being scared or an event of being not scared. Another way to approach this is to say that the speaker either remembers the event e or remembers the maximal eventuality S of all eventualities e' in the relevant time period and $e \sqsubseteq S$ (cf. Krifka (1989) and de Swart (1996), in which the following definition of event negation is used: $\lambda P.\lambda s.[\text{MAX}(s) \wedge \neg \exists e[P(e) \wedge e \subseteq s]]$).

i. Starting Context:

$$c = W$$

- ii. The presupposition associated with A is that the speaker has a memory of the particular event being discussed, namely an event of being scared or being not scared.

Presupposition of A:¹¹

$$[\forall w[w \in W_{\text{MEM},s} \rightarrow \exists e[\neg \text{scared}(s)(e)(w)]] \vee \forall w[w \in W_{\text{MEM},s} \rightarrow \exists e[\text{scared}(s)(e)(w)]]]$$

- iii. The semantics of A expresses that the speaker does not remember an event of being scared: in all the worlds compatible with the memory of the speaker there was no event (in the relevant time period) in which the speaker was scared. $W_{\text{MEM},s}$ here acts as an information state of the speaker containing all those worlds compatible with the memory of the speaker.

Semantic Denotation of A:

$$[[A]]^{w,g} = \forall w[w \in W_{\text{MEM},s} \rightarrow \neg \exists e[\text{scared}(s)(e)(w)]]$$

- iv. Steps (ii) and (iii) together entail the proposition that the speaker remembers an event of his being not scared. Therefore, an assertion of A expresses the following:

Presuppositionally-enriched Denotation of A:

$$\forall w[w \in W_{\text{MEM},s} \rightarrow \exists e[\neg \text{scared}(s)(e)(w)]]$$

- v. Under the inference that the speaker's memories of the past represent the speaker's beliefs about the history of the actual world, we can infer the following from Step (iv).

Inference of Speaker's Belief:

$$\forall w[w \in W_{\text{DOX},s} \rightarrow \exists e[\neg \text{scared}(s)(e)(w)]]$$

- vi. Step (v) pragmatically asserts that the speaker was not scared.¹² The context is then updated with this proposition.

Context Update:

$$W \cap \{w: \exists e[\neg \text{scared}(s)(e)(w)]\} = \{w: \exists e[\neg \text{scared}(s)(e)(w)]\} = c_{\text{LE}}$$

vii. Existential Closure of E:

$$\text{ExClo}([E]^{w,g}) = \{w: \exists e[\neg \text{scared}(s)(e)(w)]\}$$

viii. Local Givenness:

$$c_{\text{LE}} \subseteq E = \{w: \exists e[\neg \text{scared}(s)(e)(w)]\} \subseteq \{w: \exists e[\neg \text{scared}(s)(e)(w)]\}$$

¹¹Contextual domain restriction assumed throughout.

¹²One could also argue that the assertion creates a subordinating context for the embedded *why* question. I see no crucial difference between the two implementations here.

The existential closure of E is entailed by its local context, and we correctly predict felicitous elision of E.

As a closing note, the fact that example (8) is a cataphoric sluice was ignored for our purposes here. Something must, of course, be said about these sluices, which are common in the Santa Cruz sluicing corpus. I leave this aside for further investigation, besides noting that these sluices seem to involve some sort of processing hold in which the sluice is not interpreted until a relevant antecedent is encountered, analogous to instances of pronominal cataphora.

3.3. Polarity reversals with exclusive disjunction

The resourceful reader might at this point object that, instead of jettisoning our familiar bidirectional entailment account, a simpler path is to simply enrich the bidirectional entailment condition to include pragmatic and not merely semantic content. I show here that a pragmatically enriched bidirectional entailment account still fails to generate the full range of polarity reversal data. The polarity reversal examples discussed in this section involve exclusive disjunction. A corpus example is given in (14) and a constructed example in (15).

- (14) [corpus example 22987, Santa Cruz Ellipsis Project]

Context: On Dec. 10, [Senator] McCain sent a letter to the FCC urging the five-member board to end two years of deliberations and decide whether Paxson Communications should be given a license for a Pittsburgh station. Angela J. Campbell, an attorney for opponents to the deal, told the Globe that McCain's letter likely 'tipped' the scales in favor of the decision.

Sluice: "Senator McCain said, 'Do it by December 15 or explain why [~~you didn't do it by December 15~~],' and the commission jumped to it and did it that very day," Campbell told the Globe.

- (15) [constructed example]

Context: Students in a semantics class were given the option to do an extra credit problem, and were required to mark the number of the problem that they did on a spreadsheet accessible by the course's professor and TA. Both the professor and TA thought that John, a student in the class, would have chosen to do a problem. They look at the spreadsheet and see that nothing is marked down under John's name. The TA says to the professor:

Sluice: Either [John_j didn't do an extra credit problem]_A, or he_j didn't mark which one_i [~~he_j did _i~~]_E.

Note that these examples illustrate that negation can be either "added" into the ellipsis site, as in (14), or "deleted" from the ellipsis site, as in (15).¹³

¹³Thank you to Jason Merchant (p.c.) for pointing out that these data run counter to the claim made in Merchant (2013: 15) that negation present in the antecedent of a sluicing construction requires a corresponding negation present in the ellipsis site.

I focus here on example (15), the utterance of which asserts that either (A) *John didn't do an e.c. problem* or (E) *John did an e.c. problem*. The disjunction is exclusive because the two disjuncts are opposites: they cannot both be true (or false) at the same time. The analysis of (15) given here relies on Karttunen's (1974) proposal of the local contexts for exclusive disjunction constructions. Specifically, Karttunen gives the following asymmetric proposal for disjunctive constructions:

Karttunen's Local Context for Exclusive Disjunction:

For propositions p, q such that $p \vee q$ is uttered in a context c :

c_L for $p = c$,

c_L for $q = c + \neg p$.

The proposal says that the local context for the first disjunct of an exclusive disjunction construction—that is, the context in which the disjunct can be felicitously uttered—is the global conversational context. The local context for the second disjunct is the global conversational context intersected with the negation of the first disjunct. The intuition for this proposal is that for an exclusive disjunction to be true one of the disjuncts must be true, but not both. Therefore, the context in which the first disjunct is admitted is just the global conversational context, but the context in which the second disjunct is admitted takes into account its opposition to the first disjunct, and so all the worlds in which the first disjunct holds are excluded.

The following steps apply Local Givenness to the disjunction in (15).

i. Starting Context:

$c = W$

ii. Denotation of A:

$\llbracket A \rrbracket^{w,g} = \{w: \neg \exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

iii. Denotation and Existential Closure of E:¹⁴

$ExClo(\llbracket E \rrbracket^{w,g}) = \{w: \exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

iv. Karttunen's Local Context for A and E:

$c_{LA} = c = W$

v. Local Givenness:

$c_{LE} \subseteq ExClo(\llbracket E \rrbracket^{w,g}) = \{w: \neg \neg \exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$
 $\subseteq \{w: \exists x[\text{extra credit problem}(x)(w) \wedge \text{do}(x)(j)(w)]\}$

¹⁴Note that the wh-phrase *which one* is d-linked in the sense of Pesetsky (1987), meaning that it ranges over a salient set in the discourse. One could assume here, following Cinque (1989), that d-linked wh-phrases are referential and therefore leave behind a referentially indexed trace. Existentially closing over this trace would then restrict the possible identity of the thing to which the existentially bound variable can refer to a member of a particular set present in the discourse. However, as the d-linking is orthogonal to the example here, I suppress this issue for the sake of expositional clarity.

Local Givenness is satisfied in step (iv) because the local context for E entails the proposition expressed by E, assuming a classical logic in which a doubly negated proposition equals its unnegated equivalent. We therefore correctly predict felicitous elision of E.

The possibility of polarity reversal sluices in disjunction constructions illustrates the necessity of local contextual entailment in the current account. The global context of (15) does not entail the proposition that John did any extra credit problems, as both possibilities—of John having done extra credit problems and of him not having done any—are being entertained as possibilities. It is only in the local context of the second disjunct that the proposition that John did extra credit problems is entailed, as the local context excludes those worlds in which John didn't do any extra credit problems. Furthermore, examples such as (15) show that a pragmatically-enriched bidirectional entailment account is insufficient to explain the polarity reversal data, as no pragmatic enrichment of the semantic content of A and E in (15) will yield bidirectional entailment of the propositions. Instead, the crucial licensing factor in this example is the disjunctive operator—which contributes its heritage properties¹⁵ to A and E—and not the propositional content of A and E themselves.

4. Concerns of overgeneration

The analysis proposed here is necessarily more permissive than syntactic or semantic entailment accounts of sluicing; this additional permissiveness is required in order to capture the structural and semantic differences between the antecedent and elided phrases in polarity reversal sluices. However, there are concerns that a pragmatics-based sluicing account will overgenerate or be overly permissive. I sketch here several constraints to alleviate these concerns.¹⁶

First, I adopt the constraint that focus-marked constituents cannot be elided (Rooth 1992; Heim 1997; Merchant 2001). Second, I adopt what I call the Well-Formedness Condition on Sluicing (see Dayal and Schwarzschild 2010):

The Well-Formedness Condition on Sluicing:

If a pre-sluice is infelicitous, then the corresponding sluice will not be well-formed.¹⁷

Dayal and Schwarzschild propose the restriction in order to rule out cases such as (16), comparable to (3) above, which motivate the bidirectionality condition of e-GIVENness:

(16) Abby_i called Brian an idiot, but I don't know who [~~#she_i insulted _f~~]_E.

The Condition is both empirically supported and intuitively satisfying. It seems desirable that a question that is infelicitous when uttered overtly will remain infelicitous when partially elided. By adopting the Well-Formedness Condition we are able to rule out examples like

¹⁵See Karttunen and Peters (1979), Heim (1983), and Kadmon (2001).

¹⁶See a more extensive discussion of overgeneration concerns in Kroll (in prep). Additional concerns with a pragmatic approach are case matching facts (Merchant 2001) and the Chung's Generalization facts (Chung 2006, 2013). Case matching facts are captured in this account's adoption of Merchant's PF deletion account (2001); see Kroll (in prep) for an account of the Chung's Generalization facts.

¹⁷The term *infelicitous* was chosen here in order to allow for the proposed amelioration of islands under sluicing (Merchant 2001).

(16) independently, obviating the need for a stronger bidirectional entailment condition in these cases.

A question naturally raised at this point is why the pre-sluices of examples like (16) are infelicitous. I propose that this is because it is infelicitous to ask a question that already has a partial answer available in the discourse (Romero 1997; Fitzpatrick 2005; Barros 2014; a.o.).^{18 19} For example, B's question in (17) is infelicitous without the inclusion of *other*:

- (17) A: I saw some tigers today at the zoo.
 B: {What/which} #(OTHER) animals did you see today at the zoo?²⁰

B's response is infelicitous without *other* because A has already asserted that she has seen some tigers that day at the zoo, which is a partial answer to the question 'What animals did you see today at the zoo?'. *Other* contributes a presupposition that A has seen *some* particular animal at the zoo that day. Unlike previous discussions of this discourse requirement on questions, I propose that the behavior be accounted for using Heim's (1991) *Maximize Presupposition*:

Maximize Presupposition:

Given two contextually equivalent alternatives, speakers must use the alternative whose presuppositions are stronger and happen to be met in the context of use.

Maximize Presupposition captures exactly the generalization that we want, which is that a question must ask for only new information in a discourse and must presuppose the existence of any partial answers that are already available. The additional benefit of using Maximize Presupposition is that it relates this characteristic of questions to a more general constraint on felicitous utterances in a discourse, making it unnecessary to posit a separate constraint purely for questions.

Last, I integrate into the current account an intuitively satisfying pragmatic constraint that for a proposition to be elided it must be *uniquely salient* at the time the sluice is uttered. The idea is motivated by the common sense principle that in order for a speaker to felicitously not pronounce some part of an utterance, the meaning of the unpronounced piece of the utterance must be recoverable by the speaker's interlocutor in the discourse. The integration of this constraint correctly rules out the infelicitous sluice in (18), which is not ruled out by Local Givenness as given in §3 nor by the Well-Formedness Condition.

- (18) [Abby called [Joe]_F an idiot]_A, but I don't know who [else]_F [~~#Abby insulted~~]_E.

The saliency constraint is integrated into the final version of Local Givenness, provided below.

¹⁸See also Barker's (2013) Answer Ban and Ginzburg's (2012) Question Introduction Appropriateness Condition. While the Answer Ban is intended to apply to sluices, this is clearly a more general constraint on questions in a discourse. The QIAC deals with the resolution (complete answers) of questions in the discourse.

¹⁹I assume here a definition of partial answers based on partition semantics (Groenendijk and Stokhof 1981, 1984; Lahiri 2002, a.o.).

²⁰Where *animals* is given a kind reading, so the relevant alternatives are tigers, lions, llamas, etc.

Local Givenness (Final): A TP α can be deleted iff $ExClo(\llbracket \alpha \rrbracket^g)$ expresses a proposition p , such that $c_L \subseteq p$ and p is uniquely salient.

Additionally, the following test of saliency is proposed:

Test for saliency: p is salient at time t if p can be picked out by a propositional discourse anaphor, such as *that*, at time t .

That positive polarity sentences license the propositional discourse anaphor *that* is pointed out in Webber (1988), among others. That negative sentences also license discourse anaphora is observed in Asher (1993), Hwang (1992), and de Swart (1996):

- (19) John didn't know_i the answer to the problem. This_i lasted until the teacher did the solution on the board. [Asher, pg. 53]

The propositional discourse anaphor *that* is anaphoric to "activated" entities in the sense of Gundel et al. (1990); that is, it is anaphoric to entities that the speech participants are currently aware of, i.e. have access to due to the entities' presence in the immediate discourse context. Note that this type of anaphoric reference to the sluiced content is possible in the polarity reversal cases:

- (20) A: I don't know why [~~I wasn't scared~~]_i, but I really can not remember being scared.
B: That_i's impossible! You were just a child.

In (20), the deictic demonstrative *that* is anaphoric to the sluiced proposition *I wasn't scared*. That is, the meaning of the first sentence in B's utterance is "It's impossible that you weren't scared."

The strong claim that anaphoric reference with *that* is a necessary and sufficient condition to test the salience of a proposition in all cases is not being advocated here. Salience is a more complicated notion than can be captured in a single test, as the extensive literature on pronominal salience and reference attests. The anaphora test is merely intended to be one way to probe this issue. The larger question of how to determine the saliency of a proposition in a given discourse requires more thought and investigation than space allows here.²¹

5. Conclusion

Polarity reversal sluicing data present a new challenge to the enterprise of determining the conditions under which linguistic content can be felicitously elided. This paper shows that, counter to its dominant treatment in the syntactic literature, ellipsis is an inherently pragmatics-sensitive phenomenon subject to contextual licensing. I argue that the ability to elide linguistic content fits naturally into general theories of constraints regulating coherent discourses, and have detailed one way to account for the pragmatic sensitivity of data that

²¹Note that the claim here is that the sluiced proposition licenses the anaphora; the antecedent material may contribute a discourse referent equivalent to the pragmatically enriched proposition, but the theory here does not predict that it necessarily does.

present serious challenges for non-pragmatic theories. Many challenges to developing a complete theory of sluicing and ellipsis, of course, remain.

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