Parentheticality, assertion strength, and discourse[1]

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Abstract. Sentences with so-called SLIFTING PARENTHETICALS (e.g. *The dean, Jill said, flirted with the secretary*; Ross 1973) grammaticalize an intriguing interaction between speech act function and conventional meaning, one that is not found in regular embedding constructions (e.g. *Jill said that the dean flirted with the secretary*). In such sentences, the main clause is independently asserted and at the same time is interpreted in the scope of the parenthetical, which typically serves an evidential function. The discourse effect of this pragmasemantic set-up is that slifting parentheticals modulate the strength with which the main part of the sentence is asserted (Urmson 1952, Asher 2000, Rooryck 2001, Davis et al. 2007, Simons 2007, Maier and Bary 2015). Building on Davis et al. (2007), this paper proposes a probabilistic discourse model that captures the role of parentheticality as a language tool for qualifying speaker's commitments. The model also derives two empirical properties that set apart slifting parentheticals from regular embedding constructions, i.e. (i) the fact that slifting parentheticals invariably express upward entailing operators and (ii) the fact that they usually do not occur in subordinate clauses.

Keywords: parentheticals, evidence, assertion, polarity, embedding, probability.

1. Introduction

The interpretational properties of sentences with SLIFTING PARENTHETICALS (Ross 1973) are perhaps best illustrated by direct comparison to regular embedding constructions. Consider the minimal pair of sentences below.

(1) The dean, Jill said, flirted with the secretary.

(2) Jill said that the dean flirted with the secretary.

The slifting sentence in (1) is largely synonymous with its embedding counterpart in (2). In most contexts, uttering either sentence would imply, in some weak sense, that the dean flirted with the secretary and attribute this information to Jill. The strength of such weak implications is contingent on the additional information provided, including the lexical properties of the attitude predicate (e.g. *say* leads to a weaker claim than *discover*) and the quality of the source (e.g. Jill might be a more trustworthy source than Marissa when it comes to the dean's flirtations). We see that parentheticals as well as embedding constructions can both be used to express claims with a varying degree of strength.

However, slifting sentences exhibit a range of properties that set them apart from regular embedding constructions. Here I discuss two such differences. The first difference concerns the

[1]I would like to thank Dan Lassiter, Roger Schwarzschild, Peter Sutton, and the audiences at *Backgrounded Reports* 2016 and *Sinn und Bedeutung* 21. For judgments, I am indebted to Kurt Erbach, Jeremy Perkins, and Peter Sutton. All mistakes are my own.

observation that the former constructions obey certain polarity restrictions. Jackendoff (1972), Ross (1973), Hooper (1975), and Maier and Bary (2015) already notice that slifting parentheticals usually cannot host negation. Generalizing this observation, we could say that slifting parentheticals may create upward entailing but not downward entailing environments. This is illustrated in (3), where *I think* expresses an upward entailing operator and *I doubt* expresses a downward entailing operator. In contrast to parentheticals, the matrix clause of embedding constructions is not sensitive to the direction of the polarity it creates (4).

(3) Snowden is a Russian spy, $\left\{ \begin{array}{c} \text{I think} \\ \text{\#I doubt} \end{array} \right\}$.

(4) $\left\{ \begin{array}{c} \text{I think} \\ \text{I doubt} \end{array} \right\}$ Snowden is a Russian spy.

Second, slifting parentheticals have a more limited syntactic distribution than embedding clauses. The former do not easily modify subordinate clauses and thus do not appear in the scope of a propositional operator (5). This is in contrast to the latter constructions, which can easily be further embedded (6).

(5) #Selena thinks that Justin, the vocal coach said, is a talented singer.

(6) Selena thinks the vocal coach said that Justin is a talented singer.

The upshot of this preview of properties is that any good semantic theory of slifting sentences needs to explain why such sentences give rise to claims comparable in strength to the claims expressed by embedding constructions. At the same time, the theory should be able to derive the unique properties of slifting sentences that distinguish them from embedding constructions.

Section 2 states the main assumption of the paper. In Section 3, I show how graded claims can be modeled by using standard tools from probabilistic reasoning. Section 4 discusses the polarity and scopal properties of slifting parentheticals. Section 5 is the conclusion.

2. One sentence, two assertions

The main claim of this paper is that slifting sentences stand apart from regular embedding constructions because of a single basic fact. Following similar claims in previous literature, I assume that slifting sentences make two semantic contributions as part of their conventional meaning (cf. Urmson 1952, Hooper 1975, Bach 1999, Asher 2000, Potts 2005, Simons 2007, Maier and Bary 2015, Hunter 2016). More specifically, I assume that the slifted clause (the non-parenthetical part of the sentence) invariably encodes the main assertion while the sentence as a whole expresses secondary, typically evidential information. Hooper and Simons put this idea succinctly:

> "[...] the effect of complement preposing is to make the complement proposition the main assertion of the sentence while reducing the original main clause to parenthetical or secondary status. [...] there are two assertions, or two claims to

> truth. The first one, from the preposed complement, is given more importance in this construction, and the parenthetical assertion is clearly subordinated."
> (Hooper 1975: 95)

> "From a discourse or usage point of view, it seems quite clear that the main point of an utterance of a slifted sentence will be the content of the slifted (i.e. non-parenthetical) clause, with the syntactically parenthetical clause serving a parenthetical function." (Simons 2007: 1039)

This assumption can be summarized as follows.

(7) DOUBLE ASSERTION HYPOTHESIS
A slifting sentence makes two assertions. The main assertion is expressed by the slifted clause and the parenthetical asserts secondary information.

This hypothesis implies that the sentence in (8), repeated from (1), asserts both (8a) and (8b).

(8) The dean, Jill said, flirted with the secretary.
a. The dean flirted with the secretary. (MAIN ASSERTION)
b. Jill said that the dean flirted with the secretary. (PARENTHETICAL ASSERTION)

I argue that the Double Assertion Hypothesis can explain the potentially weakening effect of slifting parentheticals on the main claim and derive the ways in which such sentences differ from regular embedding constructions. While the latter constructions can be used to trigger weak implications as well, these implications need not be written into the semantics and can be derived through reasoning.

It is important to emphasize that the privileged semantic role of slifted clauses correlates with their apparent syntactic status as main clauses. Grimshaw (2011) presents a battery of arguments in support of the claim that English slifted clauses are indistinguishable in form from main clauses. She shows that, unlike subordinate clauses, slifted clauses cannot be non-finite (9), cannot be headed by a complementizer (10), require subject–auxiliary inversion when the parenthetical includes an interrogative predicate (11), and generally block quantifier binding from the parenthetical (12). The following data are adapted from Grimshaw (2011: 4–6).

(9) a. *To leave, I promised them.
b. I promised them to leave.

(10) a. *That it was raining hard, they thought.
b. They thought that it was raining hard.

(11) a. Had she made a mistake, he wondered.
b. *He wondered (whether) had she made a mistake.

(12) a. ??She$_i$ liked the film, every girl$_i$ said.
b. Every girl$_i$ said that she$_i$ liked the film.

This argues for a main clause analysis of slifted clauses (Jackendoff 1972) over one which views them as raised or "s(entence-)lifted" complements (Ross 1973). While the precise syntactic analysis of slifting sentences is not the focus of this paper, given the weight of the empirical evidence, I will assume that slifted clauses are main clauses and treat slifting parentheticals as adjuncts.

3. Modulating assertion strength

We have already seen that the strength with which a clause is implied can be qualified by parenthetical modification or through semantic embedding. For example, the unqualified claim in (13) can be weakened as in (13a) or (13b).

(13) Jack is married to a nurse.
a. Jack, Emmy said, is married to a nurse.
b. Emmy said that Jack is married to a nurse.

There are two simple yet important observations to be made about (13a)–(13b). The first observation is that the degree to which (13) is implied is modulated by the quality of the evidence stated in the parenthetical or the matrix clause. For example, changing *Emmy said* to *Emmy discovered*, *Emmy might have said*, or *Everyone claims* may result in a stronger or a weaker claim. The second observation is that if the context is held constant, the relative strength with which (13) is implied by each sentence is roughly the same. If we schematically represent slifting sentences as C, E and embedding constructions as $E(C)$, where C and E are mnemonics for "claim" and "evidence" (respectively), these two empirical observations can be summarized as follows.

(14) If C, E and $E(C)$ are uttered in the same context, then:
a. STRENGTH DEPENDENCE: The implication strength of C is contingent on E in both C, E and $E(C)$.
b. STRENGTH SIMILARITY: C is implied with approximately the same strength by C, E and $E(C)$.

I take it that Strength Dependence is quite uncontroversial. One piece of evidence for Strength Similarity is the fact that the main claim put forward by slifting or embedding sentences can be doubted or denied by the speaker with a comparable degree of ease.

(15) Jack, Emmy said, is married to a nurse, but $\left\{ \begin{array}{c} \text{I doubt he really is} \\ \text{I'm sure he isn't} \end{array} \right\}$.

(16) Emmy said that Jack is married to a nurse, but $\left\{ \begin{array}{c} \text{I doubt he really is} \\ \text{I'm sure he isn't} \end{array} \right\}$.

There appears to be some variation in judgment regarding the strength of slifted clauses, though.

Jackendoff (1972), Asher (2000), Murray (2014), and Hunter (2016) claim that slifted propositions cannot always be denied, even when the respective embedded proposition can.[2]

(17) a. Myrtle will come tomorrow, Margaret believes, (#but she actually came yesterday).
b. Margaret believes that Myrtle will come tomorrow, but she actually came yesterday. (examples from Jackendoff 1972: 97)

(18) a. #John, Mary assures us, can be trusted, but I don't trust him.
b. Mary assures us that John can be trusted, but I don't trust him.
(examples from Asher 2000: 36)

If these data are real, one possible explanation is that the contrast in judgment may have to do with the central discourse status of slifted clauses (see Section 4.2). However, I discovered that English speakers tend to accept (17a) and (18a). Moreover, all speakers I consulted find such sentences felicitous if a weaker follow-up (e.g. *but I seriously doubt it*) is used, such that the possibility that the slifted clause is true is left open. I will then assume that slifted clauses imply commitments that more or less match the commitments implied by the respective embedded propositions.

How can we model weak assertions? Davis et al. (2007) hypothesize that there are two major language strategies for qualifying a claim. The first strategy involves semantic embedding under an appropriate modal operator, which weakens the original claim by manipulating its truth conditions. This is the strategy illustrated by embedding constructions. Under the second strategy, first suggested in Lewis (1976), the speaker specifies the source of information and may weaken the original claim by lowering the quality threshold for asserting it.[3] Since slifting parentheticals provide evidential support for the main claim, slifting sentences arguably lexicalize this latter strategy (see also Simons 2007, Murray 2014, Hunter 2016). To illustrate the evidential strategy, Davis et al. (2007: 81) outline the following three-step procedure (here slightly adapted).

(19) If a parenthetical sentence C, E is uttered by an agent a and in a context c, then:
i. a assumes a commitment to having E-type evidence for C,
ii. the quality threshold θ^c is readjusted to the reliability of E, and then
iii. a asserts C against θ^c.

One intuitive way of fleshing out Davis et al.'s idea is to assume that propositions enter the common ground as indexed by quality thresholds, which impose a lower bound on their certainty level. The threshold against which a slifted clause C is asserted will depend not only on the context but also on the reliability of the evidence E provided by the slifting parenthetical. This threshold could then be less than the default for the given context. In contrast to parentheticals,

[2]For reasons of uniformity and in order to do justice to the proposal, in borrowed examples I will often substitute ungrammaticality marking (*) with pragmatic unacceptability marking (#).

[3]Davis et al. (2007) call these the MODAL and the EVIDENTIAL strategy, respectively. I find this terminology confusing in both directions. On one hand, slifting parentheticals contain modals as main predicates; on the other hand, modal verbs often contribute evidential meanings (von Fintel and Gillies 2010, Lassiter 2016).

an embedding sentence $E(C)$ will always be evaluated against the unmodified threshold. If C is weakened, this is because it is interpreted in the semantic scope of E, not because it is weakly asserted.

As an illustration, consider a context with a quality threshold of 0.9 and one in which the likelihood of Emmy's words being true is 0.7. If *Jack, Emmy said, is married to a nurse* is uttered, we will add to the common ground both the proposition that Emmy said Jack is married to a nurse (indexed by 0.9) and the proposition that Jack is married to a nurse (indexed by 0.7). In turn, if *Emmy said Jack is married to a nurse* is uttered, only the former proposition will be added to the common ground, and it will be indexed by 0.9.

This way of looking at things does not yet derive Strength Dependence or Strength Similarity. We still need to explain why embedded clauses, although not asserted, are implied with a comparable degree of confidence to slifted clauses, and why in both cases this degree depends on the quality of the evidence. Both of these constraints can be accounted for if we assume that contexts are associated with PROBABILITY MEASURES.[4] Probability measures are functions μ from propositions (sets of possible worlds) to real numbers between 0 and 1 such that (i) μ maps the universal set of worlds to 1 and (ii) μ maps the union of any two disjoint propositions p and q to the sum of $\mu(p)$ and $\mu(q)$. Instead of representing common grounds as sets of indexed propositions, i.e. as objects of the form $CG = \{\langle p_1, \theta_1\rangle, \ldots, \langle p_n, \theta_n\rangle\}$, we can view them as effectively specifying a probability measure, i.e. a function μ such that $\mu(p_1) = \theta_1, \ldots,$ $\mu(p_n) = \theta_n$.

We now want to model the intuition that discourse-new information may modify the likelihood of discourse-old information. Assume that we are given a prior probability for p and just learned that q. How should we update the probability of p in light of the new evidence q? One could employ the mechanism of CONDITIONALIZATION, which involves redistributing probability weights after new information is obtained. In its simple form, the probability measure μ conditionalized on the proposition q is defined as follows, for any proposition p.

(20) SIMPLE CONDITIONALIZATION

$$\mu_q(p) = \frac{\mu(p \cap q)}{\mu(q)}, \text{ where } \mu(q) \neq 0$$

However, simple conditionalization is too rigid for our threshold-based discourse model. It presumes that the newly obtained information q is certain and tells us how much of its probability weight is assigned to $p \cap q$. But what if q itself is uncertain, e.g. asserted against a threshold of $\theta = 0.9$? Work in philosophy and cognitive science has adopted a slightly more complicated mechanism, called JEFFREY CONDITIONALIZATION (Jeffrey 1990). While not previously used in formal semantics to the best of my knowledge, it gives us what we want because it is expressed in terms of simple conditionalization but also factors in the uncertainty of the evidence.[5]

[4]Probability measures have been widely studied and have well-understood properties. Less-familiar tools for modeling uncertainty include Dempster–Shafer belief functions, possibility measures, etc. (see Halpern 2003 for an overview).

[5]Jeffrey himself called this generalized form of conditionalization "probability kinematics". Notice that this

(21) JEFFREY CONDITIONALIZATION (Jeffrey 1990)
$\mu_{\langle q,\theta\rangle}(p) = \theta\,\mu_q(p) + (1-\theta)\,\mu_{\neg q}(p)$, where $0 < \mu(q) < 1$

Here the evidence is made sensitive to its likelihood: $\mu_{\langle q,\theta\rangle}(p)$ stands for the probability of p, given that the likelihood of q is θ. It is easy to see that when the evidence is certain, i.e. $\theta = 1$, Jeffrey conditionalization reduces to its simple relative. That is, $\mu_{\langle q,1\rangle} = \mu_q$, for any q. The following example illustrates the usefulness of Jeffrey conditionalization in accumulating new evidence.

Example Let p stand for the proposition *It is raining*, q stand for the proposition *Mary said it is raining*, and $\mu(p) = 0.5$, $\mu(q) = 0.5$, $\mu_q(p) = 0.7$. That is, we are completely ignorant as to whether p or q are true but we know that learning q would substantially increase the likelihood of p, e.g. because Mary is a fairly reliable source of weather information. What is the posterior probability of p if q is uttered at a 0.9 quality threshold?

- By Bayes' rule, the prior probability of q given p is: $\mu_p(q) = \dfrac{\mu_q(p)\,\mu(q)}{\mu(p)} = \dfrac{0.7\times 0.5}{0.5} = 0.7$.
- By the complement rule, the prior probability of $\neg q$ is: $\mu(\neg q) = 1-\mu(q) = 1-0.5 = 0.5$.
- By Bayes' rule and the complement rule: $\mu_{\neg q}(p) = \dfrac{\mu_p(\neg q)\,\mu(p)}{\mu(\neg q)} = \dfrac{(1-\mu_p(q))\,\mu(p)}{1-\mu(q)} = \dfrac{(1-0.7)\times 0.5}{1-0.5} = 0.3$.
- By the Jeffrey conditionalization rule and given that q is uttered at a threshold of 0.9, the posterior probability of p is: $\mu_{\langle q,0.9\rangle}(p) = 0.9\,\mu_q(p) + (1-0.9)\,\mu_{\neg q}(p) = 0.9\times 0.7 + 0.1\times 0.3 = 0.66$.

The probability of rain thus increases from 50% to 66%. This is lower than the 70% produced by simple conditionalization, since the latter rule does not take into account that we are only 90% certain that Mary said it was raining. **End of example**

The effect of slifting and embedding sentences on the probability measure of the context can now be rendered as follows.

(22) Slifting sentences C, E: $\mu \xrightarrow{\langle [\![E(C)]\!],\theta\rangle} \mu' \xrightarrow{\langle [\![C]\!],\mu'([\![C]\!])\rangle} \mu''$

(23) Embedding sentences $E(C)$: $\mu \xrightarrow{\langle [\![E(C)]\!],\theta\rangle} \mu'$

rule falls out from a few basic facts of probability theory. Proof:

$\mu(p)$	$=$	$\mu(p\cap q) + \mu(p\cap\neg q)$	total probability law	
	$=$	$\mu(q)\,\mu_q(p) + \mu(\neg q)\,\mu_{\neg q}(p)$	conditional probability	
	$=$	$\mu(q)\,\mu_q(p) + (1-\mu(q))\,\mu_{\neg q}(p)$	complement	
	$=$	$\theta\,\mu_q(p) + (1-\theta)\,\mu_{\neg q}(p)$	$\theta = \mu(q)$	QED

If a slifting sentence C,E is uttered, the probability measure is first conditionalized on $\langle [\![E(C)]\!], \theta\rangle$ and then conditionalized on $\langle [\![C]\!], \mu'([\![C]\!])\rangle$ (22). The strength of the evidential proposition $[\![E(C)]\!]$ is then the threshold value θ and the strength of the main proposition $[\![C]\!]$ is its prior probability μ conditionalized on the evidential proposition at θ. In turn, if an embedding sentence $E(C)$ is uttered, the probability measure is conditionalized on $\langle [\![E(C)]\!], \theta\rangle$ alone (23). Even though in this latter case the embedded clause is not asserted, speech participants may employ probabilistic reasoning to infer that the likelihood of C, given that $E(C)$ was asserted against θ, is $\mu_{\langle [\![E(C)]\!], \theta\rangle}([\![C]\!])$. This story accounts for both Strength Dependence and Strength Similarity: the strength of C depends on the strength and relevance of $E(C)$ in both cases. Slifting sentences and embedding sentences are then predicted to play a similar role when it comes to what inferences speakers may draw from them. They only differ in that the former assert (perhaps weakly) the slifted clause while the latter do not assert the embedded clause.

4. The uniqueness of slifting parentheticals

The analysis of varying assertion strength proposed in the previous section does not directly predict any substantial interpretational differences between slifting and embedding sentences. However, as already mentioned in the Introduction, the two constructions differ in polarity and distribution. This section discusses these differences in depth and argues that they both are rooted in the Double Assertion Hypothesis and general principles of discourse organization.

4.1. Polarity restrictions

Other things being equal, one might expect that slifting parentheticals can have the same grammatical make-up as matrix clauses. For example, the fragment *Jill said* can be used parenthetically and it can also serve as a matrix clause. However, Jackendoff (1972), Ross (1973), Hooper (1975), and Maier and Bary (2015) notice that, unlike matrix clauses, slifting parentheticals need to make a "positive" or "affirmative" import. At least initially, it appears that slifting parentheticals cannot contain negation or lexically negative predicates.

(24) John is, $\left\{\begin{array}{c}\text{I think}\\ \text{\#I don't think}\\ \text{\#I doubt}\end{array}\right\}$, a fink. (Jackendoff 1972: 97)

(25) $\left\{\begin{array}{c}\text{I think}\\ \text{I don't think}\\ \text{I doubt}\end{array}\right\}$ John is a fink.

The same authors also observe that there is no syntactic ban on slifting parentheticals hosting negation or negative predicates. If a slift contains a lexically negative verb (like *doubt* or *deny*) that is negated, the sentence becomes acceptable.

(26) John is, I don't doubt, a fink. (Jackendoff 1972: 97)

(27) Mushrooms are great on diets, I don't doubt. (Ross 1973: 155)

(28) It's a long shot, I don't deny. (Hooper 1975: 107)

The positive/affirmative import generalization must then be a semantic one and it must constrain the entire slifting parenthetical, not just its main predicate. I propose that it should be stated in terms of monotonicity.[6]

The monotonicity properties of operators have been widely discussed in the literature on polarity items and elsewhere. The two crucial notions of upward and downward entailingness are standardly defined as follows (e.g. Ladusaw 1980).

(29) a. An operator O is UPWARD ENTAILING iff for any propositions p and q, if $p \subseteq q$ then $O(p) \subseteq O(q)$.
b. An operator O is DOWNWARD ENTAILING iff for any propositions p and q, if $p \subseteq q$ then $O(q) \subseteq O(p)$.

Asher (1987) develops a semantic typology of a wide range of propositional attitude predicates. He proposes that verbs like *say*, *think*, *believe* are upward entailing while verbs like *deny* or *doubt* are downward entailing.[7] Indeed, if Jimmy believes I own a Porsche (and he also knows that Porsches are cars), then he must believe that I own a car. In turn, if Jimmy doubts I own a car (and knows that Porsches are cars), then he must doubt that I own a Porsche as well.

The polarity generalization about slifting parentheticals can now be stated as follows.

(30) UPWARD MONOTONICITY
A slifting sentence C,E can be felicitously uttered only if E expresses an upward entailing operator.

Assuming that no operator can be both upward and downward entailing, Upward Monotonicity correctly bans slifts from creating downward entailing environments. It also rules out slifts that express non-monotone operators, i.e. operators that are neither downward nor upward entailing. The verb *lie* is one example of a non-monotone propositional operator; e.g. there is no entailment relation between (31a) and (31b).[8] Upward Monotonicity then correctly predicts that the sentences in (32), which host non-monotone slifts, are not acceptable.

(31) a. Jeremy lied that he resides in Vancouver.
b. Jeremy lied that he resides in Canada.

[6]There appear to be further restrictions on what can go into slifting predicates that go beyond polarity and that are not addressed in this paper. See Ross (1973), Hooper (1975), and Haddican et al. (2014) for discussion.

[7]I will sometimes loosely talk of lexical items themselves as being upward or downward entailing. What is meant is that the operators that those items denote have the claimed monotonicity.

[8]The reason *lie* is non-monotone might be that *a lied that p* implies both *a said p* and *not-p*. Since *a* said is upward entailing while not is downward entailing, the combined effect is that of non-monotonicity. I am indebted to Emar Maier for the suggestion that *lie* expresses a non-monotone operator.

(32) a. #Paul had never known his mother, he lied.
b. #The CEO, his girlfriend lied, is a true gentleman.

There are two cases of seeming violations of Upward Monotonicity that deserve further mentioning. The first case involves situations when the speaker echoes a previous utterance and disagrees with it by using a segment that resembles a negated slifting parenthetical. This use is illustrated in (33), and can be read as *Mushrooms are great on diets? I don't think so*. The second case involves what looks like a negated slifting parenthetical attached to a negated main clause (34). The apparent function of such parentheticals is to qualify the categorical denial of a claim expressed by the first part of the sentence.

(33) Mushrooms are great on diets, I don't think so.

(34) Matt doesn't like phonology, I don't think.

It is fairly clear that (33) is not a slifting sentence at all. This is because the argument slot in the second segment is filled by a *so*-anaphor and without it the sentence becomes unacceptable. Genuine slifts do not allow *so*-insertion (cf. **The dean, Jill said so, flirted with the secretary*). While examples as in (34) do exhibit the grammatical form of slifting constructions, they turn out to have a very limited distribution and quirky interpretational properties. Ross (1973) and Hooper (1975) observe that in such examples the negation in the parenthetical is licensed by a negation in the main clause. Just any downward entailing operator in the main clause cannot support a negated slift (cf. **Few people like phonology, I don't think*) and just any downward entailing slift cannot be licensed by a negated main clause (cf. **Matt doesn't like phonology, I doubt*). In addition, the putative parenthetical may modify a non-clausal argument (cf. *Matt doesn't like phonology, I don't think he does*) and has to appear at the end of the sentence (cf. **Matt, I don't think, doesn't like phonology*). Ross (1973) also notices that such doubly-negated sentences are restricted to Neg-Raising predicates (cf. *Matt doesn't like phonology, I don't think* / **I don't fear*). Most importantly, as noted in Huddleston and Pullum (2002: 845), the negation in the slift is semantically vacuous, and (34) is synonymous with *Matt doesn't like phonology, I think*. I will then tentatively assume that such constructions illustrate some sort of negative concord and are actually upward entailing. If so, the data in (33)–(34) do not challenge the Upward Monotonicity restriction.

Where does Upward Monotonicity come from? Two explanations have been suggested in the literature, although none of them seems able to explain the full range of data. One idea is that this generalization falls out from the relative strength with which a main clause is asserted. Hooper (1975), Scheffler (2009), and Hunter (2016) propose that, roughly, upward entailing slifts imply the main clause with a sufficiently high level of confidence while downward entailing slifts do not. Assuming that τ is the minimal threshold that any assertion (whether weak or strong) in the given context should meet, we could then propose the following constraint.

(35) ASSERTION STRENGTH
A slifting sentence C,E can be felicitously uttered only if $\mu_{\langle [\![E(C)]\!], \theta\rangle}([\![C]\!]) \geq \tau$.

However, this constraint immediately runs into empirical difficulties. A segment like *it seems* entails its propositional argument in a fairly weak sense but can serve as a parenthetical (cf. *Noah majored in psychology, it seems*). In contrast, a segment like *he regrets* contains a factive predicate that presupposes the truth of its propositional argument, yet it is unacceptable as a parenthetical (cf. #*Noah majored in psychology, he regrets*). Assertion Strength leaves these facts unexplained.

A related idea is that Upward Monotonicity is tied to the evidential role of slifting parentheticals. Haddican et al. (2014) and Maier and Bary (2015) suggest that upward entailing operators provide a good source of evidence while downward entailing operators do not. We could then require that parentheticals raise the likelihood of the main sentence being true.

(36) EVIDENTIAL SUPPORT
A slifting sentence C,E can be felicitously uttered only if $\mu_{\langle [\![E(C)]\!],\theta\rangle}([\![C]\!]) > \mu([\![C]\!])$.

The main challenge for this constraint is negative evidence. Evidential Support predicts that in the given context (37a) is infelicitous, and it would not let us expect that there is anything wrong with (37b). Indeed, if Putin rarely tells the truth, what he says is likely to be false and what he denies is likely to be true. The attested data are the exact opposite of what is predicted.

(37) *Putin is a rogue leader who typically makes false claims in order to deceive his enemies.*
a. There are Russian troops in Ukraine, Putin said.
b. #There are Russian troops in Ukraine, Putin denied.

I propose that Upward Monotonicity has less to do with the semantics of slifting parentheticals and more to do with the fact that slifted clauses do double duty: they are independently asserted (albeit perhaps weakly) and they serve as arguments to slifting parentheticals, as stated by the Double Assertion Hypothesis. Slifting parentheticals are upward entailing because slifted clauses in particular and main clauses in general act like POSITIVE POLARITY ITEMS (PPIs). For example, (38) hosts a main clause interpreted under an upward entailing (UE) operator and the sentence is acceptable; (39) hosts a main clause interpreted under a downward entailing (DE) operator and the sentence is unacceptable.

(38) [Snowden is a Russian spy]$_{PPI}$, [Mary thinks]$_{UE}$.

(39) #[Snowden is a Russian spy]$_{PPI}$, [Mary doubts]$_{DE}$.

The positive polarity status of slifted clauses may be taken to follow from fact that assertions should allow speech participants to draw entailments, which are weaker inferences. In other words, asserted sentences need to be closed under their entailments, as stated by the following constraint.

(40) ENTAILMENT CLOSURE
A sentence S can be felicitously uttered only if S and all of its entailments meet the quality threshold of the context.

This type of general constraint may appear to be of little value when it comes to single assertions, because entailments are less specific than what is said and Entailment Closure will always be met. But some constraint along those lines becomes important in slifting sentences, where the slifted clause serves an argument of the parenthetical yet it is also independently asserted, as per the Double Assertion Hypothesis. It is then plausible to require that parenthetical assertions are closed under the entailments of the slifted clause.

(41) PARENTHETICAL ENTAILMENT CLOSURE
A slifting sentence C,E can be felicitously uttered only if, for any entailment C' of C, $E(C')$ meets the quality threshold whenever $E(C)$ does.

This constraint can be further elucidated by drawing attention to the fact that the two assertions C and $E(C)$ associated with a slifting sentence C,E are proportional with respect to their informativity. When E is upward entailing, the strength of $E(C)$ is directly proportional to the strength of C and any weakening of C makes $E(C)$ weaker, i.e. truth is always preserved. If, however, E is downward entailing, the strength of $E(C)$ is inversely proportional to the strength of C. In this case, a weaker C makes $E(C)$ stronger, and truth need not be preserved. In other words, only upward entailing slifting parentheticals will obey Parenthetical Entailment Closure.

To illustrate, notice that speakers may draw all sorts of entailments from the main clause in (39), including that Snowden is a spy. However, this would violate Parenthetical Entailment Closure, because the parenthetical assertion does not guarantee that Mary doubts Snowden is a spy; it only guarantees that Mary doubts Snowden is a *Russian* spy. No such problem arises in (38), because here the truth of the parenthetical assertion is preserved for all entailments of the main clause. In particular, if Mary thinks that Snowden is a Russian spy, it follows that she also thinks Snowden is a spy.

Before closing this section, one should point out that the positive polarity status of main clauses is visible from data that go beyond slifting sentences, thereby strengthening the case for an entailment closure constraint of the form proposed above. As Ross (1973), Szabolcsi and Zwarts (1993), and Potts (2002) notice, an upward monotonicity restriction is operational in *as*-parentheticals as well.

(42) John is our hero, $\left\{ \begin{array}{c} \text{as you know} \\ \text{\#as no one knows} \end{array} \right\}$. (after Szabolcsi and Zwarts 1993: 246)

Verb second embedding in German is restricted in the same way. Although main clauses are verb second and embedded clauses are verb final, German draws a grammatical distinction between regular embedding of *dass*/'that' complements with a verb final syntax and embedding of verb second clauses. Importantly, Scheffler (2009) points out that while attitude verbs of any monotonicity can occur in regular embedding constructions, verb second embedding is restricted to upward entailing attitudes.

(43) a. Peter glaubt, Maria ist schwanger.
Peter believes Maria is pregnant
'Peter believes that Maria is pregnant.'
b. #Maria bereut, sie ist nach Berlin gezogen.
Maria regrets she is to Berlin moved (Scheffler 2009: 184)

Finally, certain speaker-oriented adverbs exhibit similar behavior. Jackendoff (1972) and Bellert (1977) mention the fact that discourse adverbs do not have negative counterparts.

(44) a. { Truthfully / Honestly / Sincerely }, I can't tell you the answer.
b. { #Falsely / #Dishonestly / #Insincerely }, I can't tell you the answer. (Jackendoff 1972: 99)

Apparently, these polarity restrictions have a common source. I suggest that they are all based on a mechanism similar to the one proposed for English slifting sentences.

4.2. Main clause modifiers

A second difference between slifting and embedding sentences concerns their embeddability. It has been noticed that slifting sentences typically modify main clauses and cannot appear in subordinate clauses (Ross 1973, Rooryck 2001). Embedding constructions do not have this property and can readily be further embedded.

(45) a. #Martin now realizes that Sheila is, I had claimed, a luscious yummy.
(Ross 1973: 152)
b. #Selena thinks that Justin, the vocal coach said, is a talented singer.

(46) a. Martin now realizes that I had claimed Sheila is a luscious yummy.
b. Selena thinks that the vocal coach said Justin is a talented singer.

The data in (45) also show that the scope of slifting parentheticals is clause-bounded, i.e. that slifts obligatorily modify their host clause. If that were not the case, (45a) and (45b) would be acceptable under a reading whereby the parenthetical takes scope over the entire sentence.

I propose that the main clause restriction on slifting parentheticals once again follows from the Double Assertion Hypothesis. Recall that this hypothesis states that slifted clauses play a primary discourse role while the parenthetical component serves a subsidiary function. An empirical reflex of this contrast in pragmatic status is the fact that a slifted clause but not the entire parenthetical sentence can resolve a question, as demonstrated below.

(47) Q: Why is Fred not here?
A: He has quit his job, the secretary told me.

(48) Q: What happened next?
A: #There is life on Mars, she announced.

In a similar vein, Asher (2000: 33) gives the following example.

(49) A: The party, Mary assures us, is over.
B: #Does she?

How can we flesh out the non-central discourse status of slifting parentheticals? Asher assumes that the parenthetical component of a slifting sentence is connected to the main clause through an Evidence discourse relation. But evidentiality alone would not explain why (48) and (49) are unacceptable, since in principle evidential information can answer questions (cf. *A: Lena is dating someone. B: How do you know? A: She always leaves work early.*). The subordinate status of slifting parentheticals must then come from somewhere else.

I propose that what is wrong with (48)–(49) is not that the parenthetical assertion cannot resolve a question but rather that the main assertion must but does not do so. I assume, quite plausibly, that main clauses are conventionally marked as AT-ISSUE, where the property of at-issueness is understood as relevance to the question under discussion, as argued in Simons et al. (2010) and much subsequent work. Arguably, this is the reason why the discourses below are degraded.

(50) A: Who was Louise with last night?
B: Henry $\left\{\begin{array}{c}\text{(?)hopes}\\ \text{?wishes}\\ \text{?dreamt}\end{array}\right\}$ that she was with Bill. (Simons 2007: 1036)

(51) Q: What is Peter's favorite color?
A: ?Peter, whose favorite color is blue, never wears white shirts.

The following constraint requires that main clauses pick out one of the alternatives introduced by the question under discussion.

(52) AT-ISSUENESS
A (declarative) main clause C can be felicitously uttered in a context with a question under discussion Q only if $[\![C]\!] \in Q$.

Given that slifted clauses are main clauses, At-Issueness entails that a slifting sentence C,E can be felicitously uttered only if $[\![C]\!] \in Q$, where Q is the question under discussion in the given context. One way to read this is that slifting parentheticals attach to clauses that are obligatorily at-issue, i.e. main clauses. It is then to be expected that such parentheticals do not occur in syntactically subordinate positions. Since embedded clauses need not be marked for discourse status, embedding predicates can freely be further embedded.

In the remaining part of this section, I address one type of exception to the non-embeddability of slifting parentheticals. The following sentence is acceptable and the parenthetical seems to take narrow scope with respect to the matrix verb (see also Ross 1973).

(53) Sarah said that Will, she thinks, has strong qualifications.

One possible reaction would be to say that embedded clauses too can take on at-issue status.[9] However, this begs the question of why slifting parentheticals do not embed on a regular basis. What I would like to suggest is that examples as these are likely based on some sort of an agreement mechanism whereby the slift restates what is already expressed by the matrix clause. In support of this view, notice that (53) deteriorates if the slift presents a fresh perspective by introducing a different attitude holder (54). Also, such examples seem to require predicates that can describe the same attitude, e.g. *say* and *think*. (53) becomes unacceptable if the matrix and the slifting predicates do not line up semantically (55).

(54) ?Sarah said that Will, the committee thinks, has strong qualifications.

(55) #Sarah imagined that Will, she thinks, has strong qualifications.

I leave the precise analysis of such examples to further research, here merely noting their special properties.

5. Conclusion

This paper investigated the semantic properties of sentences with slifting parentheticals. The main claim was that such constructions function as a means of modulating assertion strength. I proposed a probabilistic account whereby the assertion strength of the slifted clause is derived from the background discourse information conditionalized on the evidence described by the parenthetical component. The account was shown to capture the intuition that the implication strength of slifted clauses varies depending on the quality and certainty of the evidence. Importantly, slifting sentences were not reduced to embedding constructions and their unique properties were preserved. In particular, the proposal was able to explain why slifting parentheticals express upward entailing operators and why they typically modify main clauses. The paper argued that those properties follow from the double assertion nature of slifting sentences and general principles of discourse management.

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[9]Cf. so-called DISCOURSE PAENTHETICAL uses of matrix clauses (Urmson 1952, Simons 2007, Hunter 2016).

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