Neg-Raising and Neg movement*

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1 Introduction

This paper is about the phenomenon known as Neg-Raising. Neg-Raising expressions are exceptional due to the availability of an interpretation that corresponds to the narrow scope of a negation below an attitude predicate. This reading is unexpected given the surface form of the expression, which corresponds to a wide scope positioning of the negation, as in (1).

(1) Mary didn't think it would snow.
= Mary thought it wouldn't snow.

This effect is observed with only a subclass of predicates that includes *think* but not, for example, *say*.

(2) Mary didn't say it would snow.
≠ Mary said it would not snow.

A variety of analyses have been proposed to account for the interpretation of (1), each falling into one of two lines of approach: syntactic and semantic/pragmatic.

The first analysis of Neg-Raising in the generative tradition was offered in Fillmore (1963), which attributes the reading to a syntactic operation that raises the negation from an embedded position where it is interpreted to the matrix position where it is pronounced.

(3) Mary does not think that it will <not> snow.

Early support for Fillmore's approach was provided by Lakoff (1969), Ross (1973) and Prince (1976) with more recent support by Collins & Postal (2014, 2017).

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An alternative approach to Neg-Raising treats the interpretation as the result of a semantic/pragmatic inference. Negation is assumed to occupy only the matrix position throughout the derivation and the interpretation is the result of an inference supported by an excluded middle (EM) that rules out the weaker wide-scope negation reading. Bartsch (1973) was the first to propose such an account, treating the EM as a presupposition triggered by Neg-Raising predicates. The effect of the EM is observed in expressions where these predicates are negated, which supports the inference illustrated in (4). The assertion is equivalent to the negation of the first disjunct of the EM, which entails the truth of the second disjunct.

(4) Excluded middle inference:

i. $\neg \text{think}_x(\text{p})$	*assertion*
ii. $\text{think}_x(\text{p}) \vee \text{think}_x(\neg \text{p})$	*EM*
iii. $\text{think}_x(\neg \text{p})$	*by i and ii*

The reading equivalent to the low-scope negation is derived without the negation appearing low in the structure. Some authors have argued against attributing the inference to a presupposition and propose treating it as a kind of implicature (Horn 1978, Romoli 2013). The issues discussed below will primarily bear on the distinction between the syntactic account and the family of semantic/pragmatic accounts as a whole, though two competing semantic/pragmatic approaches will be discussed in Section 3.

My aim in this paper is to argue for a new and somewhat peculiar treatment of the Neg-Raising data that grants both the existence of a Neg movement operation as well as an EM associated with Neg-Raising predicates. In Section 2, I introduce two instances of VP ellipsis as evidence that a purely syntactic approach to Neg-Raising cannot be maintained, leading to the conclusion that the reading can be created by an inference of the kind in (4). In Section 3, both known and novel data featuring strong NPIs in Neg-raising expressions are discussed, which I argue indicate that Neg movement is nonetheless available in the syntax. Lastly, I discuss an empirical issue that arises for the Neg movement assumption in the context of VP ellipsis that I leaves unresolved.

2 Against a syntactic account

I discuss two novel data points in this section which involve ellipsis in Neg-Raising environments. The first features ellipsis of matrix VPs and the second features the variant of VP ellipsis known as Antecedent-Contained Deletion. I take both kinds of expressions to indicate that Neg-Raising cannot be a purely syntactic phenomenon.

2.1 Neg-Raising and VP ellipsis

I take VP ellipsis to involve phonological deletion of a VP that is parallel to some antecedent VP (Sag 1976). The parallelism condition requires either LF or semantic identity between the elided VP and an antecedent. An example of VP ellipsis featuring a clause-embedding predicate is shown in (5).

(5) John $_{A}$[thought it would snow] and Sue also did $_{E}$[~~think it would snow~~]

As discussed previously, the syntactic approach to Neg-Raising attributes the reading to a covertly low negation at LF. This predicts that the matrix VP of a Neg-Raising sentence could not serve as an antecedent to an elided VP that contains no embedded negation. However, this prediction is not borne out. Consider (6), where VP ellipsis is licensed despite the ellipsis site being interpreted without a negation.

(6) John didn't think it would snow but Sue did <think it would snow>.

The first conjunct in (6) receives the Neg-Raising interpretation while still providing an appropriate antecedent to the elided VP of the second conjunct. This means that the negation of the first conjunct must not be embedded at LF and the Neg-Raising interpretation of (6) must be derived non-syntactically. I assume that this meaning is the result of an inference of the kind in (4), supported by an EM associated with *think*. Next, I discuss another instance of VP ellipsis which I show illustrates a more severe case against a purely syntactic treatment of Neg-Raising.

2.2 ACD, Neg-Raising and NPIs

The variant of VP ellipsis known as Antecedent-Contained Deletion (ACD) involves deletion of a VP in the relative clause of an object DP under identity with a larger VP that contains the surface representation of that object. An example is shown in (7).

(7) John read a book that Mary did <read>.

The problem posed by (7) is that a VP cannot be identical to a constituent that properly contains it. Thus, if the object DP is contained within the matrix VP, the embedded VP does not have a parallel antecedent. A popular solution for (7) involves syntactic movement of the object DP by the operation Quantifier Raising (QR) outside the matrix VP, creating the structure in (8) (Sag 1976).

(8) [[a book$_x$ that Mary $_{A}$[read x]]]$_y$ [John $_{E}$[read y]]]

Granting that the bound traces in the two object positions of object DP are identical enough to satisfy the conditions on ellipsis, the VPs are appropriately parallel and ellipsis is allowed.

Turning to Neg-Raising, consider the sentence in (9), which is an instance of ACD featuring the deletion of a negated VP headed by the Neg-Raising predicate *expect*. In addition to an ACD site, the object DP contains the NPI *a single*, which is licensed by the high negation. NPI licensing will be discussed in more detail in Section 3 but for now I assumed that the NPI must be within the scope of the negation at LF.

(9) John doesn't expect to pass a single exam that Mary does <expect to pass>.

This sentence is interpreted with the typical Neg-Raising reading however, two problems arise here if we assume that negation is below *expect* at LF. The first problem is that if negation was situated below *expect*, the object DP containing the NPI would be forced to scope in the complement of the matrix VP, to license the NPI. Given that the object also contains the ellipsis site, such a structure would bear an antecedent containment configuration. This is shown in (10a), where constituent E is a subconstituent of A, preventing both structural and semantic parallelism. In order to license both the ellipsis and the NPI, the LF for (9) must be as in (10b). Here the negation takes widest scope, the object hosting the NPI and deleted VP scopes immediately below the negation and the matrix VP scopes below both the object and the negation.

(10) a. [John$_j$ $_{\text{A}}$[expect [not [[a single exam$_x$ Mary$_m$ $_{\text{E}}$[expect m to pass x]]y [j pass y]]]]]
b. [not [[a single exam$_x$ Mary$_m$ $_{\text{E}}$[expect [m to pass x]]]$_y$ [John$_j$ $_{\text{A}}$[expect [j pass y]]]]]

The question now is whether (10b) coupled with an EM associated with *expect* yields the correct truth conditions for (9). [1] An important aspect of the interpretation of (9) is that it is equivalent to universal quantification of the object DP. The expression can be paraphrased as in (11).

(11) Paraphrase of (9):
'For every exam that Mary expects to pass, John expects not to pass it.'

The universal force of the object does not fall out of the LF in (10b), which yields the truth conditions in (12) interpreted relative to a world w, with the object DP contributing an existential quantifier.

(12) Truth conditions from (10b):
$\neg\exists x.\ [exam(x,w)\ \&\ \forall w' \in expect_{m,w} : pass(j,x,w')\ \&$
$\forall w'' \in expect_{j,w} : pass(j,x,w'')]$
= 'There is no exam that Mary expects to pass and John expects to pass.'

[1] There is another EM presupposition associated with the embedded *expect* in the relative clause, which I ignore here.

This LF would be true in a scenario in which Mary expected to pass an exam that John wasn't taking and thus had no expectations about. The universal force of (9) would make it inappropriate in such a context, given that it requires John to have expectations about all exams that Mary is expecting to pass. If the LF in (10b) is the correct LF for (9), the EM of *expect* must feature universal quantification as in (13).

(13) EM under universal quantification:

$\forall x.[exam(x,w)\ \&\ \forall w' \in expect_{m,w} : pass(m,x,w')] \rightarrow$
$[[\forall w'' \in expect_{j,w} : pass(j,x,w'')] \vee [\forall w'' \in expect_{j,w} : pass(j,x,w'')]]$
= 'For every exam that Mary expects to pass, John either expects to pass it or expects not to pass it.'

Such a treatment of a universal EM as a presupposition has been discussed in Gajewski (2007), making use of a proposal of presupposition projection in Heim (1983) in the context of Neg-raising with negative quantifiers—I will discuss the details of Gajewski's proposal later. Heim assumes that presuppositions project universally in quantificational expressions, including negative quantifiers which are typically analyzed as featuring negation scoping over an existential. The same process can be proposed for the case in (9), which similarly features negation scoping immediately above an existential, the NPI. The assertion of (13) together with the presupposition in (13) supports an inference of the meaning in (14), which captures the correct interpretation of (9).

(14) Inference:

$\forall x.[exam(x,w)\ \&\ \forall w' \in expect_{m,w} : pass(m,x,w')] \rightarrow$
$[\forall w'' \in expect_{j,w} : pass(j,x,w'')]$

This requires some means of producing a universal interpretation of the quantifier binding the object variables without there being such a quantifier in the LF. This is possible with presuppositions projection[2], however there is no apparent means by which the syntactic account of Neg-Raising can capture this reading of (9). The syntactic account then fails to explain the simultaneous NPI and ACD licensing in (9)—which would involve a more severe case of non-identity than (6)—and additionally fails to capture the correct interpretation of (9). In Romoli (2013), it is shown that the universal interpretation in contexts like above can also be derived on a scalar implicature treatment of Neg-Raising readings. In light of these cases in (5) and (6), I take for granted from here on that Neg-Raising readings can be derived without Neg movement. However, in the next section I argue that Neg movement is still required to treat certain Neg-Raising expressions.

[2]It should be noted that this stance on the projection behavior of presuppositions in quantificational environments is not innocuous however, further discussion of the topic of presupposition projection is too involved to include here.

3 Neg-Raising and strong NPIs

The discussion in this section will be centered around well-known patterns involving Neg-Raising and strong NPI licensing. Lakoff (1969) discussed the contrast between (15) and (16), which both feature a strong NPI in the complement of a clause-embedding predicate. The pair indicates that the strong NPI phrase *until tomorrow* can only be interpreted in the complement clause when it is embedded under a Neg-Raising predicate.

(15) John didn't think it would snow until tomorrow.

(16) *John didn't say it would snow until tomorrow.

Lakoff proposed that strong NPIs have a locality condition requiring them to be in the same clause as a sentential negation. [3] Taking Neg-Raising to be a syntactic phenomenon, this locality condition is satisfied in (15) by the covert interpretation of negation below think after Neg movement. In the case of (16) on the other hand, the Neg movement step in the derivation is not allowed past the non-Neg-Raising predicate *say*, preventing the low interpretation of negation to license the NPI.

There have been recent attempts to derive the contrast between (15) and (16) without the use of Neg movement and a clausemate condition on strong NPIs. Two such accounts will be discussed below that are each associated with distinct non-syntactic approaches to the strong/weak NPI distinction. I will argue that both approaches are inadequate, concluding that Lakoff's original treatment of the contrast is correct.

3.1 Neg-Raising, NPIs and anti-additivity

In defense of a semantic/pragmatic approach to Neg-raising, Gajewski (2005,2007) offers a purely semantic account of the contrast between (15) and (16) that relies on two crucial assumptions relating to NPI licensing. The starting point of the proposal is the influential account of NPIs attributed to Fauconnier (1975) and Ladusaw (1979), which maintains that NPIs must be in the scope of an operator that supports downward entailing (DE) inferences.

(17) Downward-entailment: if $x \rightarrow y$, then $f(y) \rightarrow f(x)$.

Gajewski accepts that downward entailment is central to NPIs but re-interprets the nature of the environments that must support DE inferences to license NPIs. It is proposed that the object that must support DE inferences is not an operator that scopes above the NPI but rather a constituent of the LF that contains the NPI. No such function is found in the LF, however, which motivates additional steps in the licensing process to technically implement this view. Gajewski proposes that a function which results from replacing a constituent

[3] What exactly constitutes a clause is not of issue here but could be thought of as CP or TP layer.

containing an NPI with a variable and lambda abstracting over that variable must yield DE inferences for the NPI to be licensed.

The second assumption used in Gajewski's account of (15) and (16) relates to the more restrictive semantic conditions on strong NPIs. Following Zwarts (1998), Gajewski assumes that strong NPIs must be situated in an environment that supports anti-additive inferences.

(18) Anti-additivity: $f(x)\ \&\ f(y) \leftrightarrow f(x \vee y)$

To illustrate, we can observe that the intuitive inferences in (19) and (20) show *not a single person* to create an AA environment while *not every* does not.

(19) Not a single person sang and not a single person danced. $\rightarrow$
Not a single person sang or danced. *AA*

(20) Not every person sang and not every person danced. $\nrightarrow$
Not every person sang or danced. *not AA*

This shows that LFs of the form [$\neg$[$\exists$ _]] provide an AA environment with respect to the position _ , while LFs of the form [$\forall$[$\neg$ _]] do not. The licensing of strong NPIs can be seen to pattern according to the anti-additivity hypothesis, as shown by the contrast between (21) and (22) featuring the strong NPI phrase *until midnight*.

(21) Not a single person arrived until midnight.

(22) *Not every person arrived until midnight.

The licensing conditions on strong NPIs are assumed to be as stated in (24), ignoring details relating to how the constituent β is interpreted functionally.

(23) A strong NPI α is licensed in a sentence S if there is a constituent β containing α in S such that β is AA with respect to the position of α.

Gajewski shows that this condition can naturally explain the contrast between (15) and (16). With the standard assumption that attitude predicates universally quantify over worlds, the expression featuring the non-Neg-Raising *say* in (16) features the scope relations $\neg\exists$. Such an LF was shown by the test in (20) to not provide an AA environment and thus should not license the strong NPI in the embedded clause. To confirm this, the expression fails the intuitive test for anti-additivity shown in (24).

(24) John didn't say that it would snow and John did not say that it would rain. $\nrightarrow$
John did not say that it would snow or rain.

The property distinguishing (15) from (16) is that *think* in (15) is associated with an EM. The inferred interpretation resulting from the EM, as in (4), creates an environment equivalent to the scope relations shown to support AA inferences with the test in (19). That (15) provides the necessary AA environment is confirmed by the intuitive test for anti-additivity in (25).

(25) John didn't think that it would snow and John didn't think that it would rain. → John didn't think that it would snow or rain.

Gajewski thus shows that the theory of strong NPIs offered by Zwarts (1998) allows for an explanation of the contrast between (15) from (16) without any reference to a locality condition or a Neg movement operation. In the next section, problems that have been noted in the literature for Zwarts' anti-additivity account will be discussed along with a more recent account of the strong/weak NPI distinction.

3.2 Neg-Raising, NPIs and scalar implicatures

Gajewski (2011) and Chierchia (2013) point out problematic sentences for the anti-additivity account of strong NPIs. A range of cases have been used to shown the inadequacies of anti-additivity but to simplify things I just discuss one point here, which is illustrated in (26) and (27). The restrictors of the subject quantifiers in these cases provide environments that license weak NPIs, do not license strong NPIs and yet do support AA inferences (left for the reader to test).

(26) *No one who has seen John in years recognized him.

(27) *Everyone who has arrived until midnight is still here.

Given that the anti-additivity account predicts these expressions to be acceptable, this account doesn't capture the full range of data. Collins & Postal (2014) point out a similar sentence to (26) as a counterexample to the anti-additivity account that differs from (26) in an important way that will be discussed in the next section.

Drawing on insights from Krifka (1995), von Fintel (1999) and Chierchia (2004), Gajewski (2011) and Chierchia (2013) reject anti-additivity and propose that the strong/weak NPI distinction is tied to non-truth-conditional aspects of meaning. The intuition is that, while downward entailment is necessary in licensing both strong and weak NPIs, non-truth-conditional aspects of meaning (scalar implicatures, presuppositions) factor into the licensing of strong NPIs but not weak NPIs. The conditions for strong NPIs thus pattern with von Fintel (1999), in assumed that the relevant notion of entailment for weak NPIs is Strawson downward entailment, i.e. entailment from sets to subsets when all relevant presuppositions are assumed to be satisfied in the context. Looking at (26), under the Gajewski/Chierchia account, the unacceptability is attributed to a presupposition or implicature attributed to the relative clause of the negative subject quantifier. This is an existential proposition along the lines of 'there are people who have seen John in recent years'. Given that strong NPIs are sensitive to presuppositions and implicatures, this interferes with DE inferences in this environment and prevents the strong NPI from being licensed. Compare this to the acceptable

expression in (28), which features a weak NPI *ever* licensed in the restrictor of the negative quantifier.

(28) No one who has ever met Mary speaks badly of her.

This follows from the Gajewski/Chierchia account given that the weak NPI is licensed under Strawson entailment, which means that the existential assumption in (28) is assumed to be satisfied and thus does not interfere with DE inferences, licensing the NPI.

In defense of a scalar implicature (SI)-based view of Neg-Raising, Romoli (2013) argues that the Gajewski/Chierchia theory of NPIs can be used to explain the contrast between (15) and (16) on purely semantic grounds. In Romoli's view, all attitude predicates are associated with a weaker alternative however, Neg-Raising and non-Neg-Raising predicates differ in the kind of alternative they are associated with. The alternatives of Neg-Raising predicates are equivalent to a corresponding EM, whereas the alternatives of non-Neg-Raising predicates are their existential counterparts. For example, the alternative of the non-Neg-Raising predicate *be certain* is the existential predicate expressing possibility. The result of negating *be certain* then is an SI expressing the possibility of the prejacent according to the speaker, as in (29).

(29) Assertion: John is not certain he will pass one of his exam.

SI: According to John, it's possible he will pass one of his exams.

Compare this SI to the one in (30) featuring *think*, which creates the Neg-Raising interpretation by the reasoning in (4).

(30) Assertion: John doesn't think he will pass one of his exams.

SI: John either thinks he will pass one of his exams or thinks he will not pass one of his exams.

Romoli then attributes the difference in ability to license strong NPIs of the two environments to the logical nature of the SIs. We know that the SI in (30) does not interfere with DE inferences given that it was already established in (25) that AA inferences are supported in this context, which entails that weaker DE inferences are supported here as well. In (29), on the other hand, the existential SI does interfere with the DE inference, which is corroborated by the intuitive test in (31), where the meaning contributed by the SI is shown in parentheses.

(31) John isn't certain he will pass one of his exams
(and according to John, it's possible that he will pass one of his exams). $\nrightarrow$

John isn't certain he will pass his biology exam (and according to John, it's possible that he will pass his biology exam).

The entailment in (31) doesn't go through because it could be that the weaker antecedent statement is true—John thinks he could pass one of his exams but he's not certain that he will—while the stronger consequent statement is false—for example, John might think that it's impossible for him to pass his biology exam. Thus, Romoli's SI treatment of Neg-Raising can make use of the more empirically successful Gajewski/Chierchia account of strong NPIs to derive the contrast between (15) and (16) without reference to a Neg movement operation. In the next two sections, I discuss counterexamples to the Gajewski/Chierchia approach, which I take to rule out a purely semantic account of strong NPIs.

3.3 Collins & Postal sentence

The first point against the Gajewski/Chierchia approach to strong NPIs—and against such a treatment of (15) and (16)—comes from Collins & Postal (2014). The sentence was not originally offered as an argument against this account but rather as an argument against the anti-additivity account of strong NPIs. In defense of Lakoff's clausemate condition and a Neg movement operation, Collins and Postal introduce a sentence of the kind in (32), which features a strong NPI in an environment that supports AA inferences yet does not license the NPI. Compare this to the sentence in (33), which features an appropriately licensed weak NPI in the same environment.

(32) *John doesn't know a person who has seen Bill in years.

(33) John doesn't know a person who has ever met Bill.

The strong NPI in (32) appears in the relative clause of an existential quantifier phrase scoping below a sentential negation which, as shown above, supports AA inferences. (32) expresses parallel scope relations to (26), which was shown to be a counterexample to the anti-additivity account of strong NPIs. Both expressions feature a negative element scoping over an existential quantifier, creating an AA environment. As discussed above, the Gajewski/Chierchia account attributes the unacceptability of (26) to the existential proposition, either a presupposition or implicature, associated with the relative clause in the negative subject quantifier. This was assumed to interfere with the DEness of the environment containing the NPI. In (32), however, there is no such presupposition or implicature that could interfere in this way. DE inferences are then expected to be supported in this environment and they are, as the test in (34) shows.

(34) Mary doesn't know a person who plays an instrument. $\rightarrow$
Mary doesn't know a person who plays the piano.

Despite appearing in an environment that supports DE inferences, the strong NPI in (32) still fails to be licensed. This case illustrates a problem for not only the anti-additivity account, as

pointed out by Collins and Postal, but for the non-truth-conditional account of strong NPIs as well. As was the original aim of Collins and Postal, I take cases like (32) as evidence in favor of a clausemate condition on strong NPIs, in the absence of an adequate account that does not make use of Neg movement.

Along with (32), Collins & Postal (2014) take a variety of additional data points to be evidence for a purely syntactic account of Neg-Raising. Though the stance I take here runs against such a treatment of the phenomenon, the core assumption of Collins and Postal's account—the availability of a Neg movement operation—I assume to be correct. I leave a discussion of the full range of data in Collins & Postal (2014) for future research, in the hopes that these cases can reconciled with the combined syntactic/semantic/pragmatic picture of Neg-Raising that I propose. In the next section, I discuss two further points involving strong NPI licensing, which I argue indicate both syntactic and non-syntactic methods of creating Neg-Raising readings.

3.4 High NPI adverbs

What has been one of the strongest arguments in favor of a syntactic account of Neg-Raising is a data point first discussed in Lakoff (1969) that differs minimally from (15) in that it features an additional weak NPI *ever* in the matrix domain. While Lakoff leaves this point as an open issue, Prince takes the variant of this case in (36) featuring the high NPI *at all* to be evidence in favor of Neg movement and a clausemate condition on strong NPIs.

(35) *John didn't ever think it would snow until tomorrow.

(36) *I don't at all think that John will leave until next week.

Assuming that both the high and low NPIs must be in the scope of the negation, the unacceptability of (35) is straightforwardly accounted for with a clausemate condition on strong NPIs. If the negation is interpreted below the Neg-Raising predicate to satisfy the locality requirement on the *until* phrases, it cannot license the high NPIs.

This data point was not discussed in Romoli (2013) and is problematic for this proposal and more generally the Gajewski/Chierchia view of strong NPIs. Assuming that the negation is only situated high at LF, Gajewski/Chierchia would expect that the strong NPI is not licensed due to some non-truth-conditional aspect of the meaning that interferes with DE inferences. However, the only difference between the bad (35) and the good (15) is the presence of the high weak NPI *ever*. This item is not expected to trigger any non-truth-conditional meaning that could prevent DE inferences with respect to the embedded clause position, making (35) a counterexample to the Gajewski/Chierchia account of strong NPIs and to Romoli's analysis of (15) and (16).

The data point in (35) is discussed in Gajewski (2005, p.71), where it is suggested that the unacceptability of the high NPI is attributed to an atypical projection behavior of the EM presupposition in the environment [not[ever[_]]. Gajewski proposes that the presupposition projects existentially in this particular environment, unlike in the typical cases where it is assumed to project universally. However, this runs against what was shown in (44) to be necessary for the acceptable (40), which lacks an embedded strong NPI. If the temporal quantification is existential in the projected presupposition, then the Neg-Raising inference cannot be made here and this expression should only have the weaker high negation reading. The EM would have to project universally in this environment to support the inference, ruling out the atypical projection treatment of (35) suggested by Gajewski. The problem then remains for accounts that derive the contrast between (40) and (35) solely on the grounds of anti-additivity.

Considering an alternative line of approach, the problem in (35) might be treated in connection to well-known intervention effects observed with NPI licensing. Locality conditions on NPIs require them to be in the immediate scope of a licenser (for a variety of different accounts see Linebarger 1981, 1987, Krifka 1995, Chierchia 2004, Guerzoni 2006). Though existentials are not typically taken to be interveners, it could be suggested that *ever* does act as an intervener here in a way that prevents the strong NPI from being licensed. However, when we consider cases like (37), we can see that strong NPIs are indeed licensed in [not[ever[_]] environments when they are not separated by a clause boundary.

(37) Sue doesn't ever arrive in until 10am.

Taken together, (15) and (35) suggest that strong NPIs must be in the same clause as the licensing operator, as proposed by Lakoff. However, not only is this contrast problematic for the existing inference-based accounts of Zwarts and Gajewski/Chierchia but it leads to the stronger conclusion that no inference-based accounts can explain the unacceptability of (35). The addition of *ever* does not change the type of inferences supported by the environment. In fact, in many contexts the addition of *ever* makes no semantic contribution at all. For instance, the expression in (38) can be uttered to express that John didn't lock the car since last using it, not that John has never locked the car before. That is, (38) in this case is semantically equivalent to the minimally different (39), which lacks *ever*.

(38) John didn't ever lock the car.

(39) John didn't lock the car.

If *ever* can be used in a way that is essentially semantically vacuous, then it should be possible to use it in such a way in (35). However, (35) is unacceptable regardless of the context it is uttered in. The contrast in the ability to license the embedded strong NPI between these two sentences then must not be semantically/inferentially rooted and thus should be

attributed to syntactic factors. I assume that these factor are a clausemate condition on strong NPIs along with a Neg movement operation.

Consider now the sentence in (40), which features a Neg-raising predicate and only the high NPI *ever*. This expression does have a Neg-Raising interpretation represented in the paraphrase below, granting the appropriate domain restriction on the temporal quantification. This expression would be appropriate in a context in which John had consider on numerous occasions the possibility of it snowing and consistently believed that it would not.

(40) John didn't ever think it would snow.
= 'John always thought that it wouldn't snow.'

This expression in minimally different from (35) in that it doesn't have the embedded strong NPI. Prince includes a variant of this data point shown in (41) in comparison with the point in (36) however, Prince only discusses the fact that the acceptable case in (41) indicates that negation is high to license the NPI and does not consider its meaning. Along with (40), this expression has a Neg-Raising reading despite the negation being forced high by the the matrix NPI. In fact, the presence of *at all* increases the clarity of the Neg-Raising interpretation of the expression, as indicated in the paraphrase below.

(41) I don't at all think that John will leave.
= 'I strongly believe that John will not leave.'

(Prince 1976: p.411, footnote 7)

Though it was not pointed out by Prince, the availability of the Neg-Raising interpretation in these two cases is a critical problem for an analysis of Neg-raising as a purely syntactic phenomenon. Such an approach would attribute the Neg-Raising interpretation to a structure like (42a), whereas the non-syntactic approach would assume a structure like in (42b).

(42) a. [ever [John [think [not [it would snow]]]]
b. [not [ever [John [think [it would snow]]]]

If the high NPI *ever* is only licensed in the scope of the negation at LF, then the Neg-Raising reading of (40) cannot be derived from a structure like (42a) and (40) must have a structure like (42b). Considering the meaning of (40), (42a) is not sufficient, assuming that *ever* contributes an existential quantifier which cannot capture the universal force of the interpretation. However, looking at (42b), the correct interpretation can only be derived on certain assumptions about the projection behavior of the EM–again, assuming for convenience that the Neg-Raising EM is a presupposition. If the EM projected existentially in this environment, the presupposition and truth conditions would be as in (43), which would not support an inference of the kind in (4) needed to derive the correct reading.

(43) Presupposition:
$\exists t$. John thought at t that it would snow $\vee$
John thought at t that it would not snow

Assertion:
$\neg\exists t$. John thought at t that it would snow

A parallel problem was shown to arise in deriving the meaning of the ACD expression in (9), which similarly received a universal interpretation despite the lack of a universal quantifier in the LF. This problem was overcome by assuming universal presupposition projection through the negation and existential quantifier and this same solution can be applied to the case of (40). With universal projection of the EM, the resulting presupposition shown in (44) together with the asserted truth conditions support an inference of the appropriate meaning.

(44) Presupposition:
$\exists t$. John thought at t that it would snow $\vee$
John thought at t that it would not snow

Assertion:
$\neg\exists t$. John thought at t that it would snow

Inference:
$\exists t$. John thought at t that it would not snow

A means of universally instantiating the EM in this context, e.g. by universal presupposition projection, is thus necessary for maintaining that weak NPIs like *ever* contribute existential quantifiers that are only licensed in the scope of a negative operator. I conclude here that (35) stands as an argument in favor of a Neg movement operation and that (40) provides equally strong support for a non-syntactic means of deriving Neg-Raising readings.

3.5 VP ellipsis with strong NPIs

Using VP ellipsis again as a diagnostic for LF structure, the syntactic position of the negation in Neg-Raising expressions can be tested using strong NPIs. Above, I took (6) to show that a purely syntactic account of Neg-Raising is not possible given that a low-scope negation at LF would prevent the ellipsis that is, in fact, allowed. With an instance of VP ellipsis similar to (6), which has a strong NPI in the embedded clause of the antecedent VP, it is possible test for whether or not the negation must be low at LF to license the strong NPI. If there is a clausemate condition on strong NPIs, then the negation would necessarily be situated low to satisfy the condition and ellipsis would be disallowed. A requirement in designing this test is that the featured NPI permits deletion of the VP with a mismatch with a non-NPI

counterpart, a well-known ability for some NPIs. Consider the example in (45), where a VP is deleted that contains an item semantically equivalent to the existential NPI *any* in the antecedent VP but is not an NPI itself, represented below as *some*.

(45) Bill didn't take any classes but Sue did <take some classes>.

The strong NPIs that appears to be most acceptable with this type of ellipsis are those of the form *in* + time, like *in three years*, as shown in (46). Speakers judge the expression to be slightly marginal however, it can still be used for the test. The interpretation of the elided temporal adverb semantically equivalent to *in three years* is the non-NPI temporal adjunct *in the past three years*.

(46) ?John hasn't visited in three years. However, Sue has <visited in the past three years>.

Using this strong NPI, the test sentence will then involve a negated antecedent VP headed by a Neg-Raising predicate that contains the embedded NPI. The sentence in (46) is of this form, which speakers judged to be more marked than (47).

(47) ??Mary doesn't think that John has visited in three years. However, Sue does <think that John has visited in the past three years>.

The contrast between (46) and (47) is subtle. Ideally, a strong NPI that can be felicitously elided under an identity mismatch with a non-NPI counterpart would be used but I could not find such an NPI for this paper. Perhaps in the future one could be found to better suit the test however, the slight contrast is noticeable and thus is informative. I take the contrast to corroborate the clausemate condition on strong NPIs, which blocks LF/semantic parallelism in (47).

Given that weak NPIs are assumed not to carry a locality condition, substituting the strong NPI in (47) with a weak NPI that can be deleted despite a mismatch of the kind in (45) is expected to result in an acceptable expression. This seems to be the case, as illustrated with (48), which features the weak NPI *ever* that can be involved with such a mismatch.

(48) Mary doesn't think that John has ever visited but Sue does <think that John has visited>.

Taken together, the contrast between the acceptable cases in (6) and (48) and the unacceptable (47) supports the stance taken here in which there is both a non-syntactic means of deriving the Neg-Raising readings as well as a Neg movement operation available in the syntax. However, despite the assumption that strong NPIs have a clausemate condition, this view does not rule out the possibility that the semantic properties of the environment containing strong NPIs is relevant to their licensing.

3.6 A partial picture of strong NPIs

The view of strong NPIs I assume so far features a clausemate condition and rejects the purely semantic anti-additivity account of Zwarts (1998) and non-truth-conditional accounts of Gajewski (2011) and Chierchia (2013). However, it is clear in the literature that NPIs are in some way sensitive to the semantic properties of the expressions that feature them, with some notion of downward entailment typically accepted as the relevant attribute. This runs against the purely syntactic treatment of strong NPI licensing, in which there is a syntactic licensing relation between NPIs and sentential negation. If this is correct, the task for future research is to try to integrate the locality requirement with more modern views of NPI licensing for a complete picture of the strong/weak distinction. The core features of each type of approach discussed above are not mutually exclusive and the correct picture may include aspects of Zwarts' account and/or the Gajewski/Chierchia account along with a locality condition. However, there have been empirical arguments offered against a locality condition, as in Horn (1978) and Gajewski (2005). These cases won't be discussed here however, see Collins & Postal (2014) for a discussion of some of these points in defense of a clausemate condition on strong NPIs.

3.7 Neg-Raising as a semantic/pragmatic phenomenon

In the sections above, I argued that only a syntactic/semantic/pragmatic view can capture the full range of Neg-Raising data. However, this does not mean that the availability of Neg-Raising readings should be attributed both to syntactic and semantic factors. A mysterious aspect of the combined view I am assuming is that the syntactic Neg movement operation is only observable with predicates associated with a semantic pragmatic feature that presumably does not itself have a syntactic representation. Accepting the two features in conjunction then calls for an account that captures this unexpected connection between a syntactic operation and semantic/pragmatic property of a lexical element not reflected in the syntactic category of the element. As an initial observation, the semantic effects of Neg movement from an embedded position to a matrix position at LF is undone by the inference in (4), which results in a meaning equivalent to the LF where the negation isn't moved from the low position. Given that Neg movement only applies past predicates that support this inference, the generalization in (49) follows.

(49) Neg movement generalization:
Neg movement only applies if it is semantically vacuous.

This generalization leads to a view of Neg movement as dependent on the presence of an EM. If this is correct, the unexpected reading of Neg-Raising sentences should be attributed to the presence of the EM, given that Neg movement is not necessary to create this reading

while the EM is. The availability of these readings should then be thought of as an intrinsically semantic/pragmatic phenomenon, with Neg movement viewed as an epiphenomenon of Neg-Raising. This raises the question of why Neg movement would be available at all, which, along with an explanation of the generalization in (49), will be left for future work.

Lastly, I will note a problem that arises for the Neg movement assumption in VP ellipsis contexts.

3.8 A problem involving ellipsis

In Section 2.1, the expression in (6), restated as (50), was offered as evidence against a purely syntactic account of Neg-Raising. Ellipsis in the second conjunct is expected not to be licensed if negation must be below *think*, which would prevent the first conjunct from serving as an appropriate antecedent for the elided VP.

(50) John didn't think that it would snow but Sue did <think that it would snow>.

Following this, I argued that although Neg-Raising cannot be a purely syntactic phenomenon, there is still evidence of a Neg movement operation in the expressions discussed above featuring strong NPIs. With this in mind, compare (50) to the minimally different yet unacceptable case of (51). This features *and* instead of *but* as well as the additive *also*, both of which support a parallel interpretation of the VPs, yet the elided VP cannot be interpreted with an embedded negation. As a reviewer points out, this expression is expected to be acceptable if Neg movement is possible, given that the negation can be covertly interpreted in the embedded clause of the first conjunct at LF to provide a good antecedent for the elided VP.

(51) *John didn't think it would snow and Sue also did <think it would not snow>.

While (50) suggests that Neg movement is not necessary to yield Neg-Raising interpretations, (51) suggests that Neg movement is not possible. The problem can be further emphasized by replacing the first conjunct of (50) with the expression in (15), argued above to require a low negation to license the NPI, resulting in (52).

(52) *John didn't think it would snow until tomorrow and Sue also did <think that it would not snow until tomorrow>.

As with (51), the ellipsis here cannot be interpreted with an embedded negation, despite negation being necessarily situated within the antecedent VP. If Lakoff's Neg movement treatment of expressions like (15) is correct, as was argued above, then (52) is clearly problematic. (51) and (52) can be additionally contrasted with an acceptable case in which negation is pronounced within the antecedent VP and interpreted within the elided VP, as in (53).

(53) John thought it wouldn't snow and Sue did <think it wouldn't snow>, too.

What then is the difference between the acceptable cases of (50) and (53) and the unacceptable (51) and (52)? I won't offer an attempt at this issue here and will leave the task of trying to reconcile these cases with the Neg movement assumption for future work.

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