Why *not numeral NP* requires *but* but not *not many NP*[1]

Danfeng WU — *University of Oxford*

Abstract. This paper observes that negated numerals require *but* (e.g. *Not three *(but four) students arrived*), whereas *not many* doesn't (e.g. *Not many students arrived*). Drawing on the additional observation that negated non-quantifier DPs require *but* (e.g. *Max eats not spinach *(but chard)*), I propose that constituent negation presupposes that the utterance containing the negation must entail a true alternative utterance, if there exists such a true alternative. This is generally satisfied by an overt *but*-phrase, except with the *not-many*-sentence because it entails an alternative sentence on its own–*Some students arrived*. I also take the contrast between *not many* and negated numerals as evidence that they have different types of assertion, in support of Kennedy (2013, 2015): *many* asserts at least n, while numerals assert at least n and at most n at the same time. Therefore, in contrast to *not many*, which entails *some*, *not three* does not entail *not one* or *not two*, and thus requires the *but*-phrase to introduce the true alternative.

Keywords: constituent negation, numerals, quantifiers, correction, semantics-pragmatics.

1. Introduction

But in English has at least three uses: counterexpectation, semantic opposition and correction (e.g., Toosarvandani's 2013, 2014 taxonomy). Each use requires contrast of some sort: in counterexpectation (e.g., *Max eats spinach but hates it*), the first conjunct (i.e., *Max eats spinach*) creates an expectation that is rejected by the second conjunct (i.e., *but hates it*); in semantic opposition (e.g., *John is tall but Bill is short*), the conjuncts contrast with each other in two positions; correction requires presence of negation in the first conjunct and absence of negation in the second conjunct (1). Absence or presence of negation in both conjuncts is not possible (2)–(3). For this reason, I also call corrective *but* sentences *not…but… sentences*.

(1)Max does**n't** eat spinach but chard. (Toosarvandani 2013:828)
(2)#Max eats spinach but chard.
(3)#Max does**n't** eat spinach but **not** chard.

In Wu (2022) I showed that *not…but…* has identical syntactic properties to *both…and…* and *either…or…*., leading to the proposal that *not* in *not…but…* is a coordinator like *both* and *either*–they have the same syntactic structure:

[1] I would like to thank the audience at Sinn und Bedeutung 29 and the University of Göttingen Form and Meaning of Coordination for helpful comments. All errors are my own.

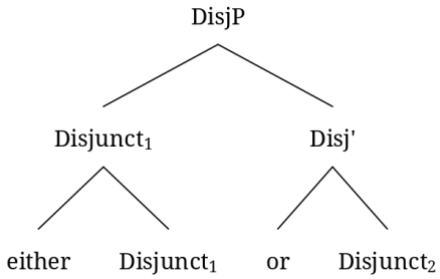

Figure 1: *The syntax of* either…or….

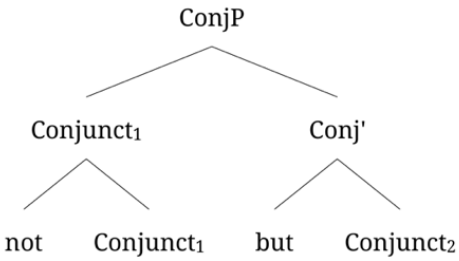

Figure 2: *The syntax of* not…but….

One of the common properties of *both*, *either* and *not* is that they require another conjunct. *Both* requires *and,* and *either* requires *or*:

(4)a. Max eats both spinach *(and chard).
b. Max eats either spinach *(or chard).

While we do not generally consider negation to require *but* (5), there is a type of negation that does–constituent negation on nominals (I call this *nominal negation*) requires a *but*-phrase (6). I call this *the not-requires-but generalization*.

(5)Max doesn't eat spinach (but chard).
(6)Max eats not spinach *(but chard).

One possible analysis of this generalization is syntactic selection: *both*P selects for *and*P, *either*P selects for *or*P, and the phrase headed by nominal negation selects for *but*P. But there are exceptions to the not-requires-but generalization: as Klima (1964), Postal (1974), Collins (2016) and others observed, *not {many/much/every/all} NP* can occur without *but* (7).

(7){Not many students/ Not every student/ Not all the students} arrived.

I think the key to understanding this exception to the not-requires-but generalization is Amiraz's (2022) observation that (7) entails an alternative sentence (i.e. *Some students arrived*), to be discussed in detail in section 2. Based on this observation, I will argue in section 3 that rather than syntactic selection, constituent negation has a presupposition that either the utterance containing the negation must entail an alternative utterance, if there exists such a true alternative; or there is no true alternative. This is formalized below:

(8)*My proposal*
A sentence p containing constituent negation has the following:
a. Presupposition: ∃p': p' ∈ the alternative set of p and p entails p'; or ¬∃p': p' ∈ the alternative set of p and p' is true.
b. Assertion: ¬p.

Example (6) is odd without the *but*P because *Max eats not spinach* does not entail any alternative sentence. The *but*P satisfies the nominal negation's presupposition by asserting the alternative explicitly. In contrast, (7) is fine because it entails an alternative sentence–*Some*

students arrived. Then section 4 will make the observation that in contrast to *not {many/much/every/all} NP*, *not Numeral NP* cannot occur without *but* (9):

(9)#Not three students arrived.

This contrast between numerals and *many* is surprising because they are both scalar items, and have been argued to have very similar meanings. I will argue that unlike (7), (9) is odd because it does not entail any alternative utterance definitively: it does not entail *One student arrived*, *Two students arrived*, *Four students arrived*, etc.

My analysis of the contrast between numerals and *many* relies on two key components. First, without *but*, negation targets the asserted content (i.e. it cannot be used metalinguistically). This has the consequence that only the asserted content of *many*, *every* and *all* is negated in (7), and only the asserted content of *three* is negated in (9). Second, *many* asserts at least n, while numerals assert both at least n and at most n, following the two-sided approach to numerals (e.g. Kennedy 2013; Kennedy 2015) but not the Classic Analysis of numerals that treat them on a par to *many* (e.g. Horn 1972). Thus, when negated, *not many* asserts at most n, while *not three* asserts less than three or more than three. The former entails *some*, but the latter does not entail *one*, *two* or *four*.

Throughout the paper I compare my analysis with those in the literature, the weaker proposals by Amiraz (2022) and Solt & Waldon (2019), and argue that we do need to posit the strong presupposition imposed by constituent negation. Section 5 then extends my analysis to *not only*, which always requires *but also*, and to *not even*, which never allows a *but*P. Section 6 concludes and raises future questions for research.

2. *Not {many/much/every/all}* entails *some*

While normally, nominal negation on non-quantifier DPs like *spinach* requires *but*P (6), *not {many/much/every/all} NP* can occur without *but* (7) (Klima 1964; Postal 1974; Collins 2016), repeated below:

(7){Not many students/ Not every student/ Not all the students} arrived.

I believe the key to the felicity of (7) lies in Amiraz's (2022) observation that it entails *Some students arrived*. Amiraz (2022) observed that in English, Hebrew and Korean, constituent negation plus *all* always entails *some*, even when embedded in a Strawson-Downward-Entailing context, where regular scalar implicatures disappear. I replicate two of Amiraz's examples, one with a factive Strawson-Downward-Entailing context (10) and the other with a non-factive Strawson-Downward-Entailing context (11).

(10) Context: Mary teaches Intro to Statistics. She accidentally gave the students the exam of Advanced Statistics. She expected they would all fail, but surprisingly, they all passed. Mary: You should all be proud of yourselves for passing the exam. Frankly, …
a. I was surprised that you didn't all fail!
b. #I was surprised that not all of you failed! (Amiraz 2022:8)

(11) a. This team would have won the title if they hadn't all died in that plane crash.
b. #This team would have won the title if not all of them had died in that plane crash.
(Amiraz 2022:8)

In the context for (10), no student failed. Because sentence negation plus *all* does not have to entail *some* (10a) (i.e. it does not have the 'not all the students failed but some did' interpretation), it is fine in this context. (10b) is odd because it entails that some students failed, which contradicts the context.

The consequent in (11) requires the counterfactual situation where no member of the team had died in the plane crash so that the entire team could compete in the game and win the title. Otherwise, it is unlikely that the survival of some non-specific team members would guarantee winning the title. In this context, (11a) is fine because it considers counterfactual situations where no team member had died, which is congruent with the consequent. (11b) is odd because it only considers counterfactual situations where some team members had died, which is incongruent with the consequent.

3. The analysis

Having introduced Amiraz's (2022) observation that constituent negation plus *all* entails *some*, this section will first present his analysis of why that is, but sentence negation plus *all* doesn't entail *some*. Then I will refine his proposal to a stronger one.

3.1. Amiraz's analysis

Amiraz claimed that there is a difference in the strengths of focus sensitivity between sentence negation and nominal negation: sentence negation has focus sensitivity which is cancelable, while nominal negation's focus sensitivity is not cancelable. For example, (12) implies that I can afford another car, but this implicature can be denied by the continuation *In fact, I can't afford any car!*

(12) I obviously can't afford a Mercedes$_F$.

In contrast, based on *not-all*-sentences like (10b) and (11b), Amiraz claimed that nominal negation behaves like a negated cleft in having non-cancelable focus sensitivity. For example, *I was surprised that not all of you failed!* (10b) has the same meaning as *I was surprised that it was not all of you that failed!*

Amiraz thus proposed that nominal negation presupposes that one of the propositions in the alternative set of the *all*-sentence is true. Assuming that the alternative set of *All of you failed* is {Some of you failed, Many of you failed, All of you failed}, nominal negation presupposes that one of these propositions is true.

How does this lead to the entailment that *Some of you failed* is true? To answer this question, I first discuss the meanings of *some*, *many*, *every* and *all*. They are scalar items–they all generate the scalar inference that some other alternatives on the scale may be false. For example,

many students arrived generally means that at least n students arrived (n being a large number), but not all the students arrived.

The common assumption is that the lower bounded meaning of *many* (at least n) is asserted semantically (i.e. it is not true that only few students arrived, Figure 3), while the upper bounded meaning (at most n) is generated pragmatically by Gricean reasoning (i.e. not all the students arrived, Figure 4).

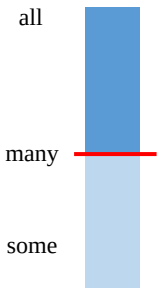

Figure 3: *The semantic assertion of* many.

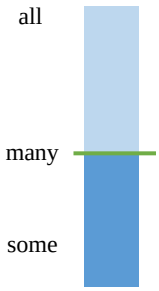

Figure 4: *The implicature of* many.

Having introduced the meanings of these quantifiers, let us return to Amiraz's analysis. Since he claimed that nominal negation presupposes that one of the alternative propositions is true, this should lead to the presupposition that if there is a weakest member of the alternative set (i.e. a member that is entailed by all the other members of the set), then this weakest member must be true.

Since *some*, *many* and *all* assert the lower bounded meaning, *Some of you failed* is the weakest member of the alternative set. Nominal negation's presupposition thus leads to the presupposition that *Some of you failed* is true (*existential presupposition*).[2] Since this is a presupposition, it projects in Strawson-Downward-Entailing contexts.

While Amiraz did not discuss *not many NP* and *not every NP* (7), his analysis can be extended to these sentences, as long as their alternative sets are the same–{Some-sentence, Many-sentence, All-sentence}. The presupposition that a member of this alternative set is true leads to the existential presupposition.

3.2. My analysis

Based on the examples where negated non-quantifier DPs require *but* (e.g. *Max eats not spinach *(but chard)*, (6)), I refine Amiraz's proposal to a stronger one (13): nominal negation not only presupposes that one of the alternatives is true, but also that *it is entailed by the utterance*.

[2] Crucially, *None of you failed* cannot be a member of the alternative set of *All of you failed*. If it were, and the alternative set were {None of you failed, Some of you failed, Many of you failed, All of you failed}, then there is no weakest member of this alternative set, and the presupposition that one of the members in the alternative set is true would not lead to the existential presupposition.

(13) *My preliminary proposal*
A sentence p containing nominal negation has the following:
a. Presupposition: ∃p': p' ∈ the alternative set of p and p entails p'.
b. Assertion: ¬p.

This accounts for the fact that negated non-quantifier DPs require *but* (6) because without the *but*P, the sentence does not entail any alternative; the alternative set of regular DPs like *spinach* does not have a weakest member. *Not {many/much/every/all} NP* can occur without *but* (7) because the alternative set of *many, much, every* and *all* has a weakest member, which is entailed by the sentence without the *but*P.

3.3. Two open issues

My analysis, which builds on Amiraz's, has two open issues that are addressed in this subsection. First, a crucial part of his analysis is the alternative set, but Amiraz did not specify exactly what it should be. For my purposes here, Katzir's (2007) and Fox and Katzir's (2011) suggestion is sufficient, as in (14).[3] According to this, *some* is a valid alternative to *many/every/all*.

(14) The alternative set of p is generated by replacing the focused constituent in p with an alternative lexical item that is at most as structurally complex as the focused constituent and has the same semantic type.

The second open issue of my analysis is which part of the quantifier meaning can be targeted by negation. So far I have focused on the asserted meaning of quantifiers (i.e. their lower bounded meaning), and assumed that their negation establishes an upper bound. But that is not always true: negation can target the implicature of quantifiers (i.e. their upper bounded meaning), as in *Not many students arrived, but all of them did*, in which case the negated quantifier is compatible with a quantifier higher on the scale. Does the fact that negation could target the implied upper bounded meaning of quantifiers affect my analysis in any way?

I will argue that it does not, because the sentences under study do not involve a *but*P (e.g. (7)), and I will show that without *but*, negation has to target the asserted meaning of quantifiers. I call the negation that targets the semantic assertion *semantic negation*, and the negation that targets the implicature *metalinguistic negation*. Metalinguistic negation can not only correct pragmatic effects such as implicatures (15a), but also phonology (15b), morphological make-up (15c) and sociolinguistic use (15d).

[3] I don't think this is actually right because it will over-generate, and permit some elements that should not be alternatives to be alternatives. For example, as we will see in section 4, *some* should not be an alternative to numerals like *three*, otherwise *some* would be the weakest member of the alternative set of *three*, and *not Numeral NP* would not require *but*, contrary to fact. But nothing in Katzir's (2007) and Fox and Katzir's (2011) proposal prevents *some* from being an alternative to numerals. But for the most part of this paper, their proposal suffices.

There were many other proposals of what elements count as alternatives. Subsequent proposals suggested that the alternatives do not have to entail one another, but only need to have any sort of partial ordering (Hirschberg 1985), or the same selectional restrictions and item-induced presuppositions (Gazdar 1979), or the same semantic field, brevity and same degree of lexicalization (Atlas & Levinson 1981). Some of these proposals account for the current data, but others don't. I leave to future research an empirically sufficient proposal of alternativehood.

(15) a. Chris managed to solve not some of the problems, but all of them.
b. I ate not tom[eiDouz] but tom[a:touz].
c. I managed to trap not two mongeese but two mongooses.
d. Grandpa is feeling not lousy but just a tad indisposed. (Based on Horn 2001:370-371)

Following Horn (1996) and Kennedy (2013), I assume that with a *but*P, nominal negation can target either the semantic assertion of *many/every/all* or their implicature, but not both at the same time. Crucially, without *but*, negation has to be semantic. Omitting the *but*-clause removes the metalinguistic reading of (15):

(16) a. #Chris didn't manage to solve some of the problems. You were not accurate enough.
b. #I didn't eat tom[eiDouz]. You pronounced it wrong.
c. #I managed to not trap two mongeese. You got the plural morphology wrong.
d. #Grandpa is not feeling lousy. I don't agree with your word choice.

I also observe that *Not many students arrived* is infelicitous in a context where all the students arrived. This is because without the *but*P, the negation here can only be semantic, but not metalinguistic. This semantic negation targets the assertion of *many* rather than its implicature (i.e. only its lower bounded meaning is negated), leading to an upper bounded meaning (i.e. less than many). It is this upper bounded meaning that entails *some*.

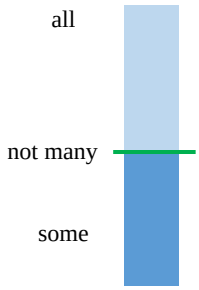

Figure 5: *Negating the semantic assertion of* many.

In contrast, *Not many students arrived, but all of them did* is fine because this involves metalinguistic negation, which targets the implicature of *many* (i.e. only its upper bounded meaning is negated), leading to a lower bounded meaning (i.e. more than many). But this lower bounded meaning is irrelevant to this paper, which focuses on the cases where *not many* does not require *but*.

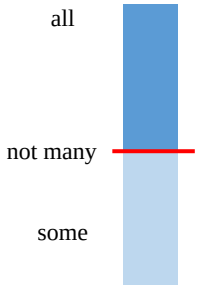

Figure 6: *Negating the implicature of* many.

This section has presented my analysis of why *not {many/much/every/all} NP* does not require *but*, which builds on and refines Amiraz (2022): not only does nominal negation presuppose that one of the alternatives is true, but it also presupposes that this true alternative is entailed by the utterance. Alternatives can be obtained by replacing the focused constituent with a lexical item with the same semantic type that is at most as structurally complex. Since negation without *but* has to be semantic, only the asserted meaning of the quantifier is negated.

4. *Not Numeral NP*: Not an exception to the not-requires-but generalization

This section discusses the surprising contrast between *not many* and *not Numeral*, and provides an analysis based on the assumption that *many* and numerals have different types of assertion. Then subsection 4.1 compares my analysis with an alternative proposal by Solt & Waldon (2019), and subsection 4.2 shows that my analysis can be used as a test for the asserted meaning of other quantifiers such as *several* and *zero*.

Having seen the behavior of *not {many/much/every/all} NP*, we may expect *not Numeral NP* to behave the same because the common analysis of numerals is that they generate scalar inferences in the same way as *many* (Classic Analysis of numerals, Horn 1972; grammatical theories of scalar implicatures, e.g. Chierchia 2004; Chierchia 2006; Fox 2007; Chierchia et al. 2012; Bylinina and Nouwen 2018): the lower boundedness of numerals (i.e. at least n) is an entailment, while their upper boundedness (i.e. at most n) is an implicature.

Figure 7: *The semantic assertion of* three *according to the Classic Analysis*.

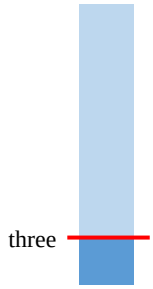

Figure 8: *The implicature of* three *according to the Classic Analysis*.

However, this prediction is not borne out: unlike *not {many/much/every/all} NP*, *not Numeral NP* requires a *but*P, repeated below:

(9)#Not three students arrived.

If we apply our analysis of *not {many/much/every/all} NP* plus the Classic Analysis of numerals to (9), we will fail to predict its infelicity. Let us assume that the alternative set of (9) is {One student arrived, Two students arrived, Four students arrived…}. [4] Nominal negation presupposes that one of those alternatives is true. This leads to the presupposition that *One student arrived* is true because it asserts at least one student arrived, and is the weakest member of the alternative set–it is entailed by all the other members of the alternative set (Figure 9). Thus, nominal negation's presupposition is satisfied, and we should not require the overt *but*P, contrary to fact.

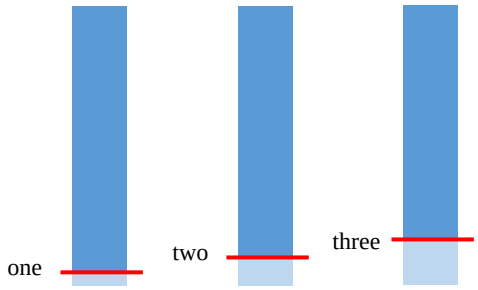

Figure 9: *The semantic assertions of* one, two *and* three *according to the Classic Analysis*.

There are alternative proposals that consider numerals to be different from *many*, and suggest that the default assertion of numerals is a **two-sided meaning** (at least n and at most n, in other words, exactly n) (Geurts 2006; Kennedy 2013, 2015; Koenig 1991).[5] I call these the *two-sided approach to numerals*. These proposals were based on acceptability judgments and experimental and developmental evidence (e.g. Koenig 1991; Horn 1992; Scharten 1997;

[4] We may wonder if *Zero students arrived* is included in the alternative set. Let us suppose it is. Like with numerals in general, there is debate on the meaning of *zero*. Bylinina and Nouwen (2018), the proponent of the grammatical theories of scalar implicatures, argued that all numerals assert the lower-bounded meaning (at least n), including *zero*, which asserts at least zero. In contrast, Kennedy (2024), the proponent of the two-sided approach to numerals, argued that all numerals assert the two-sided meaning (at least n and at most n), including *zero*, which asserts exactly zero. Therefore, Bylinina and Nouwen (2018) would consider *Zero students arrived* to be a tautology, while Kennedy (2024) would consider it to be a contradiction. It is not clear what it means if a tautology or a contradiction is included in the alternative set of (9), and it is presupposed that at least one member of this alternative set is true. Kennedy (2024) suggested that contradictions and tautologies are informationally inert, and should thus be excluded from the calculation of entailments (instead, he suggested a modified notion of entailment called *contingent entailment*). If this is the case, then *Zero students arrived* would not factor into the calculation of nominal negation's presupposition, even if it may be included in the alternative set.

[5] Numerals only have the lower-bounded meanings in some contexts, e.g. when embedded under root modals, and when the numeral-containing sentence continues with *if not* (e.g. *Kim took three classes, if not four*). Kennedy (2015) derived these meanings with a scope interaction between numerals and modals, or with a type-lowered singular term meaning based on the default two-sided meaning of the numeral.

Musolino 2004; Bultinck 2005; Geurts 2006; Hurewitz et al. 2006; Huang et al. 2013; Kennedy 2013; Marty et al. 2013).

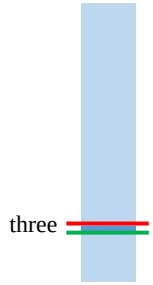

Figure 10: *The semantic assertion of* three
according to the two-sided approach to numerals.

The two-sided approach to numerals plus nominal negation's presupposition can derive the infelicity of (9). The alternative set of (9) is {One student arrived, Two students arrived, Four students arrived…}. Nominal negation presupposes that one of those alternatives is true. But since all the numerals assert exactly n, no member of the alternative set is entailed by the other members (i.e. there is no weakest member of the alternative set). Thus, nominal negation's presupposition that one of the alternatives of (9) is true does not entail the truth of any of these alternatives definitively. In other words, (9) does not entail *One students arrived*, *Two students arrived*, or any other member of the alternative set. Nominal negation's presupposition is not satisfied, and thus requires an overt *but*P to entail the alternative by asserting it explicitly:

(17) Not three but {two/four} students arrived.

Example (9) does entail *less than three or more than three students arrived*, but *less than three or more than three* is not a viable alternative to *three* due to its more complex structure.

4.1. Comparison with Solt & Waldon (2019)

Solt & Waldon (2019) observed that it is generally odd to negate a numeral out of the blue or as an answer to a *how-many*-question (18), but fine to do so in an enriched context as an answer to the question in (19).

(18) A: How many sheep does Lisa have?
B: #She doesn't have 40 sheep. (Solt & Waldon 2019:18)

(19) A: Fred has exactly 40 sheep. Does Lisa have the same number?
B: No. She doesn't have 40 sheep. (Solt & Waldon 2019:18)

They proposed that an assertion with numerals must specify a convex region in the space of answers to the current question under discussion (QUD), and a convex region is essentially a densely populated one where if two points are in the range, so are all the points between them. They followed Kennedy's (2015) two-sided semantics of numerals, according to which negated numerals assert a disjoint region, for example, less than 40 or more than 40 for (18B). This region is not convex and therefore ruled out due to being maximally uninformative. (19B) is

fine because the question in (19A) has turned the QUD into a polar question *Does the number 40 obtain for the number of sheep Lisa has?,* which is a two-member set {Lisa has exactly 40 sheep, Lisa doesn't have exactly 40 sheep}. (19B) selects the negative member, and is trivially convex.

Solt & Waldon's context-and-convexity-based analysis cannot account for nominal negation plus numeral because it cannot be saved by any question or context, suggesting that nominal negation is more restricted than sentence negation:

(20) A: Exactly three students majored in philosophy. Did the same number of students major in linguistics?
B: No. #Not three students majored in linguistics.

I observe that clefts cannot be felicitous answers to these polar questions, either, supporting Amiraz's (2022) claim that sentences with nominal negation pattern like negated clefts:

(21) A: Exactly three students majored in philosophy. Did the same number of students major in linguistics?
B: No. #It was not three students that majored in linguistics.

Solt & Waldon required that when a numeral is denied by negation, the remaining space of alternatives must be convex. Their analysis assumed that this requirement is imposed by the numeral, while my proposed requirement is imposed by negation. My proposal is also stronger than theirs in that nominal negation requires not only elimination of alternatives, but also selection of a true alternative. The alternative set of *Three students majored in linguistics* is {*One student majored in linguistics*, *Two students majored in linguistics*…}, of which no member is entailed by (20B). Even if the alternative set can be constrained by context, *Three students didn't major in linguistics* can't be a member of the alternative set due to its greater syntactic complexity than *Three students majored in linguistics*.

I want to mention that even in a restricted context, nominal negation plus non-quantifier DP is not licensed. Consider the following context for example:

(22) Context: Max must eat either spinach or chard, but not both or neither.
*Max will eat not spinach (, contrary to what we may think).

If the alternative set could be constrained by context, then the alternative set to *spinach* might just be {spinach, chard}. The non-scalar sentence in (22) could in principle contextually entail *Max will eat chard* without the *but*P, and its infelicity suggests that at least the alternatives considered by nominal negation cannot be constrained by context.

4.2. Test for the meanings of *several* and *zero*

I have proposed that *not {many/much/every/all} NP* is an exception to the not-requires-but generalization because they manage to entail the alternative *some*-sentence without an overt *but*P. *Not Numeral NP* is not an exception to the not-requires-but generalization because there is no alternative sentence that it entails definitively. This contrast between *many* and numerals

is the result of an interaction of two things. The first is the contrast in meaning between the two: *some, many, much, every* and *all* assert the lower bounded meaning (at least n), whereas numerals assert the two-sided meaning (at least n and at most n). The second is that without the *but*P, negation targets the asserted content (i.e. the lower bounded meaning of *many* but the two-sided meaning of numerals).

More generally, to be exceptional to the not-requires-but generalization, the alternative set must have a weakest member (i.e. a member that is entailed by all the other members). If it does (as in the case of *many*), then nominal negation's presupposition that at least a member of the alternative set must be true leads to the result that this weakest member is true. This weakest member is thus entailed without the *but*P, and satisfies the negation's presupposition. On the other hand, if there is no weakest member of the alternative set (as in the case of numerals, which all assert two-sided meanings), then an overt *but*P is required to satisfy the nominal negation's presupposition.

Since the alternative set must have a weakest member in order to be exceptional to the not-requires-but generalization, the alternative set would thus need to assert one-sided meanings (i.e. either the lower-bounded meaning or the upper-bounded meaning), but not both bounds at the same time. We could therefore use the not-requires-but generalization as a test of the asserted meaning of a quantifier and its alternatives. I use this test on two quantifiers as examples–*several* and *zero*.

Several follows the not-requires-but generalization (23) because none of its alternatives is entailed by the utterance. This may be because *several* asserts a two-sided meaning like *three* but not like *many*.

(23) a. *Not several students arrived.
b. Not several but only one student arrived.

Likewise, *zero* also follows the not-requires-but generalization (24) possibly because *zero* also asserts a two-sided meaning like *three* but not like *some* and *many* (supporting Kennedy 2024 but not Bylinina and Nouwen 2018).

(24) a. *Not zero students arrived.
b. Not zero but two students arrived.

5. Extensions

Having proposed an analysis of the not-requires-but generalization, I will extend my analysis to two related types of sentences in this section: *not-only*-sentences and *not-even* sentences.

5.1. *Not only*: Not an exception to the not-requires-but generalization

Not only always requires *but also*, parallel to the fact that *not* usually requires *but*:

(25) a. Max eats not only spinach *(but also chard).

b. Not only Max *(but also Pat) eats spinach.
c. Max not only swims *(but also surfs).

I analyze this fact in the same way: the proposition containing *not* presupposes that the utterance entails a true alternative. Without the *but*P, the *not-only*-sentence only rejects the proposition *only p*, but does not entail a true alternative. For example, let us assume that *Max eats not only spinach* has the alternative set {Max eats only spinach, Max eats spinach and chard, Max eats spinach and broccoli…}. Just saying *Max eats not only spinach* does not entail any member of this alternative set definitively.

It is worth pointing out that (25c) doesn't involve nominal negation, but another kind of constituent negation–verbal negation. The fact that (25c) is also subject to the not-requires-but generalization suggests that not just nominal negation, but all types of constituent negation have the presupposition that the sentence entails a true alternative.

5.2. *Not even*: An exception to the not-requires-but generalization

Not even does not require *but*P. In fact, (26) entails the *no-one*-sentence, but does not tolerate an overt *but*P:

(26) Not even John is there (*but no one is).

Without the *but*P, (26) asserts that John is not there, and presupposes that John is the most likely person to be there (e.g. Collins 2016; Rooth 1985). This entails that no one is there. This should in principle satisfy nominal negation's presupposition, if *no one* is an alternative to *even John*, and thus should not require the *but*P.

The impossibility of *but no one* suggests that *no one* is not an alternative to *even John*. Whatever the alternatives of *even John* are, perhaps none of them is entailed by (26). If (26) indeed does not entail any of its alternatives, then its felicity suggests that perhaps we should revise constituent negation's presupposition to: either there is a true alternative that is entailed by the utterance, or there is no alternative that is entailed by the utterance (as in the case of (26)):

(8)*My final proposal*
A sentence p containing constituent negation has the following:
a. Presupposition: ∃p': p' ∈ the alternative set of p and p entails p'; or ¬∃p': p' ∈ the alternative set of p and p' is true.
b. Assertion: ¬p.

Relatedly, some speakers accept *not one* without *but*, despite not accepting *not three* without *but* (9):

(27) Not one student arrived.

Example (27) means 'no student arrived', and I would analyze it as having a covert *even*: *Not (even) one student arrived*. With the covert *even*, (27) presupposes that *one* is the most likely

number of students to have arrived. I assume that generally low numbers are more likely than high numbers,[6] and this presupposition of (27) therefore implies that all the numbers higher than *one* are less likely than *one*. By denying the *one*-sentence, (27) entails that the number of students who arrived is zero. Assuming that *zero* is an alternative to *one*, this satisfies nominal negation's presupposition, and thus does not require a *but*P. *But*P is possible, though, suggesting that *zero* is indeed an alternative to *one*:

(28) Not one but zero students arrived.

If covert *even* can be merged in a *not-one* sentence, can it be merged in a *not-three* sentence like (9) to waive its requirement of the *but*P? Even if covert *even* can be merged there, leading to *Not even three students arrived*, this sentence still does not entail any alternative definitively–it does not entail *One student arrived* or *Two students arrived*. We would need a *but*P to satisfy nominal negation's presupposition (29).

(29) Not even three but only two students arrived.

6. Conclusion

This paper began with the observation that constituent negation generally requires *but*, except *not {many/much/every/all}*. Based on this observation, I have argued that constituent negation presupposes that the sentence should entail a true alternative, which is generally introduced by an overt *but*P. The exceptional sentences do not need an overt *but*P because they do entail an alternative *some*-sentence. Then I observed that numerals are not exceptional and require a *but*P. I took this as evidence against the Classic Analysis that numerals assert a lower bounded meaning like *many*, and as evidence that numerals assert a two-sided meaning. Finally, I extended my analysis to other quantifiers like *several* and *zero*, and to related constructions like *not only* and *not even*.

My analysis raises the following question that I leave to future research. This paper was framed in terms of a comparison between *not* and the other coordinators like *both* and *either*, which also require a second junct. If the reason why constituent negation requires a second junct has to do with alternative semantics as I have claimed, I want to understand whether *both* and *either* require a second junct for similar reasons. If we extend the current analysis to *both* and *either*, then perhaps *both* presupposes that the utterance entails that another alternative is also true,

[6] The works that studied the interactions of *even* and numerals assumed that numerals assert the lower bounded meaning, and thus low numbers entail the high ones, and low numbers are more likely than the high ones (Crnič 2013; Crnič 2014). Since I adopt the two-sided approach to numerals in this paper, there is no entailment relation between the numerals. I assume that the likelihood relations between numerals are determined by the common ground instead of entailment, and that generally low numbers are more likely than the high ones. This predicts that in a context where low numbers are less likely than the high ones, *even* may be able to combine with the number with the lowest likelihood (i.e. the lowest number) in a positive environment. I think this is borne out in the following example:

(i) Context: The possible scores in a physics exam range from 1 to 5. Rory is a star student and always gets 5 on every exam, but she flopped the last one miserably.
Rory even got 1 on physics.

and *either* presupposes that the utterance entails that another alternative may be true. I leave to future research whether these coordinators can have a unifying analysis.

References

Amiraz, O. (2022). Not all scalar inferences are alike: The effect of existential presuppositions. In M. Degano, T. Roberts, G. Sbardolini, and M. Schouwstra (Eds.), *Proceedings of the 2022 Amsterdam Colloquium*, Vol. 23, pp. 8–14. .

Atlas, J. D. and S. C. Levinson. (1981). It -clefts, informativeness, and Logical Form: Radical pragmatics (revised standard version). In P. Cole (Ed.), *Radical Pragmatics*, pp. 1–61. New York: Academic Press.

Bultinck, B. (2005). *Numerous Meanings: The Meaning of English Cardinals and the Legacy of Paul Grice*. .

Bylinina, L. and R. Nouwen. (2018). On "zero" and semantic plurality. *Glossa: A Journal of General Linguistics*, *3*(1). doi:10.5334/gjgl.441

Chierchia, G. (2004). Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface. In A. Belletti (Ed.), *Structures and Beyond*, pp. 39–103. Oxford University PressNew York, NY.

Chierchia, G. (2006). Broaden your views: Implicatures of domain widening and the "logicality" of language. *Linguistic Inquiry*, *37*(4), 535–590.

Chierchia, G., D. Fox and B. Spector. (2012). The grammatical view of scalar implicature and the relationship between semantics and pragmatics. In C. Maienborn, K. V. Heusinger, and P. Portner (Eds.), *Handbücher Zur Sprach- Und Kommunikationswissenschaft / Handbooks of Linguistics and Communication Science:*, Vol. 3Berlin: De Gruyter. doi:10.1515/9783110253382

Collins, C. (2016). Not even. *Natural Language Semantics*, *24*(4), 291–303.

Crnič, L. (2013). Focus particles and embedded exhaustification. *Journal of Semantics*, *30*(4), 533–558.

Crnič, L. (2014). Non-monotonicity in NPI licensing. *Natural Language Semantics*, *22*(2), 169–217.

Fox, D. (2007). Free choice and the theory of scalar implicatures. In U. Sauerland and P. Stateva (Eds.), *Presupposition and Implicature in Compositional Semantics*, pp. 71–120. London: Palgrave Macmillan UK.

Fox, D. and R. Katzir. (2011). On the characterization of alternatives. *Natural Language Semantics*, *19*(1), 87–107.

Gazdar, G. (1979). *Pragmatics: Implicature, Presupposition and Logical Form*. New York: Academic Press.

Geurts, B. (2006). Take 'five': The meaning and use of a number word. In S. Vogeleer and L. Tasmowski (Eds.), *Linguistik Aktuell/Linguistics Today*, Vol. 95, pp. 311–329. Amsterdam: John Benjamins Publishing Company.

Hirschberg, J. (1985). *A Theory of Scalar Implicature*. . Retrieved from https://api.semanticscholar.org/CorpusID:122032940

Horn, L. R. (1972). *On the Semantic Properties of Logical Operators in English*. .

Horn, L. R. (1992). The said and the unsaid. In *Proceedings of SALT 2*, Vol. 2, p. 163. .

Horn, L. R. (1996). Presupposition and implicature. In S. Lappin (Ed.), *The Handbook of Contemporary Semantic Theory*, pp. 299–319. Cambridge, Mass., USA: Blackwell Reference.

Horn, L. R. (2001). *A Natural History of Negation*. Stanford, Calif: CSLI.

Huang, Y. T., E. Spelke and J. Snedeker. (2013). What exactly do numbers mean? *Language Learning and Development*, *9*(2), 105–129.

Hurewitz, F., A. Papafragou, L. Gleitman and R. Gelman. (2006). Asymmetries in the acquisition of numbers and quantifiers. *Language Learning and Development*, *2*(2), 77–96.

Katzir, R. (2007). Structurally-defined alternatives. *Linguistics and Philosophy*, *30*(6), 669–690.

Kennedy, C. (2013). A scalar semantics for scalar readings of number words. In I. Caponigro and C. Cecchetto (Eds.), *From Grammar to Meaning*, 1st edn, pp. 172–200. Cambridge University Press.

Kennedy, C. (2015). A "de-Fregean" semantics (and neo-Gricean pragmatics) for modified and unmodified numerals. *Semantics and Pragmatics*, *8*. doi:10.3765/sp.8.10

Kennedy, C. (2024). Zeroing in on exclusively exclusive content. In *Proceedings of CLS 59*.

Klima, E. (1964). Negation in English. In J. Fodor and J. Katz (Eds.), *The Structure of Language: Readings in the Philosophy of Language*Prentice-Hall.

Koenig, J.-P. (1991). Scalar predicates and negation: Punctual semantics and interval interpretations. In *Proceedings of CLS 27*, Vol. 27, pp. 140–155. .

Marty, P., E. Chemla and B. Spector. (2013). Interpreting numerals and scalar items under memory load. *Lingua*, *133*, 152–163.

Musolino, J. (2004). The semantics and acquisition of number words: integrating linguistic and developmental perspectives. *Cognition*, *93*(1), 1–41.

Postal, P. M. (1974). *On Raising: One Rule of English Grammar and Its Theoretical Implications*. Cambridge (Mass.) London: MIT press.

Rooth, M. E. (1985). *Association with Focus*. .

Scharten, R. (1997). *Exhaustive Interpretation: A Discourse-Semantic Account*. PhD thesis.

Solt, S. and B. Waldon. (2019). Numerals under negation: Empirical findings. *Glossa: A Journal of General Linguistics*, *4*(1). doi:10.5334/gjgl.736

Toosarvandani, M. (2013). Corrective but coordinates clauses not always but sometimes. *Natural Language & Linguistic Theory*, *31*(3), 827–863.

Toosarvandani, M. (2014). Contrast and the structure of discourse. *Semantics and Pragmatics*, *7*. doi:10.3765/sp.7.4

Wu, D. (2022). *Syntax and Prosody of Coordination*. PhD thesis. MIT.