Not Even
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August 2015

Abstract: The goal of this paper is to give an analysis of the syntax and semantics of *even* that is consistent with the assumptions in Collins and Postal 2014. The basic fact I account for is that *even*-phrases can be modified by negation:

i. a. Even John is there.
b. Not even John is there.

This simple fact has several consequences for the analysis of *even*. First, it suggests that *even* is a quantifier. Second it supports the assumption that there are two kinds of *even*, depending on the role the focus plays in the scalar presupposition (see Rooth 1985). Third, it provides another example of NEG raising.

Keywords: even, negation, negative polarity items, scalar presupposition, existential presupposition, scope freezing, NEG raising.

1. Introduction

The goal of this paper is to give an analysis of the semantics of *even* that is consistent with the assumptions in Collins and Postal 2014 (henceforth, CP2014). The basic fact I account for is that *even*-phrases can be modified by negation (see Hoekseman and Zwarts 1991: 64-66 for some cross-linguistic data):

(1) a. Even John is there.
b. Not even John is there.

This simple fact has several consequences for the analysis of *even*. First, it suggests that *even* is a quantifier. Second it supports the assumption that there are two kinds of *even*, depending on the role the focus plays in the scalar presupposition (see Rooth 1985). Third, it provides another example of NEG raising.

In section 2, I discuss some basic facts about the distribution of negation. In section 3, I show how scope freezing supports some fundamental assumptions of CP2014. In section 4, I give an analysis of the semantics of *even* as a quantifier. In section 5, I give an analysis of *not even* consistent with the conclusions in sections 2-4. In section 6, I give a brief comparison of my theory of *even* to two other theories: Wilkinson 1996 and Crnič 2014. In section 7, I discuss NEG raising. Section 8 is the conclusion.

2. Distribution of Negation

Syntactically, [not even John] appears to be a constituent in (1b). First, structures of the form [not S] are not allowed:

(2) a. *Not we should go to the store.

b. *Not it is raining.

This suggests that in (1b) [not even John] is the subject.

Second, [not even John] can trigger NEG Inversion, as shown by the following examples (which some people find a bit stilted or literary):

(3) a. Not even John have I shown the records to.
b. Not even John did the Dean invite.

I assume, following CP2014 (see also Haegeman 2000) that negative inversion involves moving a negative constituent into the left periphery of the clause (Spec FocP). Therefore, [not even John] must be a constituent occupying Spec FocP.

Negation may not modify a proper name (whether or not it is in subject position).

(4) a. *[Not John] is there.
b. *[Not John] did I see.
c. *I gave [not John] the money.
d. *I want to talk with [not John].

The claim that proper names cannot be modified by negation raises the question of how to analyze (5):

(5) Mary was there, but not John.

Unlike (4a), the sequence *not John* is grammatical here. I assume that this is an example of stripping, as defined by Hankamer and Sag (1976: 409): "Stripping is a rule that deletes everything in a clause under identity with corresponding parts of a preceding clause, except for one constituent (and sometimes a clause-initial adverb or negative)." (see also Lobeck 1995: 27) If stripping is deletion under identity, then it is quite different from *not even John* in (1b), which requires no antecedent.

Consider now contrastive negation, described by McCawley (1991):

(6) He saw not John *(but Mary).

It is unclear what the exact structure of *not John but Mary* is. The fact that *but Mary* is obligatory supports my claim that proper nouns cannot be modified by negation. But other than this observation, the structure of (6) remains a mystery.

Negation does however modify quantificational DPs, e.g., *not many people*, *not everybody*. Furthermore, CP2014 argue that negative existential quantifiers like *nobody* are analyzed in terms of NEG modifying a null quantifier SOME:

(7) [[NEG SOME] body] (structure of *nobody*)

In general, in the framework of CP2014, negation modifies predicates. For example, if P is true of x, then [not P] is not true of x. More generally:

(8) NEG takes X with semantic value: $\lambda P_1 \ldots \lambda P_n$ […]
And returns Y with semantic value: $\lambda P_1 \ldots \lambda P_n \neg$[…]

As CP2014 note: "This rule is actually a schema for an infinite number of semantically different NEGs. There will be a distinct semantic value for NEG for each different semantic type: $\lambda P_1 \ldots \lambda P_n$ […]. For propositional variables p (no predicate abstraction), the negation is simply ¬p."

So it would be unexpected for negation to modify a proper name, which is not a predicate (but rather of type <e>). On the other hand, a quantifier is of type <<e,t>, <<e,t>, t>>, and may therefore be modified by negation, yielding a quantifier of the same type. Similarly, a quantificational DP is of type <<e,t>, t>, and may be modified by negation, yielding an expression of the same type.

Consider a wider range of quantifier data:

(9) a. Not many people are there.
b. Not everybody is there.
c. Not only John is there.
d. Not more than three people are there.

On the theory in CP2014, two structures are possible for [not many people], illustrated in (10). By (8), both of these structures determine the same semantic value.

(10) a. [[not many] people]
b. [not [many people]]

Just like a proper name cannot be modified by negation, neither can a definite description:

(11) a. *Not the president is there.
b. *Not the biggest person is there.

The unacceptability of (11a,b) suggests that definite descriptions are not quantifiers (contra Neale 1990). Rather, any theory where a definite determiner has type <<e,t>, e> and a definite description has type <e> would be consistent with the data in (11a,b). Neither the definite determiner nor the definite description would have the right type to be modified by negation.

As a final note, the data concerning the distribution of negation argues that proper names cannot in general be shifted from the type <e> to the type <<e,t>,t> (see Partee 2004: 205 on type-shifting principles). For example, suppose the semantic value of a proper name *John* could be λP.P(John) in subject position. Then, since this is a quantificational DP, NEG should be able to modify it. But negation cannot modify proper names in subject position (see (4a)). Therefore, such type shifting of proper names in subject position is not possible. Whether type shifting of a proper name is ever possible (in any syntactic context) is a more general question, which could be explored using the NEG modification diagnostic.

3. Scope Freezing

Modification of a subject DP by negation gives rise to scope freezing. In every example in (9), the scope of negation and the following quantifier is frozen. For example, consider two conceivable ways that (9a) might be interpreted:

(12) a. It is not the case that many people are there. (not > many)
(=Few people are there)
b. Many people are not there. (many > not)

These two interpretations are not equivalent logically. In fact, neither interpretation entails the other.

For comparison consider some cases where the scope of the quantifiers is not frozen with respect to negation:

(13) a. I have not seen many of the students.
b. Everybody is not happy.

(13a) has either the *not* > *many* interpretation, or the *many* > *not* interpretation (especially with heavy stress on *many*). But no matter how *many* is stressed in (9a), it never has the *many* > *not* interpretation. Similarly, (13b) is ambiguous.

In the next few paragraphs, I will give an explanation of scope freezing in terms of the assumptions adopted in this paper. To simplify the discussion, I will assume that there is a syntactic rule of QR (quantifier raising) which moves a quantifier phrase and leaves a trace. The explanation would hold on other possible assumptions about quantificational DPs (see CP2014 for a discussion).

Consider (9a) on the structure in (10b). In order for [many students] to take scope over negation, it would have to undergo QR and leave a trace yielding the following structure:

(14) [<[many people]$_1$> [[not t_1] are there]]

In this structure, the trace is interpreted as variable of type <e>. But then, [not t_1] is not a possible structure, since negation only modifies predicates.

Consider (9a) on the structure in (10a). In this structure, [many people] is not a constituent, so there is no way that it can undergo QR, and hence [many people] cannot take scope over negation.

Alternatively, consider a structure where *many* by itself undergoes QR, and yields the following structure:

(15) [<many$_1$> [[[not t_1] people] are there]]

Since NEG modifies t_1 and [NEG t_1] is the determiner for *people* (of type <e,t>), the only type possible for t_1 in this structure is <<e,t>, <<e,t>, t>>. But then, the only interpretation of (15) will be one where the semantic value of t_1 (after assignment of values to variables) is ⟦many⟧, and once again there is scope freezing.

This explanation of scope freezing relied on two essential assumptions of the CP2014 framework: (a) negation can modify quantifiers and quantificational DPs, and (b) negation cannot modify expressions of type <e>.

4. The Semantics of *even*

On the standard view, *even* makes no truth conditional contribution to a sentence. Rather, it contributes an existential and a scalar presupposition. On that view, it is unclear why [not even John] is acceptable, whereas [not John] is not acceptable. These considerations suggest that negation in [not even John] is modifying a quantifier.

I propose that *even* is a quantifier that introduces a scalar presupposition. A simple way to implement this proposal is to analyze *even* as an existential quantifier whose range is *John*:

(16) a. Even John is there.
b. $\exists x [x = \text{John} \wedge P(x)]$
Presupposition: John is the least element of S_P.

S_P is a contextually given set of people which is totally ordered in the following way: for each person x, the likelihood that P(x) is a number between [0,1]. $x \leq y$ iff [the likelihood that P(x)] ≤ [the likelihood that P(y)] (see Karttunen and Peters 1979: 25-26). For convenience, I will indicate the ordering as follows:

(17) John < Bill < Mary < Sue

This interpretation of *even* can be formalized as follows (F stands for the denotation of the focused constituent):

(18) $[\![\text{even}]\!] = \lambda F \lambda P.\exists x[x = F \wedge P(x)]$
Presupposition: F is the least element of S_P.

Further formalization of (18) would be possible. First, I could introduce a Likelihood(p) function that takes a proposition and yields a real number in the interval [0,1] to model the notion of a scale. Second, I could add the presupposition as a condition on the function (as in Heim and Kratzer 1998: 81). Third, I could add world variables to the predicate P, which would be true of an individual x and a world w: P(x,w). However, the simple form given in (18) suffices for the purposes of this paper.

An alternative analysis of *even* as a quantifier is given in (19):

(19) $[\![\text{even}]\!] = \lambda F \lambda P.P(F)$
Presupposition: F is least element of S_P.

Since (18) and (19) yield equivalent truth conditions, and both account for the distribution of negation with *even*, I will not try to distinguish them here.

This semantic value of *even* does not presuppose or entail that there is a y other than the focus F such that P(y) (contra Horn 1969: 10 and Wilkinson 1996: 194). The reason for this is that there are examples that have no such presupposition. Consider the following example: A dog

food company is developing a new dog food. The product is ready for testing. No dog has ever tasted it before. Now, I have a dog named Rover. I decide to feed it to him to see if he likes it. When I feed it to him, he gobbles it up. This is strange to me, since Rover is very picky. He doesn't like any food at all really. In this situation, I can say:

(20) I predict this dog food will be very popular. Even Rover likes it.

Clearly there is no existential presupposition, since no dog other than Rover has ever eaten this dog food (and so it is not possible that any other dog likes it yet). Two native speakers of English agreed with the author that (20) is fine in this situation.

The analysis of *even* as a quantifier easily accounts for the scope facts discussed by Wilkinson (1996: 195):

(21) a. It is hard for me to believe that Bill understands even Syntactic Structures.
b. It is hard for me to believe that Bill understands even Mother Goose.

According to Wilkinson (following Karttunen and Peters 1979: 27), the *even*-DP can have either embedded scope or matrix scope. On the embedded scope interpretation of [even Syntactic Structures] in (21a), there is a scalar presupposition that Syntactic Structures is the least likely thing for Bill to understand. On the wide scope interpretation of [even Mother Goose] in (21b), there is a scalar presupposition that Mother Goose is the least likely thing that it is hard for me to believe that Bill understands (and therefore that Mother Goose should be easy for Bill to understand).

Since on my theory [even DP] is a quantifier, it is expected that it will take either narrow or wide scope out of an embedded clause (just like other quantifiers). The two predicted interpretations are given below (an unpronounced occurrence is indicated with angled brackets <…>):

(22) a. Narrow scope:
It is hard for me to believe that [<[even syntactic structures]$_1$> John read DP$_1$]
Order: Syntactic Structures < Mother Goose

b. Wide scope:
[<[even Mother Goose]$_1$> It is hard for me to believe that John read DP$_1$]
Order: Mother Goose < Syntactic Structures

In these examples, likelihood is evaluated with respect to a different P(x) in each case. For (22a), the likelihood is evaluated with respect to P(x) = [John read x]. In (22b), likelihood is evaluated with respect to P(x) = [It is hard for me to believe that John read x].

5. *not even*

I assume, following CP2014, that negation has the following semantic value when modifying a quantifier (see (8)):

(23) $[\![\text{NEG}]\!] = \lambda X \lambda P \lambda Q \neg[X(P)(Q)]$

Assuming negation does not block presupposition projection, applying (23) to (18) yields:

(24) $[\![\text{not even}]\!]$ = $\lambda F \lambda P.\ \neg \exists x\ [\ x\ = F \wedge P(x)]$
Presupposition: F is the least element of S_P.

Then the complete semantic calculation for (1b) yields:

(25) a. Not even John is there.
b. $\neg \exists x\ [\ x = \text{John} \wedge\ [x \text{ is there}]]$
Presupposition: John is the least element of S_P, where P(x) = [x is there].

Translated into informal English this means:

(26) John is not there, and John is the least likely person to be there.

The problem is that this interpretation is not right (see Wilkinson 1996: 197, fn. 1). (25) entails that John is not there, which is right. But (1b) presuppose that John is the most likely person to be there. And there is a further implicature that since John is not there, not many other people are there either.

I suggest that the only change that needs to be made to (25) is in the presupposition. If the presupposition is that John is the most likely person, then the right truth conditions obtain for (1b):

(27) $\neg \exists x\ [\ x = \text{John} \wedge P(x)]$
Presupposition: John is the greatest element of S_P.

In other words, I am suggesting that there are two different *even* forms. I will call the *even* that is modified by NEG NPI-*even*. It is defined as follows:

(28) $[\![\text{even}_{NPI}]\!]$ = $\lambda F \lambda P. \exists x\ [\ x\ = F \wedge P(x)]$
Presupposition: F is the greatest element of S_P.
Syntax: even_{NPI} is modified by NEG.

The other *even*, which cannot be modified by NEG, is P-*even*. It is defined as follows:

(29) $[\![\text{even}_{P}]\!]$ = $\lambda F \lambda P. \exists x\ [\ x\ = F \wedge P(x)]$
Presupposition: F is the least element of S_P.
Syntax: even_P is not modified by NEG.

I predict that cross-linguistically there will be languages that distinguish these two forms, so that NPI-*even* and P-*even* will not have the same phonological form (just as they do not have the same presuppositions or syntactic properties).

A property of this system is that the following two sentences come out with the same semantic values, although they are calculated in different ways:

(30) a. Not even John is there.
b. Even John is not there.

(30a) involves NPI-*even*, and (30b) involves P-*even*. I have already shown how to calculate the semantic value of (30a). So consider (30b). Since *even* is not modified by NEG, it has the following semantic value:

(31) $\exists x [x = John \wedge \neg P(x)]$
Presupposition: John is the least element of $S_{\neg P}$.

The crucial thing is that likelihood is evaluated with respect to ¬P(x), i.e., not being there. Therefore, John is the most unlikely person to not be there. In other words, John is the most likely person to be there. Now, according to (31), he is not there. This is intuitively what (30b) means.

My approach to presupposition reversal is most similar to that of Rooth 1985: 153, who claims that there is a polarity *even*. The differences between my approach and Rooth's approach are: (a) I claim that *even* is a quantifier in order to be able to account for the fact that negation may modify *even*, (b) I do not assume any additional existential presupposition, (c) Negative polarity *even* must be modified by negation (not simply be in the scope of a decreasing expression).

As for (c), although I assume that NPI-*even* occurs when *even* is modified by NEG, I accept Wilkinson's 1996 arguments (against Rooth 1985) that NPI-*even* is not needed to account for the interpretation of *even* in other decreasing contexts.

6. Comparison to Other Theories

I will briefly compare my analysis of (1b) to two other theories, that of Wilkinson 1996 and that of Crnič 2014. First consider Wilkinson. There are two structures possible for (1b):

(32) a. [[not even] John] is there.
b. [[not [even John]] is there.

On Wilkinson's theory, the scope of *even* and NEG is determined by covert movement of an [even DP]. In (32a), there is no such constituent, so Wilkinson must assume the structure in (32b). After QR, the resulting structure is:

(33) $[<[\text{even John}]_{1>}\ [[\text{not } t_1] \text{ is there}]]$

In this structure t_1 is interpreted as a variable of type <e>. But by assumption, expressions of type <e> cannot be modified by negation. So (33) is not a possible structure.

To account for the interpretation of (1b), Wilkinson would be forced to say that negation and *even John* do not form a constituent. But this contradicts the results of section 2. So it seems that there is no way to analyze (1b) in Wilkinson's approach.

Consider now Crnič 2014, who assumes that "The assertive import of *even* is vacuous." (pg. 178). As noted before, this is a standard assumption in semantic treatments of *even*. Crnič

also assumes that *even* is a propositional operator, adjoined at the clausal level. To get to the clausal level, it is assumed that "*Even* can move at LF and leave no trace." (pg. 180).

Given these assumptions, the LF representation of (1b) would be:

(34) [even [[not John] is there]

But then NEG is modifying a proper name, which is of type <e>. So Crnič's approach fails for (1b) as well.

7. NEG Raising

I have claimed that NPI-*even* is only possible when NEG modifies *even*. However, it appears that presupposition reversal occurs even in cases where *even* is not modified by NEG. Consider the following three sentences::

(35) a. I don't consider even John to be my friend.
b. Not even John do I consider to be my friend.
c. ?I consider not even John to be my friend.

(35a) and (35b) are equivalent truth conditionally. (35c) would have the same interpretation, but it is marginal in English, probably for the same reason that (36b) is marginal:

(36) a. I don't consider many people to be my friend.
b. ?I consider not many people to be my friend.

Whatever the source of the marginality of (35c) and (36b), the equivalence of (35a) and (35b) suggest that underlyingly (35a) should be analyzed in terms of a [not even John] constituent in object position. In (35a), NEG raises to the post-Aux position. In (35b), [not even John] raises to Spec FocP.

This analysis of (35a) is summarized below (see CP2014 on NEG raising):

(37) I do NEG_2 [<[<NEG_2> even John]$_1$> [consider DP_1 to be my friend]]
|_____|
NEG raising

In this structure [NEG_2 even John] has raised to a scope position, perhaps a VP adjoined position (see CP2014 on post-Aux scope positions). NEG_2 raises from this scope position to the post-Aux position.

The two different kinds of *even* (NPI-*even* and P-*even*) can give rise to structurally ambiguous sentences. Consider the following sentence:

(38) The dean didn't invite even John.

I suggest that this sentence is structurally ambiguous. *even* can either be understood as NPI-*even* or P-*even*. The paraphrases, which are truth conditionally equivalent, are given by (39):

(39) a. Not even John did the Dean invite.
b. Even John, the Dean didn't invite.

The interpretation of (38) in (39b) can be brought out by putting stress on *John*. The interpretation of (38) in (39a) does not require any such stress.

The four possible LF-structures for (38), combining the different kinds of *even* with different scope assignments are given below:

(40) a. The dean did NEG_2 [[<NEG_2> $even_{NPI}$ John]$_1$ [invite DP_1]]
b. *The dean did NEG_2 [[<NEG_2> $even_P$ John]$_1$ [invite DP_1]]
c. [[$even_P$ John]$_1$ The dean did NEG_2 [invite DP_1]]
d. *[[$even_{NPI}$ John]$_1$ The dean did NEG_2 [invite DP_1]]

The representations in (40b) is ruled out since P-*even* is modified by NEG. The representation in (40d) is ruled out since NPI-*even* is not modified by NEG. The representation in (40a) is equivalent truth-conditionally to (40c).

8. Conclusion

In this paper, I have argued that *even* is a quantifier. There are two homophonous *even* forms, whose definitions are given below:

(41) $[\![even_{NPI}]\!]$ = $\lambda F \lambda P.\exists x[\ x\ = F \wedge P(x)]$
Presupposition: F is greatest element of S_P.
Syntax: $even_{NPI}$ is modified by NEG.

(42) $[\![even_P]\!]$ = $\lambda F \lambda P.\exists x[\ x\ = F \wedge P(x)]$
Presupposition: F is the least element of S_P.
Syntax: $even_P$ is not modified by NEG.

In arguing for two different *even* forms, my analysis most closely resembles Rooth 1985. Furthermore, my analysis provides support for several major assumptions from CP2014, including the assumption that quantifiers and quantificational DPs may be modified by negation. Lastly, I have shown that NEG can undergo raising away from the *even* that it modifies.

Acknowledgements: I would like to thank Paul Postal for comments on an earlier version of this paper.

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