

Syntactic autonomy and result clauses*

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Abstract

In this paper I look at whether the syntactic properties of the result clause construction in English can be predicted from its semantic properties. I adopt the semantics of Meier (2000, 2003) which treats the construction as having a hidden conditional meaning. The structure she proposes makes predictions for the syntactic properties of result clauses that are not fulfilled, in that different degree words are associated with different structures. I propose structures that are not strictly compositional.

1 Introduction

An important question within generative syntax is the extent to which syntactic structure is predictable from semantic properties. Work on this issue has centred around verb complementation, and particularly around the choice between nominal and clausal arguments. Pesetsky (1982) argues that verbs can select for the category of their arguments, a choice that does not necessarily follow from semantics (he calls this categorial selection, or *c-selection*). On the other hand, Wierzbicka (1988) argues that such choices can be reduced to semantic differences. I will contribute to this debate using the result clause construction in English for illustration. Such a construction has been known since Rouveret (1978) to exhibit different semantic scope readings, and Doetjes (1997) has recently argued for some additional meaning contrasts. The question I will deal with here is whether these different meanings correspond to unique syntactic structures. If they do, this is evidence for a strictly compositional view of syntax. If not, it supports an autonomous syntactic component of grammar.

The semantic readings referred to will be presented in section 2, along with the proposal for a degree semantics from Meier (2000, 2003), which is the basis for a compositional syntax. This syntax will be presented in section 3, as well as a related proposal from Bhatt and Pancheva (2004). These proposals will be tested in section 4, and I will conclude that a strictly compositional approach is not warranted. In the remainder of the paper I set out my own view. In terms of a theoretical base, I follow the Minimalist program as set out in Chomsky (1993, 1995), with the important assumption that right-adjunction is allowed (see, for instance, Saito and Fukui 1998).

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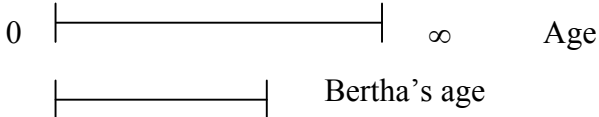
2 Semantics of result clauses

2.1 Degree semantics

Meier (2000, 2003) argues that the result clause construction is semantically comparative. Take the following example for illustration (Meier 2003: 70):

- (1) Bertha is old enough to drive a car.

Informally, this means that Bertha's age is greater than the age at which she is old enough to drive a car. Comparison takes place between values on a scale associated with the gradable adjective (following von Stechow 1984). Taking the scale for age, Bertha's age may be depicted as a subset of values on that scale, called an *extent* (i.e., her age ranges from 0 to 24 years, say):

- (2)
- 
- 0 |—————| ∞ Age
 |—————| Bertha's age

The semantics of (1) crucially involves a hidden conditional, where the proposition denoted by the result clause is the consequent and the proposition denoted by the main clause is the antecedent. Meier also argues that there is an implicit modal in the result clause. Evidence for this is that a modal may be added which does not change the meaning, but makes it more precise (Meier 2003: 71):

- (3) Bertha is old enough to be able to drive a car.

The truth conditions of (1) which show the hidden conditional are given in (4), see Meier (2003: 88):

- (4) The maximum e , such that Bertha is e -old is greater than or equal to the minimum e^* , such that, if Bertha is e^* -old, she can drive a car.

In order for (1) to be true, the top value of the extent (e) of Bertha's age must equal or be above the minimum age at which she can drive a car.

For Meier, *so* has an equivalent semantics to *enough*. Consider the following (Meier 2003: 97):

- (5) The jet flies so fast that it can beat the speed record.

This can be paraphrased as:

- (6) The maximum e , such that the jet flies e -fast is greater than or equal to the minimum e^* , such that, if the jet flies e^* -fast, it can beat the speed record.

Similarly to (1), the sentence in (5) is true if the maximum value of the jet's speed equals or is above the minimum speed needed to break the speed record.

An important difference between *so* and *enough* is that the explicit modal associated with *so* need not be the same as the one associated with *enough*. Compare the following (Meier 2003: 98), with their paraphrases underneath:

- (7) a. The lion was tame enough for the lion keeper to enter the cage.
 “The e , such that the lion is e -tame is greater than or equal to the minimum e^* , such that, if the lion is e^* -tame, the lion keeper *can* enter its cage” (my italics: JRW)
- b. The lion was so tame that the lion keeper could enter the cage.
 “The e , such that the lion is e -tame is greater than or equal to the minimum e^* , such that, if the lion is e^* -tame, the lion keeper *could* enter its cage” (my italics: JRW)

The difference is that the standard of comparison is lower with (7a), as Meier puts it¹. The lion has to be more tame in (7b) than it is in (7a). It is more likely that the lion keeper entered the cage in (7b) than in (7a). In fact, (7a) can be uttered if the keeper only intends to do so.

Too, on the other hand, is said to compare maximal extents. Consider the example in (8) from Meier (2003: 93):

- (8) The food is too good to be thrown away.

The paraphrase for (8) is as follows:

- (9) The maximum e , such that the food is e -good is greater than the maximum e^* , such that, if the food is e^* -good, it can be thrown away.

In contrast to the other examples, the maximum level of goodness of the food must be above the maximum level of goodness at which the food can be thrown away.

¹ Fredrik Heinat and Satu Manninen (p.c.) point out that tense could be a factor here. Compare (7) with the following which are in the present tense:

(i) a. The lion is tame enough for the lion keeper to enter the cage.

b. The lion is so tame that the lion keeper could enter the cage.

It feels as though the standard of comparison is the same here, in that the lion keeper can only be intending to enter the cage.

There are other crucial semantic properties that degree words have which will be taken up in the next section.

2.2 Semantic relations

Doetjes (1997) argues that there are different readings when degree words modify VPs on the one hand, and APs and NPs² on the other. When degree words modify VPs, there are two possible readings depending on the predicate (my examples in this part of the section are based on those in Doetjes 1997: 136-142):

- (10) a. He goes to the cinema a lot.
b. It has rained a lot.

The reading associated with the degree word, *a lot*, in (10a) is a Frequency reading. It depends on the presence of a count predicate. We are describing a series of individual events of going to the cinema. The predicate in (10b) can also have this reading where there are a number of showers of rain. However, it can also be a mass predicate. In this case there is a Duration reading: that is, we are saying that it rained a long time.

With APs and NPs, though, the situation is different. Consider the following:

- (11) a. Jan has a lot of luck in love affairs.
b. Jan is very lucky in love affairs.

These examples illustrate the Grade reading. We can paraphrase them both as: “Jan has a high degree of luck in love affairs”. This interpretation is dependent on the sentence containing an abstract noun or adjective. When there is a concrete noun or adjective instead, we have the following situation:

- (12) a. This dish contains a lot of salt.
b. This dish is very salty.

In contrast with the examples in (11), here we are talking about there being a large amount of salt. This is therefore known as a Quantity reading.

Meier only covered AP/NP examples in her work, so we should look at VP ones to see if they can be explained in her semantic terms as well. Consider some examples in (13) containing *so*:

- (13) a. John stayed home so much that he got bored.
b. John went to the cinema so much that he has little money left.

² The actual structural relation between the degree word and AP/NP will be taken up in section 5.

These examples may be paraphrased as below:

- (14) a. The maximum e , such that John stayed home e -much is greater than or equal to the minimum e^* , such that, if John stayed home e^* -much, John can get bored.
 b. The maximum e , such that John went to the cinema e -often is greater than or equal to the minimum e^* , such that, if John went to the cinema e^* -often, John can have little money left.

For these to be true, the maximum value of the time John did something has to equal or be above the minimum amount of time required for the result to happen. As we can see, these readings can be adequately described in Meier's terms.

A well-known property of degree constructions³ is the fact that they are associated with scope readings. It has been demonstrated in the literature that result clauses have a narrow-scope and a wide-scope reading, cf. Rouveret (1978), Guéron and May (1984) and Culicover and Rochemont (1990) for instance. Consider the following:

- (15) a. Susan said John was so stupid that he had left his keys at home.
 b. Susan said John was so stupid that he walked out.

In (15a), the narrow-scope reading of the result clause means that John's stupidity resulted in him leaving his keys at home. The wide-scope reading in (15b) means that Susan saying that John was stupid to a high degree resulted in John walking out. Meier considers similar cases and argues for a paraphrase like (16a) for narrow-scope readings, and for one like (16b) for wide-scope readings:

- (16) a. Susan said that the extent e , such that John was e -stupid is greater than or equal to the minimum extent e^* , such that, if John is e^* -stupid, John leaves his keys at home.
 b. The extent e , such that Susan said John was e -stupid is greater than or equal to the minimum extent e^* , such that, if John is e^* -stupid, John walks out.

The wide-scope reading involves the extent taking scope over *said*, while the opposite is the case for the narrow-scope reading. Note that both wide- and narrow-scope versions exist for all the other readings:

³ The degree constructions are comparatives and result clauses.

- (17) Quantity
- a. Wide-scope
Susan said John ate so much chocolate that he got angry.
 - b. Narrow-scope
Susan said John ate so much chocolate that he got sick.
- (18) Frequency
- a. Wide-scope
Susan said John went to the cinema so much that he got angry.
 - b. Narrow-scope
Susan said John goes to the cinema so much that he has little money left.
- (19) Duration
- a. Wide-scope
Susan said John stayed home so much that he got angry.
 - b. Narrow-scope
Susan said John stayed home so much that he got bored.

This concludes my look at the semantics of degree words and result clauses, although a more formal encoding of this semantics will be given below. Let us now turn to how a compositional syntax for this construction may look.

3 Compositional syntax and result clauses

There are two approaches I will look at here. Meier's will be considered in section 3.1, and Bhatt and Pancheva's (2004) version in section 3.2.

3.1 Meier

Meier (2000: Chapter 8, 2003) argues for the following syntactic structure. The degree word itself is a specifier in syntax (this view follows from Bresnan 1973), and the result clause is base-generated as a complement of the degree word⁴:

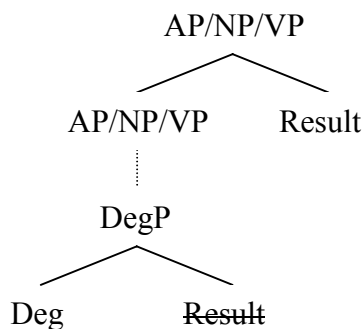
⁴ It is a standard assumption that the degree word selects the result clause (see for example Baltin 1987). Typical evidence for this conclusion is that the finiteness of the result clause depends on the degree word. *So* requires a finite clause, *too* requires an infinitival one, while *enough* allows both:

- (i) a. John was so exhausted that he fell asleep.
b. *John was so exhausted to fall asleep.
- (ii) a. John was too exhausted to fall asleep.
b. *John was too exhausted that he could not fall asleep.
- (iii) a. John was exhausted enough to fall asleep.
b. John was exhausted enough that he fell asleep.

(20) [AP/NP/QP [DegP Deg Result] A/N/Q]

In order to achieve the correct word order on the surface, we need to extrapose the clause. Meier does not specify where to, but says, in relation to comparatives, that the *than*-phrase moves “to the right periphery of the sentence” (Meier 2003: 77). I will assume that the result clause is moved to adjoin to the element the degree word modifies (see section 2.2), i.e. the NP/AP in the case of the Grade and Quantity readings, and the VP in the case of the Duration and Frequency readings. This results in the following surface structures⁵:

(21)

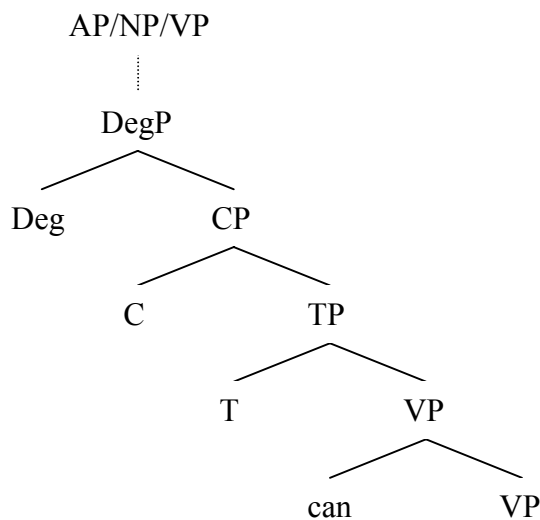


What happens to get a compositional structure at LF? Meier (2003: 85) proposes first of all that a modal is inserted into the structure of the result clause as a new VP dominating the verb⁶. Then, the result clause is reconstructed back into its base-position in DegP:

⁵ I would like to point out a general problem with this proposal from the point of view of standard Minimalist thinking. Obligatory operations are usually triggered by some morpho-syntactic feature. Extraposition, on the other hand, is a stylistic operation, which is not obligatory in most cases. Making it obligatory in this way raises questions about the nature of extraposition, and also about the nature of obligatory operations. Rightward movement processes like extraposition are reanalysed by Kayne (1994) as leftward movement which strands something. It is beyond the remit of this paper to investigate this possibility further.

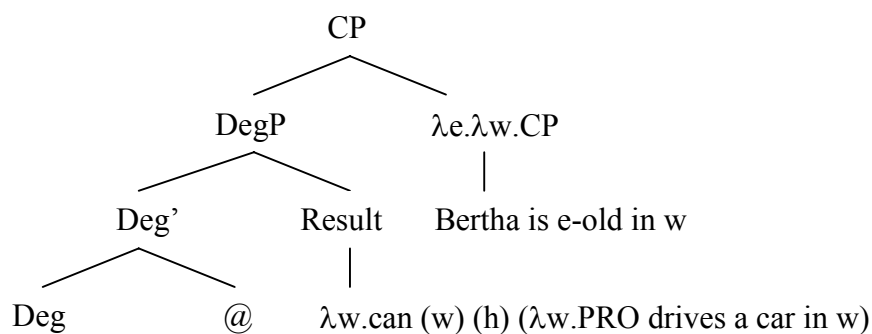
⁶ Some additional elements including a world variable are also inserted, but I will not show this for ease of exposition.

(22)



Finally, the whole DegP is raised covertly to take scope over CP. This leaves the following LF structure:

(23)



Meier argues that the resulting structure is compositional. The hidden conditional is created through the LF-raising process. @ in (23) represents the actual world of discourse, w represents a variable world, and h is a background variable (this gives the vital information to interpret the hidden conditional, i.e., in this case, the age at which people are allowed to drive). Formally, Meier (2003: 88, 93) encodes this semantics as a three-place relation between a world of discourse, the result clause and the main clause:

(24) enough/too (@) (λw .can (w) (h) (λw .PRO drives a car in w))
 (λe . λw .Bertha is e old in w)

(25) so (@) (λw .could (w) (h) (λw .PRO drives a car in w))
 (λe . λw .Bertha is e old in w)

The wide-scope/narrow-scope distinction is encoded by Meier (2003: 99-100) in terms of how far covert raising of DegP takes place. Consider again the examples in (15):

- (15) a. Susan said John was so stupid that he had left his keys at home.
 b. Susan said John was so stupid that he walked out.

The LFs for these cases are given in (26):

- (26) a. [Susan said [[so stupid that he had left his keys at home] John was]]
 b. [[So stupid that he walked out] Susan said [John was]]

The DegP including the reconstructed result clause raises to take scope over the matrix predicate under the wide-scope reading, (26b), but stays within its scope under the narrow-scope reading, (26a).

To summarise this approach, the result clause is merged low down, and is extraposed in overt syntax, but is at clause-level at LF. Let us now turn to an alternative view proposed by Bhatt and Pancheva (2004) which takes a different view of the LF position of the result clause.

3.2 Bhatt and Pancheva

Bhatt and Pancheva (2004) propose an analysis of comparatives, which, they state explicitly, can be extended to result clauses. This approach is based on work by Williams (1974), Fox and Nissenbaum (1999) and Fox (2002) where there is a correlation between the scope of the phrase out of which an element has been extraposed and the landing site of that extraposed element. In the construction under discussion, the scope of the degree word is as high as the surface position of the result clause. Crucially, Bhatt and Pancheva's analysis does not involve extraposition, but instead the result clause is merged counter-cyclically as the complement of the relevant degree word which has been raised covertly to its scope position. We can think of this raising process as raising of semantic features only. The degree word is still pronounced in its base position, but it takes scope in the higher position. Thus, one crucial difference with Meier's proposal is that the result clause need not be merged low down.

Let us consider the derivation of a simple narrow-scope example like (27), repeated from (15a):

- (27) Susan said John was so stupid that he had left his keys at home.

In terms of AP structure, Bhatt and Pancheva follow Bresnan (1973), as Meier did. Therefore, *so* is a specifier of *stupid*. The whole sentence, excluding the result clause, is derived first of all:

(28) $[_{CP} \text{ Susan said } [_{CP} \text{ John was } [_{AP} \text{ so stupid}]]]$

At LF, *so* needs to raise to its scope position. Two are available here, AP and the embedded clause (Bhatt and Pancheva state that the higher scope position involves attachment to IP, but I see no difference if it is CP). There is a tendency, if “extraposition” is string-vacuous, for the lowest position available to be chosen. Here, the shortest movement the degree word can make is to the AP it modifies. Therefore, the degree word will be right-adjoined to AP, and the result clause will be merged as the moved degree word’s complement:

(29) $[_{AP} \text{ DegP A}] \Rightarrow [_{AP} [_{AP} \text{ DegP A}] [_{\text{DegP}} \text{ Deg Result}]]$

A similar process will happen to a VP narrow-scope example like (30):

(30) John stayed home so much that he got bored.

The main clause will be derived first of all:

(31) $[_{TP} \text{ John } [_{VP} \text{ stayed home so much}]]$

So will then be raised. There is the possibility for clauses to adjoin to VP and select the result clause there:

(32) $[_{VP} \dots \text{ DegP}] \Rightarrow [_{VP} [_{VP} \dots \text{ DegP}] [_{\text{DegP}} \text{ Deg Result}]]$

Finally, let us look at a wide-scope example like (15b), repeated as (33):

(33) Susan said John was so stupid that he walked out.

The degree word will raise to adjoin to the matrix VP or clause (this choice make important predictions which we will test below). In the former case, the structure will be as in (32), otherwise it is (34):

(34) $[_{CP} \dots \text{ DegP}] \Rightarrow [_{CP} [_{CP} \dots \text{ DegP}] [_{\text{DegP}} \text{ Deg Result}]]$

In contrast to Meier’s approach, therefore, Bhatt and Pancheva argue that the result clause is merged at different levels within clauses. Let us now look at each reading in turn to see if there is evidence for the structures we have described here.

4 Testing compositional syntactic structures

There is a structural distinction between narrow-scope NP/AP readings on the one hand and narrow-scope VP readings on the other, so these are the first two structures we will test. Then, wide-scope readings will be tested as a group. The results will be summarised in section 4.4.

4.1 Narrow-scope NP/AP readings

The examples illustrating the narrow-scope Quantity and Grade readings which we will be testing are as follows. The Quantity reading is illustrated in (35), and the Grade reading in (36):

- (35) a. Susan said John has so many books that he has little money left.
 b. Susan said John has too many books to have much food.
 c. Susan said John has enough books that he can start a library.
 d. Susan said John has enough books for him to start a library.
- (36) a. Susan said John has always been so lucky that he wins the lottery all the time.
 b. Susan said John has always been too unlucky to win the lottery.
 c. Susan said John has always been lucky enough that he wins the lottery.
 d. Susan said John has always been lucky enough to win the lottery.

There is a major difference between Meier's and Bhatt and Pancheva's views from the point of view of c-command at LF. We would not expect c-command to be possible between the embedded subject and result clause according to Meier⁷, see the structures in (37), but the opposite is the case according to Bhatt and Pancheva, see (38):

- (37) a. Susan said [[too many books to have much food] John has]
 b. Susan said [[too unlucky to win the lottery] John has always been]
- (38) a. Susan said [John has [too many books to have much food]]
 b. Susan said [John has always been [too unlucky to win the lottery]]

Principle C data to test these structures for examples involving *too* and *enough* is as follows:

⁷ As pointed out by Fredrik Heintz and Satu Manninen (p.c.), there is a question of when Principle C is tested during Meier's derivation. Recall that she argues that there is both reconstruction of the result clauses from its extraposed position into DegP, and then the DegP is raised to clause-level. I assume that Principle C is tested after both reconstruction and raising.

- (39) a. *Susan said he_i has too many books for John_i to have much food.
 b. *Susan said he_i has enough books that John_i can start a library.
 c. *Susan said he_i has enough books for John_i to start a library.
- (40) a. *Susan said he_i has always been too unlucky for John_i to win the lottery.
 b. *Susan said he_i has always been lucky enough that John_i won the lottery.
 c. *Susan said he_i has always been lucky enough for John_i to win the lottery.

Since coindexation is not possible, the result clause is c-commanded by the embedded subject. These results cast doubt on Meier's proposal, but support Bhatt and Pancheva's.

Examples with *so* will demonstrate a different conclusion. Principle C data is given in (41):

- (41) a. Susan said he_i has so many books that John_i has little food left.
 b. Susan said he_i has always been so lucky that John_i wins the lottery all the time.

These cases, in contrast, do follow Meier's prediction, and are against Bhatt and Pancheva's, since coindexation is possible. Thus, we can conclude that both proposals receive support for different degree words.

Let us not turn to the narrow-scope VP reading.

4.2 Narrow-scope VP readings

The examples illustrating the narrow-scope Frequency and Duration readings are as follows. The Frequency reading is illustrated in (42), and the Duration one in (43):

- (42) a. Susan said John went to the cinema so much that he has little money left.
 b. Susan said John went to the cinema too much to have much money.
 c. Susan said John went to the cinema enough that he has a membership card.
 d. Susan said John went to the cinema enough for him to have a membership card.
- (43) a. Susan said John stayed home so much that he got bored.
 b. Susan said John stayed home too much to get any work done.
 c. Susan said John stayed home enough that he had to help her.
 d. Susan said John stayed home enough for him to help her.

From the point of view of c-command, there is once again a contrast here. Bhatt and Pancheva can argue that the result clause is attached lower down, (45); while Meier has to have it at clause-level, (44):

- (44) a. Susan said [[Too much to have much money left] John went to the cinema]
 b. Susan said [[Too much to get much work done] John stayed home]
- (45) a. Susan said [John went to the cinema [too much to have much money left]]
 b. Susan said [John stayed home [too much to have much money left]]

Principle C data will decide. Consider examples for *too* and *enough*:

- (46) a. *Susan said he_i went to the cinema too much for John_i to have much money.
 b. *Susan said he_i went to the cinema enough that John_i has a membership card.
 c. *Susan said he_i went to the cinema enough for John_i to have a membership card.
- (47) a. *Susan said he_i stayed home too much for John_i to get any work done.
 b. *Susan said he_i stayed home enough that John_i had to help her.
 c. *Susan said he_i stayed home enough for John_i to help her.

Here, the embedded subject does c-command into the result clause since coindexation is not possible. Again, Meier's prediction is not confirmed, but Bhatt and Pancheva's is.

As before, examples with *so* will prove to be exceptions:

- (48) a. Susan said he_i went to the cinema so much that John_i has little money left.
 b. Susan said he_i stayed home so much that John_i got bored.

Since coreference is possible, these examples do confirm Meier's prediction, but not Bhatt and Pancheva's.

With all narrow-scope readings, therefore, each proposal is supported for individual degree words. Let us turn to the wide-scope readings.

4.3 Wide-scope readings

4.3.1 *i. Wide-scope VP readings*

The examples we will be concentrating on in this first sub-section for the Frequency and Duration reading are given below in (49) for the Frequency reading and (50) for the Duration one:

- (49) a. Susan said John went to the cinema so much that she got angry.
 b. Susan said John went to the cinema too much for her to avoid being angry with him.
 c. Susan said John went to the cinema enough that she got angry.
 d. Susan said John went to the cinema enough for her to get angry.
- (50) a. Susan said John stayed home so much that she got angry.
 b. Susan said John stayed home too much for her to avoid being angry with him.
 c. Susan said John stayed home enough that she got angry.
 d. Susan said John stayed home enough for her to get angry.

Under Meier's proposal, the result clause is at matrix clause level:

- (51) a. [[So much that she got angry] Susan said John went to the cinema]
 b. [[So much that she got angry] Susan said John stayed at home]

For Bhatt and Pancheva, since the lowest possible attachment site is to be preferred, the result clause should be at VP-level within the matrix clause:

- (52) a. [Susan [[so much that she got angry] said John went to the cinema]]
 b. [Susan [[so much that she got angry] said John stayed at home]]

We shall use the Principle C test again to show where the result clause is attached in the tree, this time in relation to the matrix subject. Consider the data below for *so* and *enough*:

- (53) a. She_i said John went to the cinema so much that Susan_i got angry.
 b. She_i said John went to the cinema enough that Susan_i got angry.
 c. She_i said John went to the cinema enough for Susan_i to get angry.
- (54) a. She_i said John stayed home so much that Susan_i got angry.
 b. She_i said John stayed home enough that Susan_i got angry.
 c. She_i said John stayed home enough for Susan_i to get angry.

Because the pronoun and the R-expression can be co-indexed, this shows that the matrix subject cannot c-command into the result clause. Meier makes this prediction, and therefore is confirmed by these data, but for Bhatt and Pancheva it is a problem.

We reach a different conclusion for examples involving *too*, though. Consider the Principle C data for the relevant examples:

- (55) a. *She_i said John went to the cinema too much for Susan_i to avoid being angry with him.
 b. *She_i said John stayed home too much for Susan_i to avoid being angry with him.

Contrary to the other degree words, *too* is associated with a structure where the result clause is attached lower down. No binding relationship is possible in (55), therefore the result clause must be within the c-command domain of the matrix subject. The next question is how low down the clause is. The next set of data will test to see if the clause is c-commanded by the embedded subject:

- (56) a. Susan said he_i went to the cinema too much for her to avoid being angry with John_i.
 b. Susan said he_i stayed home too much for her to avoid being angry with John_i.

Coindexation is possible here between the pronoun and R-expression, therefore the result clause is outside the c-command domain of the embedded subject. This goes against Meier's proposal, but supports Bhatt and Pancheva's.

Once again, there is support for both proposals for individual degree words. Let us consider the wide-scope AP/NP readings finally.

4.3.2 ii. Wide-scope AP/NP readings

The next reading we will look at is the Quantity and Grade readings with a wide-scope interpretation. The examples we will be concentrating on are given below. The Quantity reading is illustrated in (57), and the Grade reading in (58):

- (57) a. Susan said John bought so many books that she got angry.
 b. Susan said John bought too many books for her to avoid being angry with him.
 c. Susan said John bought enough books that she got angry.
 d. Susan said John bought enough books for her to get angry.

- (58) a. Susan said John was so stupid that she got angry.
 b. Susan said John was too stupid for her to avoid being angry with him.

- c. Susan said John was stupid enough that she got angry.
- d. Susan said John was stupid enough for her to get angry.

The structures we are testing are the same as with the VP readings. Therefore, Meier's version is as in (59), while Bhatt and Pancheva's is in (60):

- (59) a. [[So many books that she got angry] Susan said John bought]
- b. [[So stupid that she got angry] Susan said John was]
- (60) a. [Susan [[so many books that she got angry] said John bought]]
- b. [Susan [[so stupid that she got angry] said John was]]

We shall use the Principle C test on these cases. Consider the data below for *so* and *enough*:

- (61) a. She_i said John bought so many books that Susan_i got angry.
- b. She_i said John bought enough books that Susan_i got angry.
- c. She_i said John bought enough books for Susan_i to get angry.
- (62) a. She_i said John was so stupid that Susan_i got angry.
- b. She_i said John was stupid enough that Susan_i got angry.
- c. She_i said John was stupid enough for Susan_i to get angry.

Because the pronoun and the R-expression can be co-indexed, this shows that the embedded and matrix subjects cannot c-command into the result clause, supporting Meier, but not Bhatt and Pancheva.

We reach a different conclusion for examples involving *too*. Consider the Principle C data for the relevant examples:

- (63) a. *She_i said John bought too many books for Susan_i to avoid being angry with him.
- b. *She_i said John was too stupid for Susan_i to avoid getting angry with him.

Since binding is not possible, the matrix subject c-commands into the result clause, contrary to Meier. We will now check whether the embedded subject c-commands into the result clause:

- (64) a. Susan said he_i bought too many books for her to avoid getting angry with John_i.
- b. Susan said he_i was too stupid for her to avoid getting angry with John_i.

Since coindexation is possible, the result clause is outside the c-command domain of the embedded subject, as predicted by Bhatt and Pancheva.

4.4 Summary

The conclusion from this discussion is that both proposals receive confirmation for individual degree words. When we tested the narrow-scope examples with *too* and *enough*, the result clause was shown to be attached low down at LF, which supported Bhatt and Pancheva's view. We can assume the structure will look roughly as follows, although the exact structure will be determined in the next section:

- (65) a. Susan said [John has [too many books/enough books [Result]]]
 b. Susan said [John has always been [too unlucky/lucky enough [Result]]]
- (66) a. Susan said [John [went to the cinema too much/enough [Result]]]
 b. Susan said [John [stayed at home too much/enough [Result]]]

For examples containing *so*, on the other hand, the data suggested that the result clause is attached at clause-level, which supports Meier's view:

- (67) a. Susan said [John has so many books [Result]]
 b. Susan said [John has always been so unlucky [Result]]
- (68) a. Susan said [John went to the cinema so much [Result]]
 b. Susan said [John stayed at home so much [Result]]

For the wide-scope readings, tests suggested that result clauses selected by *so* and *enough* were attached at matrix clause-level, and so have a structure like (67) and (68). *Too* proved to be the exception here, and appeared to have the result clause attached at embedded clause-level:

- (69) a. [Susan said [[John went to the cinema too much] [Result]]]
 b. [Susan said [[John stayed at home too much] [Result]]]

Bhatt and Pancheva's proposal predicted this latter result.

The overall conclusion we can reach here is that each semantic readings is not associated with one and the same syntactic structure. The choice of degree word affects this structure. Therefore, it cannot really be the case that the result clause construction is associated with a strictly compositional syntax. Now let us determine the structures more carefully.

5 My proposal

The first thing to do before we determine the structure of these readings is to consider the basic structure of NP and AP. There is evidence that *too* is structurally different from *so* and *enough*. The following data shows that *too* may combine with APs only, and thus is a head, while *enough* is a modifier (Doetjes, Neeleman and van de Koot 1998: 327-329):

- (70) a. He is [_{DegP} too [_{AP} famous]] to leave town.
 b. *He is [_{DegP} too [_{PP} under scrutiny]] to be elected at this time.
 c. *He is [_{DegP} too [_{DP} a scientist]] to care about such problems.
 d. *He [_{DegP} too [_{VP} likes venison]] for his own good.
- (71) a. He is [_{AP} [_{AP} funny] enough] to be my buddy.
 b. He is [_{PP} enough [_{PP} over the limit]] to be arrested.
 c. He is [_{DP} [_{DP} man] enough] for Sue.
 d. He [_{VP} [_{VP} loves Mary] enough] to marry her.

White (1999: 47, fn.9) extends this to include *so*:

- (72) a. He is [_{AP} [_{so}] [_{AP} famous]] that he has to leave town after a short time.
 b. He is [_{PP} [_{so}] [_{PP} under scrutiny]] that he cannot be elected.
 c. He is [_{DP} [_{*so/such}] [_{AP} a scientist]] that he does not care about such problems.
 d. He [_{VP} [_{so}] [_{VP} likes venison]] that he eats it all the time.

Therefore I assume that *too* is a head which selects an AP or quantifier, see (73), while *so* and *enough* are modifiers, see (74) and (75):

- (73) a. [_{DegP} too [_{AP} unlucky]]
 b. [_{NP} [_{DegP} too many] books]⁸
- (74) a. [_{AP} [_{so}] unlucky]
 b. [_{NP} [_{QP} so many] books]
- (75) a. [_{AP} unlucky [enough]]
 b. [_{NP} [enough] books]/ [_{NP} books [enough]]

Based on this phrase structure distinction, I will set out my own proposed structures.

⁸ *Too many* in (73b) and *so many* in (74b) are both modifiers.

5.1 The structure of the narrow-scope NP/AP reading

I presented data in footnote 4 that the degree word selects the result clause. The simplest analysis of this construction is, therefore, one where the degree word selects the clause in narrow syntax (as Chomsky 2000 refers to syntax up to LF):

- (76) a. Susan said John has [so many/too many/enough books Result]
 b. Susan said John is [so lucky/too unlucky/unlucky enough Result]

One question we can ask now is how the c-command data in (41) for *so*, repeated below, can be accounted for:

- (41) a. Susan said he_i has so many books that John_i has little food left.
 b. Susan said he_i has always been so lucky that John_i wins the lottery all the time.

We can simply say that the bracketed constituent in (76) undergoes covert raising⁹.

However, there is a more serious question, which concerns constituency. Data indicates that the bracketed sequences in (76) are constituents in the case of *too* and *enough*, but not in the case of *so*. The focus of the pseudo-cleft construction in (77) is a constituent, while only constituents can be questioned, (78):

- (77) a. What Susan said John has always been is too unlucky to win the lottery.
 b. What Susan said John has always been is lucky enough to win the lottery.
 c. ??What Susan said John has always been is so lucky that he wins the lottery all the time.

- (78) What did Susan say John had?
 A1: Too many books to have much food.
 A2: Enough books to start a library.
 A3: ??So many books that he has little money left.

Therefore, we can conclude that examples involving *so* have the schematic surface structure in (79):

- (79) a. Susan said [[John has so many books] [Result]]
 b. Susan said [[John has always been so unlucky] [Result]]

⁹ Pesetsky (2000) argues that phrasal covert movement still has a place in minimalist thinking alongside feature movement.

The question remains what exactly is the structural relation between the result clause and the rest of the sentence. Let us consider sentences with *too* and *enough* first of all, starting with those where these degree words combine with adjectives. *Enough* has to appear after the element it modifies in the case of adjectives. The result clause can be merged directly as the complement of *enough*:

(80) [AP/NP A/N [QP enough Result]]

This allows the selection properties of *enough* to be satisfied in narrow syntax.

When *too* selects an adjective, it can also select the result clause directly in one of the following structures, one left-branching (Corver 1990) as in (81a), and the other right-branching (White 1997) as in (81b):

(81) a. [DegP [Deg' too AP] Result]
 b. [DegP1 too [DegP2 AP [Deg'2 Deg Result]]]

The difference between these versions is that in (81a) the adjective and result clause are not a constituent, while they are in (81b). Therefore we shall test if they are a constituent by seeing if the AP and result clause can be co-ordinated:

(82) *Susan said John was too unlucky to win and bored to try again.

This suggests that (81a) is the correct choice.

Consider next the cases of NPs. We should note the possibility of having *enough* to the right of the noun head, just as with the AP version:

(83) Susan said John has books enough to start a library.

This will have the structure in (80) above. There is also the order, where *enough* precedes the noun. What is the structure there? One possibility is to have a Kayne (1994)-style right-branching structure, as in (84):

(84) Susan said John has [[NP enough books] Result]

There are two problems with this analysis, which mean I will not pursue it further. The first relates to extraction. As is well known, extraction is possible out of NPs:

(85) Who did Susan say you buy [[enough pictures of t] to start a gallery]?¹⁰

Under an analysis like that in (84), (85) would involve extraction out of a left-branch. This has been known for a long time to be problematic, so an analysis that breaks this rule is suspect (see Corver 1990 for a thorough discussion of this issue). Most problematic, though, is the fact that *has* in (83) and *buy* in (85) cannot directly select their complements. These problems lead me away from such an approach.

Given the problems noted in footnote 4 concerning extraposition, I will assume that the result clause is not directly selected, but is adjoined to NP. Two structural possibilities then arise, which are presented in (86) and (87). The clause is adjoined high up in (86) leaving *enough books* and *too many books* as constituents. The clause is adjoined low down in (87), and *books* and the result clause are constituents instead:

(86) [NP [NP enough/too many books] Result]

(87) [NP enough/too many [NP [books] Result]]

Evidence in favour of (87) comes from co-ordination data:

- (88) a. Susan said John has [enough [[books to start a library] and [food to start a shop]]].
 b. Susan said John has [too many [[books to have much food] and [chocolates to stay in shape]]].

This data suggests that the noun and result clause form a constituent that excludes the degree word. This is precisely the case in (87).

What happens about the selection relationship between *enough* and the result clause, though? Hallman (2004) argues that selection can be satisfied through mutual c-command. He uses the definitions of this relation presented below:

(89) X c-commands Y iff X and Y are categories and X excludes Y and every category that dominates X dominates Y. (Kayne 1994: 16)

(90) A category X excludes a category Y if no segment of X dominates Y. (Kayne 1994: 133, fn.1)

¹⁰ One problem with this example is that the clause could also be a purpose clause, i.e. the sentence can be paraphrased as “Susan said you bought enough books in order to start a library”.

- (91) A category X dominates a category Y if every segment of X dominates Y. (Hallman 2004: 92)

The result of these definitions is that two elements that are adjoined to a single phrase mutually c-command, and therefore can select, each other. In (87), both *enough* and the result clause are adjoined to NP; the next category up, VP, dominates them both; therefore they mutually c-command each other, and the degree word can select the result clause.

Finally in this section, let us consider the structure of the *so* examples. Recall the two examples that we are looking at in this section, with their structures:

- (79) a. Susan said [[John has so many books] [Result]]
 b. Susan said [[John has always been so lucky] [Result]]

Following Guéron and May (1984) and Culicover and Rochemont (1990) and White (1999), I conclude that this reading for *so* is encoded by base-generating the result clause as an adjunct of the embedded clause:

- (92) Susan said [_{CP} [_{CP} John has so many books] [Result]]

Recall that *so* itself is a modifier within NP, and also AP:

- (93) a. [_{NP} [_{QP} so many] books]
 b. [_{AP} [so] lucky]

So selects the result clause by raising to adjoin to the matrix clause:

- (94) [_{CP} deg [_{CP} [_{CP} ... ~~deg~~] Result]]

The CP is immediately dominated by the VP of *said*. Therefore, the degree word and result clause mutually c-command each other, and the former can select the latter.

Is it a problem that selection takes place covertly¹¹? Bošković and Takahashi (1998) and Fanselow (2001) argue following a suggestion in Chomsky (1995) that selection properties only need to be satisfied at LF, therefore this option is available.

Let us now turn to the narrow-scope VP readings.

¹¹ Neil Smith (p.c.) suggests that an alternative approach which avoids the problem of raising a head in order to satisfy its own selection features would be to use meaning postulates. I will leave this alternative to further research, though.

5.2 The structure of the narrow-scope VP reading

As was the case with the narrow-scope NP/AP reading, this reading can also be simply analysed structurally with the degree word selecting the result clause, and forming a constituent with it:

- (95) a. Susan said John went to the cinema [so much/too much/enough Result]
 b. Susan said John stayed home [so much/too much/enough Result]

We shall test this using pseudo-cleft sentences, (96); and questions, (97):

- (96) a. What Susan said John did was go to the cinema too much to have much money left.
 b. What Susan said John did was go to the cinema enough for him to have a membership card.
 c. ??What Susan said John did was go to the cinema so much that he has little money left¹².

- (97) How much did Susan say John went to the cinema?
 A1: Too much to have much money left.
 A2: Enough for him to have a membership card.
 A3: ??So much that he has little money left¹³.

This data suggests that the structure for *too* and *enough* is as in (95), but that for the *so* examples is as in (98):

- (98) a. Susan said [John [[went to the cinema so much] [Result]]]
 b. Susan said [John [[stayed at home so much] [Result]]]

We should test a Kayne (1994) right-branching analysis for *too* and *enough*:

- (99) a. Susan said John [[_{VP} went to the cinema too much/enough] Result]
 b. Susan said John [[_{VP} stayed home too much/enough] Result]

As before, extraction data leads me to avoid such an analysis:

- (100)a. Where did Susan say John [[go to t too much] to get a membership card]?
 b. Where did Susan say John [[stay t too little] to get a membership card]?

¹² This data is grammatical with an intonation break between *much* and the result clause. This suggests to me that some sort of extraposition operation has occurred.

¹³ See the previous footnote.

These left-branch extractions should be illicit.

What I propose is that the result clause is right-adjoined to the VP¹⁴:

- (101)a. Susan said [John [_{VP} [_{VP} went to the cinema too much/enough] [Result]]]
 b. Susan said [John [_{VP} [_{VP} stayed at home too much/enough] [Result]]]

Further evidence in favour of this is c-command data which indicates that the result clause is attached higher than internal arguments of the verb:

- (102)a. Susan said John saw her_i too often not to recognise Mary_i at once.
 b. Susan said John saw her_i often enough that he recognises Mary_i at once.
 c. Susan said John saw her_i often enough to recognise Mary_i at once.

- (103)a. Susan said John saw her_i too long not to recognise Mary_i at once.
 b. Susan said John saw her_i long enough that he recognises Mary_i at once.
 c. Susan said John saw her_i long enough to recognise Mary_i at once.

Since coindexation is possible between the indirect object, *her*, and *Mary*, the former cannot c-command the latter.

In order for the result clause to be selected by the degree word, that degree word must move covertly. For both *too* and *enough*, the LF structure will look like the following:

- (104) [_{VP} deg [_{VP} [_{VP} ... ~~deg~~] Result]]

Both the degree word and result clause are dominated by the TP, so they mutually c-command each other. Therefore, the degree word can select the result clause.

Let us turn now to the structure of examples involving *so*. Similar arguments to those in section 4.1 above apply to the structure of the *so* examples here. Therefore I will conclude without further discussion that the structure involves CP-adjunction, and *so* can select the result clause after covert movement:

- (94) [_{CP} deg [_{CP} [_{CP} ... ~~deg~~] Result]]

Finally, let us consider the structure of the wide-scope readings.

5.3 Structure of the wide-scope readings

Once again we should test to see if a direct selection plus covert movement analysis is available for this reading:

¹⁴ I will assume without argument that this is adjunction to VP rather than to vP.

- (105)a. Susan said John bought [so many/too many/enough books Result]
 b. Susan said John was [so lucky/too unlucky/unlucky enough Result]

- (106)a. Susan said John went to the cinema [so much/too much/enough Result]
 b. Susan said John stayed home [so much/too much/enough Result]

We will use the pseudo-cleft sentence test, (107) and (108), and question test, (109) and (110), as before:

- (107)a. *What Susan said John did was go to the cinema so much that she got angry.
 b. *What Susan said John did was go to the cinema too much for her to avoid being angry with him.
 c. *What Susan said John did was go to the cinema enough for her to get angry.

- (108)a. *What Susan said John did was buy so many books that she got angry.
 b. *What Susan said John did was buy too many books for her to avoid being angry with him.
 c. *What Susan said John did was buy enough books for her to get angry.

- (109) How much did Susan say John went to the cinema?
 A1: *Too much to avoid being angry with him.
 A2: *Enough to avoid being angry with him.
 A3: *So much that he got angry.

- (110) What did Susan say John bought?
 A1: *Too many books to avoid being angry with him.
 A2: *Enough books to avoid being angry with him.
 A3: *So many books that he got angry.

As a result of this data, the result clause must be base-generated outside the phrase the degree word is located.

My proposal is that the wide-scope reading for result clauses is encoded by base-generating the result clause as an adjunct of the matrix clause, see the structure in (111):

- (111) [_{CP} [_{CP} Susan said John has so many books] [Result]]

This structure holds for examples involving *enough* and *so*.

The wide-scope reading for *too* is instantiated with the clause adjoined to the embedded clause:

- (112) [_{CP1} Susan said [_{CP2} [_{CP2} John was too stupid] [for her to avoid being angry with him]]]

Recall the c-command data that suggested this structural difference:

- (55) a. *She_i said John went to the cinema too much for Susan_i to avoid being angry with him.
 b. *She_i said John stayed home too much for Susan_i to avoid being angry with him.
- (63) a. *She_i said John bought too many books for Susan_i to avoid being angry with him.
 b. *She_i said John was too stupid for Susan_i to avoid getting angry with him.

Selection of the result clause takes place after raising of the degree word (in the NP cases, there will also be some raising for Case reasons).

6 Conclusion

In this paper, I have studied the result clause construction in English. The starting point was whether its major syntactic properties could be explained from its semantic characteristics. C-command data showed that there was no unified structure for each semantic reading. Each reading was argued to have a number of different structures depending on the degree word chosen, and on the element it modified. *So* proved to be different from *too* and *enough* in that it was always attached at clause-level. Thus, this work provides evidence that there are syntactic properties that cannot be deduced from semantic properties, and that syntax is an autonomous entity.

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