

Focus and Ellipsis in Comparatives and Superlatives: A Case Study
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1. Introduction

The central goal of this paper is to present a semantics of comparatives that deals uniformly with comparative ellipsis and superlatives. Consider (1):

(1) Jean_i gave her_i sister a more expensive book than Alice.

Understandings of the following types are possible:

1. HER SISTER focus: Jean gave Jean's sister a more expensive book than Jean gave Alice.
2. JEAN focus (strict): Jean gave Jean's sister a more expensive book than Alice gave Jean's sister.
3. JEAN focus (sloppy): Jean gave Jean's sister a more expensive book than Alice gave Alice's sister.

In each case, the NP which semantically parallels the NP in the *than*-phrase has been called the focus. I will refer to the NP in the *than*-phrase as the contrast. Now consider the variants in (2), which have analogous interpretations:

(2) Jean gave her sister the most/more expensive book.

1. HER SISTER focus: of all/both x's such that Jean gave x books, Jean gave Jean's sister the most/more expensive book.
2. JEAN focus (strict): of all/both x's such that x gave Jean's sister books, Jean gave Jean's sister the most/more expensive book.
3. JEAN focus (sloppy): of all/both x's such that x gave x's sister books, Jean gave Jean's sister the most/more expensive book.

I will use the term CONTRAST-SET to describe the set of entities whose properties are being measured and compared, a set which always includes the denotation of the focus. In the paraphrases above, the contrast-set is described by the *of*-phrase. I will call the nonelliptical focus constructions in (2) maximal-degree constructions (rather than superlative constructions) because they come with both comparative and superlative morphology. The only difference between the two is whether or not the contrast-set is presupposed to have two members.

Each of the three readings in (2) can be obtained from the corresponding reading of (1) simply by quantifying over the argument position filled by the contrast. Sentence (2) has another reading with no parallel in (1). This is the reading on which no givings are presupposed. There is simply a set of books available in the discourse, and Jean has given her sister the most expensive. I will refer to the minimal NP containing the comparative element as the COMPARATIVE NP in comparatives and the SUPERLATIVE NP in superlatives. For this reading, I will say that the superlative NP is the focus. One kind of elliptical comparative which makes a parallel comparison is shown in

- (3) Jean gave her sister a more expensive book than *War and Peace*.

Here, too, only one giving event is at issue. What is being compared is the expense of the book in that giving event with the expense of *War and Peace*.

The basic conclusion I draw from (1), (2), and (3) is the following: for both constructions interpretations vary according to which NP is taken as focus. In effect, the same interpretive difficulties that arise in comparatives arise in maximal-degree constructions.

I will argue below that there is a striking similarity between the pattern of readings in (1) and (3) and a pattern typical of the interaction of focus and quantification. Consider, two different focus possibilities for (4):

- (4) a. Most New Yorkers eat Chinese food with CHOPSTICKS.
b. Most New Yorkers eat CHINESE FOOD with chopsticks.

The two focus possibilities correspond roughly to the following readings:

- (5) a. Most New Yorkers who eat Chinese food with something eat Chinese food with CHOPSTICKS.
b. Most New Yorkers who eat something with chopsticks eat CHINESE FOOD with chopsticks.

In each case the focus construction can be thought of as adding a restriction to the quantification. The restriction is obtained by abstracting the focus out of the main clause semantics and existentially quantifying it away. I will follow Jacobs 1991 by calling the property obtained by abstracting the focus out of the main clause semantics the BACKGROUND.

Consistent with a number of other analyses (beginning with Cresswell 1976), this treatment will interpret both comparatives and superlatives as a quantification over degrees; the various readings above are all obtained by restricting the comparative quantification with different backgrounds.

As remarked above, (2) has both superlative and comparative variants. Thus, comparative morphology is compatible with maximal-degree semantics. Some sentences are ambiguous. Consider:

- (6) Who's taller?

Sentence (6) might be uttered in two different sorts of contexts:

- (7) a. Their center is not the tallest member of the team. Who's taller?
 b. John and Bill weigh the same. Who's taller?

In (a), the question is which member of the team under discussion is taller than the center. This is a discourse-bound comparative. In (b), the discourse provides a contrast-set and the question is who in that set has the maximum height. Since the set has cardinality two, the comparative form of the adjective is licensed. The second sentence in (b) might be replaced with any of the following:

- (8) a. Of the two, who's taller?
 b. Who's taller, John or Bill?
 c. Is John or Bill taller?

All of these unambiguously call for a maximal-degree interpretation.

The comparative construction exhibits a bewildering range of elliptical phenomena. This paper is concerned with COMPARATIVE ELLIPSIS. I take it that all of the following are elliptical:

- (9) a. John has met more presidents than Mary.
 b. John has met more presidents than Mary has.
 c. John has met more presidents than Mary has met.
 d. John owns pictures of more presidents than Mary owns.
 e. John owns more trucks than Mary does cars.

Sentence (9a) illustrates what I will call comparative ellipsis; (9b) illustrates the comparative construction interacting with verb-phrase ellipsis; (9c) illustrates the almost obligatory deletion of the head noun of the degree NP in the *than*-clause when it is identical with the head noun of the comparative NP; and (9d) illustrates what may be a more extreme version of the same thing. Sentence (9e) illustrates gapping in a comparative clause. Dealing with all these examples would be well beyond the scope of this paper.

Having stated the practical agenda for the paper, I will add that I do not foresee any problems of principle. The approach to both ellipsis and focus that I will adopt is from Dalrymple, Shieber, and Pereira 1991 (henceforth DSP), a paper which deals primarily with verb-phrase ellipsis.¹ The DSP framework shows promise of being a very general tool with which to approach phenomena of ellipsis. It seems likely that examples of the type exhibited in (9b) and (9c)

¹Pulman 1991 also proposes applying the DSP framework to comparative ellipsis. The details of the analysis are different, but the approach is very much in the spirit of what is argued here.

do not present problems particular to comparatives. Sentences (9c) and (9d) do raise issues particular to comparatives, but the form of ellipsis shown there is largely orthogonal to the central issues of this paper. I emphasize sentences like (9a) because these are the examples that behave most like other focus constructions with regard to the scope-of-focus issues discussed in Section 2.1.

I will distinguish between degree and quantity comparatives. Degree comparatives are adjectival or adverbial. Quantity comparatives involve number or amount:

Degree: John drove faster than Mary.

John was taller than Mary.

Quantity: John ate more apples than Mary.

John drank more wine than Mary.

Due to limitations of space, I will deal only with degree comparatives in this paper. There are some interesting issues involved in extending the account here to quantity comparatives, which show somewhat different ranges of readings of scope properties. For a fuller discussion, see Gawron 1992.

2. Parallels between Measure Constructions and *Only*

2.1. Scope of Ellipsis and Scope-Fixing

Consider first the ambiguity of a sentence like:

(10) John wants to own more records than Mary.

Sentence (10) can be paraphrased with either (11a) or (11b):

(11) a. Wide scope: John wants to own more records than Mary wants to own.

b. Narrow scope: John wants to own more records than Mary owns.

In the wide-scope reading, the comparison is between desires; in the narrow-scope reading, the comparison is between the number of records John owns and the number John owns, and John wants that comparison to work out a certain way.² As the paraphrases suggest, there is an ambiguity in how much missing material has to be reconstructed. Now consider a superlative example:

(12) John wants to own the most records.

Again, two readings are possible:

(13) a. John wants to own more records than anyone else wants to own.

²Paraphrase (b) here actually collapses two distinct *de re* and *de dicto* readings, but that does not affect the point under discussion.

- b. John wants to own more records than anyone else owns.

There is a difference between (11) and (13) in these cases; the attachment of the *than*-phrase gives the comparative construction a syntactic way of *fixing* the scope of ellipsis. Consider the following:

- (14) John wants to own more records than Mary by next year.

Sentence (14) has only a narrow-scope reading: what John wants is that by next year his collection is bigger than Mary's. A natural explanation is that the modifier *by November* most naturally attaches low, thus forcing low attachment of the *than*-phrase. Low attachment of the *than*-phrase means narrow scope-of-focus.

In light of this evidence, we propose Hypothesis A, to be revised later:

Hypothesis A

The sister of *than*-phrase is the scope-of-focus in comparative ellipsis.

The simple picture of comparative ellipsis is this: there is a relation between an individual and a measure and the measure-values of the relation are compared for the focus and the contrast. By the scope-of-focus in Hypothesis A, I mean the constituent whose semantics provides the relation being compared. In the wide-scope reading of (10), that constituent is the VP *wants to own more records*. In the narrow-scope reading, that constituent is the VP *own more records*.

In being governed by something like Hypothesis A, comparative ellipsis sentences with *than* resemble sentences with *only*. Scope-fixing effects with *only* are discussed in Taglicht 1984 and Rooth 1985:

- (15) a. They were advised to only learn Spanish.
b. They were only advised to learn Spanish.

Here (a) has the reading on which advice is given to ignore languages other than Spanish; (b) has the reading on which the only advice given was to learn Spanish. The (a) sentence lacks the reading available for the (b) sentence, and vice versa. Thus, syntactic attachment of *only* fixes the scope of ellipsis, just as the syntactic attachment of the *than*-phrase does. The sentences in (15) are unambiguous only by a syntactic accident. The word *only* attaches verb-phrase initially so that it is clear which verb-phrase it has chosen; the *than*-phrase attaches verb-phrase finally, so that sentences like those in (13) may be ambiguous.

2.2. Entailments in Adjectival Comparatives

Noun phrases analogous to the following are noted in Bresnan 1973:

- (16) a. A stronger man than John was found.
 b. ?A stronger man than Mary was found.
 c. A man stronger than John was found.
 d. A man stronger than Mary was found.

One would like these facts to fall out from Hypothesis A. That is, all of the NPs in (16) are elliptical, and what they are elliptical for is determined by how much material is C-commanded by the *than*-phrase. Thus, one's account of ellipsis, guided by Hypothesis A, ought to give the NPs semantics roughly like the following:

- (17) a. An m strong man such that [$m > s$ and John is an s strong man]
 b. ?An m strong man such that [$m > s$ and Mary is an s strong man]
 c. A man m strong such that [$m > s$ and John is s strong]
 d. A man m strong such that [$m > s$ and Mary is s strong]

An interesting property of these cases is that they appear related to some exceptions to Hypothesis A (discussed in Section 2.1). Consider:

- (18) a. A more competent engineer than Bonnie was hired.
 An m competent engineer such that [$m > s$ and Bonnie is an s competent engineer] was hired.
 b. A more competent engineer was hired than Bonnie.
 An m competent engineer was hired such that [$m > s$ and Bonnie, an s competent engineer, was hired].

A literal application of Hypothesis A would lead one to expect that these had something like the indicated paraphrases, but in fact sentences (a) and (b) do not appear to differ on their possible readings. Crucially, (b) has no entailment that Bonnie was hired. Contrast the sort of case which motivated Hypothesis A:

- (19) BONNIE hired a more competent engineer than Frieda.

Here, if Bonnie is being compared to Frieda (that is, if *Bonnie* is the focus), then Frieda has to have hired an engineer.

We can sum up the facts from this section and Section 2.1 with the following observation:

Observation

- (a) When the comparative NP is the focus, the syntactic scope-of-focus is the comparative N-bar.
 (b) Otherwise the syntactic scope-of-focus is the surface sister of the *than*-phrase.

One might eliminate the disjunctive nature of this observation in either of two ways. First, one might assimilate (18b) to extraposition, and apply Hypothesis A only to the source. The drawback of this approach, it seems to me, is that it offers no explanation of the facts. Although an extraposition analysis will capture the actual reading of (18), it gives no account of why other readings aren't possible. To correctly constrain the readings, we will need to restrict *than*-phrases to N-bar attachment when the focus is the comparative NP. But this restrictions will be lifted when the focus is anything else. The other way to go is to look for a semantic explanation. This is what I will propose below.

3. Semantics of Comparatives

3.1. Subdeletion

To illustrate the approach to the semantics of comparatives taken here, it will be useful to start with a noncomparative example:

(20) This desk is six feet wide.

I will represent the semantics of degree adjectives as a relation between individuals and degrees:

(21) wide (that-table, [foot 6])

The term [foot 6] denotes a measure in an ordered set of measures with the sort of structure discussed in Krifka 1987 and Nerbonne 1991. It is not crucial to the issues discussed in this paper that degree adjectives be relations between individuals and degrees, but it is crucial that the semantics of a simple measure assertion like (21) have in it terms that correspond to an individual being measured and a measure.

I will also assume that adjectival relations are downwardly monotonic on their measure arguments, so that if (21) is true then

(22) wide (that-table, [foot 5])

is also true. So the truth-conditions of (21) will only require that table to be at least 6 feet wide. One advantage of this downward monotonicity is that the semantics of *that table is wide* can just be:

(23) wide (that-table, STANDARD)

where STANDARD is some pragmatically fixed standard. The truth-conditions of (23) will then require that table to be at least as wide as the standard.

The kind of comparative that is easiest to understand semantically occurs relatively infrequently:

(24) This desk is longer than that table is wide.

I assume that (25) provides a satisfactory logical representation of (24):

- (25) $\forall ?s$ [wide(that-table, ?s),
 $\exists ?m$ [$> (?m, ?s)$,
 long(this-desk, ?m)]]

Glossing the semantics: every degree s that is in the width relation to that table is such that there exists a degree m greater than s that stands in the length relation to this desk.

One reason for the universal quantification is the downward monotonicity of the adjective relation. We need to require this desk to have a length taller than all the widths of that table in order to be sure that the maximal width is included. There are other motivations for the universal quantification, however. One is that the *than*-phrase is a negative polarity context:

- (26) John is smarter than any bureaucrat.

Another is the behavior of comparatives in modal contexts:

- (27) John can run faster than Bill.

This sentence should come out true only if John can run faster than any speed Bill can run. To get this right, one would need universal quantification even if the adjective relations weren't downwardly monotonic.³

The central claim of this semantics is that the comparative construction introduces a quantifier on measures restricted by the material in the *than* phrase.⁴

I will assume that each measure set has an ordering relation on measures which I will notate simply as $>$, and that comparatives use $>$. I will call the measure constrained by the main clause the STANDARD and the measure constrained by the *than*-clause the REFERENCE.

3.1. Comparative Ellipsis

We now turn to cases involving ellipsis. We begin with a brief summary of the framework of DSP, using a verb phrase ellipsis example:

³Thanks to Bob Moore for pointing this example out.

⁴I will refer to the second-order property obtained by abstracting on ψ in:

$$\forall s [\phi(s), \\ \exists m [> (m, s), \psi(m)]]$$

as the comparative quantifier; thus, ψ stands as the comparative quantifier's scope. Of course, there are really two quantifiers here, and they can scope independently, but for most of the examples under consideration that possibility is not germane to the discussion. This paper has little to say about constraints on the scoping possibilities of the comparative quantifier.

- (28) a. Bill washed his car and John did too.
 b. $\text{AND}[\text{wash}(b, \text{car}(b)), P(j)]$

Given the semantics in (b), the problem of interpreting (a) now reduces to the problem of solving for the unspecified property P . In DSP, resolving that property involves the following steps.

1. Locate source: $\text{wash}(b, \text{car}(b))$.
2. Establish parallel elements and locate *primary occurrences* in source.

$\text{wash}(\underline{b}, \text{car}(b))$

Parallel elements are constituents in a tree. Primary occurrences are terms in the semantic form. A primary occurrence in the source is a term actually contributed by a parallel element. Thus, the two subjects are parallel in (28a), and the first occurrence of b above is primary because it is contributed by the subject NP in the source. The second is not because it is contributed by a pronoun which is not a parallel element.

3. Set up equation.

$P(b) = \text{wash}(\underline{b}, \text{car}(b))$

4. Solve equation.

Strict: $P = \lambda x[\text{wash}(x, \text{car}(b))]$
 Sloppy: $P = \lambda x[\text{wash}(x, \text{car}(x))]$
 $P = \lambda x[\text{wash}(\underline{b}, \text{car}(x))]$
 $P = \lambda x[\text{wash}(\underline{b}, \text{car}(b))]$

5. Discard UNACCEPTABLE SOLUTIONS, that is, solutions which contain a primary occurrence. DSP reject certain solutions that violate parallelism in that they do not abstract over a primary occurrence. In this case the single primary occurrence is the occurrence of b filling the first argument role of *wash*. Thus, the third and fourth solutions above are unacceptable.

We now turn to cases of comparative ellipsis:

- (29) Jean gave her sister a more expensive book than Alice.

The semantics is

$$(30) \quad \exists y [\forall s [R(a, s), \\ \exists m [>(m, s), \\ \text{AND}[\text{book}(y), \\ \text{expensive}(y, m)]]], \\ \text{give}(j, \text{sister}(j), y)]$$

The idea here is that what the *than*-phrase contributes is just a relation between an individual and a measure:

$$R(a, s)$$

Note that is not meant to commit the syntax in any way to an empty measure element.

On the approach to the semantics of comparatives we have adopted, the *than*-phrase always introduces a proposition which restricts the comparative quantifier, whether or not the sentence is elliptical. In the elliptical sentences all we have restricting the quantifier is an unspecified relation between an individual and a degree. The problem of interpreting the elliptical sentences now reduces to the problem of resolving the relation R . We will resolve the relation by abstracting elements out of the semantics of the main clause. Thus we have a paradigm case of the interaction of focus and quantification as discussed in section 1. A relation is being contributed by the semantics of the main clause (this is what corresponds to the background of Jacobs 1991), and that relation restricts the domain of quantification.

In the framework of DSP, solving for R means setting up a second-order equation on the basis of parallelisms between the elliptical semantics and some template semantics. The steps are as follows:

1. Locate scope-of-focus. We will use the term scope-of-focus rather than source because, as illustrated in section 2.1, there are ambiguities in comparative ellipsis that can be captured only if the amount of material omitted in the ellipsis is allowed to vary. In this case, the template on which the elliptical clause will be built is just the semantics of the main clause minus the comparative quantifier. That the comparative quantifier must always be abstracted out before setting up equations is just a stipulation about degree constructions (the account of maximal-degree constructions will entail the same move):

$$(31) \quad \exists y[\text{AND}[\text{book}(y), \\ \text{expensive}(y, m)], \\ \text{give}(j, \text{sister}(j), y)]]$$

2. Establish parallel elements and locate primary occurrences in source. In comparative ellipsis, there are two parallelisms to worry about. One will

be established simply by locating parallel elements in a syntactic tree. This is the parallelism of the focus and contrast. The other parallelism is that between the standard measure and the reference measure. Not wishing to adopt an abstract syntactic analysis for these cases, I will simply assume that parallelism of degrees is given by the construction. Thus, the unique occurrence of the standard in (31) will be a primary occurrence. Let us consider the case where *Jean* is focus.

Main Clause:	JEAN	gave her sister an	<i>m</i>	expensive book
	Focus			Standard
Than Clause:	Alice		<i>s</i>	
	Contrast			Reference

3. Set up and solve equations.

$$\begin{aligned}
 (32) \quad \text{JEAN as focus: } R(j, m) &= \exists y [\text{AND}[\text{book}(y), \\
 &\quad \text{expensive}(y, \underline{m})], \\
 &\quad \text{give}(j, \text{ sister}(j), y)] \\
 \text{Strict: } R &= \lambda x, z [\exists y [\text{AND}[\text{book}(y), \\
 &\quad \text{expensive}(y, z)], \\
 &\quad \text{give}(x, \text{ sister}(j), y)]] \\
 \text{Sloppy: } R &= \lambda x, z [\exists y [\text{AND}[\text{book}(y), \\
 &\quad \text{expensive}(y, z)], \\
 &\quad \text{give}(x, \text{ sister}(x), y)]]
 \end{aligned}$$

Substituting the acceptable solutions for *R* in (30) yields the desired result.

4. Discard unacceptable solutions. Again these are just the solutions that have primary occurrences in them. There are five unacceptable solutions in all, two which fail only in leaving behind the primary occurrence of the focus, two which fail in leaving behind both primary occurrences, and one which fails in leaving behind the primary occurrence of the standard. Here are two of them:

$$(33) \quad R = \lambda x, z \exists y [\text{AND}[\text{book}(y), \\
 \quad \text{expensive}(y, z)], \\
 \quad \text{give}(j, \text{ sister}(x), y)]]$$

$$(34) \quad R = \lambda x, w \exists y [\text{AND}[\text{book}(y), \\
 \quad \text{expensive}(y, z)], \\
 \quad \text{give}(j, \text{ sister}(x), y)]]$$

The first of these would give the impossible reading: *Jean gave Jean's sister a more expensive book than Jean gave Alice's sister*. The second is just vacuous abstraction on both argument positions and would give the contradictory reading that Jean gave her sister a more expensive book than Jean gave her sister. The reader may verify that the other three unacceptable solutions all give impossible readings.

The other reading to deal with is the case where *her sister* is the focus. In this case the equation is:

$$(35) \quad \text{HER SISTER: } R(\text{sister}(j), m) = \exists y[\text{AND}[\text{book}(y), \\ \text{expensive}(y, m)], \\ \text{give}(j, \text{sister}(j), y)] \\ R = \lambda x, z [\exists y[\text{AND}[\text{book}(y), \\ \text{expensive}(y, z)], \\ \text{give}(j, x, y)]]$$

In this case there is only one acceptable solution because there is only one primary occurrence for each argument of the relation. There are three unacceptable solutions, one which leaves behind just the primary occurrence of the focus, one which leaves behind just the primary occurrence of the standard, and one with vacuous abstraction on both argument positions of R , which leaves behind both.

We turn now to the other example of comparative ellipsis discussed in Section 1:

(36) Jean gave her sister a more expensive book than *War and Peace*.

The semantics is:

$$(37) \quad \exists y [\forall s [\text{R}(\text{War-and-Peace}, s), \\ \exists m [>(m, s), \\ \text{AND}[\text{book}(y), \\ \text{expensive}(y, m)]]], \\ \text{give}(j, \text{sister}(j), y)]$$

The equations for this scope-of-focus are:

$$(38) \quad R(y, m) = \text{AND}[\text{book}(y), \\ \text{expensive}(y, m)] \\ R = \lambda x, z [\text{AND}[\text{book}(x) \\ \text{expensive}(x, z)]]$$

Since R is applied to *War and Peace*, the sentence will be true only if *War and Peace* is a book. This, then, is one step in accounting for the entailment facts

noted in Bresnan 1973 and discussed in Section 2.2. We still need to explain why this is the correct scope-of-focus for those examples, however.

In this case the head noun and the adjective predications must both contain primary occurrences. Among the unacceptable solutions, there are two ruled out simply because they do not abstract over one of the two primary occurrences of y :

$$(39) \quad R = \lambda x, z [\text{AND}[\text{book}(y), \\ \text{expensive}(x, z)]] \\ R = \lambda x, z [\text{AND}[\text{book}(x) \\ \text{expensive}(y, z)]]$$

The first reading would not preserve the entailment that *War and Peace* is a book (see Section 2.2). The second would contradictorily require that y be more expensive than itself.

In calling both occurrences of y primary occurrences here, we are building on the sense of primary occurrence as it is assumed in DSP. The motivation for this move is the following: the two occurrences of y in the equations in (39) differ from the two occurrences of j in (32) in that the grammar always requires the two occurrences of y to be identified. An adjective modifying a noun always has its theme argument identified with the noun's. One may think of the semantics of the N-bar as being:

$$[\text{book} \wedge \lambda x[\text{expensive}(x, z)]](w)$$

Here \wedge represents property conjunction. From this perspective there is really only one primary occurrence of the N-bar variable. What is going on here is reminiscent of other cases where the grammar requires identification of two variables, such as the cases of obligatorily sloppy pronouns in Serbo-Croatian discussed in DSP. A more familiar case would be the cases of obligatory sloppy readings with raising verbs such as *expect* in

$$(40) \quad \text{John expects to leave and Bill does too.}$$

Here there is no reading on which Bill expects John to leave. Yet there is good motivation for believing that *expect* takes a proposition argument, and that the semantics of the source clause is

$$(41) \quad \text{expect}(j, \text{leave}(j))$$

Blocking the strict reading would entail hypothesizing two primary occurrences.

We have now worked through the semantics of two closely related elliptical examples, arguing that the principal difference between them is a difference in the scope-of-ellipsis. It should be clear from these examples that any hopes

this analysis may have in being explanatory lie in being able to give a principled account of how the scope-of-focus is determined. Consider again the semantics shown in (30). What would have happened if we had chosen the scope-of-focus in (31) with the comparative NP as the focus? The reading predicted then would have been incorrect:

- (42) Jean gave her sister an m expensive book and Jean gave her sister *War and Peace*, an s expensive book, and m was bigger than s .

This is essentially the same fact we noted for (18).

I will now argue that for semantic reasons the maximal scope-of-focus when the comparative NP is focus is the N-bar. Consider (37). There are four cases to look at:

1. Nbar scope: okay.
2. The scope-of-focus is the scope of the indefinite.

$$R(y, m) = \text{give}(j, \text{sister}(j), y),$$

Here there is no occurrence of m on the right-hand side of the equation. Therefore, this equation has no solution that does not involve vacuous abstraction.

3. The scope-of-focus is the sentence with indefinite quantified in and r is a first-order relation. The equation then is

$$R(y, m) = \exists y[\text{AND}\{\text{book}(y), \\ \text{expensive}(y, m)\}, \\ \text{give}(j, \text{sister}(j), y)]$$

The problem with this equation is that there is no occurrence of y , the focus, on the right-hand side. Since the quantifier has been quantified in, any y on the right hand side is a bound variable and no solution can abstract over it. Again, the equation has no solutions which do not involve vacuous abstraction.

4. The scope-of-focus is the sentence with indefinite quantified. R is a higher-order relation. The system in DSP allows type-lifting in order to deal with cases where one or both of the parallel elements is a quantifier. Thus, in analyzing:

Every student revised his paper, and John did too.

John can be made parallel to *Every student* by type-lifting. On this account (36), *War and Peace* is parallel not to an individual-level variable, but to the indefinite quantifier, *a more expensive book*. It is thus type-lifted to be a quantifier:

$$\lambda P[P(\text{War-and-Peace})]$$

and R is correspondingly type-lifted to allow a quantifier to be one of its arguments. The resulting equation is

$$R \left(\lambda P[\exists y [\text{AND}[\text{book}(y), \text{expensive}(y, m)]]], m \right) = \exists y \left[\text{AND}[\text{book}(y), \text{expensive}(y, m)], \text{give}(j, \text{sister}(j), y) \right]$$

But this, too, has no solutions which do not involve vacuous abstraction. In this case no solution can simultaneously abstract over the focus quantifier and m the standard. Two of the solutions are

$$\begin{aligned} R &= \lambda P, z[\mathcal{P}(\lambda y[\text{give}(j, \text{sister}(j), y)])] \\ R &= \lambda P, z[\exists y[\text{AND}[\text{book}(y), \text{expensive}(y, z)], \text{give}(j, \text{sister}(j), y)]] \end{aligned}$$

There is also a solution which vacuously abstracts over both argument positions.

If we could eliminate all the equations that have only vacuous solutions, then we would have an account of why the N-bar is the only scope-of-focus in this case. Careful readers of DSP will note that they posit no restriction against vacuous solutions. Instead, unacceptable solutions are characterized as those which still contain a primary occurrence. This rules out many cases of vacuous abstraction, but it also rules out solutions such as (33). Rather than try to modify this characterization, I want to suggest that there is an independent restriction, not on solutions, but on equations, which rules out those that have no nonvacuous solutions. This restriction should be thought of as an adjunct to the algorithm for finding a source and parallel elements and setting up an equation. An equation which has no nonvacuous solutions is simply one for which no true parallelisms have been found.

We can now revise Hypothesis A of Section 2.1 and propose a semantic account of the scope-of-focus facts observed in (18):

Hypothesis A: Final Version

The syntactic scope-of-focus is the maximal constituent of the surface sister of the *than*-phrase whose semantics can provide a scope-of-focus with acceptable ellipsis equations.

Note that with this hypothesis, we have an account of the adjectival entailment facts noted in Bresnan 1973 and discussed in section 2.2

(43) ? A stronger man than Mary was found.

The widest scope-of-focus that yields an acceptable equation is the N-bar. There is one narrower scope-of-focus than that N-bar that yields equations with acceptable solutions, namely, the semantics of the adjective:

(44) $\text{strong}(y, m)$

But Hypothesis A, on syntactic grounds, rules out choosing this as the scope-of-focus for (43). It follows from this that any equations resolving the ellipsis will have to include the noun predication in their solutions for R . Thus, any solutions will entail that Mary is a man.

3.2. Maximal-Degree Consturctions

We begin by presenting the semantics for (2), reproduced here:

(45) Jean gave her sister the most expensive book.

The semantics, irrespective of what the focus i, s is

(46) the y [$\forall s$ [$\exists x$ [$C(x), R(x, s)$],
 $\exists m$ [$\geq(m, s)$,
 AND[$\text{book}(y)$,
 $\text{expensive}(y, m)$]]],
 $\text{give}(j, \text{sister}(j), y)$]

There are several differences here from the semantics of a comparative ellipsis sentence. First, the position filled by the contrast in the *than*-phrase has been existentially quantified over, with that quantification restricted to the members of a contrast-set C . Under the scope of \forall , this has the effect of a universal quantification. Second, the ordering relation has been changed from $>$ to \geq . This is because the focus is in the contrast-set too, and if the sentence is ever to be uttered truthfully, ties with the highest scoring element of the contrast set must be allowed.⁵

One might argue for the inclusion of the contrast-set C in (46) on the basis of a general requirement that all quantification should be contextually restricted. But independently of that there is a specific motivation for making it explicit in the semantics of superlatives. Sometimes the contrast-set can be associated with syntactically overt material:

⁵The only difference in the semantics of *Jean gave her sister the more expensive book* is that instead of quantifying over the contrast-set with \exists we quantify with $(\exists, 2)$.

- (47) a. Of the three sisters, Jean bought the most expensive book.
 b. Which sister bought the most expensive book?

Thus, (47a) is appropriate only when *JEAN* is the focus, and the set of buyers Jean will be compared to is the set of the three sisters in question, which must include Jean. In (47b), on what is probably the most accessible reading, the contrast-set is identified with the restriction-set of the *wh*-phrase.

The equations for the case when *Jean* is focus and for the case when *her sister* is focus are exactly as they were for the comparative analogue discussed in Section 3.2, as are the solutions. As was noted in Section 1.1, sentence (46) has another focus possibility, parallel not to (29) but to (36). In this case the focus is the superlative NP. The equation for this reading is exactly the same as the equation for (36), given in (38).

Another difference between the superlatives and the comparatives is that no version of Hypothesis A applies to the superlatives, since they have no *than*-phrase. Thus, nothing prevents a reading in which the scope of focus is narrower than N-bar when the focus is the superlative NP:

- (48) Of the three items the clerk showed, Jean bought the most expensive ring.

Here the items need not be all rings. The scope-of-focus must be the adjective-phrase alone:⁶

4. Conclusion

In this paper I have proposed an analysis of measure constructions that provides a uniform semantics for comparative ellipsis and superlatives, arguing that both can be regarded as examples of focus constructions. The specialness of comparatives ellipsis consists in requiring a contrast along with a focus.

The analysis proposes an account of the entailments of degree comparatives in which the comparative NP is the focus. Thus,

- (49) A stronger man than Bill was found.

entails that Bill was a man. This is accounted for by the relationship between the scope-of-focus and the *than*-phrase.

I conclude with an effort to show that the equational machinery of DSP does extend neatly to handle a paradigm case of a focus construction. The following is a reworking of the analysis of *only* in Rooth 1985:

- (50) John only introduced Sue to her brother.

⁶Thanks to Carl Pollard for pointing this reading out.

$$(51) \quad \forall p [\exists x [A(x), \text{AND} [\sim p, (P(x) = p)]], \\ (p = \text{introduce}(j, \text{brother}(s), s))]]$$

$$\text{SUE:} \quad \begin{aligned} P(s) &= [\text{introduce}(j, \text{brother}(s), s)] \\ P &= \lambda y [\text{introduce}(j, \text{brother}(y), y)] \\ P &= \lambda y [\text{introduce}(j, \text{brother}(s), y)] \end{aligned}$$

$$\text{HER BROTHER:} \quad \begin{aligned} P(\text{brother}(s)) &= [\text{introduce}(j, \text{brother}(s), s)] \\ P &= \lambda y [\text{introduce}(j, y, s)] \end{aligned}$$

The resemblance of the proposed semantics to the semantics of maximal measure constructions is striking. Instead of a universal quantification over measures, there is a universal quantification over propositions. Most interestingly, in both cases, the restriction of the universal requires an existential quantification over a pragmatically given set. In the case of comparatives, I have called that the contrast-set; Rooth calls A the alternative-set, characterizing the members of A as the alternatives to the focus in the discourse. In the case where *her brother* was focus, Rooth 1985 would associate two things with (50):

$$(52) \quad \begin{aligned} \text{a. } &\forall p [C(p) \wedge \sim p \longrightarrow p = \text{introduce}(j, \text{brother}(s), s)] \\ \text{b. } &\lambda p \exists y [[A(y)] \wedge p = \text{introduce}(j, y, s)] \end{aligned}$$

The first is roughly the semantics of the sentence, independent of what the focus is; the second is the p-set (or presupposition set) that goes with having *her brother* as focus. The p-set property in (52b) is then identified with the property of propositions C in (52a). In the recasting given in (51) predicating C of p has been replaced by predicating property P of any individual x and requiring proposition p to be equal to the resulting proposition. The equations solving for P are then set up depending on what has been chosen as the focus. In effect, the task of recursively building up p-sets in parallel with the main semantics is being taken over by the equation-solving machinery. Rooth's idea that one component of the semantics should be kept independent of what the focus is has been preserved. In fact, that property has been preserved throughout this paper: the semantics independently of a solved equation is always compatible with any focus in the scope-of-focus.

Rooth's approach shares with that of Jacobs 1991 the idea that an account of focus requires recourse to some two-component account of meaning. In Rooth it is the main translation and the p-set; in Jacobs it is the focus and the background. One interesting feature of the equational approach is that it tries to make do with a single meaning component, which can then generate a variety of restrictions on the quantifications of focus operators.

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