

A unified analysis of *the same*, phrasal comparatives, and superlatives

Recent years have showed a renewed interest in the issues of giving a compositional analysis of a number of scope-related phenomena, such as the so-called *parasitic scope* inherent in *same* and *different* (Barker 2007) and the analysis of phrasal comparatives such as *Anna has more money than Bill* (Bhatt and Takahashi 2007). So far, these analyses do not extend to one another, despite the number of properties that they share (cf. Heim 1985). We give a new unified analysis that is easily extended to all of the phenomena mentioned by Heim (including superlatives) that preserves the advantages of previous proposals, such as compositionality and a simplistic syntax-semantics interface.

Barker 2007 focuses on the internal (non-deictic) reading of sentences like (1) in which Anna and Bill have read some book in common, laying out various past analyses of *same* that were either non-compositional (not respecting surface syntax) or pragmatic, and showing that neither kind makes the correct predictions. He presents an analysis in which *same* is a kind of quantificational adjective whose scope target does not exist until a plural NP in the sentence undergoes QR, which creates an intermediate adjunction site for the (parasitic) raising of *same*.

- (1) Anna and Bill read the same book
- (2) Anna read the same book as Bill

He gives a full analysis of examples like (1) and many others using a categorial grammar with continuations. Besides some possible theoretical shortcomings (such as the ad hoc structural postulate that is required), one empirical shortcoming is the assumption that *same* (or *the same*, since the presence of the definite is left for future work) is dependent upon a plural-denoting expression. Example (2) shows that the plural need not be a continuous string.

This discontinuity is just like a certain kind of phrasal comparative, called the *associate-remnant* comparative, such as (3), where *Clara* is the remnant (following *than*). This sentence has two readings as in (4) and (5). In (5), *Anna* is the associate, and in (6), it is *Bill*.

- (4) Anna owes more to Bill than Clara.
- (5) Anna owes more to Bill than Anna owes to Clara.
- (6) Anna owes more to Bill than Clara owes to Bill.

Our analysis uses a curry-esque style of categorial grammar (like lambda grammar or abstract categorial grammar, cf. de Groote 2001) in which the syntactic component is divided in two: the tectogrammar, which is the locus of argument structure, and the phenogrammar, which deals with word order and morpho-syntactic issues. Both the phenogrammar and semantic components are lambda calculi, and the tectogrammar is a linear logic. All three components work in lock-step, and for this analysis, only two rules are required: function application (merge) and hypothetical proof (analogous to 'move'). These are given in (7) and (8), respectively.

$$\begin{array}{l}
 (7) \quad \vdash f(a) : B : g(e) \\
 \quad \quad \quad \diagdown \quad \quad \diagup \\
 \vdash f : A \multimap B : g \quad \quad \vdash a : A : e
 \end{array}
 \qquad
 \begin{array}{l}
 (8) \quad \vdash \lambda p.f : A \multimap B : \lambda x.g \\
 \quad \quad \quad | \\
 p : A : x \vdash f : B : g
 \end{array}$$

Here, the turnstile (\vdash) separates any non-discharged hypotheses on the left from the rest of the

expression, and the three parts are separated by colons (pheno : tecto : sem). The linear logic “lollipop” (\multimap) indicates a function in the tecto component, in the way that \rightarrow does for the other components. Thus, for example, if you isolate the tecto component, which has category types like NP and S, $\vdash S$ (with nothing to the left of the turnstile) indicates a stand-alone sentence, while $\text{NP} \vdash S$ indicates a sentence that is missing an NP somewhere within it, and $\vdash \text{NP} \multimap S$ is the type of an intransitive verb that is looking for an NP argument to yield a sentence. The semantics is exactly as it usually is, and the phenogrammar has only one basic type, *string*, from which one can build functions from strings to strings, etc. Strings are concatenated using a (+) operator to yield correct sentence word orders.

Turning now to the analysis of (4), the lexicon required is as in (9), where G is a variable of type $\langle d, et \rangle$, z, u, s and t are variables of type *string*, and r is a variable of type $\langle \text{string}, \langle \text{string}, \text{string} \rangle \rangle$, which is why r appears in the entry for *more* with two arguments: *MORE* and s . We also make use of *traces* that introduce hypotheses on both sides of the turnstile, such as (9g).

- (9) a. *Anna*: $\vdash \text{ANNA} : \text{NP} : a$
 b. *Bill*: $\vdash \text{BILL} : \text{NP} : b$
 c. *Clara*: $\vdash \text{CLARA} : \text{NP} : c$
 d. *owes*: $\vdash \lambda z. \lambda u. \lambda s. s + \text{OWES} + z + u : \text{NP} \multimap (\text{Deg} \multimap (\text{NP} \multimap S)) : \lambda x. \lambda d. \lambda y. \text{owe}'(x)(d)(y)$
 e. *more*: $\vdash \lambda r. \lambda s. \lambda t. r(\text{MORE})(s) + t : (\text{Deg} \multimap (\text{NP} \multimap S)) \multimap (\text{NP} \multimap (\text{Th}[\text{NP}] \multimap S)) :$
 $\lambda G. \lambda x. \lambda y. \text{more}'(G)(x)(y)$
 where $[[\text{more}]](G)(x)(y)$ is true iff $\mathbf{max}(\lambda d. G(d)(x)) > \mathbf{max}(\lambda d. G(d)(y))$
 f. *than*: $\vdash \lambda s. \text{THAN} + s : \text{NP} \multimap \text{Th}[\text{NP}] : \lambda x. x$
 g. $p : \text{NP} : x \vdash p : \text{NP} : x$

We see in *more*'s tecto type that it takes something missing a degree and an NP argument and returns something that takes two NP arguments (one of which is *than*-marked), which is what is required for phrasal comparison. The derivation is slightly different for the two readings, but in essence, *owes* combines with two traces, one of each of the degree and NP types. Then it combines with the argument that is neither the associate nor the remnant, followed by two rounds of hypothetical proof as the various hypotheses/traces are discharged. That leaves something that is looking for a degree argument and an NP argument once again, which is the kind of thing that *more* is looking to combine with. The result of that application yields something looking for two NPs, at which point the associate and remnant are taken as arguments, giving a complete sentence. The sentence missing a degree and an NP would be a regular sentence without a comparative, so it does not have a second argument position for whatever is in the *than* phrase. However, just as in other instances of parasitic scope, this scope position is created as a result of another operator, here, *more*. We exploit this connection to give parallel analyses of internal readings with *same* and superlatives in the talk (since space prevents full analyses of all three here). Finally, we show that the same technology can extend the essence of Barker's proposal to the examples that he doesn't cover, namely those in which the plural entity is discontinuous, showing further advantages of distinguishing a phenogrammatical component in the grammar.

Barker, Chris. 2007. Parasitic scope. *Linguistics and Philosophy* 30:407–444.

Bhatt, Rajesh and Shoichi Takahashi. 2007. Direct comparisons: resurrecting the direct analysis of phrasal comparatives. *Proceedings of SALT 17*.

de Groote. 2001. Towards abstract categorical grammars. In *Association for Computational Linguistics*.

Heim, Irene. 1985. Notes on Comparatives and Related Matters. ms.