

### More on Quantifiers in Comparative Clauses

**Goal:** To give an explanation of the ban on downward entailing quantifiers (DE-Qs) in comparative clauses (c-clauses, cf. (1)) that is compatible with the solutions to the problem of quantifier ‘scope’ in c-clauses (cf. (2)) given in Schwarzschild & Wilkinson (2002, **S&W**), Schwarzschild (2004, **S**) & Heim (2006, **H**). [I assume degree predicates are monotonic]

(1) \*Ann is taller than no/not all/few boys are.

(2) Apparent generalization: **B is F-er than Q is** is true iff  $Q(\lambda x. B \text{ is F-er than } x \text{ is})$

**Problem:** A standard account of comparatives (cf. Heim 2000) suggests that they compare the maximal degrees of two sets, contributed by the main clause and c-clause.

(3) **Al is taller than Ann is** is true iff  $\max(\lambda d. Al \text{ is } d\text{-tall}) > \max(\lambda d. Ann \text{ is } d\text{-tall})$

This analysis has the advantage that it straightforwardly rules out DE-Qs in the c-clause.

(4) \***Ann is taller than no boy is** is true iff  $\max(\lambda d. Ann \text{ is } d\text{-tall}) > \max(\lambda d. no \text{ boy is } d\text{-tall})$

As observed in von Stechow (1984) and Rullmann (1995), the set of degrees to which no boy is tall has no maximum; hence (4) is undefined. Sadly, this analysis predicts incorrect truth conditions when other quantifiers are substituted for *no boy*. For example:

(5) a. **Ann is taller than every boy is** is true iff  $\max(\lambda d. Ann \text{ is } d\text{-tall}) > \max(\lambda d. everyboy \text{ is } d\text{-tall})$

b. Every boy *x* is s.t. Ann is taller than *x*.

The truth conditions in (5)a say that Ann is taller than the shortest boy; this is incorrect. The correct truth conditions are in (5)b. This is the scope problem for quantifiers in c-clauses. **S&W**, **S** and **H** provide a general solution to the scope problem. In **H**’s theory the LF of a comparative sentence is as follows. The position of  $\Pi$  marks the scope of maximality in the c-clause.

(6) a. **B is F-er than Q is** (B an individual, F a scalar predicate, Q a quantifier)  
 $\lambda d. \Pi(\lambda d'. d' > d)(\lambda d. F(d)(B))[\lambda D. Q \lambda x. \Pi(D)(\lambda d. F(d)(x))]$  (Heim 2006)

b.  $\Pi(A)(B)$  iff  $\max(B) \in A$

Factoring in the contribution of  $\Pi$ , we see that a comparative sentence receives truth conditions of the form in (7). Henceforth, I refer to **S&W**, **S** and **H** as Maximal Main Clause (MMC) theories, since the truth conditions claim the maximal degree in the set denoted by the main clause (MC) is a member of the set denoted by the comparative clause (CC).

(7) Maximal Main Clause (MMC) theory: (B, F and Q as in (6))  
 $\max(\underbrace{\{d: F(d)(B)\}}_{MC}) \in \underbrace{\{d': Q \lambda x. d' > \max(\{d: F(d)(x)\})\}}_{CC}$  (e.g., Heim 2006)

The reader can easily verify that this schema correctly derives the truth conditions for (5), as well as sentences containing many other quantificational determiners: *some/many/most/exactly 2*, a.o.

**DE Quantifiers:** MMC faces a problem, however, when we look at c-clauses containing DE-Qs. The MMC schema predicts that (1) means that no/not all/few students are shorter than Bill. This is a perfectly comprehensible meaning. This is problematic: DE-Qs are banned from c-clauses based on their semantic properties; thus, we expect the semantics of comparatives to explain the ban. MMC offers no such explanation. MMC could be saved, if the second occurrence of  $\Pi$  in (6)a could be forced to scope above all DE quantifiers, yielding undefinedness as in von Stechow (1984)/Rullmann (1995). All other quantifiers, however – with the exception of some modal predicates – can scope, and in fact favor scoping, over  $\Pi$ ; see **S** and **H**.

**Solution:** I propose that we can rule out DE quantifiers without stipulating the scope of  $\Pi$  in comparative clauses. Specifically, I propose that there is no  $\Pi$ /maximality operator in the main clause of comparatives; rather the comparative clause is an existential quantifier. Call this the Existential Comparative Clause theory (ECC), cp. Seuren (1972).

(8) Existential Comparative Clause (ECC) theory: (B, F and Q as in (6))  
 $(\exists d \in \{d': Q \lambda x. d' > \max(\{d: F(d)(x)\})\}): F(d)(B)$

When Q is upward entailing and F monotonic, MMC and ECC are equivalent. When Q is DE, on the other hand, the theories part ways. In that case, ECC predicts the sentence to be necessarily true. (This is already noted in von Stechow 1984 as a consequence of Seuren's (1973) views.) Suppose  $Q=no\ girl$ . Then, the set of degrees  $d$  s.t. no girl's height is below  $d$  is an initial segment of the scale. So long as the main clause is non-empty (plausibly a requirement to be defined), it overlaps any initial segment of the scale. Hence, regardless of the relative heights of the subject and the girls the sentence is true. I propose this triviality underlies the unacceptability of DE quantifiers in comparative clauses.

**NM Quantifiers:** This raises a new problem, however, concerning non-monotonic (NM) quantifiers like *exactly two*. ECC appears to be too weak here.

(9) Bill is taller than exactly two students are.

If the semantics only requires Bill to have some degree of height that is above exactly two students' heights, this requires Bill to be taller than two students but allows him to be taller than any number more. MMC fares better, saying Bill's height must be in the set of degrees above exactly two student's heights. I believe, however, that ECC can and should be maintained (to preserve its account of the ban on DE-Qs). We can obtain the correct truth conditions for (9) as follows: (i) *exactly n* means  $n$  but is lexically marked to undergo strengthening by a covert EXH operator (cf. Fox 2006). When EXH takes scope within the c-clause in (9), it has no effect on the meaning of the comparative. This is because (10)a is always an initial segment of (10)b.

(10) a.  $\{d': EXH [\underline{n} NP] \lambda x.d' > \max(\{d: F(d)(x)\})\}$  (EXH[ $n$  NP] = [exactly  $n$  NP])  
 b.  $\{d': [n NP] \lambda x.d' > \max(\{d: F(d)(x)\})\}$  [the focus of EXH is underlined]

ECC does not distinguish between these two intervals (as long as they are non-empty, which I assume is presupposed). Suppose  $A$  is a downward closed interval, and  $B$  is upward closed. Then for any initial segment  $B'$  of  $B$ ,  $A$  overlaps  $B'$  iff  $A$  overlaps  $B$ . Thus, MC (always downward closed) intersects the set of degrees above exactly two students' heights iff it overlaps the set of degrees above two students' heights. I propose that EXH is not allowed to have no effect on the meaning of the construction containing it; so, it takes higher scope:

(11)  $EXH[\exists d \in \{d': [\underline{n} NP] \lambda x.d' > \max(\{d: F(d)(x)\})\}: F(d)(B)]$

LF (11) implies that for any  $n' > n$ , the comparative sentence is false. For example, the LF of (9) is (12)a, which has the truth conditions (12)b. These are the correct truth conditions for (9).

(12) a. EXH[Bill is taller than two students are.]  
 b. Bill is taller than two students are and Bill is not taller than three students are.

Such an analysis extends to any NM quantifier whose upper bound could plausibly result from the lexically stipulated application of EXH (*just, exactly, only, ?at most*). It is an open question whether this analysis can be extended to all cases of NM quantifiers. It is also an open question whether all NM quantifiers can 'scope out' of comparative clauses. For example, though conjunctions of UE-Qs with DE-Qs are NM, they are unacceptable in comparative clauses:

(13) \*Bill is taller than [some boys but no girls] are.

The unacceptability of (13) can be explained by ECC since it is predicted to be equivalent to *Bill is taller than some boys are*. Hence adding the conjunct *but no girls* violates Brevity.

**Summary** ECC is equivalent to MMC for UE-Qs in CC. ECC explains the unacceptability of DE-Qs in CC, MMC does not. MMC incorrectly predicts all NM-Qs scope out (see (13)); under ECC, NM-Q acceptability depends on structure of the NM-Q. Many NM-Qs are left to examine.

**References:** S&W (2002) Quantifiers in Comparatives. *NaLS* 10:1-41; S (2004) Scope-splitting in the comparative. Ms. Rutgers; H (2006) Remarks on comparative clauses as GQs. Ms. MIT