On Quantifiers and NPIs in Comparative Clauses

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Abstract

Traditional analyses of comparatives such as Seuren's and von Stechow's are designed to predict the occurrence of negative polarity items in the comparative clause, by making the latter a downward entailing environment. These analyses, however, have problems with the interpretation of quantifiers in the than-clause. Larson and Schwarzschild & Wilkinson have proposed solutions to these problems, but their analyses no longer predict the occurrence of NPIs. My aim in this talk is to make some progress towards a resolution of this dilemma.

Part 1: The dilemma

Generalization 1: Comparatives license NPIs in the than-clause

(1) I am stronger now than I ever was before.

Generalization 2: Quantifiers in the than-clause take matrix scope.

(2) I am stronger than everyone else is.
    = for everyone else x, I am stronger than x

Outline for part 1:

• Present an analysis that predicts NPI-licensing straightforwardly and show that it has difficulty with quantifier scope.
• Present an analysis that predicts quantifier scope and show that it has difficulty with NPIs.

1. Seuren's analysis

basic idea:

(3) John is taller than Mary is.
    means:
    'John is tall to some degree to which Mary isn't tall'
    \exists d \ [John is d-tall & \neg Mary is d-tall]
assumption required to make this work:

(4) "monotonicity" ("at least" interpretation) of adjectives:
If John is 6' tall, he is also 5' tall, 4' tall etc.; but not 7' tall, 8' tall etc.

(5) If x is d-tall & d' < d, then x is d'-tall.

Seuren's meaning for the comparative morpheme:

(6) -er(P_{\text{than}})(Q_{\text{matrix}}) \iff \exists d [d \in Q & \neg d \in P]
(a relation between two sets of degrees)

assumptions about LF-syntax (for concreteness only, not crucial here):

(7) John is taller than Mary is.
LF: [-er than wh1 Mary is t1 tall]2 John is t2 tall
interpreted as: -er (\lambda_1. Mary is t1 tall) (\lambda_2. John is t2 tall)

Predictions about NPI-licensing, on Ladusaw's theory

(8) Downward entailment:
if \exists d [d \in Q & \neg d \in P] and P' \subseteq P, then \exists d [d \in Q & \neg d \in P']

(9) I am stronger now than I ever was before.
'I am now strong to a degree to which I wasn't ever strong before'

Predictions about quantifiers in the than-clause

(10) I am stronger than everyone else is.

(11) LF: [-er than wh1 everyone else is t1 strong]2 I am t2 strong
predicted: 'I am strong to a degree to which not everyone else is strong'
wrong meaning!!
This is already true if there is one person that I am taller than.

Scoping out the quantifier:

(12) another potential LF for (10):
everyone else3 [-er than wh1 t3 is t1 strong]2 I am t2 strong
\forall x \neq 1: I am strong to a degree to which x isn't
correct meaning

(13) Wide Scope Hypothesis:
Sentences with quantifiers in the than-clause mean what they do because the quantifiers QR out.
Objections to the Wide Scope Hypothesis:\(^1\):

(a) **island insensitivity:**
This instance of QR should be blocked by island constraints.

(14) *Who are you stronger than is.
(15) A different girl knows what every boy bought.\(^2\)
(16) Alice is richer than George was and most of his children will ever be. (S&W)
'A is richer than George was & for most of G's children x, A is richer than x will be'

(b) **stipulated obligatoriness:**
Even if syntactically licit, this instance of QR should be optional.

(c) **adverbial and verbal quantifiers:**
Even quantifiers that can never QR show obligatory wide scope.

(17) floated quantifiers:
Lucy paid more for her suit than they both paid in taxes last year. (S&W)
'for both x, Lucy paid more for her suit than x paid in taxes last year'
not: 'Lucy paid more than the lesser of their two tax bills' (predicted by Seuren)

(18) frequency adverbs (adverbial quantifiers over times):
It is warmer in Stony Brook today than it usually is in New Brunswick. (S&W)
'for most times t, it is warmer in Stony Brook today than it is in New Brunswick at t'
not: ' S.B. is warm to a degree that N.B. reaches at most half of the time'

(19) I have to admit – it's cleaner here than it sometimes is in my house.
'there are times when my house is less clean than this'
not: 'this is cleaner than it ever is in my house'

(20) modals (verbal quantifiers over possible worlds):
It is warmer today than it might be tomorrow. (S&W)
'today's temperature is such that, for all I know, tomorrow's might be less than that'
not: 'today it is warm to a degree that I know that it won't be tomorrow'

\(^1\) Objections (a) and (b) have been around since the discovery of the problem, though the coordinate structure example () is new in Schwarzschild & Wilkinson (2002). Objections (c) and (d) are original to Schwarzschild & Wilkinson.

\(^2\) Moltmann & Szabolcsi, Fox.
(21) **scope paradoxes:**
The putative wide-scope quantifier is not scoping over higher material within the *than*-clause.

(22) Bill did better than John predicted that most of his students would do.

not necessarily: 'for most of John's students x, Bill did better than John predicted x would do'

(John may have made no prediction about any individual)

but also not: 'Bill did well to a degree such that John did not predict that most of his students would do well to that degree'

(23) situations considered by Schwarzschild & Wilkinson:

(i) John: "Most will get between 70 and 80". Bill gets 83.

intuition: sentence is true

(ii) John: "Most will get between 70 and 80". Bill gets 76.

intuition: sentence is false

2. An analysis inspired by Larson and Schwarzschild & Wilkinson\(^3\) (*"LSW"*)

basic idea: *than*-clauses as generalized quantifiers over degrees

(24) new adjective meanings:

'D' ranges over sets of degrees.

x is D-tall iff x's (maximal) height is an element of D

(25) relation between Seuren's adjective meanings and these new ones:

x is D-tall iff max{d: x is d-tall (in Seuren's sense)} ∈ D

\[^3\] It is an open question whether this analysis is descriptively equivalent to the one developed by S & W. I conjecture that it is. I present it instead of theirs because it is easier to develop and apply.
than-clauses:

(26) assuming same LF-syntax as before (wh-movement from position next to adjective):

\[\text{than Mary is} = \text{than } \text{wh}_1 \text{ Mary is } t_4 \text{ tall}\]

interpreted as:

\[\lambda_1. \text{Mary is } t_1 \text{ tall},\]

\[\lambda_1. \text{Mary is D tall}\]

\[\lambda_1. \text{Mary's height } \in \text{D}\]

semantic type: a predicate of sets of degrees, i.e., a generalized quantifier over degrees

(27) new meaning for the comparative morpheme:

\[-\text{er}(d_\text{than})(d'_\text{matrix}) \Rightarrow d' > d\]

(a relation between two degrees)

LF-syntax for the whole sentence (again for concreteness only):

(28) John is taller than Mary is.

first derive the same as above:

\[[-\text{er} \text{than wh}_1 \text{ Mary is } t_4 \text{ tall}]_2 \text{ John is } t_2 \text{ tall}\]

\[= [-\text{er} [\lambda_1. \text{ Mary is } t_1 \text{ tall}]] [\lambda_2. \text{ John is } t_2 \text{ tall}]\]

Given the new types, however, this is not interpretable as it stands:

\[-\text{er} \text{ needs to apply to a degree, but gets a generalized quantifier over degrees.}\]

(29) Remedy: resolve type-mismatch by QRing the than-clause:

\[[\lambda_1. \text{ Mary is } t_1 \text{ tall}] [\lambda_3.[-\text{er } t_3] [\lambda_2. \text{ John is } t_2 \text{ tall}]\]
Mary is taller than John. This is interpreted as:

\[ \lambda D. \text{Mary's height} > \lambda D. \text{John's height} \]

In all following examples, the matrix clause is of the simple form "x is Adj+er" (with x a referential expression). Therefore, the LF-portion in the scope of the \textit{than}-clause always reduces to: "\(\lambda d. x \text{ is Adj-er than } d\)" (or, "\(\lambda d. x's \text{ N > d}\)", where N is the appropriate nominalization for Adj).

**Predictions about quantifiers in the \textit{than}-clause**

(30) I am stronger than everyone else is.

\[
\text{LF: } [\text{wh}_1 \text{ everyone else is } t_1 \text{ strong}]_3 [-\text{er than } t_3]_2 \text{ I am } t_2 \text{ strong}
\]

interpreted as:

\[ \lambda D. \forall x \neq I: \text{x's strength} > \lambda d. \text{my strength} > d \]

\[ = \forall x \neq I: \text{my strength} > \text{x's strength} \]

correct meaning!

Comparison with Wide Scope Hypothesis above: On LSW analysis, the whole \textit{than}-clause QRs, but quantifiers inside stay put. This helps with the examples that were problematic before (cf. (16) - (22)).
(31) coordinate structure example:
\[ \lambda D. \text{G was D rich} \& \text{most of G's children will be D rich} \] \((\lambda d. \text{A's wealth} > d)\)

(32) epistemic modal example:
\[ \lambda D. \text{might(tomorrow be D warm)} \] \((\lambda d. \text{today's temperature} > d)\)
\[ = \lambda D. \text{in some w compatible with what I know: tomorrow's temperature in w} \in D \]
\((\lambda d. \text{today's temperature} > d)\)

(33) scope paradox example:
predicted meaning:
for every w consistent with what John predicted:
most of J's students do less well in w than Bill does in the actual world

Predictions about NPI-licensing, on Ladusaw's theory
Downward entailment?

(34) Are than-clauses in the scope of a DE operator? – No.
\(-er\) is not even of the right type to be possibly DE.
\(-\)clauses in interpretable LFs are not in the scope of any operator at all.

What about "global" DE-ness?

(35) Cows fly more often than he lifts a finger to help. (Linebarger)

(36) If VP\(_1\) entails VP\(_2\), and \textit{Cows fly more often than he VP\(_2\)} is true,
do we predict that \textit{Cows fly more often than he VP\(_1\)} must be true?
Yes, on plausible auxiliary assumptions.\(^5\)

(37) \(p \in D \text{ often } \iff |\{t : p \text{ is true at } t\}| \in D\)
(i.e., the number of times that p happens is in D)

\(^4\) Leaving out the \textit{ever} for now; on this see below.

\(^5\) S & W's discussion seems to suggest otherwise, at least implicitly.
(38) LF-derivation and interpretation for *Cows fly more often than he VP*:

\[ \text{ever than [wh he VP t often]} \text{2 cows fly t often} \]
\[ \Rightarrow [\text{wh he VP t often}] \text{3 [-er than t} \text{3]} \text{2 cows fly t often} \]
\[ [\lambda D. \text{he VP D often}] (\lambda d. [\lambda D. \text{cows fly D often}](\text{-er(d)})) \]
\[ = [\lambda D. \text{the # of times that he VP} \in D] (\lambda d. \text{the # of times that cows fly} > d) \]
\[ = \text{the # of times that cows fly} > \text{the # of times that he VP} \]

(39) If VP$_1$ entails VP$_2$, then the # of times that he VP$_2$ >= the # of times that he VP$_1$.

Therefore,

if VP$_1$ entails VP$_2$, and the # of times that cows fly > the # of times that he VP$_2$,
then the # of times that cows fly > the # of times that he VP$_1$.

Conclusion: The LSW analysis does predict that *lift a finger* in (35) is in a DE global context (although there is no one item that's a DE operator).

Similar examples:

(40) He frowned more often than he said anything.

(41) More people took deductions than contributed anything to charity.

(42) More people enroll than will ever be able to finish.

(43) Many more people enroll than have a hope in hell of finishing.

However, this situation does not obtain for all examples with NPIs in *than*-clauses.

(44) I am stronger now than I ever was before.

(45) He told me more jokes than I cared to write down. (Rullmann)

(46) Dort bezahlst du viel mehr, als du bei uns zu bezahlen brauchst.

Applying LSW analysis to example (44):

\[ [\text{wh I ever before was t strong}] \text{3 [-er than t3]} \text{2 I am t strong now} \]
\[ [\lambda D. \text{ever-before} t [I was D strong at t]] (\lambda d. \text{my strength now} > d) \]
\[ = \ \text{ever-before} t [\text{my strength now} > \text{my strength at t}] \]
\[ = ? \exists t \text{[t is before now} \ & \ \text{my strength now} > \text{my strength at t}] \]
(48) two problems with this:

(a) *ever* is not in a DE environment (see 2nd to last line)

(b) standard existential interpretation of *ever* gives wrong truth conditions (last line)
    (correct meaning obtained if *ever* were universal)

analogous problems for (45) and (46), e.g. for (46):

(49) (a) *brauchen* ('need', NPI) ends up with widest scope
    (cf. epistemic modal example (32) above),
    hence it should not be licensed.

(b) Interpretation of *brauchen* as necessity gives wrong truth conditions;
    it would have to be interpreted as possibility.

(50) ... daß du nicht zu kommen brauchst
    that you not to come need(NPI)
    'it is not necessary for you to come'

Notice: All these are straightforward on a Seuren-style analysis: NPIs are licensed and can be
given their standard meanings (*ever* existential, *brauchen* = necessity).

Free Choice analysis?

(51) I am stronger than anyone else is.

(52) interpretation predicted by LSW analysis (cf. (30) above):
LF: [wh₁ anyone else is t₁-strong]₃ [-er than t₃]₂ I am t₂ strong
interpreted as:
    [λD. anyone else is D strong] (λd. my strength > d)
    = anyone else (λx. my strength > x's strength)

(a) if *anyone else* here is NPI, then two problems:
    • not licensed by a DE context
    • wrong truth conditions (existential)

(b) if *anyone else* here is Free Choice, no problem⁶:
    • no DE context needed
    • correct truth conditions (universal)

⁶ Actually, one may wonder whether the licensing conditions for FCs are met – whatever exactly
these are.
Conjecture: Comparative clauses license FC readings for items that otherwise don't allow them, including ever, brauchen_{NPI}. The quantificational force of the FC reading is the dual of the quantifier expressed by the NPI.

But why should this be so?

Here are some further challenges for the LSW analysis:

Wrong truth conditions for certain modals

(52) I stayed longer than I had to.
    than I needed to.
    than (was) necessary.

predicted to mean: 'it was necessary for me to stay less long than I did'
correct meaning: 'it was allowed/possible for me to stay less long than I did'

(53) I stayed longer than I was allowed to.

predicted to mean: 'I could have stayed less long than I did'
correct meaning: 'I ought to have stayed less long than I did'

Indefinites

(54) John is richer than a professor is.

(55) logical structure on LSW analysis:
a professor (\lambda x. John's wealth > x's wealth)

(a) existential reading of indefinite:
    \exists x [professor(x) & John's wealth > x's wealth]
(b) generic reading of indefinite:
    for every typical professor x: John's wealth > x's wealth

Generic reading preferred, but existential reading can be facilitated:

(56) John is richer than a professor who I am friends with is.

Correct prediction:

(57) A professor makes a lot of money.
    (generic reading available)

(58) One of my colleagues makes a lot of money.
    (only existential)

(59) John makes more money than one of my colleagues does.
    'there is a colleague of mine x such that John makes more money than x does'
Conjecture: Readings of indefinites in comparatives match readings that they can have independently.

However:

(60) Hans ist ziemlich klein, aber jemand anderer hier ist größer.
    Hans is rather short, but someone else here is taller.
    (perfectly okay, existential reading)

(61) ?Hans ist größer, als jemand anderer hier ist.
    Hans is taller than someone else here is
    (existential reading, if any, but not very good)

(62) Er hat mehr verlangt, als jemand anderer, der ebenso gut war, verlangt hat.
    he has more demanded than someone else who just as good was demanded has
    'he asked for more (money) than someone else who was equally good asked for'
    (perfectly acceptable; might be answer to "why wasn't he hired")

Indefinites trapped below an NPI:

(63) Er stieg höher, als je zuvor jemand gestiegen war.
    he climbed higher than ever before someone climbed had
    'he climbed higher than anyone had ever climbed before'

(64) also with wh-indefinites or with irgend-indefinites:
    Er stieg höher, als je zuvor wer gestiegen war.
    'wer' = 'who'
    irgendjemand irgendwer
    (same meaning)

To generate correct truth conditions on the LSW analysis, we need a universal interpretation not only for *je zuvor*('ever before'), but also for the indefinites (irgend)jemand and (irgend)wer. But these indefinites don't have any attested generic or universal readings elsewhere.

Negation and decreasing quantifiers in the *than*-clause

(65) *John is taller than Mary isn't.

(66) ??John is taller than nobody else is.

(67) ??John is taller than few people are.
Seuren's analysis:

(68) for (65): $\exists d \{J \text{ is } d \text{ tall} \& \neg \neg \text{ Mary is } d \text{ tall}\}$

trivially true

LSW analysis:

(69) for (65): $[\lambda D. \text{ Mary is not } D \text{ tall}] \ (\lambda d. \text{ John's height } > d)$

= not $[\text{ John's height } > \text{ Mary's height}]$,

i.e., John is not taller than Mary is

No obvious reason why this is not good.

Part 2: Speculations in search of a solution

A "two operator" approach?

Intuitive starting point: Seuren's meaning for the comparative contains a negation. If that
negation could be in places lower than the edge of the whole than-clause, it looks like we could
capture the desired readings.

(70) John is taller than everyone else is.

wrong: $J$ is tall to a degree to which not everyone else is.

right: $J$ is tall to a degree to which everyone else is not.

(71) It is warmer today that it might be tomorrow.

wrong: Today it is warm to a degree to which it cannot be tomorrow. (NOT > POSS)

right: Today it is warm to a degree to which it may not be tomorrow. (POSS > NOT)

(72) Alice is richer than George was and most of his kids will be.

wrong: $A$ is rich to a degree $d$ such that

it is not the case that $G$ is $d$-rich and most of his kids are $d$ rich.

right: $A$ is rich to a degree $d$ such that

$G$ is not $d$-rich and most of his kids are not $d$ rich.

(73) Bill did better than John said that most of his students would do.

wrong: $B$ did well to a degree $d$ such that John did not say that most would do $d$ well.

right(?): $B$ did well to a degree $d$ such that John said that most would not do $d$ well.

(requires transparent interpretation of 'say')
What about quantifiers/operators that are not upward monotone?

negation and monotone decreasing quantifiers:

(74)  *John is taller than Mary isn't.  
John is tall to a degree to which Mary isn't not tall. 
still predicted trivial, whether covert negation is above or below overt one

(75)  ?*John is taller than nobody in my class is. 

(a) John is tall to a degree to which nobody in my class isn't tall. 
(b) John is tall to a degree to which not nobody in my class is tall. 
both trivial

non-monotone quantifiers:

(76)  John is taller than exactly one of the others is.  (cf. S & W) 

(a) John is tall to a degree to which not exactly 1 other one is.  
(b) John is tall to a degree to which exactly 1 other one is not. 
both are wrong! 
LSW is right: 'there is exactly one that John is taller than'

(77)  situation 1: Mary 3', Bill 4', John 5' 
intuition: sentence is false 
but:   (a) is true: take e.g. 3'  
     (b) is true: take e.g. 4'

(78)  Alice is richer than George was and exactly one of his sons will be.

(79)  It is warmer today than it was exactly once last year.

Do we really understand these sentences?

(80)  Bill did better than John predicted that exactly one of his students would do.

(81)  situation where (80) is intuitively true (?): 
John: "exactly one of my students will get 73 points" 
Bill gets 74.

(82)  reading predicted by LSW: 
For every w consistent with what John predicted: 
   exactly one of J's students does less well in w than Bill does in the actual world.  
This is not actually true in the situation in (81)! 
E.g., J's prediction does not exclude that another student gets 72.
Conclusion: More fieldwork on non-monotone quantifiers needed. Conceivably, the simpler examples like (76) work by scoping out after all.

Trapping quantifiers under NPIs

(83) I kept it longer than I kept everything else.

(84) I kept it longer than I ever kept everything else.
   (a) 'everything' scopes over 'ever':
       than everything else₁ I NEG ever kept t₁ t long
       (a possible reading?)
   (b) surface scope:
       than I NEG ever everything else₁kept t₁ t long
       = than I always kept something else
       (judgment???)
   (c) other readings?

(85) Bill did better than John ever predicted that most of his students would do.

(86) scenario where (85) seems true:
    John makes various utterances at different times:
    "most will get between 70 and 80"
    "most will get below 85"
    "most will get between 65 and 88"
    Bill gets 90.
    This works fine with LSW (provided that 'ever' is universal), but it apparently cannot be handled on the present approach.

Quantifiers and negation: some other mysterious interactions

(87) I don't think that most of them even noticed.
   (a) expected: 'at least half of them didn't notice' (outer negation)
   (b) unexpected: 'most of them didn't notice' (inner negation)
   These truth conditions are not very far apart.

(88) I don't think that the vast majority of them even noticed.
   (a) expected: 'at least a significant minority of them didn't notice'
   (b) unexpected: 'a vast majority of them didn't notice'
   tentative judgment: the sentence conveys (b)
(89) I doubt that the vast majority have had so much as an intro linguistics course.

(90) It's quite unlikely that the vast majority of them will even show up.

(91) Nobody thought that the vast majority of them would even show up.

(92) I didn't ever expect that the vast majority of the students had even had an intro course.

(93) Ich habe garnicht mehr damit gerechnet,  
not at all anymore on it counted  
 daß die allermeisten von ihnen auch nur kommen würden.  
that the all-most of them even come would  
'I no longer expected that the vast majority of them would even come'

(94) Keiner von uns hat gedacht, daß das allermeisten auch nur merken würden.  
none of us has thought that that the all-most even notice would  
'None of us thought that the vast majority would even notice'