

Adverbial comparatives as event modifiers*

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1. Loose readings of adverbial phrasal comparatives

The focus of this paper is the adverbial comparative construction exemplified in (1)–(2):

- (1) John flew the little Cessna more skillfully than an airline pilot.
- (2) The helicopter flew higher than the tallest building.

On its most felicitous interpretation, the comparative in (1) compares John's degree of skill in flying Cessnas with an airline pilot's degree of skill in flying airliners. Similarly, the comparative in (2) would typically be understood to compare the helicopter's altitude to the height of the tallest building. We term these readings 'loose' readings owing to the apparent mismatch between the two predicates of degrees that are compared. The availability of loose readings is not predicted by standard analyses of phrasal comparatives.

The application of two well-known analyses of phrasal comparatives to (1) is illustrated in (3)–(4). On the clausal reduction analysis in (3), the clausal complement of *that* is reduced via ellipsis to a DP. The constituent [er [than ...]] is a generalized quantifier over degrees that moves to bind a degree variable and take scope over the entire clause.¹

The 'direct' analysis in (4) exploits the mechanism of parasitic scope. The complement of *than* is underlyingly phrasal. The degree operator takes an individual as its first argument and then moves to 'tuck in' between the subject and its associated λ -node, again binding a degree variable:

*We would like to thank Rajesh Bhatt for useful discussions, as well as Barbara Partee, the NELS audience and reviewers for comments. We also thank Dave Kush for supplying Hindi data.

¹We ignore here the issue of word order. One possibility (Bhatt & Pancheva 2004) is that [er] QRs covertly to the right, with [than ...] late-merged as an adjunct to it.

- (3) *Clausal reduction analysis* (Heim 1985)

[[er [Op₁ [than an airline pilot [flew t_1 -skillfully]]]]] (Op₁ interpreted as λ node)
 [λ_2 [John flew the little Cessna [t_2 skillfully]]]

$$[[er]] = \lambda P_{dt} . \lambda Q_{dt} . \max(Q) > \max(P)$$

‘John flew the little Cessna more skillfully than an airline pilot flew the little Cessna.’

- (4) *Direct analysis* (Heim 1985, Bhatt & Takahashi 2011²)

[_{VP} John flew the little Cessna [[er [than an A.P.]] skillfully]]
 [_{TP} John [λ_1 [_{VP} [t_1 flew the little Cessna [[er [than an A.P.]] skillfully]]]]
 [_{TP} John [[er [than an A.P.]] [λ_2 [λ_1 [_{VP} [t_1 flew the little Cessna [t_2 skillfully]]]]]]

$$[[er]] = \lambda x_e . \lambda P_{d,et} . \lambda y_e . \max\{d \mid P(d, y)\} > \max\{d \mid P(d, x)\}$$

‘John flew the little Cessna more skillfully than an airline pilot flew the little Cessna.’

Neither the clausal reduction nor the direct analysis derives the loose reading. This reading must therefore have some other derivation. Two possibilities spring to mind. The first, which we term the $e \rightarrow d$ analysis, is that comparatives such as (1)–(2) can be interpreted in a manner analogous to comparatives where the standard is a degree expression. This kind of analysis is most obviously applicable to (2). If the standard in (2) can be mapped the maximal degree of the tallest building’s height, then (2) can be interpreted in the same way as a comparative like (5):

- (5) The helicopter flew higher than 200 ft.

This analysis can also be applied to (1), if the standard in (1) can be mapped to the maximal degree of an airline pilot’s skill. Some existing analyses of phrasal comparatives, such as Gawron (1995), posit precisely such an individual-to-degree mapping. If this kind of analysis is on the right track, then the availability of loose readings is not particularly surprising, and it is easy to see how they might be accounted for.

The second possibility, which we term the ‘mismatched ellipsis analysis’, is an elliptical variant of the $e \rightarrow d$ analysis. Rather than mapping the standard to a degree in the semantics, the standard is analyzed as a clause containing an elided adjectival comparative:

- (6) The helicopter flew higher than the tallest building [is tall].

The assumption that phrasal comparatives may have underlying clausal structure is (for English at least) not implausible. We will come shortly to the question of whether or not ellipsis in (6) can plausibly be licensed.

²Bhatt & Takahashi argue that the direct analysis is not correct for English phrasal comparatives.

This paper has two main aims. The first is to show that neither the $e \rightarrow d$ analysis nor the mismatched ellipsis analysis can succeed in accounting for loose readings. Our arguments to this effect are presented in sections 2 and 3. The second aim is to present an alternative analysis of loose readings resting on the hypothesis that adverbial comparatives can be interpreted as event modifiers. This analysis is introduced in section 4. Finally, section 5 presents a data point that appears problematic for all existing analyses, our own included.

2. The mismatched ellipsis analysis

2.1 First problem: constraints on ellipsis

It has been argued that English phrasal comparatives are derived by reduction of clausal comparatives (Lechner 2004, Bhatt & Takahashi 2011). It is clearly possible in principle to derive the loose reading of (1) via reduction of a clausal comparative, as illustrated in (7):

- (7) [[_{er} [_{than} [_{Op₁} [_{an airline pilot} [_{is} [_{t₁} skillful]]]]]]]
[_{λ₂} [_{John} [_α flew the little Cessna [_{t₂} skillfully]]]]]]

The matching condition holding between the elided material and its antecedent must be much less stringent than the matching condition on VP ellipsis. In (8), for example, the loose reading (8b) is completely absent:

- (8) John flew the little Cessna more skillfully than an airline pilot did.
a. #John flew the little C. more skillfully than an airline pilot flew the little C.
b. *John flew the little C. more skillfully than an airline pilot flies an airliner.

Lechner (2004, 114) argues that “[A]ll deletion in comparatives derives from Gapping, Right Node Raising and Across-the-Board movement.” The constraints typically assumed on these operations are incompatible with the analysis in (7). It seems, then, that this analysis can be maintained only by postulating an ellipsis or reduction operation that applies only to comparative structures. This seems a rather unattractive option on grounds of parsimony, and we will shortly see empirical grounds for rejecting a clausal reduction analysis of loose readings.

2.2 Second problem: clausal reduction likely not available in all languages

Japanese and Hindi translations of comparatives such as (1)–(2) have the same range of available readings as their English counterparts:

- (9) John-wa kookuuki-no soojuushi-yori umaku sesuna-o shoojuusi-ta. (Japanese)
John-WA airline-GEN pilot-than skillfully Cessna-ACC operate-PAST
‘John operated the Cessna more skillfully than an airline pilot (operates an airline).’

- (10) Sono herikoputaa-wa ichiban takai tatemono-yori takaku ton-da.
that helicopter-WA most high building-than high fly-PAST
'The helicopter flew higher than the tallest building (is high).'
- (11) Patang imaarat-se zyaada unchii udayii (Hindi)
kite building-than more high flew
'The kite flew higher than the building (is high).'

Bhatt & Takahashi (2011) conclude that Hindi phrasal comparatives do not have underlying clausal structure, and that Japanese phrasal comparatives have underlying clausal structure only in those instances where there is clear surface syntactic evidence for its existence (e.g. multiple standards). Sudo (2015) argues that all apparently clausal comparatives in Japanese have a phrasal source. If clausal reduction is not involved in the derivation of the comparatives in (9)–(10), then there must be a means of deriving loose readings without this operation. While this leaves open the possibility that loose readings nonetheless have clausal reduction derivations in English, it shows that the problem of accounting for the existence loose readings across languages cannot be solved by appeal to clausal reduction. The next subsection presents evidence that a clausal reduction derivation of loose readings is not, in any case, available in English.

2.3 Third problem: multiple standards

The presence of multiple standards of comparison in a phrasal comparative is usually taken to indicate that the comparative has a clausal source:

- (12) John was happier in Venice than Jane in Rome.
John was happier in Venice than Jane [was happy] in Rome.

If (13) is modified by adding a second standard, the felicitous reading (14b) is absent, and only the infelicitous reading (14a) remains:

- (13) The helicopter flew higher than the rock climber.
a. #The helicopter flew higher than the rock climber flew.
b. The helicopter flew higher than the rock climber was high.
- (14) The helicopter flew higher in 20 seconds than the rock climber in 20 minutes.
a. #The helicopter flew higher in 20s than the rock climber flew in 20m.
b. *The helicopter flew higher in 20s than the rock climber was high in 20m.

A mismatched ellipsis analysis cannot account for the absence of reading (14b), since there is nothing to rule out the derivation suggested by the gloss itself, shown in (15):

- (15) The helicopter flew higher in 20 seconds than the rock climber [was high] in 20 minutes.

3. The $e \rightarrow d$ analysis

Let us first consider the variant of the $e \rightarrow d$ analysis where the mapping from individuals to degrees is supplied contextually without any further restriction. This analysis can be implemented by assigning the comparative morpheme the denotation in (16), and introducing a null constituent F as its complement. The value of F is contextually determined. The LF for (1) under this analysis is shown in (17):

$$(16) \quad \llbracket \text{er} \rrbracket = \lambda f_{ed} . \lambda x_e . \lambda P_{dt} . \max(P) > f(x)$$

$$(17) \quad \llbracket \llbracket \text{er } F \rrbracket \text{ than an airline pilot} \rrbracket [\lambda_1 \llbracket \text{John flew the little Cessna } [t_1 \text{ skillfully}] \rrbracket \rrbracket \rrbracket$$

A problem for this analysis is that the availability of loose readings is conditioned on the choice of adverb. For example, replacing *skillfully* in (1) with *frequently* causes the loose reading to disappear. There is, however, no difficulty in defining the relevant functions from individuals to degrees, as in (19):

- (18) John flew the Cessna more **frequently** than an airline pilot.

- a. #John flew the Cessna more **frequently** than an airline pilot flew the Cessna.
- b. *John flew the Cessna more **frequently** than an airline pilot flies airliners.

- (19) a. $\lambda x_e . \max\{d \mid x \text{ flies an airliner } d \text{ skillfully}\}$
 b. $\lambda x_e . \max\{d \mid x \text{ flies an airliner } d \text{ frequently}\}$

Intuitively, the oddness of (18) under reading (18b) has to do with the oddness of ‘John is frequent’ as compared to ‘John is skillful’. (Indeed, the mismatched ellipsis analysis arguably captures the contrast between (1) and (18) for this reason.) In the variant of the $e \rightarrow d$ analysis presented in Gawron (1995), the $e \rightarrow d$ mapping is not determined freely by the context but is recovered from existing structure. This may offer an explanation for the absence of reading (18b). It seems likely that at some level of representation, the clause in (1) involves a predicate **skillful**(x, d) holding of individuals and degrees. In contrast there is presumably no predicate **frequent**(x, d) in the composition of in (18). If so, the function defined in (19b) has no antecedent, which explains the absence of reading (18b). Gawron defines the relevant notion of antecedence using the theory of ellipsis resolution of Dalrymple, Sheiber, & Pereira (1991). Unfortunately, while Gawron’s approach seems to offer some insight into the contrast between (1) and (18), Kennedy (1999) notes that the system faces a significant overgeneration problem. In (20), for example, both ‘long’ and ‘wide’ are present in the discourse, so that both F_1 and F_2 have antecedents. Nonetheless, the indicated interpretation is clearly unavailable:

- (20) The table is wider than the rug; the rug is longer than the desk.
 The table is [[[er F₁][than the rug]] wide]; the rug is [[[er F₂][than the desk]] long].
 $[[F_1]] = \lambda x_e . \max\{d \mid x \text{ is } d \text{ long}\}$ $[[F_2]] = \lambda x_e . \max\{d \mid x \text{ is } d \text{ wide}\}$
 *‘The table is wider than the rug; the rug is longer than the desk is wide.’

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We propose that a comparative such as (1), repeated here as (21), can be interpreted as a comparison between the degree of skill of a flying event and an airline pilot’s degree of skill.

- (21) John flew the little Cessna more skillfully than an airline pilot.

Following Schäfer (2008), we assume that manner adverbs such as *skillfully* do not modify events directly, but rather modify manners. Manners are connected to events via the relation **manner**(*m*, *e*). The $[[ly]]$ suffix converts a predicate of individuals to a predicate of events by existentially quantifying over manners:

$$(22) \quad [[ly]] = \lambda P_{et} . \lambda e_v . \exists m_e [\mathbf{manner}(m, e) \wedge P(m)]$$

For convenience we assign manners the same type as individuals (*e*). This allows a single predicate of degrees and individuals to be applied both to a regular individual like John and to a manner.³ In a sentence such as ‘John played skillfully’, *skillful* combines with a contextually-supplied degree and then with *ly* to create a predicate of events:

$$(23) \quad [[skillful]] = \lambda d . \lambda x_e . x \text{ is } d \text{ skillful}$$

$$(24) \quad [[skillfully]] = [[ly]]([[[skillful]](d)]) = \lambda e_v . \exists m_e [\mathbf{manner}(m, e) \wedge [[skillful]](d)(m)]$$

(where *d* is supplied contextually)

The predicate of events derived by *ly* can then combine with a VP via Predicate Modification. Phrases such as ‘more skillfully than an airline pilot’ can also be interpreted as predicates of events. The trick is to use the denotation for *er* from the direct analysis of comparatives⁴, with *ly* attaching above *er*. Instead of combining with a syntactically derived $\langle d, et \rangle$ predicate, the [er [than ...]] complex combines directly with *skillfully*:

³Manners could be assigned a separate type at the price of adding some form of subtyping to the type system (Alexeyenko 2012, 207fn2).

⁴Whether or not this denotation for *er* is available in English is a matter of controversy (Bhatt & Takahashi 2011). Unfortunately we do not have space here to consider the typological implications of our analysis.

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(25) $\llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \text{ skillful} \rrbracket = \lambda x_e . x \text{ is more skillful than an airline pilot}$

(26) $\llbracket \llbracket \text{ly} \llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \text{ skillful} \rrbracket \rrbracket =$
 $\lambda e_v . \exists m_e [\mathbf{manner}(m, e) \wedge m \text{ is more skillful than an airline pilot}]$

The loose reading of (1) is derived from the LF in (27):

(27) John $[_{VP} [_{VP} \text{ flew the little Cessna}]]$
 $[_{ly} \llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \text{ skillful} \rrbracket]]$

The denotation of $[_{ly} \dots]$ in (26) combines via Predicate Modification with the denotation of $[_{VP} \text{ flew the little Cessna}]$ (treating *the little Cessna* as a type e expression for simplicity):

(28) $\llbracket [_{VP} \text{ flew the little Cessna}] \rrbracket = \lambda e_v . \mathbf{flew}(\mathbf{the\ little\ Cessna}, e)$

After the introduction of the agent, the interpretation of (21) can be paraphrased as follows:

(29) There was a flying event e , John was the agent of e , the little Cessna was the patient of e , and a manner of e was more skillful than an airline pilot is skillful.

Loose readings of this kind can be derived only if the predicate of individuals constructed by *er* is suitable as a predicate of manners. Thus, adverbs such as *frequently* cannot trigger a loose reading, as $\text{frequent}(m)$ is undefined for any manner m .

In the case of most English adverbs, the operation that converts a predicate of individuals to a predicate of events can be associated with with overt *ly* morphology. If the preceding analysis is to be maintained, we must assume that this conversion can occur without any overt morphological trigger. This must be possible, for example, for *high(er)* in (2). The same goes for adverbial PPs of the kind in (30), which has a loose reading:

(30) John flew the little Cessna with more skill than an airline pilot.

(31) $[_{PP} \text{ with} \llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \text{ skill} \rrbracket]]$
 $\llbracket \llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \llbracket \lambda_1 [_{PP} \text{ with} [t_1 \text{ skill}]] \rrbracket \rrbracket \rrbracket$
 \uparrow
 $[_{ly} \llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \llbracket \lambda_1 [_{PP} \text{ with} [t_1 \text{ skill}]] \rrbracket \rrbracket \rrbracket]]$
 John $[_{VP} [_{VP} \text{ flew the little Cessna}]]$
 $[_{ly} \llbracket \llbracket \text{er [than an airline pilot]} \rrbracket \llbracket \lambda_1 [_{PP} \text{ with} [t_1 \text{ skill}]] \rrbracket \rrbracket \rrbracket]]$

We assume that adverbial PPs such as $[_{PP} \text{ with skill}]$ are predicates of individuals that contain a degree argument. In a sentence such as ‘John did it with skill’, the value of the degree argument is supplied contextually. The argument may also be bound by a degree abstractor to yield a predicate of degrees and individuals:

(32) $\llbracket \llbracket \text{Op}_1 [_{PP} \text{ with } t_1 \text{ skill}] \rrbracket \rrbracket = \lambda d . \lambda x_e . x \text{ has degree } d \text{ of skill}$

The denotation of (30) is computed as follows:

$$\begin{aligned}
 (33) \quad & \llbracket [\text{er} [\text{than an airline pilot}] [\text{Op}_1 [\text{PP with } t_1 \text{ skill}]]] \rrbracket \\
 & = \lambda x_e . \max\{d \mid x \text{ has degree } d \text{ of skill}\} > \\
 & \quad \max\{d \mid \text{an airline pilot has degree } d \text{ of skill}\} \\
 & \llbracket [\text{ly} [\text{er} [\text{than an airline pilot}] [\text{Op}_1 [\text{PP with } t_1 \text{ skill}]]] \rrbracket \\
 & = \lambda e_v . \exists m_e [\mathbf{manner}(m, e) \wedge \\
 & \quad \max\{d \mid m \text{ has degree } d \text{ of skill}\} > \\
 & \quad \max\{d \mid \text{an airline pilot has degree } d \text{ of skill}\}] \\
 & \llbracket [\text{VP flew the little Cessna}] \rrbracket = \lambda e_v . \mathbf{flew}(\mathbf{the \textit{little Cessna}}, e) \\
 & \llbracket [\text{VP} [\text{VP} \dots]] \rrbracket = \lambda e_v . \mathbf{flew}(\mathbf{the \textit{little Cessna}}, e) \wedge \\
 & \quad \exists m_e [\mathbf{manner}(m, e) \wedge \\
 & \quad \max\{d \mid m \text{ has degree } d \text{ of skill}\} > \\
 & \quad \max\{d \mid \text{an airline pilot has degree } d \text{ of skill}\}]
 \end{aligned}$$

4.1 Restrictions on wide scope

In contrast to the $e \rightarrow d$ analysis and the mismatched ellipsis analysis, our analysis predicts loose readings to be incompatible with wide scope for the comparative operator. The $\llbracket [\text{er} [\text{than} \dots]] \rrbracket$ complex is of type $\langle\langle d, et \rangle, et \rangle$. If $\llbracket [\text{er} [\text{than} \dots]] \rrbracket$ moves to bind a degree variable, it must move to a position immediately above a constituent of type et and immediately below a constituent of type e . The two individuals to be compared are then supplied by this latter constituent together with the complement of *than*. Thus, as soon as $\llbracket [\text{er} [\text{than} \dots]] \rrbracket$ moves above *ly*, there is no possibility of the manners existentially quantified over by *ly* being one of the terms of the comparison. The predicted scope restrictions are attested, as shown in (34). The derivations in (35)–(36) yield readings (34a) and (34b):

- (34) John claimed to fly the little Cessna more skillfully than an airline pilot.
- a. John claimed that [the max d s.t. John flew the little Cessna d -skillfully was greater than the max d s.t. an airline pilot flew an airline d -skillfully].
 - b. The max d s.t. John claimed to fly the little Cessna d -skillfully is greater than the max d s.t. an airline pilot claimed to fly the little Cessna d -skillfully.
 - c. *The max d s.t. John claimed to fly the little Cessna d -skillfully is greater than the max d s.t. an airline pilot claimed to fly an airliner d -skillfully.

$$\begin{aligned}
 (35) \quad & \text{John} [\text{VP claimed to} [\text{VP} [\text{VP fly the little Cessna}]] \\
 & \quad [\text{ly} [\text{er} [\text{than an A.P.}] \text{skillful}]]] \\
 & \hspace{15em} (\text{does not derive reading (34c)})
 \end{aligned}$$

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- (36) John [[er [than an A.P.]] [λ_2 [λ_1 [$_{VP}$ t_1 claimed to [$_{VP}$ [$_{VP}$ fly the little Cessna] [ly [t_2 skillful]]]]]]]]]
(does not derive reading (34c))

5. The passive puzzle

So far we have assumed that (1)–(2) illustrate the same construction. However, there is an interesting difference in the range of interpretations available for their passive counterparts:

- (37) John flew the helicopter higher than the tallest building.
a. #John flew the helicopter higher than the tallest building flew.
b. John flew the helicopter higher than the tallest building is tall.
- (38) The helicopter was flown higher than the tallest building.
a. #The helicopter was flown higher than the tallest building was flown.
b. The helicopter was flown higher than the tallest building is tall.
- (39) John flew the little Cessna more skillfully than an airline pilot.
a. #John flew the little Cessna more skillfully than an airline pilot flew the Cessna.
b. John flew the little Cessna more skillfully than an airline pilot is skillful.
- (40) The little Cessna was flown more skillfully than an airline pilot.
a. #The little Cessna was flown more skillfully than an airline pilot was flown.
b. *The little Cessna was flown more skillfully than an airline pilot is skillful.

Neither the ellipsis analysis nor the $e \rightarrow d$ analysis can explain the contrast between (37)–(38) and (39)–(40). With regard to the $e \rightarrow d$ analysis, it should be no more difficult to map the standard to a degree of skill in (40b) than it is in (39b). With regard to the mismatched ellipsis analysis, it seems that if ellipsis is licensed in (41), it should also be licensed in (42). Our own analysis also predicts the availability of reading (40b).

- (41) John flew the little Cessna more skillfully than an airline pilot [is skillful].
(42) The little Cessna was flown more skillfully than an airline pilot [is skillful].

One possible conclusion to be drawn from the data above is that the phenomenon of loose readings is not unitary. A number of audience members suggested that reading (39b) might be derived using a standard clausal reduction analysis with an E-type pronoun within the ellipsis site ('flew higher than an airline pilot [flies it=_{his} aircraft]'). If the mechanism underlying reading (39b) of (39) is different from the mechanism underlying reading (37b) of (37), this might account for the differing behavior of (37) and (39) when passivized. The E-type analysis of (39b) is, however, difficult to square with the absence of the same reading under VP ellipsis, as seen in (8) above.

6. Conclusion

The availability of ‘loose’ readings for adverbial comparatives such as (1)–(2) is not predicted by standard analyses. We have presented an analysis that accounts for the restriction of loose readings to manner adverbials, and for their incompatibility with wide scope for the comparative operator. The puzzle posed by the data in (37)–(40) remains.

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