Comparative-induced event measure relations

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In Vietnamese quantity comparison structures, differentials are prohibited from appearing phrase-internally. I argue this is because they are athematic measure phrases. However, this leads to a semantic type clash given the meaning of the comparative. I propose to resolve this by means of a COMPARATIVE-INDUCED EVENT MEASURE RELATION which type-shifts the predicate in the appropriate context. This relation is also shown to be active in English, suggesting that it may be a more general property of predicates cross-linguistically.

1 Comparison in Vietnamese

In simple statements, both “adjectival” (stative) and “verbal” (dynamic) predicates appear to take the same types of arguments:

(1) a. Lửa cháy nhiều mét.
   fire tall ten/many meters
   ‘The fire is ten/many meters high.’

b. Ngọc đọc nhiều cuốn sách.
   Ngọc read ten/many CLF book
   ‘Ngọc reads ten/many books.’

In comparative structures, differentials canonically occur phrase-finally:

(2) a. Ngọc cao hơn Phương 10/nhiều cm.
   Ngọc tall HƠN DƯNG 10/many cm
   ‘Ngọc is ten/many cm taller than Phương.’

   Ngọc read HƠN Phương six/many CLF book
   ‘Ngọc reads six/many more books than Phương.’

Phrases involving NHIỀU ‘many’ are also acceptable when the magnitude of the difference between the amounts is very small (probably because it is actually a pure existential which can be strengthend).

However, in quantity comparison structures, phrases with NHIỀU ‘many’ may directly follow the predicate, while Num+ClP phrases may not.

(3) a. Ngọc đọc nhiều (cuốn) sách hơn Phương.
   Ngọc read many CLF book HƠN Phương
   ‘Ngọc reads more books than Phương.’

b. *Ngọc đọc sau/cuốn sách hơn Phương.
   Ngọc read six CLF book HƠN Phương

Puzzle: if NHIỀU ‘many’ is a determiner, then the unacceptability of (3b) is expected, but this present a type clash in the interpretation of (2b).

Proposal: when following the predicate, NHIỀU is a parameterized determiner argument; phrase-final ClPs are athematic measure phrase adjuncts to gradable stative predicate meanings, which are derived from quantizable eventive predicate meanings.

2 Semantics of comparison

Assuming a relational analysis of phrasal comparatives, where gradable predicates containing a degree argument DegP, denoting relations of type \(<d,\leq,\geq,\rangle\) between individuals and degrees [Creswell 1976][von Stechow 1984][Heim 1985][2000]

(4) a. Ann is 10cm taller than Lucy. b.
While the meaning of the comparative is often assumed to be something like (5a), this
must be expanded to account for differentials (5b). The first can always be derived from
the second by existentially binding the degree argument.

(5) a. [-ER] = \( \lambda y \lambda f_{<d,e>} \lambda x. \max(f)(x) \geq \max(f)(y) \)
b. [-ER] = \( \lambda y \lambda f_{d\lambda x} \max(f)(x) - \max(f)(y) \geq d \)

(6) John is 10cm taller than Lucy.

(7)

\[
\begin{array}{c}
\text{John} \\
\text{than Lucy} \\
\text{10cm}
\end{array}
\]

(8) \( \text{[many]} = \lambda d \lambda f_{<e,t>} \lambda g_{<e,t>} \lambda y. \exists x[f(x) \land g(x)(y) \land |x| = d] \)

(9) John buys more books than Mary.

\[
\begin{array}{c}
\text{John} \\
\text{-ER than Mary} \\
\text{λn} \\
\text{λx} \\
\text{many books} \\
\text{λy} \\
\text{buy y}
\end{array}
\]

\[
\begin{array}{c}
\text{[buy n many books]} = \lambda n. \lambda y. \exists x[\text{book}(x) \land |x| = n \land \text{buy}(y)(x)] \\
\text{[buy more books than Mary]} = \lambda y. \exists x[\text{book}(x) \land |x| = n \\
\land \max\{\text{buy}(y)(x)\} \geq \max\{\text{buy}(\text{Mary}(x))\}] \\
\text{(more is just the morphological spell-out of [many] + [-ER].)}
\end{array}
\]

### 2.1 Vietnamese

For stative comparison, we can apply these same denotations to Vietnamese. Once again,
the comparative combines with a degree relation:

(10) \( \text{[họn]} = \lambda y \lambda f_{d\lambda x} \max(f)(x) - \max(f)(y) \geq d \)

(11) Linh cao họn Phương 10cm.
Linh tall họn Phương 10cm
‘Linh is 10cm taller than Phương.’

(12)

\[
\begin{array}{c}
\text{Linh} \\
\text{-ER than Phương} \\
\text{cao} \\
\text{tall} \\
\text{họn} \\
\text{Phương}
\end{array}
\]

\[
\begin{array}{c}
\text{[họn Phương]} = \lambda f_{d\lambda x} \max(f)(x) - \max(f)(\text{Phương}) \geq d \\
\text{[họn Phương cao]} = \lambda f_{d\lambda x} \max(f)(x) - \max(f)(\text{Phương}) \geq d \\
\text{[họn Phương cao]} = \lambda f_{d\lambda x} \max(f)(x) - \max(f)(\text{Phương}) \geq d
\end{array}
\]

The same comparative meaning can be used to compute the denotations for structures containing
dynamic predicates as well as those containing many, a (type-shifted) parameterized
determiner (Hackl 2000).
\[\text{[mua n nhiều sách]} = \lambda n \lambda y. \exists x [\text{book}(x) \land |x| = n \land \text{buy}(y)(x)]\]

\[= [\text{Linh mua nhiều sách hơn Phụng}] = \exists x [\text{book}(x) \land |x| = \text{max}\{\text{buy}(\text{Linh})(x)\} \geq \text{max}\{\text{buy}(\text{Phụng})(x)\}]\]

2.1.1 Phrase-final structures

Now: what makes these structures different from what we have just seen?

17. Linh mua hơn Phụng sau/nhiều cuốn sách.
Linh buy HON Phụng six/many CLF book
‘Linh bought six/many more books than Phụng.’

Three issues:

1. the comparative operator appears to be combining directly with the verb;
2. there appears to be a differential interpretation of the NP containing sách ‘book’;
3. both Num+CLP and nhiều ‘many’ can appear phrase-finally.

Can we be certain that the comparative is combining directly with the predicate? I.e., is it possible that 17 contains elided structure? Unlikely:

\[\text{[mua hơn Phụng][10cm]}\]
\[= [\lambda d \lambda x. \text{max}(\text{tall})(x) - \text{max}(\text{tall})(\text{Phụng}) \geq d(10\text{cm})]\]
\[= [\lambda x. \text{max}(\text{tall})(x) - \text{max}(\text{tall})(\text{Phụng}) \geq 10\text{cm}]\]

14. \[\text{nhiều} = \lambda d \lambda f <e,t>, \lambda g <e,t>, \lambda y. \exists x [f(x) \land g(x)(y) \land |x| = d]\]

15. Linh mua nhiều sách hơn Phụng.
Linh buy many book hơn Phụng
‘Linh bought more books than Phụng.’

2.1.2 Được

One context in which phrase-final differential and nhiều-phrases behave ‘athematically’ is with được, a passive/benefactive marker (Duffield 2001):

19. a. Martha cho James một cuốn sách.
Martha give James one CLF book
‘Martha gave James a book.’

b. James được Martha cho một cuốn sách.
James DUOC Martha give one CLF book
‘James was given a book by Martha.’

(20) shows that nhiều sách ‘many books’ can be given this benefactive reading, but nhiều sách hơn Lê ‘more books than Lê’ cannot:

20. a. Việt mua nhiều sách hơn Lê.
Việt buy many book HON Lê
‘Viet bought more books than Lê.’

b. Nhiều sách được Việt mua hơn Lê.
many book DUOC Việt buy HON Lê
‘More books than Lê (bought) were bought by Việt.’

c. *Nhiều sách hơn Lê được Việt mua.
many book HON Lê DUOC Việt buy

In structures with phrase-final differentials or nhiều-phrases, transformations involving được are robustly ungrammatical, suggesting that the phrase-final elements are athematic.
   Việt buy HON Le many CLF book
   ‘Viet bought many more books than Le.’

   b. *Nhiều cuốn sách được Việt mua hơn Le.
   many CLF book DUOC Việt buy HON Le
   ‘Viet has bought more books than Le.’

   c. *Nhiều cuốn sách hơn Le được Việt mua.
   many CLF book HON Le DUOC Việt buy

2.1.3 Phrase-final structures, part 2

If phrase-final objects are adjuncts, this presents a problem for the analysis of **hơn**:

22. a. Việt mua hơn Le ba cuốn sách.
   Việt buy HON Le three CLF book
   ‘Viet bought 3 more books than Le.’

   b. *Ba cuốn sách được Việt mua hơn Le.
   3 CLF book DUOC Việt buy HON Le
   ‘Viet has bought 3 more books than Le.’

   c. *Ba cuốn sách hơn Le được Việt mua.
   3 CLF book HON Le DUOC Việt buy

Problem: [muà] is the wrong kind of argument to [hơn Phùông] given [11] because [hơn] has an argument that can only be saturated by a gradable predicate.

Solution(s): either two [hơn]s, or two [muà]s.

In the absence of any additional, independent evidence for two comparative operators, or constraints on the distribution thereof, let’s consider the second option. A gradable meaning of muà (call it [muàgp]) encodes a measure function that takes an object x and provides a measure of how much buying x did.

23. a. [cao] = λdλx. tall(x) ≥ d

   b. [muàgp] = λdλx. BUYING(x) ≥ d

3 Comparative-induced event measure relations

Can (and should) gradable meanings for predicates like **muàgp** (BUYING) be derived from meanings like **muà** ‘buy’?

- Verbs like begin and enjoy which select for complements that denote activities or events can force NP direct objects to type-shift (John began (to read/reading) the book)

- A related phenomenon: OBJECT-INDUCED EVENT MEASURE RELATIONS [Krifka 1990]

24. 4000 ships passed through the lock last year.

   25. [muà] Phùông μ6 cuốn sách
   mua B U Y I N G hơn Phùông 6 CLF book
   μ[11] = [hơn]μ[12] = [λyλf λdλx.max(f(x) − max(f(y)) ≥ d)](Phùông)
   = λfλdλx.max(f(x) − max(f(Phùông)) ≥ d

   μ[13] = [hơn Phùông]μ[14] = [λfλdλx.max(f(x) − max(f(Phùông)) ≥ d](μ[12])
   = λdλx.BUYING(x) − max(BUYING)(Phùông) ≥ d

   μ[15] = [muà hơn Phùông]μ[16] = μ6 cuốn sách
   = [λx.max(BUYING)(x) − max(BUYING)(Phùông)) ≥ d](6 cuốn sách)
   = μx.max(BUYING)(x) − max(BUYING)(Phùông) ≥ 6 cuốn sách

Krifka proposes a polysemous null determiner μ having either interpretation in [27], where Q is a nominal property; R is a VP meaning (relation between a subject argument and event); u is a (non-atomic) entity; e is an event; and OEMR is a function from a VP to an object-induced event measure relation [28].

26. a. Object-related zero determiner: λQλRλeλμ[R(e, u) ∧ Q(u)]

       b. Event-related zero determiner: λQλRλe[OEMR(R)(e, Q)]

27. OBJECT-INDUCED EVENT MEASURE RELATION: if R is a VP relation, OEMR(R) is a relation between an event e and a quantized measure Q which is
guaranteed to hold if \( e \) can be decomposed into non-overlapping subevents whose
measures add up to the measure specified by \( Q \) \((\text{Barker 1999:3}).\)

Krifka constructs a measure function on events from the meaning of the verbal predicate
alone. Can something similar be done for the Vietnamese comparative?

(29) **CEMR**: for every predicate \( P \) with a meaning of type \(<e,et>\), there is a predicate
\( P' \) with the following meaning of type \(<d,et>\),
\[
\lambda d \lambda x. P'(x) \geq d.
\]
The relation CEMR applied to a non-gradable predicate \( P \) yields a gradable predi-
cate \( P' \) that returns the degree to which \( x \) is \( P' \).

So CEMR(mua) yields a predicate mua' which specifies the degree to which \( x \) has
participated in a buying event; but what kind of measure is that?

**What is needed**: a scale along which the predicative action \( P' \) can be measured. The difer-
nental (derived from the meaning of the direct object of \( P \)) names the points.

- **cao** ‘tall’: points = ‘heights’; GP denotes a relation between individuals and heights
- **mua\textsubscript{gp}**: points are derived directly from the meaning of the differential

Assume a differential like **6 cuốn sách** ‘6 C.L.F book’ generally has a meaning like that
shown in (30) (modulo the complexities of the classifier meaning itself):

(30) \[ \exists x. \text{book}(x) \land |x| = 6 \]

This meaning may then be generalized to that of (31):

(31) \[ \exists x. f(x) \land |x| = n \]

Given an ordered scale \( S \) with points \( n_0, n_1 \ldots n_k \in \mathbb{Z} \), each point may be renamed (32):

(32) \[ \exists x. f(x) \land |x| = n_0, \exists x.f(x) \land |x| = n_1, \ldots \exists x.f(x) \land |x| = n_k \]

These functions then name degrees analogous to 1 inch, 2 inches, 3 inches...

The set from which the scale \( S \) comes is unimportant so long as it describes ordered points
which may be put into one-to-one correspondence with predicates of the type given in (31).

Once this is accomplished, the transformed measure phrase can be used to measure the size
of the gap between the degree to which two individuals possess some gradable quality, e.g.
Linh’s BUYING and Phương’s BUYING measured with respect to books for mua\textsubscript{gp}.

4 **Out-prefixation**

A related phenomenon: *out-prefixation* in English

(33) a. John ate 4 pies.
   b. John out-ate Mary by 4 pies.

(34) a. I wrote 4 essays.
   b. I out-wrote Jim by 4 essays.

However, not all predicates are amenable to *out-* prefixation...

   b. *John out-recognized Mary (by 4 people).

(36) a. I completed 4 essays.
   b. *I out-completed Mary (by 4 essays).

...and among those that are, a differential is not always an option:

(37) a. Obama out-niced Clinton in the primary (by a dozen hugs).
   b. Kim out-danced me last night (by 4 minutes).
   c. The Giants out-played the Patriots (by 3 games/4 throws).
   d. Justin out-sang Kelly (by 3 songs/4 solos/6 points).

Why? CEMR only applies to predicates which can receive quantized eventive readings.

(38) a. Obama really out-niced Clinton last night (in the course of some debate/conversation/series of events).
   b. Kim out-danced me last night (in the course of the evening/a song, she danced more/better than I did).
   c. The Giants out-played the Patriots (during the Super Bowl/this season).
   d. Justin had to out-sing Kelly (in the course of an evening/episode/season) to win.

Differentials are prohibited because, as measure phrase adjuncts, they are the wrong kind
of meaning to combine with non-gradable predicates. For evidence of adjuncthood, note
that passivization of the measure phrase is robustly ungrammatical (cf. §2.1.2).

(39) a. *4 pies were out-eaten Mary by John.
   b. *6 books were out-bought Alan by Eric.
   c. *10 essays were out-written me by Simon.

Much like more is assumed to be the morphological spell-out of **many** plus **ER, out-buy**
can be taken as the spell-out of **buy\textsubscript{gp}** plus **OUT-**.
Mary mua sau cuốn sách càng giá trị Linh 6 quyển sách."

Some outstanding problems: why out-nice but not *out-mean (cf.? out-nasty, out-smart but not *out-stupid, etc. Or is out- prefixation always OK and something else is governing the coercion? (polarity?)

5 Conclusions

To account for the Vietnamese data, I have argued:

1. measure phrase differentials are adjuncts (a la Schwarzschild 2004);
2. they are licensed by a quantized eventive reading of the predicate;
3. this type-shift is induced by the semantics of the comparative.

A similar type-shift appears to be active in the distribution of English out- prefixation.

An outstanding issue: at the moment, 6 cuốn sách requires two different denotations: an argument meaning like $\exists x.\text{book}(x) \land |x| = 6$, and an adjunct meaning as a degree-denoting measure phrase viz. $\$5, 5 feet as measure phrases vs. $\$5, 5 feet as arguments. One way around this might be to push on the idea that all (or many) predicates are always gradable, i.e. Linh mua sau cuốn sách really has the meaning “Linh’s degree of CUỘN-buying is six books”. More work on the distribution of the classifier is necessary here.

References


