ON THE PARAMETRIC VARIATION OF DELETION IN COMPARATIVES[*]

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0. The problem

Two main categories of deletion phenomena in comparative constructions: Comparative Deletion (CD) and Comparative Ellipsis (CE)

Traditional analyses (Principles and Parameters framework): CD is universally principled ($\leftrightarrow$CE), and is defined on the basis of its being obligatory.

But: cross-linguistic data show that CD is subject to parametric variation; there are other obligatory deletion processes specific to comparatives

$\rightarrow$ **Proposal**: a functional definition based on the target site of CD, which may be better applied when accounting for the parametric variation in the comparative subclause.

1. The structure of comparatives

(1) Mary is more intelligent [than Peter is x-much intelligent].
    reference value   standard value

(2)

QP
Q'
Q — much
DegP
AP — intelligent
Deg' — Deg — -er
CP — than Peter is [$_{QP}$ x-much intelligent]

x = a certain absolute degree in the construction; realized as Ø

(Kántor 2008a, Lechner 1999, 2004)

2. The standard analysis of deletion processes in comparatives

Comparative Deletion:

(3a)   Mary is taller than Peter is ___$_{CD}$.   (*predicative*)
       (___$_{CD}$ = x-much tall)

(3b)   The tiger ran faster than the man drove ___$_{CD}$.
       (___$_{CD}$ = x-much fast)

(3c)   Susan has more cats than Peter has ___$_{CD}$.   (*nominal*)
       (___$_{CD}$ = x-many cats)

(3d)   Susan has bigger cats than Peter has ___$_{CD}$.   (*attributive*)
       (___$_{CD}$ = x-much big cats)

→ Target: adjectival, adverbial or nominal constituent (after movement to [Spec; CP])

<div align="right">(Kennedy–Merchant 2000)</div>

Comparative Ellipsis:

(4a) Mary is taller than Peter ____CE ____CD.
  (____CE = is; ____CD = x-much tall)

(4b) The tiger ran faster than the man ____CE ____CD.
  (____CE = ran; ____CD = x-much fast)

(4c) Susan has more cats than Peter ____CE ____CD.
  (____CE = has; ____CD = x-many cats)

(4c) Susan has bigger cats than Peter ____CE ____CD.
  (____CE = has; ____CD = x-much big cats)

→ Target: any other recoverable constituent

CD universally obligatory – the parameter is [+CD], + referring to obligatoriness

CE universally optional – the parameter is [–CE] , – referring to optionality

<div align="right">(Kennedy 2002, Lechner 1999, 2004, Bresnan 1973, 1975)</div>

3. Comparative Deletion reconsidered

English is [+CD]:

(5) *I fed cats more often than Peter bathed pigs often.

But the English pattern is not universal; consider the Hungarian example:

(6) Többször   etettem   macskát kaviárral, mint **ahányszor**   Péter
   more.often feed-1.Sg.Past.Ind. cat-Acc. caviar.with than **x-much often** Peter

   fürdetett   malacot szivaccsal.
   bathe-3.Sg.Past.Ind. pig-Acc. sponge.with

   'I fed cats more often with caviar than Peter bathed pigs with a sponge.'

→ CD is not universally principled but there is a [±CD] parameter – Hungarian is [–CD] and English is [+CD]

→ defining CD on the basis of its being obligatory is fundamentally flawed: a functional definition is needed

4. Comparative Ellipsis reconsidered

English and Hungarian are [–CE], as shown by (3) and (6)

CE often claimed to be a superfluous term (Kennedy 2000; Lechner 1999, 2004):

(7) Luise goes to London more often than [DP **Mary**] goes [PP **to Oxford**] ____CD.
    (____CD = x-much often)

But in some languages ellipsis other than CD is obligatory; consider the examples from Italian:

(8) *Luisa ama   più Pietro ____CD che ami   Giorgio.
     Luise love-3.Sg.Pres.Ind. more Peter   that love-3.Sg.Pres.Subj. George
     'Luise loves Peter more than she loves George.'   (____CD = quanto 'x-much')

(9) Luisa   ama   più Pietro ____CD che ____CE Giorgio.
    Luise   love-3.Sg.Pres.Ind. more Peter   that   George
    'Luise loves Peter more than she loves George.'
                        (____CD = quanto 'x-much'; ____CE = ami 'love-3.Sg.Pres.Subj.')

Italian *che*-comparatives tolerate only one overt constituent (which can be a PP, an AP or a non-finite VP as well, see Napoli–Nespor 1986) in the subclause:

(10) Maria è   più bella   ___CD che ____CE
     Mary be-3.Sg.Pres.Ind. more beautiful-Fem.Sg.   that

       diligente.
       diligent-Fem.Sg.

     (____CD = quanto 'x-much'; ____CE = sia 'be-3.Sg.Pres.Subj.')

     'Mary is more beautiful than she is diligent.'

(11) Viaggio   più con Giorgio ___CD che ___CE con Sergio.
     travel-1.Sg.Pres.Ind. more with George   that   with Sergio
     'I travel more with George than with Sergio.'
     (____CD = quanto 'x-much'; ____CE = viaggi 'travel-1.Sg.Pres.Subj.')

(12) Sergio vuole   più ballare   ___CD che ___CE lavorare.
     Sergio want-3.Sg.Pres.Ind. more dance-Inf.   that   work-Inf.
     'Sergio wants to dance more than he wants to work.'
     (____CD = quanto 'x-much'; ____CE = voglia 'want-3.Sg.Pres.Subj.')

A full subclause is possible if there is no CD – these are adjunct clauses, adjoined to the PP complement of the Deg head:

(13) Luisa ama   Pietro più di quanto Maria ami
     Luise love-3.Sg.Pres.Ind. Peter more of x-much Mary love-3.Sg.Pres.Subj.

       Giorgio.
       George

     'Luise loves Peter more than Mary loves George.'

This kind of ellipsis is specific to comparatives in Italian and does not apply to ordinary relative clauses:

(14) Ho   letto   il   libro che Giovanni
      have-1.Sg.Pres.Ind. read-Past.Part. the-Masc.Sg. book that John

    ha   letto.
    have-3.Sg.Pres.Ind.   read-Past.Part.

    'I have read the book John has read.'

→ besides a [±CD] parameter, there is also a [±CE] parameter – Italian is [+CE], as opposed to Hungarian and English

→ CD cannot be defined on the basis of its being obligatory – it is not uniquely so

→ CE is not a superfluous term

5. *The interaction of deletion phenomena – Comparative Verb Gapping*

The application of CD may require ellipsis for the structure to converge.

Let us take the example in (6), repeated here as (15):

(15) Többször   etettem   macskát kaviárral,   mint **ahányszor**   Péter
      more.often feed-1.Sg.Past.Ind. cat-Acc. caviar.with than **x-much often** Peter

    fürdetett   malacot szivaccsal.
    bathe-3.Sg.Past.Ind. pig-Acc. sponge.with

    'I fed cats more often with caviar than Peter bathed pigs with a sponge.'

CD (and only CD) applied:

(16) *Többször   etettem   macskát kaviárral,   mint ___$_{CD}$ Péter
       more.often feed-1.Sg.Past.Ind. cat-Acc. caviar.with than   Peter

    fürdetett   malacot szivaccsal.
    bathe-3.Sg.Past.Ind. pig-Acc. sponge.with

    (___$_{CD}$ = ahányszor 'x-much often')

    'I fed cats more often with caviar than Peter bathed pigs with a sponge.'

The deletion of the finite verb by Comparative Verb Gapping (CVG) saves the construction (though the meaning will be different):

(17) Többször   etettem   macskát kaviárral, mint ___$_{CD}$ Péter ___$_{CVG}$
      more.often feed-1.Sg.Past.Ind. cat-Acc. caviar.with than   Peter

    malacot fagylalttal.
    pig-Acc. ice-cream.with

    (___$_{CD}$ = ahányszor 'x-much often'; ___$_{CVG}$ = etetett 'feed-3.Sg.Past.Ind.')

    'I fed cats more often with caviar than Peter fed pigs with ice-cream.'

Note that the ellipsis of the verb does not require the deletion of the operator:

(18) Többször   etettem   macskát   kaviárral,   mint **ahányszor**   Péter
      more.often feed-1.Sg.Past.Ind. cat-Acc.   caviar.with than **x-much often** Peter

      ___**E**   malacot fagylalttal.
            pig-Acc. ice-cream.with

(___**E** = etetett 'feed-3.Sg.Past.Ind.')

'I fed cats more often with caviar than Peter fed pigs with ice-cream.'

The absence of an overt comparative operator (*x-often*, Hungarian *ahányszor*) requires the ellipsis of the finite verb in Hungarian, where this operator is otherwise available ↔ in English, there is no overt operator and the deletion of the finite verb is not required.

→ Since the application of CVG is obligatory *iff* the operator has been deleted, CD cannot be considered as the only (possible) obligatory deletion process in comparatives.

6. The proposed analysis

Two major tasks: – to define what CD is
                  – to give a more accurate analysis of other deletion phenomena

6.1. A novel analysis for Comparative Deletion

New definition of CD:

an operation responsible for eliminating the QP from the comparative subclause, if it is logically identical with the one in the matrix clause.

> (for the structure of the functionally extended AP, see Corver 1990, 1997; for logical identity, see Merchant 2001: 13–31)

CD involves the movement of an element to [Spec; CP] (ordinary *wh*-movement): adopting Rizzi's analysis for the cartographic approach for the Left Periphery (Rizzi 1997: 297, 1999: 1, 2004: 237-238; see also Rizzi 2002, Roberts 2004), I assume that this CP is the one below the CP headed by *than* (see also Lechner 2004, Kántor 2008b):

(19) CP
```
           CP
            \
             C'
            /  \
          C      CP
          |     /  \
        than  Op.   C'
                   /  \
                  C    IP
```
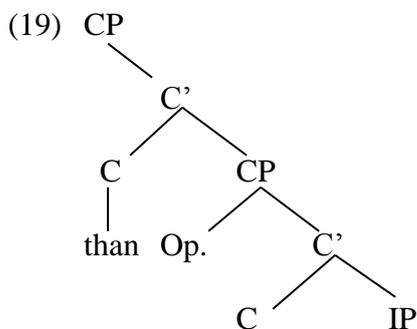
CD takes place in this position (not where the QP is base-generated) if the C head is equipped with a [CD] feature – this feature is always and obligatorily present in [+CD] languages

the deletion of the lower copy is carried out regularly by PF (see Chomsky 2005: 12; Bobaljik 2002):

← the lower copy has an appropriate antecedent (Lipták–Craenenbroeck 2006: 257; Merchant 2001: 23–37), if the QP in the matrix clause is logically identical with the one in the subclause

This is possible in non-comparative subordinate structures as well:

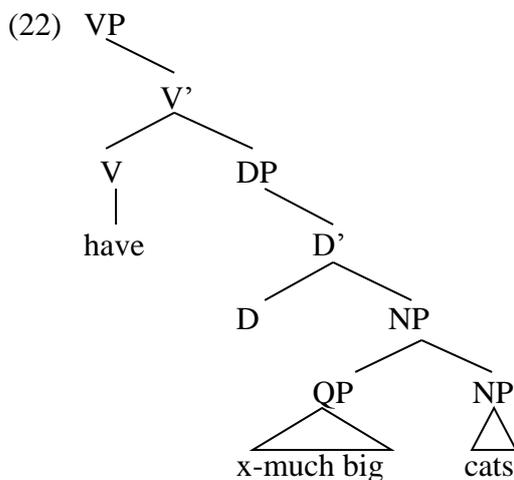(20) She thought that he would go abroad [PP before being asked to ~~go abroad~~].

Advantages:

● Based on the target site → it is universally applicable since it allows for the [±CD] parametric variation

● It pertains to all types of comparatives: the distinction between adjectival/adverbial and nominal constituents becomes superfluous

● Subcomparatives do not have to be treated as exceptional

The target site is the same in all types of comparatives:

– both AdjPs and AdvPs are embedded in QPs:

– QPs in attributive comparatives are adjoined to NPs (Kántor 2008c: 149; Kennedy– Merchant 2000: 19):

(21) Susan has bigger cats than Peter has ~~[DP x-much big cats]~~.

(22) VP
```
         VP
          \
           V'
          /  \
         V    DP
         |     \
       have     D'
               /  \
              D    NP
                  /  \
                QP    NP
             x-much big  cats
```

But: the entire DP has to be deleted, not just the QP:

(23) *Susan has bigger cats than Peter has ___CD cats.
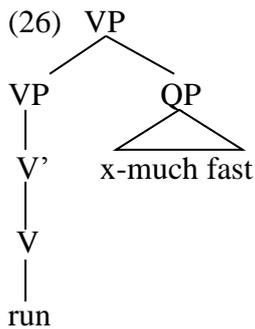   (___CD = x-much big)

Island constraints: the QP cannot be moved out of a DP-island (Kántor 2008c: 148–149; Izvorski 1995: 217; Bošković 2005; Grebenyova 2004; Kayne 1983; Ross 1986); this holds for ordinary *wh*-movement as well:

(24) *[QP How big]$_i$ does Susan have [DP [NP t_i [NP cats]]]?

Movement in predicative comparatives:

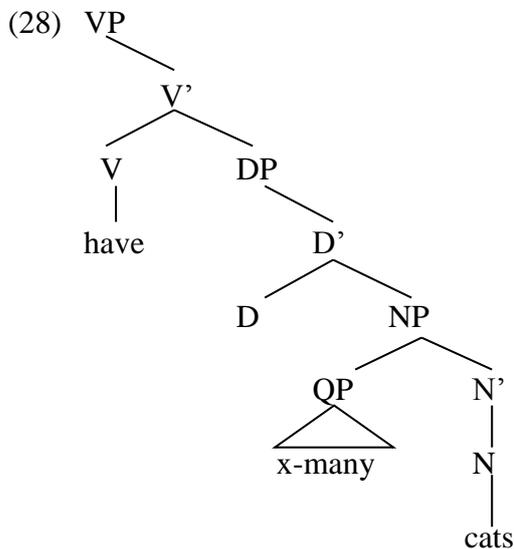(25) VP
```
        VP
         |
         V'
        /  \
       V    QP
       |    /\
       be  x-much tall
```
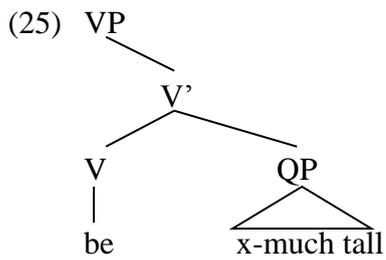
Similar movement for adjunct QPs:

(26) VP
```
        VP
       /  \
     VP    QP
      |    /\
     V'   x-much fast
      |
      V
      |
     run
```

Nominal comparatives: QP in [Spec; NP] as a post-determiner (Newson et al. 2006: 144–145; Zamparelli 2000: 13–26):

(27) Susan has more cats than Peter has [DP x-many cats].

(28) VP
```
        VP
          \
           V'
          /  \
         V    DP
         |      \
        have     D'
                /  \
               D    NP
                   /  \
                  QP   N'
                  /\    |
            x-many     N
                        |
                       cats
```

The phenomenon is not specifically related to comparatives:

(29) *[QP How many]$_i$ does Susan have [DP [NP t_i cats]]]?

Subcomparatives: the relative quantities of different properties or entities are compared (Kennedy 2000)

(30) The desk is longer than the office is long.

(31) The desk is longer than the office is wide.

QPs not identical → regularly no deletion

Nominal subcomparatives:

> (32) Susan has more cats than Peter has ~~cats~~.

> (33) Susan has more cats than Peter has dogs.

No deletion of the lower copy in subcomparatives because of recoverability requirements (Lipták–Craenenbroeck 2006: 257) – but the higher copy in [Spec; CP] will be elided by CD

Languages with [–CD]: the higher copy may remain, when there is no [CD] feature on the C head – in this case, the lower copy is regularly deleted by PF, since it will be fully recoverable

→ the new definition of CD is favourable to the standard assumptions

6.2. Distinguishing Comparative Ellipsis from other processes

Different deletion processes in comparative subclauses:

> (34) Mary loves Peter more than Susan did ___$_E$ ___$_{CD}$.
> (___$_E$ = love Peter; ___$_{CD}$ = x-much)

> (35) Mari   jobban szereti   Pétert,   mint ___$_{CD}$ Zsuzsa ___$_{CVG}$
>   Mary more   love-3.Sg.Pres.Ind. Peter-Acc. than   Susan
>
>   Gyurit.
>   George-Acc.
>
> (___$_{CD}$ = amennyire 'x-much'; ___$_{CVG}$ = szereti 'love-3.Sg.Pres.Ind.)
>
> 'Mary loves Peter more than Susan loves George.'

> (36) Mari   jobban szereti   Pétert,   mint ___$_{CD}$ Zsuzsa   ___$_{CVG+E}$
>   Mary more   love-3.Sg.Pres.Ind. Peter-Acc. than   Susan
>   'Mary loves Peter more than Susan does.'
>   (___$_{CD}$ = amennyire 'x-much'; ___$_{CVG+E}$ = szereti Pétert 'love-3.Sg.Pres.Ind. Peter-Acc.')

> (37) Maria ama   Pietro più   ___$_{CD}$ che Susanna ___$_{CE}$.
>   Mary love-3.Sg.Pres.Ind. Peter more   that Susan
>   'Mary loves Peter more than Susan does.'
>   (___$_{CD}$ = quanto 'x-much'; ___$_{CE}$ = ami Pietro 'love-3.Sg.Pres.Subj. Peter')

CE: an operation obligatorily eliminating everything recoverable from the subclause and leaving only one overt constituent in the final structure

A similar PF operation: sluicing – deletes everything after a C head equipped with an [E] feature, for which the deleted material has to fully recoverable (Merchant 2001; Lipták–Craenenbroeck 2006)

> (38) Mary wrote something but she did not say what ___$_E$.

> (39) Mary wrote something but she did not say what she wrote.

CVG: distinct from CE as it targets only the finite verb

Estonian seems to have CVG similarly to Hungarian:

(40) Mari kammis kassi enam kordi, kui **mitu korda** Peter
Mary comb-3.Sg.Past.Ind. cats-Acc. more times than **x-many times** Peter

vannitas.
bathe-3.Sg.Past.Ind.

'Mary combed cats more often than Peter bathed.'

(41) *Mari kammis kassi enam kordi, kui ___CD Peter
Mary comb-3.Sg.Past.Ind. cats-Acc. more times than Peter

vannitas.
bathe-3.Sg.Past.Ind.

(___CD = mitu korda 'x-many times')

'Mary combed cats more often than Peter bathed.'

(42) Mari kammis kassi enam kordi, kui ___CD Peter ___CVG.
Mary comb-3.Sg.Past.Ind. cats-Acc. more times than Peter
'Mary combed cats more often than Peter.'
(___CD = mitu korda 'x-many times'; ___CVG = kammis 'comb-3.Sg.Past.Ind.')

Processes not specific to comparatives:

− For the English example, VP-ellipsis is a possible analysis (Kennedy–Merchant 1997):

(43a) Mary bought the book that Susan did ___E.
(___E = buy)

(43b) Mary arrived before Susan did ___E.
(___E = arrive)

− Optional ellipsis in Hungarian comparatives is the same in other subclauses:

(44a) Mari akkor látta Pétert, amikor Zsuzsa ___E Gyurit.
Mary then see-3.Sg.Past.Ind. Peter-Acc. when Susan George-Acc.
'Mary saw Peter when Susan did George.' (___E = látta 'see-3.Sg.Past.Ind.)

(44b) Mari akkor látta Pétert, amikor Zsuzsa ___E.
Mary then see-3.Sg.Past.Ind. Peter-Acc. when Susan
'Mary saw Peter when Susan did.' (___E = látta Pétert 'see-3.Sg.Past.Ind. Peter-Acc.)

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The aim of this paper is to refute the assumptions prevalent in the literature on Comparative Deletion (CD) in comparatives and to provide an alternative solution placing CD into a radically new perspective, within a generative framework, more precisely Principles and Parameters Theory. Traditional analyses consider CD to be universally principled, separating it from other deletion phenomena, and defining it on the basis of its being obligatory. Based on cross-linguistic data, I will show that CD is subject to parametric variation and instead of describing it by virtue of its obligatoriness, I Variation of Parameters (that we will learn here) which works on a wide range of functions but is a little messy to use. Variation of Parameters. To keep things simple, we are only going to look at the case: d2ydx2 + pdydx + qy = f(x). where p and q are constants and f(x) is a non-zero function of x. The complete solution to such an equation can be found by combining two types of solution: The general solution of the homogeneous equation d2ydx2 + pdydx + qy = 0. Particular solutions of the non-homogeneous equation d2ydx2 + pdydx + qy = f(x).Â (This is the same answer that we got in Example 1 on the page Method of undetermined coefficients.) Example 3: Solve d2ydx2 â˜' 6dydx + 9y =1x. 1. Find the general solution of d2ydx2 â˜' 6dydx + 9y = 0. In mathematics, a parametric equation defines a group of quantities as functions of one or more independent variables called parameters. Parametric equations are commonly used to express the coordinates of the points that make up a geometric object such as a curve or surface, in which case the equations are collectively called a parametric representation or parameterization (alternatively spelled as parametrisation) of the object. For example, the equations.