PP-over-V meets Universal 20

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It has proven hard to force a decision between rival analyses of Universal 20. This is because new typological data are scarce, and the number of syntactic tests applicable in the noun phrase is relatively small. I therefore consider a related set of facts that involve language-internal word order variation in the verb phrase. I first show that the pattern of grammatical and ungrammatical orders in Dutch verb phrases containing three PPs closely matches the pattern of attested and unattested orders in the noun phrase. I then use the distribution of the particle *pas* 'only' to argue that PP extraposition results from variation in the linearization of sister nodes. This means that the symmetric account of Universal 20 in Abels and Neeleman 2012 extends to the Dutch data, but the antisymmetric account in Cinque 2005 does not.

1. Introduction

This paper is about two sets of data that are – I think – instantiations of the same abstract pattern. The first data set consists of observations collected by Cinque (2005) under the rubric of Universal 20. The second data set consists of the distribution of prepositional phrases in Dutch, as described in Koster 1974 and Barbiers 1995. Although patterns resembling Universal 20 have been found in a variety of structures (see Cinque 2009 and Abels 2016), the unmistakable similarity of the two data sets is noteworthy in itself, given that Universal 20 is a typological generalization about word order in the noun phrase, whereas the Dutch data involve language-internal word order variation in the verb phrase. This implies that the constraints that give rise to Universal 20 must be general enough to apply to both noun phrases and verb phrases, and moreover exert their influence in grammars of individual languages, as well as at the typological plane. This is as expected if the constraints in question are principles of Universal Grammar.

Considering Universal 20 and the distribution of PPs in Dutch in tandem is likely to be informative in two ways: insights into Universal 20 may bear on the analysis of the distribution of PPs and – more importantly – insights into the distribution of PPs may bear on the analysis of Universal 20. The latter should be of considerable interest to syntacticians and typologists working on word order. It has proven very difficult to decide between competing analyses of Universal 20 using typological data pertaining to the noun phrase, essentially because new typological data are scarce, and the number of syntactic tests applicable in the noun phrase is relatively small. By contrast, it is quite easy to run syntactic tests that diagnose detailed properties of the Dutch verb phrase. This implies that the parallel between Universal 20 and the distribution of PPs in Dutch offers an opportunity to make some genuine headway.

Universal 20, as originally proposed by Greenberg (1963), is given in (1). It states that there is an asymmetry in the order of pre- and postnominal modifiers. Relevant prenominal modifiers come in a fixed order, but the order of postnominal modifiers is variable:

(1)   When any or all of the items – demonstrative, numeral, and descriptive adjective – precede the noun, they are always found in that order. If they follow, the order is either the same or its exact opposite.

In most recent literature, Universal 20 is understood to be a generalization over 'neutral' or 'basic' orders. Thus, as illustrated in (2a), there are languages in which the neutral order in the noun phrase is Demonstrative – Numeral – Adjective – Noun. Similarly, there are languages with N-Dem-Num-A or N-A-Num-Dem as the neutral order (see (2b,c)). However, there are no languages in which A-Num-Dem-N is attested as the neutral order.

(2) a. these   five empty   bottles
    b. i-kombe bi-bi bi-tano bi-tune   *Kîîtharaka* (Peter Muriungi, p.c.)
        8-cup   8-this 8-five   8-red
        'these five red cups'
    c. távò ḍàxó xóxó àtɔn éhè lɔ lɛ́   *Gungbe* (Aboh 2004)
        table big   old   three DEM SPF PL

The two accounts of Universal 20 I will consider are the antisymmetric analysis in Cinque 2005 and the symmetric analysis in Abels and Neeleman 2012. Although these accounts are very different, Universal 20 emerges in both of them from the interaction of an invariant hierarchy of modifiers with two further analytical components: a mirroring device and standard leftward movement of the noun or a constituent containing the noun. The mirroring device is responsible for the alternation in (3I,II). Leftward noun movement derives (3III) from (3I). However, on the assumption that there is no rightward noun movement, (3IV) cannot be derived from (3II).

(3)

I	II	III	IV
Dem Num A N	N A Num Dem	N [Dem Num A t_N]	[t_N A Num Dem] N

The full set of attested and unattested orders, as described in Cinque (2005), is given in (4) (see also Dryer 2009/2011 and Cinque, in prep.). The mirroring device is again deemed responsible for the data in columns I and II, where each grammatical structure has a grammatical counterpart with reversed order. The derivation of the orders in column III crucially involves (leftward) movement. It is therefore predicted that that none of these orders have a grammatical mirror image.

(4)

	I	II	III	IV
a.	Dem Num A N	N A Num Dem	N Dem Num A	A Num Dem N
b.	Dem Num N A	A N Num Dem	Dem N Num A	A Num N Dem
c.	Dem A N Num	Num N A Dem	A N Dem Num	Num Dem N A
d.	Dem N A Num	Num A N Dem	N Num A Dem	Dem A Num N
e.	A Dem Num N	N Num Dem A	N Dem A Num	Num A Dem N
f.	A Dem N Num	Num N Dem A	N A Dem Num	Num Dem A N

The main disagreement between Cinque and Abels and Neeleman concerns the nature of the mirroring device. Cinque claims that mirroring is a consequence of roll-up movement, while Abels and Neeleman claim that mirroring is a consequence of variation in the linearization of sister nodes. At the root of this dispute are diverging assessments of the validity of Kayne's (1994) Linear Correspondence Axiom (LCA), which is compatible with roll-up movement, but not with variation in linearization.

The distribution of prepositional phrases in Dutch also results from a combination of mirroring and leftward head movement. In embedded clauses, PPs mirror around the verb, a phenomenon I will refer to as 'PP-over-V', following Koster 1974 and Barbiers 1995:[1]

(5) a. dat hij [[door een stuurfout]₃ [met een knal]₂ [op het hek]₁ strandde_V]
    that he by a steering-error with a bang on the fence got.stuck
    'that he got stuck on the fence with a bang because he made a steering error'

   b. dat hij [strandde_V [op het hek]₁ [met een knal]₂ [door een stuurfout]₃]
    that he got.stuck on the fence with a bang by a steering-error

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[1] In addition to PP-over-V, Dutch allows right dislocation of arguments, as well as (certain) adverbials:

(i) a. Ik heb 'm gisteren gekocht [_DP die jas].
    I have him yesterday bought that coat
    'I bought it yesterday that coat.'
   b. Ik heb die jas gekocht [_AdvP gisteren].
    I have that coat bought yesterday
    'I bought that coat yesterday.'

Examples of this type require one of two intonations: either the right-dislocated material is stressed and preceded by a prosodic break, or it is destressed and not preceded by a prosodic break.

One may wonder whether (iib) really is right dislocation, as there is no preverbal 'placeholder' for the adverbial. Note, however, that on analyses in which right-dislocated material appears in a separate sentence whose further content is elided (see Ott and De Vries 2014, Truckenbrodt, in press, and references mentioned there), such placeholders are not expected to be an obligatory component of right dislocation. In fact, abstracting away from information-structural constraints, right dislocation should be possible as long as the sequence of sentences on which it is based is felicitous, with the second providing a further specification of the information provided by the first. This is indeed true of the two sequences in (ii).

(ii) a. Ik heb 'm gisteren gekocht – ik heb die jas gisteren gekocht.
    I have him yesterday bought – I have that coat yesterday bought
   b. Ik heb die jas gekocht – ik heb die jas gisteren gekocht.
    I have that coat bought – I have that coat yesterday bought

Could PP-over-V be an instance of right dislocation? I do not think so. Right-dislocated material cannot answer a *wh*-question. Thus, there is a sharp contrast between the examples in (iii) and (iv).

(iii) a. [Context: What did you buy yesterday?]
    Ik heb die jas gisteren gekocht.
    I have that coat yesterday bought
    'I bought that coat yesterday.'

   b. [Context: When did you buy that coat?]
    Ik heb die jas gisteren gekocht.
    I have that coat yesterday bought
    'I bought that coat yesterday.'

(iv) a. [Context: What did you buy yesterday?]
    *Ik heb 'm gisteren gekocht [_DP die jas].
    I have him yesterday bought that coat
    'I bought it yesterday, that coat.'

   b. [Context: When did you buy that coat?]
    *Ik heb die jas gekocht [_AdvP gisteren].
    I have that coat bought yesterday
    'I bought that coat yesterday.'

This fact about right-dislocation follows from the analyses mentioned above. *Ik heb 'm gisteren gekocht* 'I bought it yesterday' is not a felicitous answer to the question 'What did you buy yesterday?', and *Ik heb die jas gekocht* 'I bought that coat' is not a felicitous answer to the question 'When did you buy that coat?'.

By contrast, extraposed PPs *can* answer *wh*-questions:

(iv) [Context: When did you buy that coat?]
    Ik heb die jas gekocht [_PP op maandag].
    I have that coat bought on Monday
    'I bought that coat on Monday.'

Moreover, extraposed PPs are acceptable even if the sentence that hosts them does not have the kind of intonation that facilitates right dislocation. These observations of course do not imply that PPs cannot appear in dislocation. However, they do show that PP-over-V and right dislocation cannot be the same phenomenon.

In addition, Dutch has V-to-C in main clauses (Koster 1974, 1975; Den Besten 1977):

(6) a. dat   Jan   zijn moeder op-belde
       that John his   mother up-called
       'that John called up his mother'
    b. Jan   belde z'n moeder op t_V.
       John called his mother up
       'John called up his mother'

If we consider possible and impossible orders of the verb and three PPs, putting together data from main and embedded clauses, we arrive at the table in (7). While the parallel with Universal 20 is not perfect, it seems unquestionable (assuming PP_3 corresponds with Dem, PP_2 with Num, PP_1 with A, and N with V). Indeed, the similarity between (4) and (7) is highly statistically significant (that is, whether or not a noun phrase order is attested is a good predictor of whether or not the corresponding verb phrase order is grammatical).[2]

(7)

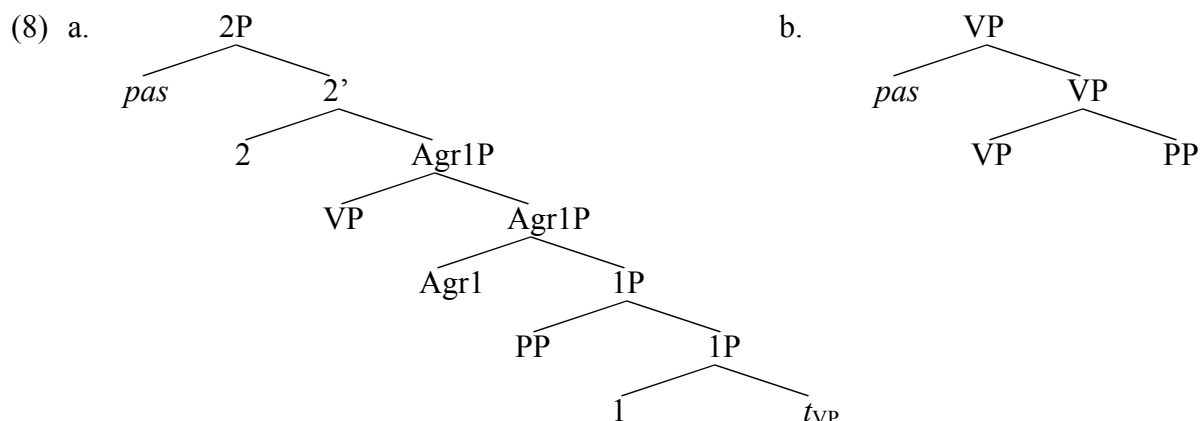|	I	II	III	IV
a.	$PP_3\ PP_2\ PP_1\ V$	$V\ PP_1\ PP_2\ PP_3$	$V\ PP_3\ PP_2\ PP_1$	$PP1\ PP_2\ PP_3\ V$
b.	$PP_3\ PP_2\ V\ PP_1$	$PP_1\ V\ PP_2\ PP_3$	$PP_3\ V\ PP_2\ PP_1$	$PP_1\ PP_2\ V\ PP_3$
c.	$PP_3\ PP_1\ V\ PP_2$	$PP_2\ V\ PP_1\ PP_3$	$PP_1\ V\ PP_3\ PP_2$	$PP_2\ PP_3\ V\ PP_1$
d.	$PP_3\ V\ PP_1\ PP_2$	$PP_2\ PP_1\ V\ PP_3$	$V\ PP_2\ PP_1\ PP_3$	$PP_3\ PP_1\ PP_2\ V$
e.	$PP_1\ PP_3\ PP_2\ V$	$V\ PP_2\ PP_3\ PP_1$	$V\ PP_3\ PP_1\ PP_2$	$PP_2\ PP_1\ PP_3\ V$
f.	$PP_1\ PP_3\ V\ PP_2$	$PP_2\ V\ PP_3\ PP_1$	$V\ PP_1\ PP_3\ PP_2$	$PP_2\ PP_3\ PP_1\ V$

In what follows I therefore explore the implications of the hypothesis that Universal 20 and the distribution of PPs in Dutch are indeed the same phenomenon (at an appropriate level of abstraction).

Current insights into Universal 20 have one clear implication for the analysis of PP-over-V: the phenomenon should not be treated as resulting from PP movement. I show that, to the extent that this can be tested, there is indeed no evidence for traces of either PP extraposition or PP intraposition.

The main finding of the paper, however, concerns an implication of PP-over-V for the analysis of Universal 20. The diagnostic tool I will make use of in my analysis of the Dutch verb phrase involves the particle *pas* 'only'. This particle can associate with PPs, but only if a very strict locality condition is met: as argued by Barbiers (1995:65), *pas* must immediately c-command its associate. This condition is satisfied if the c-command domain of *pas* does not contain a category closer to *pas* than its associate (with the exception of categories that dominate the associate). The upshot is that association with *pas* can be used as a highly sensitive 'distance detector'. This is useful, because a standard antisymmetric account of PP-

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[2] Some details. The null hypothesis is that there is no relation between attested noun phrase orders and grammatical verb phrase orders. The alternative hypothesis is that a verb phrase order is grammatical if and only if the corresponding noun phrase order is attested. The data show that the alternative hypothesis makes the correct prediction for 21 out of 24 pairs of corresponding noun phrase and verb phrase orders (compare the tables in (4) and (7)). The chance of such a result, or a more extreme result, obtaining under the null hypothesis equals 2325 (the number of ways 21 or more pairs can be selected out of 24) times 0.5^{24} (the chance of any of these selections under the null hypothesis). This yields a p-value of 0.00014.

over-V in terms of 'roll-up movement' requires more structure between *pas* and a postverbal PP than a symmetric account that relies on variation in the linearization of sister nodes:[3]

(8) a.

```
          2P
         /  \
      pas    2'
            /  \
           2   Agr1P
              /    \
            VP     Agr1P
                  /    \
               Agr1    1P
                      /  \
                    PP    1P
                         /  \
                        1   t_VP
```

b.

```
        VP
       /  \
     pas   VP
          /  \
        VP    PP
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As a consequence, an antisymmetric analysis of PP-over-V predicts that it should be impossible for *pas* to associate with a postverbal PP. In the antisymmetric structure in (8a), *pas* does not immediately c-command the postverbal PP – the fronted VP is closer to *pas* and therefore counts as an intervener. By contrast, association with a postverbal PP is predicted to be possible on a symmetric account. In (8b), *pas* does immediately c-command the postverbal PP – its VP sister is equally far away from *pas* and therefore does not count as an intervener. The fact of the matter is that postverbal PPs *can* associate with *pas*. This implies that a symmetric view of phrase structure permits a straightforward unification of the analyses of Universal 20 and the distribution of PPs in Dutch. The antisymmetric view does not, and – as I will demonstrate – attempts to remedy this problem must fail, essentially because various configurations in which association with *pas* must be ruled out are isomorphic to (8a).

This is not the only argument I will present, but I highlight it here as, to the best of my knowledge, it is a new kind of argument. Existing objections against antisymmetry are based on locality constraints incompatible with the movements required to generate surface order (see Abels and Neeleman 2009, 2012). The argument sketched above shows that there are additional empirical problems that originate in the increased size of syntactic representations required under antisymmetry. This is striking, as symmetric and antisymmetric representations are notational variants in terms of gross constituency.

The paper is organized as follows. In section 2, I sketch three ways in which mirror image effects can be accounted for: variation in the linearization of sister nodes, movement of dependents of the head, and roll-up movement. In sections 3 and 4, I then outline the symmetric analysis of Universal 20 (based on mirroring through variation in linearization) and the antisymmetric analysis (based on mirroring through roll-up movement). Section 5 discusses the basics of PP-over-V. As most of sections 3-5 consists of necessary background information, those well-versed in the debate surrounding antisymmetry may wish to skip sections 3 and 4, and those well-versed in Dutch syntax may wish to skip section 5. The

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[3] I should briefly clarify the labelling conventions used here and below. Where labels are not relevant to the point under discussion, they are omitted. Throughout, I reserve labels like XP and YP for dependents in an extended projection; I label functional projections using integers. I further follow Cinque's (2005) practice of labelling functional projections that host landing sites for movement as Agr-projections. These conventions are intended to increase presentational clarity; nothing of substance hinges on them.

remainder of the paper (sections 6 to 10) deals with the syntax of the particle *pas* 'only', which, as mentioned, can associate with temporal PPs under very strict locality (Barbiers 1995). This strict locality makes it possible to test exactly what mirroring device is involved in PP-over-V. First, the data show that PP-over-V is not a result of PP movement, as predicted if Universal 20 and the distribution of PPs in Dutch are of a kind. Second, the data show that PP-over-V cannot be analyzed as involving roll-up movement either. This leaves variation in linearization as the only remaining option, contra antisymmetric accounts of Universal 20 and PP-over-V. Section 10 summarizes the main findings of the paper.

2. Three ways of mirroring

As I tried to make clear in the introduction, the syntax of mirror image effects is central to the issues dealt with in this paper. There are three options that I will consider. The first is that mirror image effects result from variation in the linearization of trees. If YP must c-command XP when both are merged in the extended projection of a lexical head L, then reordering sister nodes will straightforwardly lead to reversed orders when YP and XP both precede or both follow L:

(9) a.

YP

XP   L

b.

YP

L   XP

While variation in linearization is certainly the simplest way of deriving mirror image effects, it is not the only way. One alternative is to make use of movement of YP and XP, the 'dependents' of L. This kind of analysis comes in two variants: one could rely on rightward movements that link the base structure in (9a) to a representation like (10a), or on leftward movements that link the base structure in (9b) to a representation like (10b).

(10) a.

YP

XP

t_{YP}

t_{XP} L

b.

YP

XP

L t_{XP}

t_{YP}
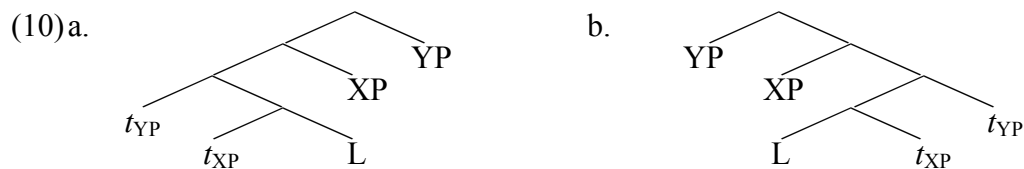
Of course, in order to derive mirror image effects, we need a condition that bans a reversal of landing sites: it should not be possible to link (9a) to (11a), or (9b) to (11b).

(11) a.   *

XP

YP

t_{YP}

t_{XP} L

b.   *

XP

YP

L t_{XP}

t_{YP}
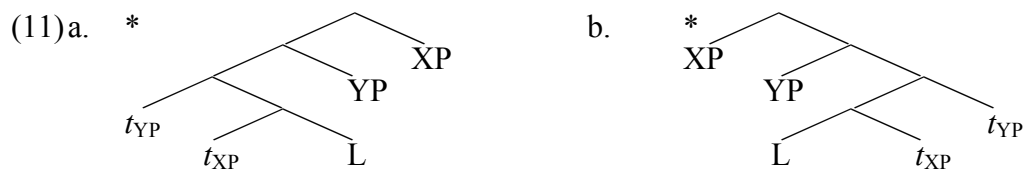
There is an off-the-shelf solution for this in the form of a chain-based version of Relativized Minimality (as proposed in Starke 2001). The main difference between this constraint and standard Relativized Minimality is that interveners are not simply constituents in the path of movement, but rather full chains (comprising a constituent and all its traces). The constraint can be formulated as in (12).

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(12)   A chain C_α headed by α blocks formation of a chain C_β headed by β if and only if
  (i) C_α and C_β are of the same type, and
  (ii) all of the links in C_α are c-commanded by β and c-command a trace of β.

The chain-based version of Relativized Minimality was designed to capture order preservation effects in derivations that involve multiple movements of the same type. However, in case the movements in question all cross the lexical head of an extended projection, (12) bans a non-mirroring order of landing sites. It rules out the representations in (11), because in both (11a) and (11b) XP is structurally separated from its trace by a full chain $\{YP, t_{YP}\}$. By contrast, (10a) and (10b) are well formed, because neither XP nor YP is structurally separated from its trace by a full chain: XP is separated from its trace by just the chain link t_{YP}, while YP is separated from its trace by just the chain link XP.[4]

    A second alternative to base-generated mirroring is roll-up movement, a technique used to capture mirror image effects in much of the antisymmetric literature. Antisymmetry requires an underlying structure that is rightward descending. Specifiers of functional heads can host YP and XP in such a structure, making it possible to base-generate the YP-XP-L order. The reverse order is derived by first moving LP across XP and subsequently moving a category that dominates LP in its derived position across YP. In order to make this work and adhere to standard antisymmetric constraints on phrase structure, two additional functional projections must be postulated, whose specifiers function as landing sites for the required movements:

(13)
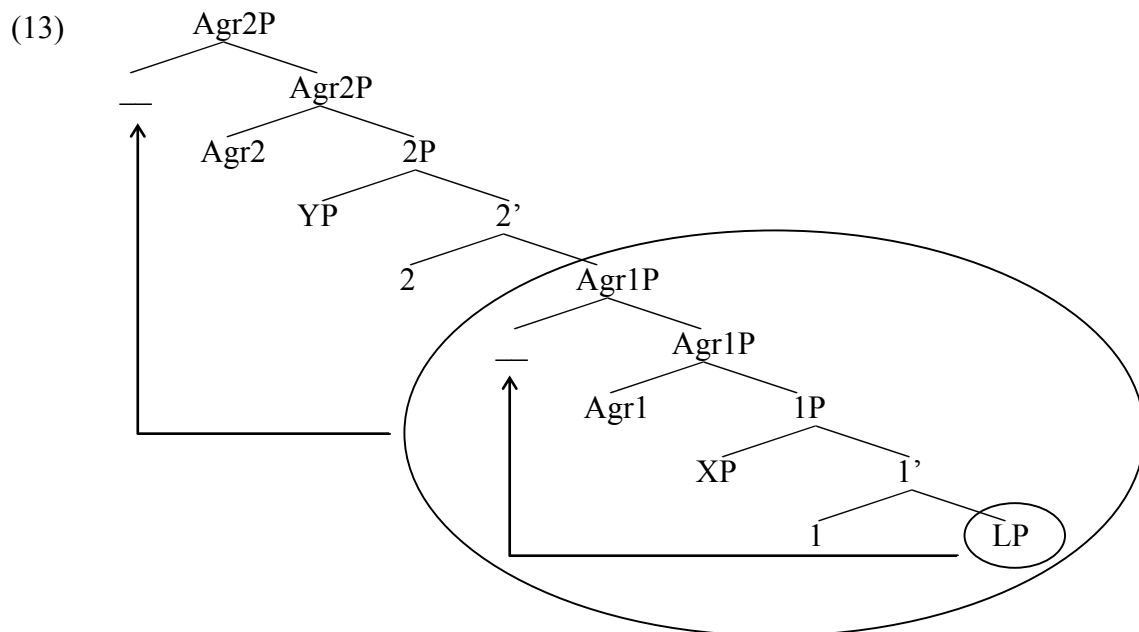
All three techniques of capturing mirror image effects have precedents in the literature. Mirroring through rightward movement is used in Koster's (1974) analysis of PP-over-V.

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[4] I do not wish to suggest that (12) is the only principle that can ensure mirroring effects. What (12) does is guarantee *shape conservation* in the sense of Williams 2003 under extraposition and intraposition. There are others ways of achieving this. However, in order to keep things manageable, I will restrict myself here to shape conservation through Relativized Minimality.

The analyses of Universal 20 sketched in the next two sections use variation in linearization and roll-up movement, respectively.
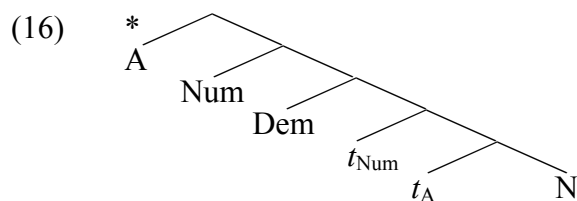
3. Universal 20 Symmetric

I now turn to the analysis of Universal 20. The pattern in (3) permits a simple analysis based on mirroring though variation in linearization (see Ackema and Neeleman 2002; for an earlier antisymmetric account, see Cinque 1996). Three assumptions are necessary. The first is that there is a universal hierarchy Dem > Num > A > N; that is, the noun combines with adjectives before it combines with numerals and demonstratives, and it combines with numerals before it combines with demonstratives. If so, the two orders in (3I,II) can be base-generated:[5]

(14) a.
Dem
Num
A   N

b.
Dem
Num
N   A

The second assumption is that neutral word order can result from leftward, but not rightward noun movement. This allows the attested order in (3III) to be derived from (14a), as in (15a), but blocks a derivation in which (3IV) is derived from (14b), as in (15b):

(15) a.
N
Dem
Num
A t_N

b. *
N
Dem
Num
t_N A
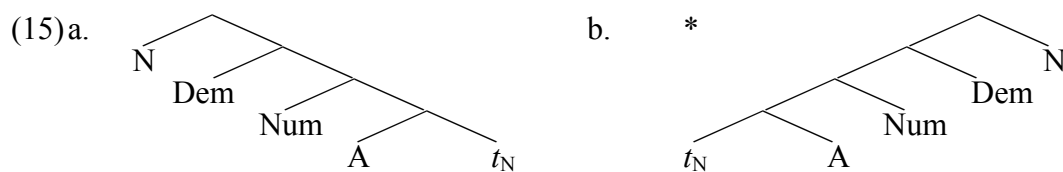
The third assumption is that neutral orders cannot be derived by movement of a dependent of the head noun. Otherwise, leftward movement of the adjective and the numeral could produce the unattested order in (3IV) after all (see (16)). This is not a surprising restriction. While head movement typically does not have interpretive effects, phrasal movement almost always does (see Chomsky 1995). In line with this, movement of modifiers can only deliver orders that are marked and that therefore fall outside the realm of Universal 20.

(16) *
A
Num
Dem
t_{Num}
t_A N

The account developed so far can be summarized as follows:

(17) (i)   There is a universal hierarchy Dem > Num > A > N.
(ii) Neutral orders are base-generated or derived by X^0-movement.   (to be revised)
(iii) X^0-movement is asymmetric: it must be leftward.   (to be revised)

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[5] As long as the constraints in (17)/(22) are in place, the pattern in (4) is generated. This is true even if no restrictions are imposed on the X-bar theoretical status of modifiers, the range of landing sites for movement or the types of movement involved (see Abels and Neeleman 2012). This is why the trees in this section are left unlabelled.

So far I have limited myself to the minimal data set (3). Does the account scale up to reality; that is, does it capture the full set of data in (4), repeated in (18) for convenience? Abels and Neeleman (2012) argue that only one minor adjustment is necessary. In addition to the structures in (14), three other symmetric pairs can be generated without movement. The relevant trees are given in (19a,b), (19c,d) and (19e,f); they deliver the attested orders in (18Ib,IIb), (18Ic,IIc) and (18Id,IId), respectively.

(18)

	I	II	III	IV
a.	Dem Num A N	N A Num Dem	N Dem Num A	A Num Dem N
b.	Dem Num N A	A N Num Dem	Dem N Num A	A Num N Dem
c.	Dem A N Num	Num N A Dem	A N Dem Num	Num Dem N A
d.	Dem N A Num	Num A N Dem	N Num A Dem	Dem A Num N
e.	A Dem Num N	N Num Dem A	N Dem A Num	Num A Dem N
f.	A Dem N Num	Num N Dem A	N A Dem Num	Num Dem A N

(19) a.

b.

c.

d.

e.

f.
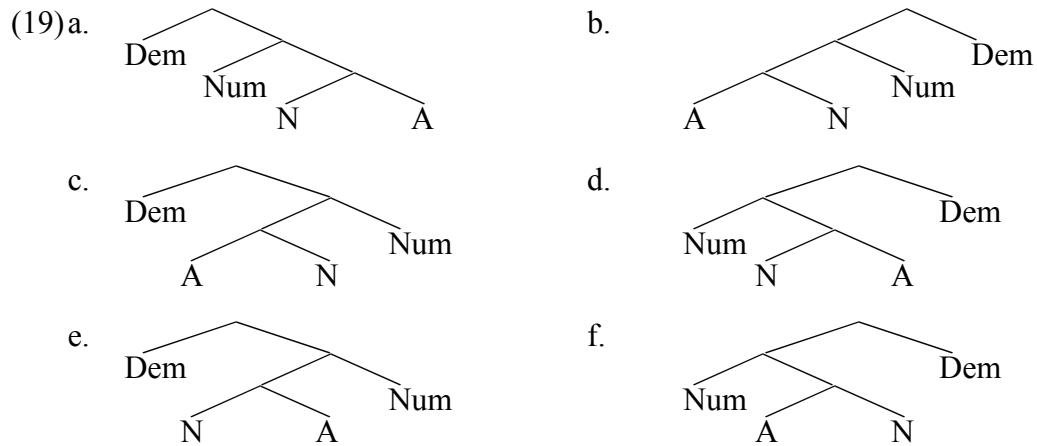
In addition to (15a), three more grammatical structures can be generated by movement of the noun, as demonstrated by the trees in (20), which deliver the attested orders in (18IIIb,d,e).

(20) a.

b.

c.
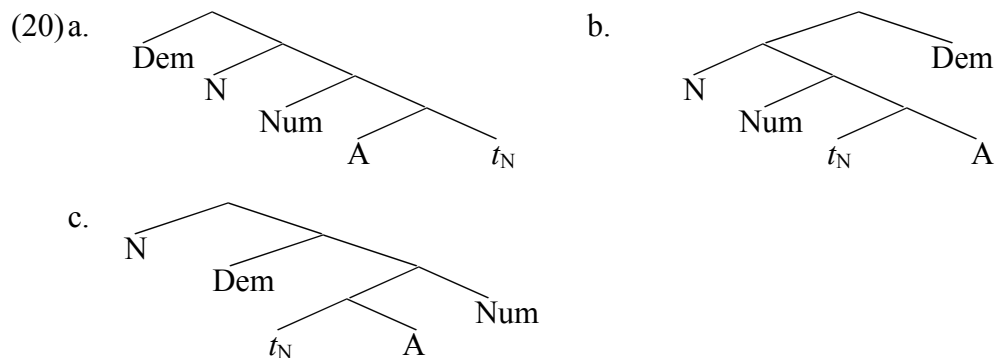
The final two attested orders in (18IIIc,f) can also be generated though movement if a small change is made in the assumptions in (17ii,iii): noun movement must be allowed to pied-pipe adjectives, as in (21). In order to accommodate pied-piping, I have substituted X^+ for X^0 in the revised conditions below – X^+ stands for the lexical head or a constituent containing the lexical head.

(21) a.

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        A    N   Dem
                    Num    t_{A+N}
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b.

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        N    A   Dem
                    Num    t_{A+N}
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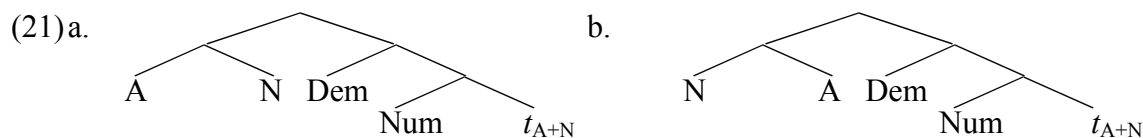
(22) (i)   There is a universal hierarchy Dem > Num > A > N.

    (ii)   Neutral orders are base-generated or derived by X^+-movement.   (final version)

    (iii) X^+-movement is asymmetric: it must be is leftward.   (final version)

Let me conclude this section with a brief discussion of how the unattested orders in (18) are ruled out. Given the hierarchy of merger in (22i), A and N must be adjacent in any base-generated structure. Conversely, if they are separated, movement must have taken place. Since neutral orders cannot be derived by movement of adjectives, and since the noun cannot move rightward, it is impossible under the assumptions in (22) to separate an adjective and a noun if they come in this order (see (23a)). Similarly, given that numerals must be adjacent in any base-generated structure to the substring comprising the adjective and the noun, the order in (23b) is excluded. As a consequence, (18Ie,f) and all of (18IV) are ruled out.

(23) a.   *A … X … N

    b.   *Num … X … A+N

Two unattested orders remain, namely (18IIe,f). In these orders, the adjective and the noun are separated, suggesting that N has moved (leftward, as required). But if that is the case, the base structure for both (18IIe) and (18IIf) must have been either Num-Dem-A-N or Num-Dem-N-A. Neither of these orders can be generated under the assumptions in (22) (compare (18IVc,f)).[6]

4. Universal 20 Antisymmetric

The analysis of Universal 20 outlined in the previous section is a symmetric reinterpretation of the antisymmetric analysis in Cinque 2005, which I summarize in (24). The two analyses are based on very similar sets of assumptions. However, instead of a ban on rightward X^+-movement, Cinque adopts Kayne's (1994) Linear Correspondence Axiom. This principle dictates that every projection has the same fixed shape: [$_{XP}$ *specifier* [$_{XP}$ X *complement*]]. That is, the head is combined with at most two phrasal categories, such that the higher (the specifier) precedes the head and the lower (the complement) follows it. This has a number of consequences. First, the hierarchy in (22i) must be implemented in an expanded structure (as expressed in (24i)). Second, there is only one base-generated order, namely Dem-Num-A-N; every other order must be derived by N^+-movement.[7] In particular, mirror image effects must result from roll-up movement, rather than variation in linearization. This is why (24i)

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[6] In principle, various orders that are base-generated according to Abels and Neeleman 2012 can, on the assumptions in (22), be derived through movement as well. This may seem to lead to a certain degree of redundancy. However, it is likely that learners disprefer movement and posit it only when they have to. This weeds out the unwanted derivations. Notice that there is evidence for this learning strategy from typological frequencies: as it turns out, orders that *must* be derived by movement are systematically rarer than structures that can be derived through base generation.

[7] In recent work, Cinque (2016) suggests that even the Dem-Num-A-N order is (typically) derived by movement, basing himself on the order of postnominal functional heads. However, this refinement of the original proposal does not affect the argumentation in this paper, so I abstract away from it here.

mentions Agr1, Agr2 and Agr3, whose specifiers function as landing sites for movement. Third, given its characterization of the syntax as fundamentally asymmetric, the LCA implies that movement must be leftward. A moving category will simply not find c-commanding positions to its right.

(24) (i) The underlying structure of the extended projection of the noun is projected from a series of heads that come in a fixed hierarchy:
Agr3 > 3 > Agr2 > 2 > Agr1 > 1 > N, where
a. 3 hosts DemP in its specifier
b. 3 hosts NumP in its specifier, and
c. 1 hosts AP in its specifier
(ii) Neutral orders are base-generated or derived by X^+-movement.
(iii) Projections have the shape [$_{XP}$ *specifier* [$_{XP}$ X *complement*]].

The structure described in (24i) unfolds as in (25), where the positions labeled α, β and γ are landing sites for movement. All derivations have this representation as their starting point.

(25)   [$_{Agr3P}$ __ Agr3 [$_{3P}$ **Dem** 3 [$_{Agr2P}$ __ Agr2 [$_{2P}$ **Num** 2 [$_{Agr1P}$ __ Agr1 [$_{1P}$ **A** 1 **NP**]]]]]]
γ   β   α

The simplest derivation involves no movement at all and therefore yields Dem-Num-A-N. All the other attested orders can be derived as well; their derivations are given in (26b-n).

(26) a. Ia: No movement   (Dem-Num-A-N)
b. Ib: NP moves to α   (Dem-Num-N-A)
c. Ic: Agr1P moves to β   (Dem-A-N-Num)
d. Id: NP moves to α, Agr1P moves to β   (Dem-N-A-Num)
e. IIa: NP moves to α, Agr1P moves to β, Agr2P moves to γ   (N-A-Num-Dem)
f. IIb: Agr1P moves to β, Agr2P moves to γ   (A-N-Num-Dem)
g. IIc: NP moves to α, Agr2P moves to γ   (Num-N-A-Dem)
h. IId: Agr2P moves to γ   (Num-A-N-Dem)
i. IIIa: NP moves to γ   (N-Dem-Num-A)
j. IIIb: NP moves to β   (Dem-N-Num-A)
k. IIIc: Agr1P moves to γ   (A-N-Dem-Num)
l. IIId: NP moves to β, Agr2P moves to γ   (N-Num-A-Dem)
m. IIIe: Agr1P moves to β, NP moves to γ   (N-Dem-A-Num)
n. IIIf: NP moves to α, Agr1P moves to γ   (N-A-Dem-Num)

Equally importantly, none of the unattested word orders in (18) can be derived under the assumptions in (24). The logic is much the same as in section 2.

Given that the symmetric and antisymmetric analyses of Universal 20 generate the exact same typology, there are no simple testable predictions that can be used to decide between the two proposals. This problem is compounded by the fact that the symmetric and antisymmetric analyses group material together in very similar ways. I illustrate this for N-Dem-A-Num in (27a,b) and for N-A-Num-Dem in (28a,b). In both pairs the antisymmetric analysis is given first, with its symmetric counterpart below it. If one only considers overt material and traces

of long movement (that is, non-roll-up movement), the two representations in each pair are isomorphic.

(27) a. $[_{\text{Agr3P}}$ **NP** $[_{\text{3P}}$ **DemP** $[_{\text{Agr2P}}$ $[_{\text{Agr1P}}$ t_{NP} $[_{\text{1P}}$ **AP** t_{NP} $]$ $]$ $[_{\text{2P}}$ **NumP** t_{Agr1P} $]$ $]$ $]$ $]$
　　 b. $[$　 **N** $[$　 **Dem** $[$　 $[$　 t_{N}　 **A**　 $]$　 **Num**　 $]$ $]$ $]$

(28) a. $[_{\text{Agr3P}}$ $[_{\text{Agr2P}}$ $[_{\text{Agr1P}}$ **NP** $[_{\text{1P}}$ **AP** t_{NP} $]$ $]$ $[_{\text{2P}}$ **NumP** t_{Agr1P} $]$ $]$ $[_{\text{3P}}$ **DemP** t_{Agr2P} $]$ $]$
　　 b. $[$　 $[$　 $[$　 **N**　 **A**　 $]$　 **Num**　 $]$　 **Dem**　 $]$

This is not a quirk of these two particular orders. Abels and Neeleman (2009) demonstrate that the two analyses assign the same gross constituency to overt material and traces of long movement in all attested orders. The proof is based on two automatic dominance-preserving procedures that can be used to translate one analysis into another. These procedures, dubbed shrinking and stretching, are given below:

(29)　　*Shrinking* (partial definition, omitting label adjustments)
　　a.　Prune the antisymmetric tree by deleting the functional heads and their intermediate projections, maintaining dominance.
　　b.　Delete any trace whose antecedent is the sister of the trace's mother.
　　c.　Prune all non-branching non-terminals, maintaining dominance.

(30)　　*Stretching* (partial definition, for right adjuncts/specifiers only)
　　In a structure $[_{\text{Y}}$ X α$]$, where Y is projected from X and α is A, Num or Dem,
　　a.　insert a node $F_{\alpha}P$ between α and its mother;
　　b.　insert a trace of X under $F_{\alpha}P$ and to α's right;
　　c.　relabel Y as $\text{AgrF}_{\alpha}P$.
　　d.　For every headless node β, insert one identically labeled node γ between β and β's right daughter, and a second identically labeled node as γ's left daughter.

In practical terms, then, the difference between the two proposals seems to be one of quantity. The proposals generate the same typology and assign very similar structures to the orders in that typology. However, the symmetric analysis uses small trees and few movements, while the antisymmetric analysis uses large trees and many movements. The question I will focus on here is whether the extra movements and extra structure required by antisymmetry are harmful.

Abels and Neeleman (2012) do not identify harmful effects of the extra structure, but they do show that the extra movements postulated under antisymmetry are qualitatively different from the ones needed under the symmetric account – they violate independently motivated conditions on movement. The conditions in question are anti-locality, the ban on stranding of pied-piped material and the A-over-A condition. I refer to the article for detailed discussion, but will briefly summarize the issue raised by the ban on stranding of pied-piped material (see Abels 2008 and Neeleman and Van de Koot 2010 for an account of this constraint and the circumstances under which it is applicable). The effects of the ban on stranding of pied-piped material are illustrated in (31c), which is ungrammatical because a preposition pied-piped in a first step of *wh*-movement is left behind in an intermediate

landing site by a subsequent step of *wh*-movement (see Postal 1972). The examples in (31a,b) show that each of the movements in (31c) is well formed in itself; it is the specific combination of movements that is ruled out.

(31) a. [PP With which friend] did you say [tPP that she went home tPP]

   b. [NP Which friend] did you say [tNP that she went home with tNP]

   c. *[NP Which friend] did you say [[PP with tNP] that she went home tNP]

The antisymmetric analysis of Universal 20 violates, and must consequently reject, the ban on stranding of pied-piped material. The N-Dem-A-Num order can only be derived by a first step of movement that pied-pipes the adjective, followed by a second step of movement that strands it (see (27a)). By contrast, the symmetric analysis in (27b) does not assume the first step of movement (which is of the roll-up type), and therefore does not violate the ban on stranding of pied-piped material either. We see, then, that the antisymmetric analysis is at a disadvantage here, as it must develop a new account for the ungrammaticality of (31c) and related data.[8]

Below, I will demonstrate that the extra structure required by antisymmetry is also problematic, basing myself on data involving PP-over-V.

5. PP-over-V

Koster (1974) was perhaps the first to observe mirror-image effects in the order of preverbal and postverbal PPs in Dutch.[9] Koster's primary interest in the phenomenon did not lie in the mirror-image effect itself, but rather in the evidence it provides for verb movement in main clauses (verb-second). I think it is useful to summarize Koster's beautifully argued paper, which was published in Dutch, for reasons that will be obvious by the end of this section.

Koster's starting point is an unexpected contrast between Dutch and English main clause word order. While the order of (certain) postverbal PPs in English is fixed (as shown in (32)), the order of the corresponding postverbal PPs in Dutch is variable (as shown in (33)). This contrast is obviously something that requires analysis.

(32) a. John thought [of his father]$_1$ [during the break]$_2$.

   b. ??John thought [during the break]$_2$ [of his father]$_1$.

(33) a. Jan   dacht [aan zijn vader]$_1$ [tijdens de   pauze]$_2$.
       John thought of   his father   during the break

---

[8] Rizzi (2015) discusses examples like (31c), arguing that their ungrammaticality follows from restrictions on labeling (rather than from constraints on movement interactions). However, as Klaus Abels (p.c.) points out, Rizzi's account also disallows labeling in the crucial nominal structure – [N [Dem [[A t_N] Num]]) – unless A and Num share with N the feature required for labeling. If they do share this feature, then there is a danger that the antisymmetric account can no longer explain the generalization in (24ii). The explanation for (24ii) proposed in Cinque 2005 and adopted by Abels and Neeleman 2012 is that movements that derive neutral orders target a labeling feature unique to the head of the extended projection. If this feature is not unique to N, it is unclear why neutral orders cannot be derived by movement of Num or A.

[9] The pattern has also been identified in German, although the data are not as crisp as they are in Dutch (see Schweikert 2005). It would take me too far afield, though, to discuss contrasts between Dutch and German extraposed PPs.

    b.   Jan   dacht   [tijdens de pauze]$_2$ [aan zijn vader]$_1$.
        John thought during the break   of   his father

Koster's explanation of the contrast between (32) and (33) is based on the observation (already mentioned in the introduction) that in Dutch embedded clauses prepositional phrases mirror around the verb. That is, the preferred preverbal order in (34) is the reverse of the preferred postverbal order in (35) .

(34) a.   dat Jan [tijdens de   pauze]$_2$ [aan zijn vader]$_1$ dacht
         that John during the break   of his father thought
         'that John thought of his father during the break'
    b.   ??dat Jan [aan zijn vader]$_1$ [tijdens de pauze]$_2$ dacht
         that John of his father during the break   thought

(35) a.   dat Jan dacht [aan zijn vader]$_1$ [tijdens de pauze]$_2$
         that John thought of his father during the break
    b.   ??dat Jan dacht   [tijdens de   pauze]$_2$ [aan zijn vader]$_1$
         that John thought during the break   of his father

He demonstrates that, given this fact, the variable order in Dutch main clauses can be understood if the verb moves from the position it occupies in embedded clauses. This is easy to see. Following the verb in (36a) – the scheme for embedded clauses – only one order of PPs can be generated (PP$_1$-PP$_2$). However, following the verb in (36b) – the scheme for main clauses – two orders are admissible (PP$_2$-PP$_1$ and PP$_1$-PP$_2$).

(36) a.   *that* … [<PP$_2$> [<PP$_1$> V <PP$_1$>] <PP$_2$>]
    b.   V … [<PP$_2$> [<PP$_1$> t_V <PP$_1$>] <PP$_2$>]

The analysis also explains the contrast between Dutch and English main clauses. As PPs must be generated to the right of the verb in English, the only admissible order is V-PP$_1$-PP$_2$.

    Koster's next move is the highlight of the article. He notes that his analysis does not predict complete freedom in Dutch main clauses. In case there are *three* PPs merged according to a strict hierarchy, two of the six logically possible orders are ruled out. A strict order of merger gives rise to the scheme in (37a), or (37b) once verb movement is factored in. Fixing the position of the PPs in (37b) in various ways yields the orders in (38a-d), but crucially (38e,f) cannot be generated.

(37) a.   [<PP$_3$> [<PP$_2$> [<PP$_1$> V <PP$_1$>] <PP$_2$>] <PP$_3$>]
    b.   V … [<PP$_3$> [<PP$_2$> [<PP$_1$> t_V <PP$_1$>] <PP$_2$>] <PP$_3$>]

(38) a.   V … PP$_3$ PP$_2$ PP$_1$
    b.   V … PP$_3$ PP$_1$ PP$_2$
    c.   V … PP$_2$ PP$_1$ PP$_3$
    d.   V … PP$_1$ PP$_2$ PP$_3$
    e.   *V … PP$_2$ PP$_3$ PP$_1$
    f.   *V … PP$_1$ PP$_3$ PP$_2$

Although it is not trivial to find cases of three PPs that come in a fixed preverbal order, they exist, and therefore these predictions can be tested. The examples in (39) form the base line. They have the right profile, as all alternative pre- and postverbal orders are marked or ungrammatical, a point explored in some detail in Barbiers 1995.

(39) a. dat hij [door een stuurfout]$_3$ [met een knal]$_2$ [op het hek]$_1$ strandde
that he   by   a   steering-error with a   bang   on the fence got.stuck
'that he got stuck on the fence with a bang because he made a steering error'
  b. dat hij strandde [op het hek]$_1$ [met een knal]$_2$ [door een stuurfout]$_3$
that he got.stuck on the fence with a   bang   by   a   steering-error

If we now consider possible main clause orders, we find exactly the predicted pattern. The orders in (40a-d) are grammatical, but the ones in (40e,f) are not.

(40) a. Hij strandde [door een stuurfout]$_3$ [met een knal]$_2$ [op het hek]$_1$.
he got.stuck by   a   steering-error with a   bang   on the fence
'He got stuck on the fence with a bang because he made a steering error.'
  b. Hij strandde [door een stuurfout]$_3$ [op het hek]$_1$ [met een knal]$_2$.
he got.stuck by   a   steering-error on the fence with a   bang
  c. Hij strandde [met een knal]$_2$ [op het hek]$_1$ [door een stuurfout]$_3$.
he got.stuck with a   bang   on the fence by   a   steering-error
  d. Hij strandde [op het hek]$_1$ [met een knal]$_2$ [door een stuurfout]$_3$.
he got.stuck on the fence with a   bang   by   a   steering-error
  e. *Hij strandde [met een knal]$_2$ [door een stuurfout]$_3$ [op het hek]$_1$.
he got.stuck with a   bang   by   a   steering-error on the fence
  f. *Hij strandde [op het hek]$_1$ [door een stuurfout]$_3$ [met een knal]$_2$.
he got.stuck on the fence by   a   steering-error with a   bang

What emerges, then, is that Koster's (1974) analysis of word order in Dutch prefigures current analyses of Universal 20 in employing the combination of leftward head movement and a mirroring device. Indeed, if we take a step back and collate the data from root and non-root environments in a single table, looking only at the order of the verb and the three PPs, the pattern that emerges is the one already given in the introduction to this paper:[10]

(41)

	I	II	III	IV
a.	PP$_3$ PP$_2$ PP$_1$ V	V PP$_1$ PP$_2$ PP$_3$	V PP$_3$ PP$_2$ PP$_1$	PP$_1$ PP$_2$ PP$_3$ V
b.	PP$_3$ PP$_2$ V PP$_1$	PP$_1$ V PP$_2$ PP$_3$	PP$_3$ V PP$_2$ PP$_1$	PP$_1$ PP$_2$ V PP$_3$
c.	PP$_3$ PP$_1$ V PP$_2$	PP$_2$ V PP$_1$ PP$_3$	PP$_1$ V PP$_3$ PP$_2$	PP$_2$ PP$_3$ V PP$_1$
d.	PP$_3$ V PP$_1$ PP$_2$	PP$_2$ PP$_1$ V PP$_3$	V PP$_2$ PP$_1$ PP$_3$	PP$_3$ PP$_1$ PP$_2$ V
e.	PP$_1$ PP$_3$ PP$_2$ V	V PP$_2$ PP$_3$ PP$_1$	V PP$_3$ PP$_1$ PP$_2$	PP$_2$ PP$_1$ PP$_3$ V
f.	PP$_1$ PP$_3$ V PP$_2$	PP$_2$ V PP$_3$ PP$_1$	V PP$_1$ PP$_3$ PP$_2$	PP$_2$ PP$_3$ PP$_1$ V

---

[10] PPs can undergo A'-movements of various kinds, including fronting to the left periphery of main clauses. The table in (41) abstracts away from such movement.

This pattern is largely identical to the one established by Cinque for the typology of the noun phrase (see ((4)). There are three cells where the correlation breaks down (namely (41IIIb,c,f)). It is not a mystery why this should be so. First, verb second (as opposed to noun movement) takes the verb all the way to the left periphery of its extended projection, ruling out (41IIIb). Second, verb second (as opposed to noun movement) does not permit pied-piping, ruling out (41IIIc) and (41IIIf). These are properties specific to verb second. Should a typological study uncover a larger range of V^+ movements, one would expect to find a full match.

I take it as self-evident that PP-over-V and Universal 20 should be treated, if at all possible, as resulting from the same abstract principles: a hierarchy and either (22ii,iii) or (24ii,iii). As I will argue below, pursuing this desideratum has consequences for both the analysis of PP-over-V and that of Universal 20. I start with the former. Two predictions are made about Dutch syntax. First, PP-over-V should not be the result of movement of PPs (as this is ruled out by (22ii) and (24ii)). Second, Dutch should have no rightward verb movement (as this is ruled out by (22iii) and (24iii)). As regards the second prediction, it is in fact well know there is no evidence for rightward verb movement in Dutch, and that rightward verb movement would in fact cause difficulties if it was postulated (see Reuland 1990). The first prediction is addressed below, in section 8.

6. Pas: Basic Syntax and Semantics

In the following four sections, I will explore the consequences of the distribution of the 'qualifier' *pas* for the analysis of PP-over-V. The distribution and interpretation of *pas* have been described in detail by Barbiers 1995, and the observations that follow are his, except where indicated.[11] The analysis sketched in this section also adopts many of Barbiers' theoretical claims, but crucially not all of them – see section 10 for a discussion of Barbiers' proposal.[12] Finally, 'qualifier' is a term borrowed from Barbiers, but used here more narrowly to refer to *pas* and related elements.

Barbiers argues that the basic meaning of *pas* is 'long(¬Φ)'. In this formula, Φ stands for a proposition expressed by the structure in which *pas* occurs. Insertion of *pas* implies that, within a contextually given interval, the period in which Φ does not hold is characterized as long compared to the period in which it does:

(42) |-------------------------||---------|
                       ¬Φ   Φ
                      long   short

All else being equal, this suggests that the truth of Φ is recent. Indeed, *pas* is interpreted in this way in examples like (43): the period following John's move to Amsterdam is taken to be short compared to the period preceding that event.

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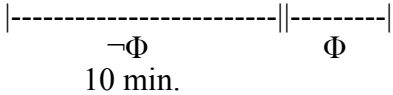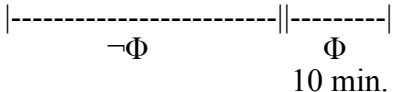
[11] *Pas* has a second use as a numeral qualifier. In this guise, it appears local to a numeral whose value it characterizes as low. Thus, in *pas na tien jaar therapie* 'only after ten years of therapy', ten years is characterized as long, but in *na pas tien jaar therapie* 'after only ten years of therapy', it is characterized as short. (N.B. Some speakers reject *na pas tien jaar therapie* in favour of *na slechts tien jaat therapie* 'only after ten years of therapy', but I find it grammatical and many examples of this type can be found on the web.)

[12] To be concrete, I adopt from Barbiers the hypothesis that the temporal modifier *pas* means 'long(¬Φ)' (see immediately below) and the locality restriction in (50). The idea that *pas* always modifies VP, encoded through a selectional requirement [QL], is mine.

(43)   Jan   is pas naar Amsterdam verhuisd
        John is PAS to   Amsterdam moved
        'John has recently moved to Amsterdam'

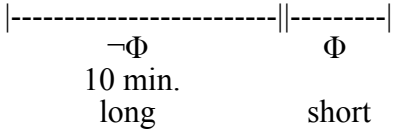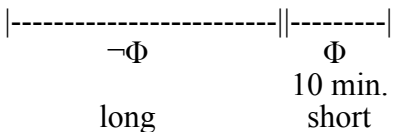There are temporal modifiers that have a comparable semantics. Examples are 'after ten minutes' and 'since ten minutes' in (44). We can depict the semantic contribution of these modifiers as in (45).

(44) a.   Jan kon   na   tien minuten weer lachen.
          John could after ten minutes again laugh
          'John was able to laugh again after ten minutes.'
     b.   Jan kan sinds tien minuten weer lachen.
          John can since ten minutes again laugh
          'John is able to laugh again since ten minutes.'

(45) a. |-------------------------||---------|
                      ¬Φ   Φ
                   10 min.

     b. |-------------------------||---------|
                      ¬Φ   Φ
                                      10 min.

Interestingly, *pas* can be associated with such modifiers. If this happens, the result is an alignment of the temporal structures of *pas* and the modifier. Thus, the examples in (46) differ from those in (44) in that a subjective judgment is expressed about the length of the ten-minute period the modifiers measure. In (46a) this period is characterized as long (see (47a), while in (46b) it is characterized as short compared to the preceding period in which John was not able to laugh (see (47b). (Throughout I use underlining to indicate association.)

(46) a.   Jan   kon   pas [na   tien minuten] weer lachen.
          John could PAS after ten minutes again laugh
          'John was only able to laugh again after ten minutes.'
     b.   Jan   kan pas [sinds tien minuten] weer lachen.
          John can PAS since ten minutes again laugh
          'John is only able to laugh again since ten minutes.'

(47) a. |------------------------||---------|
                      ¬Φ   Φ
                   10 min.
                    long   short
     b. |------------------------||---------|
                      ¬Φ   Φ
                                     10 min.
                    long   short

Note that it is crucial that the interpretation of *pas* is linked to a contextually given interval. The boundaries of this interval make it possible to compare the spans of time during which Φ holds and does not hold. Otherwise, the time during which Φ holds in (47a) would be open-

ended on the right, while the time during which ¬Φ holds in (47b) would be open-ended on the left.

Pas differs from temporal adverbials like *recent* 'recently', which do not permit alignment under association. Thus, the examples in (48) are interpreted with 'recently' modifying 'was able to laugh again after ten minutes'. While such an interpretation is acceptable in (48a), it is very strange in (48b).

(48) a. ?Jan kon recent na tien minuten weer lachen.
       John could recently after ten minutes again laugh
       'It happened recently that John was able to laugh again after ten minutes.'
    b. *Jan kan recent   sinds tien minuten weer lachen.
        John can recently since ten minutes again laugh
       'It is recent that John is able to laugh again since ten minutes.'

In sum, I propose that *pas* enters into two relations: it always modifies a verbal category and in addition it can be associated with a temporal modifier.
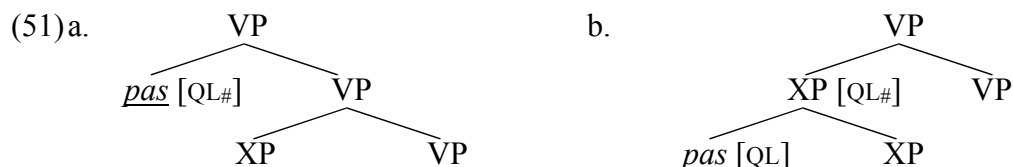
Modification and association are subject to distinct syntactic constraints. The syntax of *modification* involves, I assume, a selectional requirement introduced by *pas* and satisfied under sisterhood by a verbal category. I will represent this selectional requirement as a feature [QL] (for 'qualification') and I will use the diacritic # to indicate its satisfaction, as below:

(49)   VP
           ╱   ╲
      pas [QL#]   VP
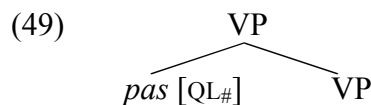
The syntax of *association* is largely regulated by a very strict locality constraint: as already argued by Barbiers (1995:65), *pas* must immediately c-command its associate. I formulate this constraint as in (50).

(50)   *Pas* must c-command its associate XP, and there can be no YP such that *pas* asymmetrically c-commands YP, and YP asymmetrically c-commands XP.

The constraint in (50) allows *pas* and its associate to be merged separately, as in (51a) (this option was presupposed in the discussion above). In addition, it allows *pas* to form a constituent with its associate, as in (51b). Note that in the latter case, [QL] must be copied upwards to the node dominating *pas* in order for it to find a verbal sister to modify.

(51) a.   VP   b.   VP
          ╱   ╲   ╱   ╲
     pas [QL#]   VP   XP [QL#]   VP
                ╱   ╲   ╱   ╲
              XP   VP   _pas_ [QL]   XP

Both structures indeed exist. The examples in (52) demonstrate that *pas* does not have to form a constituent with its associate. The associate can be fronted while the particle remains in situ. Such movement would violate the adjunct island constraint if *pas* and the fronted PP formed a constituent in the underlying representation.

(52) a. [PP Na   hoeveel   jaar therapie] praatte Jan   volgens   jou pas t_{PP}
          after how-many year therapy talked John according.to you PAS
        zonder   blozen?
        without blushing
        'After how many years of therapy did you say John could talk without blushing?'

   b.   [PP Na   tien jaar therapie] praatte Jan   volgens   mij pas t_{PP}
          After ten year therapy talked John according.to me PAS
        zonder   blozen.
        without blushing
        'I think that John talked without blushing only after ten years of therapy.'

In the examples in (53), *pas* and its associate are fronted together to the first position in a main clause. Given that there is only one position preceding the finite verb in main clauses, *pas* and its associate must form a constituent in these examples.

(53) a.   [PP Pas [PP na   tien jaar therapie]] praatte Jan   volgens   mij t_{PP}
           PAS   after ten year therapy talked John according.to me
        zonder   blozen.
        without blushing
        'I think John talked without blushing only after ten years of therapy.'

   b.   [PP [PP Na   tien jaar therapie] pas] praatte Jan   volgens   mij t_{PP}
           after ten year therapy   PAS talked John according.to me
        zonder   blozen.
        without blushing
        'I think John talked without blushing only after ten years of therapy.'

Please note that that these data also show that apparently no ordering restrictions are imposed on *pas* and its associate when they are merged. Thus, in addition to (51b), the structure in (54) is well-formed. (I will come back to this in the next section.)

(54)   VP
                  ┌──────┴──────┐
              XP [QL#]   VP
            ┌────┴────┐
          XP   *pas* [QL]
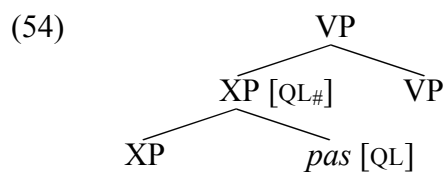
The XP-*pas* order is of course also found when no fronting takes place:

(55)   dat Jan   volgens   mij [PP [PP na   tien jaar therapie] pas]
        that John according.to me   after ten year therapy PAS
        zonder blozen   praatte
        without blushing talked
        'that John, I think, talked without blushing only after ten years of therapy'

The very strict locality imposed by (50) is not surprising. *Pas* can associate with a wide range of categories. These include PPs (as illustrated above), AdvPs (see (56a)), DPs (see (56b)),

and CPs (see (56c)).[13,14] If, as suggested by these data, there are no syntactic restrictions on the categories that *pas* can associate with, then the expectation is that any category will act as an intervener.

(56) a. Jan   ging pas [_{AdvP} gisteren]   naar huis.
          John went PAS   yesterday to   home
          'John went home only yesterday.'
     b. Jan   ging pas [_{DP} de derde week van augustus] naar huis.
          John went PAS   the third week of August   to   home
          'John went home only in the third week of August.'
     c. Jan   ging pas [_{CP} toen de wijn op was] naar huis.
          John went PAS   when the wine up was to   home
          'John went home only when the wine ran out.'

The strict locality that (50) insists on implies that *pas* cannot be linearly separated from an in situ preverbal associate, not even when it is not merged with that associate. A structure like (57a) is ruled in, but in (57b) XP is asymmetrically c-commanded by *pas* and asymmetrically c-commands the intended associate, in violation of the requirement of immediate c-command.

(57) a.

```
            VP
          /    \
       pas      VP
              /    \
            PP      VP
                  /    \
                XP      …
```

     b. *

```
            VP
          /    \
       pas      VP
              /    \
            XP      VP
                  /    \
                PP      …
```

This is the right result. For example, *pas* cannot be associated with a preverbal temporal PP across another PP, as demonstrated by the contrast between (58a) and (58b) (both non-root clauses):[15]

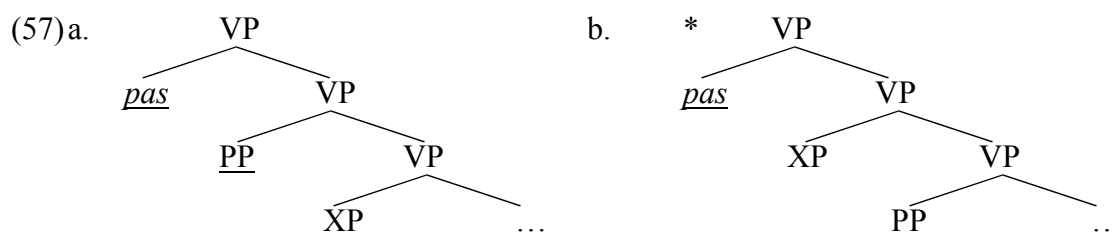(58) a. dat Jan [volgens   mij]₃ pas [na   tien jaar   therapie]₂
          that John according.to me   PAS after ten   year therapy
          [zonder blozen]₁ praatte
          without blushing talked
          'that John talked without blushing only after ten years of therapy, I think'

---

[13] Note that the PP *naar huis* 'home' in (56c) does not intervene between *pas* and its CP associate. In fact, it is merged lower than the CP, which appears in extraposition: *pas* [[PP t_V] CP].

[14] Marcel den Dikken (p.c.) suggests that the bracketed constituents in (56) are in fact all PPs. However, the constituents labelled AdvP in (56a) and DP in (56b) cannot undergo PP-over-V (footnote 1), so I would maintain that they are unlikely to be PPs. *Toen* 'then' has the same distribution in isolation, but can extrapose when it takes a clausal complement. This is consistent with an analysis as either a PP or a CP (given that CPs extrapose in Dutch).

[15] *Volgens mij* 'according to me' is often used as a parenthetical. The judgment in (58b) presupposes an absence of the intonational contour that licenses parenthetical use. In the presence of such an intonation, the example is perhaps a little more palatable, though I would still classify it as ungrammatical.

b. *dat Jan <u>pas</u> [volgens   mij]₃ [<u>na   tien jaar therapie</u>]₂
   that John PAS *according.to me   after ten year therapy*
   [zonder blozen]₁ praatte
   without blushing talked

The effect is not limited to PPs: any category that intervenes between *pas* and a preverbal associate leads to ungrammaticality. I illustrate this in (59) for intervening DPs, AdvPs and VPs.

(59) a. *dat Jan   <u>pas</u> [DP het boek] [<u>na   tien jaar</u>] gelezen heeft
        that John PAS   *the book after ten year read   has*
        intended: 'that John read the book only after ten years.'
   b. *dat Jan een boek <u>pas</u> [AdvP vaak] [<u>na   tien jaar</u>] leest
        that John a   book PAS   *often after ten year reads*
        intended: 'that John often reads a book only after ten years.'
   c. *dat Jan   <u>pas</u> [VP aan Marie denkend] [<u>na   tien minuten</u>] zag
        that John PAS   *of Mary thinking after ten minutes saw*
        dat ik voor   'm stond
        that I before him stood
        intended: 'that John, because he was thinking of Mary, saw that I was standing in front of him only after ten minutes.'

In all likelihood, *pas* is a maximal projection (as assumed tacitly above). When not attached to its associate, *pas* does not block verb movement to C. This follows if it is an adjunct rather than a functional head. When merged with its associate, *pas* does not project either. Evidence for this comes from locative inversion, which reliably diagnoses PPs in Dutch (see Zwart 1992 for discussion and references). In structures involving locative inversion, PPs are fronted in the preferred absence of an expletive. The example in (60) thus shows that the combination of *pas* and a PP can undergo locative inversion. Consequently, this combination must itself be a PP, rather than a projection of *pas* (thanks to Marcel den Dikken (p.c.) for pointing out these facts).

(60)   [PP Pas [PP <u>in de derde kist</u>]] zat (??er)   een lijk.
         PAS   *in the third coffin sat (there) a   body*
        'Only in the third coffin could a body be found.'

However, I will briefly explore the alternative hypothesis that *pas* is a functional head in section 9, showing that this would not materially affect my main argument against antisymmetry.

With the basics in place, I will now confront various theories of PP-over-V with challenges emerging from the distribution of *pas*. In addition to the above data, there are two core observations to be accounted for. First, PP-over-V does not seem to affect the ability of PPs to associate with *pas*. The data in (61) show that the associate can appear to the right of the verb, and that it can be preceded by other postverbal PPs.

(61) a. dat Jan [volgens   mij]₃ <u>pas</u> [zonder blozen]₁ praatte
         that John according.to me PAS without blushing talked
         [na   tien jaar therapie]₂
         after ten   year therapy
         'that John talked without blushing only after ten years of therapy'
     b. dat Jan [volgens   mij]₃ <u>pas</u> praatte [zonder blozen]₁
         that John according.to me PAS talked without blushing
         [na   tien jaar therapie]₂
         after ten   year therapy

Second, when *pas* is attached to its associate (either to the left or to the right), PP-over-V is blocked (henceforth, I will refer to such combinations as *pas*+PP):[16],[17]

(62) a. *dat Jan zonder blozen   praatte [PP <u>pas</u> [PP <u>na   tien jaar therapie</u>]]
          that John without blushing talked   PAS   after ten year therapy
         that John talked without blushing only after ten years of therapy'
     b. *dat Jan zonder blozen   praatte [PP [PP <u>na   tien jaar therapie</u>] <u>pas</u>]
          that John without blushing talked   after ten year therapy PAS
         'that John talked without blushing only after ten years of therapy'

I will look at four analyses of PP-over-V, which respectively capture the mirror-image effect uncovered by Koster in terms of variation in linearization (section 7), PP-movement (section 8), roll-up movement in standard antisymmetric trees (section 9) and roll-up movement in shrunken trees (section 10).

7. Pas: Base-generated PP-over-V

To the best of my knowledge, Weerman (1989) was the first to suggest an account of PP-over-V that relies on variation in linearization. Neeleman and Weerman (1999) highlight the fact that such an analysis captures the mirror image effect observed by Koster (1974). Here I show that a base-generation account can also deal in a straightforward manner with the observation that PP-over-V does not affect association with *pas*.
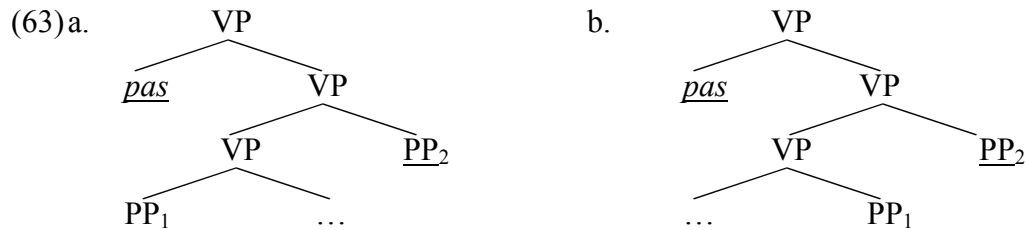
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[16] The inability of *pas*+PP to appear in postverbal position might follow on an analysis in which *pas* is never attached to its associate, so that it cannot be affected by PP-over-V (compare Büring and Hartmann 2001). However, I am skeptical of such an approach, partly because of examples like (53), which show that *pas*+PP can form a constituent.

[17] Some speakers find examples like (62b) slightly better than examples like (62a). This might be due to the fact that there is an alternative parse – [PP P [DP DP *pas*]] – for the relevant string. On this parse, *pas* would not block extraposition (see also footnote 23). For most speakers, this alternative parse cannot have the interpretation targeted here (it would mark 'ten' as a low number in the context, while what is intended is that 'ten years' represents a long period of time). However, isolated examples can be found on the web in which a modifier [PP P [DP *pas* DP]] is interpreted as if it were structured [PP *pas* [PP P DP]]. An example is given in (i).

(1) Hij vertegenwoordigde de harde lijn, maar kreeg na   pas weken onderhandelen zijn zin.
     he represented   the hard line but got   after pas weeks negotiating   his way
     'He was a tough negotiator, but got his way only after weeks of negotiations.'
     (http://www.mihai.nl/wordpress/wp-content/uploads/Boekenstijn-en-van-Agt.pdf; 29 July 2016)

So, if the contrast between (62a) and (62b) turns out to be real, this may be behind it.
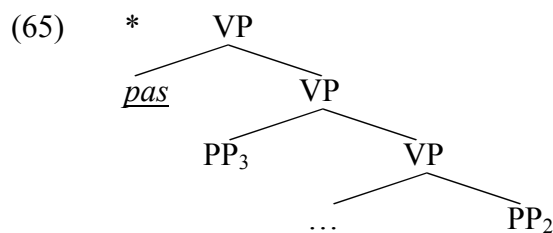
22

If linear order can vary, while dominance and labeling relations remain constant, (50) permits linear separation of *pas* and its associate, as long as the associate is an extraposed PP merged high enough. This is shown in (63); except for their linearization, the representations given are identical to the tree in (57a) (with XP instantiated as PP_1), and therefore they satisfy the requirement of direct c-command.

(63) a.
```
              VP
           /      \
        pas        VP
                 /     \
               VP       PP₂
             /    \
          PP₁     …
```
b.
```
              VP
           /      \
        pas        VP
                 /     \
               VP       PP₂
             /    \
           …      PP₁
```

This explains the grammaticality of the examples in (61), for which I give structures below:

(64) a. dat Jan [volgens   mij]₃ pas [[[zonder   blozen]₁   praatte]
     that John according.to me   PAS   without blushing talked
     [na   tien jaar therapie]₂]
     after ten year therapy

   b. dat Jan [volgens   mij]₃ pas [[praatte [zonder   blozen]₁]
     that John according.to me   PAS   talked   without blushing
     [na   tien jaar therapie]₂]
     after ten   year therapy

Crucially, PP-over-V will not always allow association with *pas*. If there is an intervening XP, the structure is still predicted to be unacceptable. In (65), PP_3 is c-commanded by *pas* and c-commands PP_2, the intended associate, in violation of the requirement of direct c-command.

(65) *
```
              VP
           /      \
        pas        VP
                 /     \
               PP₃      VP
                      /     \
                    …        PP₂
```

Indeed, if *pas* is generated too high, it cannot associate with a PP, whether that PP is pre- or postverbal. The examples in (66) are as bad as the one in (58b):

(66) a. *dat Jan   pas [[volgens   mij]₃ [[[zonder   blozen]₁   praatte]
     that John PAS   according.to me   without blushing talked
     [na   tien jaar therapie]₂]]
     after ten year therapy

   b. *dat Jan   pas [[volgens   mij]₃ [[praatte [zonder   blozen]₁]
     that John PAS   according.to me   talked   without blushing
     [na   tien jaar therapie]₂]]
   *after ten year therapy*

There is nothing else to be said, except to emphasize that the data follow so easily because on a base-generation analysis of PP-over-V, a PP in postverbal position will not be any higher or any lower in the structure than the same PP in preverbal position. This explains straightforwardly why PP-over-V does not feed or bleed association with *pas*.

I now turn to the fact that *pas*+PP cannot appear postverbally. In a symmetric theory of syntax there must be parameters that determine the way sister nodes are ordered. The idea of a single unified head parameter has proven too coarse-grained. For example, the analysis of Universal 20 requires that in the noun phrase the linearization rules for demonstrative, numeral and adjective are, or at least can be, independent. In the verbal extended projection, too, the head parameter must be unpacked into various category-specific linearization rules. For example, while in Dutch DP arguments precede V, PPs may precede or follow and CP-complements must follow (a fact not illustrated here).[18] The question, then, is what linearization rule regulates the placement of *pas*.

My proposal is that there is no rule that mentions *pas* as such, but rather that linearization is sensitive to [QL], the selectional requirement used to encode modification by *pas*. In particular, categories in which [QL] is satisfied must precede their sister, as stated in (67).

(67)   If [QL] is satisfied in XP, then XP precedes its sister.

This linearization rule captures three generalizations. First, it has the consequence that *pas*, if attached to its associate, can either precede or follow its sister, a fact already illustrated in (53). The reason is that [QL], while introduced by *pas*, is not satisfied in *pas* in a structure of this type. Rather, it is copied up and satisfied in a higher node. Since, by hypothesis, no linearization rule mentions *pas* directly, no particular order is imposed:

(68) a.   b.
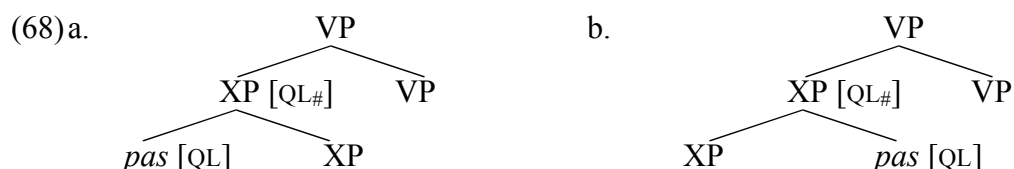
Second, (67) predicts that *pas* must precede its sister if it is merged separately from its associate or if it does not have an associate at all. In that case, [QL] must be satisfied in *pas*:

(69) a.   b. *
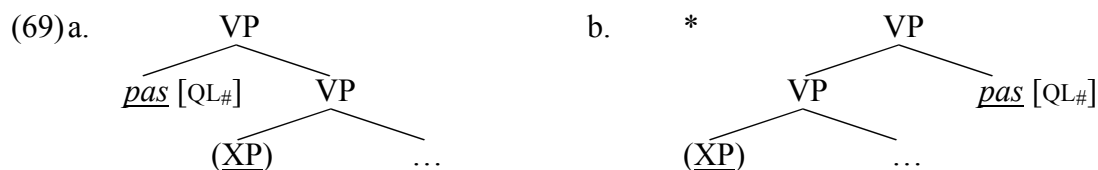
This accounts for the ungrammaticality of the examples in (70). In (70a), *pas* has no associate; the example has the structure in (69b), with XP absent.[19] In (70b), *pas* immediately
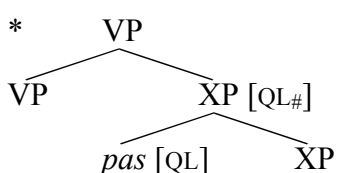
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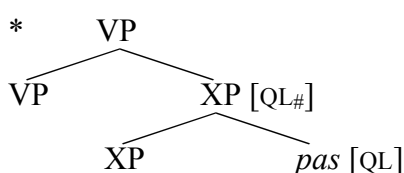
[18] The growth in word order parameters in this proposal has a counterpart in antisymmetric theories. For every linearization parameter necessary in a symmetric theory of syntax, antisymmetry will require that a movement parameter be postulated.

[19] Barbiers points out that some speakers permit postverbal *pas* when it does not have an associate, but is interpreted as 'recent' (other speakers do not accept the relevant examples). I think that this judgment has its origin in the general ability of temporal adverbials to appear in right dislocation (compare footnote 1). Indeed, if postverbal *pas* exists, it certainly cannot be used to answer *wh*-questions:

c-commands its associate, as required, but appears postverbally. This example has the structure in (69b), with XP present. Finally, (70c) has the same structure, except that XP follows rather than precedes its sister.

(70) a. *[Dat Jan naar Amsterdam verhuisd is pas] verbaast me.
          that *John to   Amsterdam moved   is PAS amazes me*
          'That John has recently moved to Amsterdam I find surprising.'
      b. *dat   Jan [[na   tien jaar therapie]₂ [[zonder blozen]₁ praatte]] pas
          that *John after ten year therapy   without blushing talked PAS*
      c. *dat   Jan [[[zonder blozen]₁ praatte] [na   tien jaar therapie]₂] pas
          that *John without blushing talked after ten year therapy   PAS*

Third, and most relevant in the current context, a constituent consisting of *pas* and its associate must precede its sister. After all, in such structures [QL] is copied up and satisfied in the node that immediately dominates *pas*:

(71) a. *   VP   b. *   VP
         / \   / \
        VP   XP [QL#]   VP   XP [QL#]
             / \   / \
        pas [QL]   XP   XP   *pas* [QL]

This, of course, accounts for the data in (62).

Interestingly, the ban on PP-over-V of *pas*+PP has a counterpart in a ban on PP-over-V of PPs that, like *pas*, are qualifiers. An example of such a PP is discussed by Barbiers (1995). *Op z'n minst* 'at its least' (at least) associates with DPs that contain a numeral and has a distribution very similar to *pas*. Core examples demonstrating this are given below:

(72) a. Jan   heeft [volgens   mij] [op z'n minst] [tien boeken] gekocht.
          John has   according.to me   at its least   ten books   bought
          'I think John has bought at least ten books.'
      b. *Jan   heeft [op z'n minst] [volgens   mij] [tien boeken] gekocht.
          John has   at its least   according.to me ten books   bought
      c. [Tien boeken] heeft Jan [volgens   mij] [op z'n minst] gekocht.
          ten books   has John according.to me at its least bought
      d. [[Op z'n minst] tien boeken] heeft Jan   volgens   mij gekocht.
          at its least ten books   has John according.to me bought
      e. [TIEN boeken [op z'n minst]] heeft Jan   volgens   mij gekocht.
          ten books   at its least   has John according.to me bought

Crucially, *op z'n minst* (and other qualifying PPs) cannot be extraposed:[20]

(i)   [Context: When did you buy that coat?]
      a. Ik heb die jas PAS gekocht.   b.   *Ik heb die jas gekocht PAS.
          I have that coat PAS bought   *I have that coat bought PAS*
          'I bought that coat yesterday.'   'I bought that coat on Monday.'

So, the star in (70a) reflects the ungrammaticality of extraposition of *pas* other than through right dislocation.
[20] To the extent that this example is well formed, it must have the intonation of right dislocation under focus:

(73)   *Dat Jan [tien boeken] gekocht heeft [op z'n minst] verbaast me.
        that John ten books   bought has   at its least   surprises me

This follows from the rule in (67) if *op z'n minst* is indeed a qualifier. If so, its top node will contain [QL#], which implies that it must precede its sister, even though it is a PP.

   In sum, a base-generation account of PP-over-V, in conjunction with (67), captures all known data about the distribution of *pas*.

8. Pas: PP-over-V as PP Movement

An obvious alternative to a base-generation analysis of PP-over-V is to make use of a movement operation that shifts PPs across the verb (or the verb's trace in main clauses). In fact, this is the analysis assumed in Koster (1974). PP-over-V is taken to result from the transformational rule in (74), which is meant to apply to preverbal PPs from left to right.

(74)   … – PP – X – V – …
           1   2   3   → 2 3+1 (optional)

If applied in this way, (74) will generate mirror orders. Starting with the string in (75a), a first application of the rule will deliver (75b). A second application will tuck PP_1 in below the surface position of PP_2, as in (75c). This is because the rule states that each PP is shifted to the immediate right of the verb.

(75) a. PP_2 PP_1 V
     b. PP_1 V PP_2
     c.   V PP_1 PP_2

This analysis can be updated in various ways. Here I consider a reinterpretation in which the order of PP landing sites is regulated by the chain-based version of Relativized Minimality in (12), repeated here for convenience:

(i)   ?Dat Jan [TIEN boeken] gekocht heeft – [op z'n MINST] – verbaast me.
          that John ten books bought has   at its least   – surprises me
         'that John bought at least ten books I find surprising'

A second potential confound (in addition to right dislocation) is the fact that *op z'n minst*, much like *althans* 'at least' and *tenminste* 'at least', can introduce material that limits the conditions under which a proposition holds. In this guise, it often appears in parenthetical expressions. This is relevant because parentheticals can appear clause-finally, giving the impression that *op z'n minst* can undergo PP-over-V together with a PP associate:

(i)   dat die feiten algemeen bekend zijn – althans /tenminste /op z'n minst in de syntactische literatuur
       that those facts generally known are – at.least /at.least /at its least in the syntactic   literature
       'that those facts – at least in the syntactic literature – are generally known'

PP-over-V is blocked, however, when a parenthetical analysis is ruled out:

(ii)   dat Jan een nieuw artikel <op z'n minst aan vijftig collega's> geeft
       that John a new article at its least to fifty colleagues gives
       <*op z'n minst aan vijftig collega's>
         at its least to fifty colleagues
       'that John gives a new article to at least fifty colleagues'

(76)   A chain C_α headed by α blocks formation of a chain C_β headed by β if and only if
  (i) C_α and C_β are of the same type, and
  (ii) all of the links in C_α are c-commanded by β and c-command a trace of β.

As explained in section 2, the condition in (76) yields mirror orders in case two or more movements of the same type cross the lexical head of an extended projection. Thus, (77a) is grammatical, because PP_1 is separated from its trace by none of the chain links of $\{PP_2, t_2\}$, and (77b) is grammatical because only t_2 intervenes. But the anti-mirror order in (77c) is ruled out, because PP_1 is now separated from its trace by the full chain $\{PP_2, t_2\}$.

(77) a. $[[t_2 [[t_1 \text{ V}] PP_1]] PP_2]$
  b. $[[[t_2 [t_1 \text{ V}]] PP_1] PP_2]$
  c.   *$[[[t_2 [t_1 \text{ V}]] PP_2] PP_1]$

Note that this account does not require preverbal generation of PPs plus rightward movement (henceforth 'PP extraposition'). The mirroring effect could also result from postverbal generation of PPs plus leftward movement (henceforth 'PP intraposition'). The structures in (78) have the same properties as those in (77), except for linear order:

(78) a. $[PP_2 [[PP_1 [\text{V } t_1]] t_2]]$
  b. $[PP_2 [PP_1 [[\text{V } t_1] t_2]]]$
  c.   *$[PP_1 [PP_2 [[\text{V } t_1] t_2]]]$

One complication with this way of deriving mirror image effects is that it relies on a notion of type-identical chain. While it is sensible to assume that multiple instances of PP extraposition or intraposition are of the same type, it is not equally obvious that this is true of movements of two or more distinct categories. This means that it would not be a good idea to try and analyze the mirror effects relevant to Universal 20 using movements, regulated by the principle in (76), of adjectives, numerals and demonstratives. There simply is no guarantee that such movements would give rise to mirror image effects.

Moreover, once movement of constituents that do not contain the lexical head is used to derive neutral orders, overgeneration seems unavoidable. Even if we assume that movements of modifiers of the noun always belong to the same type, there is no reason why a trivial chain consisting of a modifier in its base position should be of the same type as a chain created by movement of a lower modifier. Yet this must be the case if we want to account for the fact that prenominally the universal hierarchy of modifiers translates into a universal linear order (Dem-Num-A):

(79) a.   *$[\text{Num} [\text{Dem} [t_{\text{Num}} \text{N}]]]$
  b.   *$[\text{A} [\text{Num} [t_A \text{N}]]]$
  c.   *$[\text{A} [\text{Dem} [t_A \text{N}]]]$

Although movement regulated by (76) is unhelpful in analyzing of Universal 20, it may still be the right way to capture the mirror image effects found with PP-over-V. I will evaluate this hypothesis by considering how a PP-movement analysis could deal with the distribution of *pas*.

The central question in evaluating the PP-extraposition and PP-intraposition analyses must be whether there is evidence for traces of PPs that have supposedly moved. I begin by looking at the fact that *pas*+PP cannot show up postverbally. In the previous section, I have attributed this to a linearization rule that is sensitive to the presence of [QL#]. This account must be adjusted if it is to be adopted in an account of PP-over-V based on PP-movement. The normal run of events regarding the interaction of modification and movement is that modification takes place in a modifier's underlying position. Hence, one would expect that when *pas*+PP moves, [QL] is satisfied in the trace, rather than in the head of the chain. But this would imply that there should be no problem with extraposition of *pas*+PP, contrary to fact:

(80) $[[t_{pas+PP}$ V] *pas*+PP]
           [QL#]

The only solution I see is to postulate that [QL] is exceptional in that its satisfaction must take place in the head of the chain created by PP extraposition. This would rule out V–*pas*+PP order as a violation of the linearization rule in (67):

(81)   *$[[t_{pas+PP}$ V] *pas*+PP]
                [QL#]

If we want to adopt an intraposition analysis of PP-over-V and maintain that (67) restricts the distribution *pas*+PP, a very similar assumption must be made. On such an analysis, intraposition of *pas*+PP must be made obligatory, and the only way this can be achieved is by stipulating that [QL] can only be satisfied in the head of the chain created by PP intraposition:

(82)   [*pas*+PP [V t_{pas+PP}]]
           [QL#]

As it turns out, then, both the extraposition and intraposition analysis of PP-over-V would have to deny any relevance of traces of PP movement to the satisfaction of [QL]. This of course suggests that such traces do not exist, and hence that PP-over-V does not involve PP movement.

The distribution of *pas* when merged separately from its associate can also be used to test whether PP extraposition leaves a trace. If it did, we might expect it to be possible for *pas* to associate with the trace while the PP takes scope in its derived position, or for *pas* to associate with the PP in its derived position while the PP undergoes reconstruction for scope.

Such separation of the scopal position of an extraposed PP and the position in which it associates with *pas* should be unproblematic in principle. Reconstruction for scope is commonplace. Moreover, there can be no doubt that *pas* can associate with traces as well as extraposed PPs. The possibility of association with a trace was already illustrated in (52), which is repeated in (83) for convenience.

(83) a. [PP Na   hoeveel   jaar   therapie] praatte Jan   volgens   jou   pas t_{PP}
          after how-many year   therapy   talked   John according.to you PAS
     zonder   blozen?
     without blushing
     'After how many years of therapy did you say John could talk without blushing?'

   b. [PP Na   tien jaar therapie] praatte Jan   volgens   mij   pas t_{PP}
          after ten   year therapy   talked   John according.to me   PAS
     zonder   blozen.
     without blushing
     'I think that John talked without blushing only after ten years of therapy.'

The example in (84) shows that *pas* must also be allowed to associate with an extraposed PP:

(84)   dat   Jan   pas [[t_{PP} zonder blozen   praatte [PP na   tien *e*]],
         that John PAS   without blushing talked   after ten,
         en [t_{PP} zonder blozen   danste [PP na   vijftien jaar   therapie]₂]]
         and   without blushing danced   after fifteen year   therapy
         'that John only talked without blushing after ten years of therapy, and only danced without blushing after fifteen'

Each conjunct in (84) contains a postverbal PP. Given that the time span denoted by each of the extraposed PPs is to be taken as long, association with *pas* must take place in an across-the-board fashion, which in turn implies that *pas* must be merged externally to the coordination as a whole. Therefore, *pas* asymmetrically c-commands the extraposed PPs and each extraposed PP asymmetrically c-commands its trace. It then follows from (50) that *pas* must associate with the PPs in their surface position; it cannot associate with the putative traces of extraposition, as these are too deeply embedded.

We can determine whether the scopal position of an extraposed PP and the position in which it associates with *pas* can be distinct by considering the structures in (85). If separation of functions is permitted, (85a) should permit a reading in which the PP takes scope over AdvP (low association with *pas*; high scope), while (85b) should should allow a reading in which AdvP takes scope over the PP (high association with *pas*; low scope).

(85) a.   [AdvP [*pas* [t_1 V]]] PP₁
     b.   [*pas* [[AdvP [t_1 V]] PP₁]]

However, the fact of the matter is that such readings do not exist. The order in (85a) requires that AdvP takes scope over the PP, while the order in (85b) requires that the PP takes scope over AdvP. This is demonstrated by the data below. The example in (86a) unambiguously expresses that John often wants to see two successful trials of a dish before he prepares it for guests. The example in (86b) unambiguously expresses that only after two successful trials will John prepare a dish for guests on a regular basis.

(86) a. dat Jan een maaltijd vaak pas voor gasten bereidt
         that John a   meal   often PAS for guests prepares
         na   twee geslaagde pogingen
         after two successful trials
         'that it is often only after two successful trials that John prepares a meal for guests'
         often > after two trials; *after two trials > often
     b. dat Jan een maaltijd pas vaak voor gasten bereidt
         that John a   meal   PAS often for guests prepares
         na   twee geslaagde pogingen
         after two successful trials
         'that it is only after two successful trials that John prepares a meal often for guests'
         *often > after two trials; after two trials > often

In sum, there is no evidence from the distribution of *pas* for a trace of PP extraposition.

Next consider PP intraposition. If PPs move leftward across the verb, they should leave a trace in postverbal position. Given that it is possible for *pas* to associate with traces, this particle should therefore be able to show up to the right of an associated PP that it does not form a constituent with, as in (87). The example in (88) shows that this prediction is incorrect, however:

(87)   *PP [XP [*pas* [V t_{PP}]]]

(88)   *dat Jan [volgens   mij]₃ [na tien jaar therapie]₂
         that John according.to me   after ten year therapy
         [zonder blozen]₁ pas praatte
         without blushing PAS talked
         'that John talked without blushing only after ten years of therapy, I think'

This means that there is also no evidence from the distribution of *pas* for a trace of intraposition.

While the absence of evidence for traces is predicted by the base-generation account, it is embarrassing for PP-movement accounts that the various relations a PP enters into cannot be distributed across chain members.[21]

---

[21] Koster (2001) analyzes PP-over-V in terms of an alternative notion of 'parallel construal'. Parallel construal is a rule that equates two structures, one in which two categories α and [ω δ] are merged and another in which [ω δ] is merged with a category containing α:

(i)   [XP … [ωP α [ω δ]] …] = [ωP [XP … α …] [ω δ]]

The rule applies only if ω is a head that functions as a Boolean operator and if certain other conditions are met (see Koster 2000 for details).
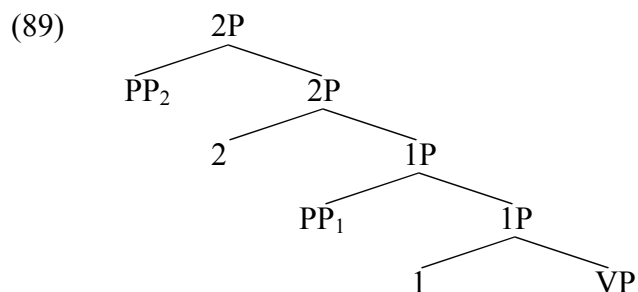
Koster (2001) argues that PP-over-V involves parallel construal facilitated by a silent Boolean operator, which is represented in (ii) by a colon. The interpretation of a **:**P is such that the complement of **:** narrows down the interpretation of its specifier. In the case of PP-over-V, the specifier is taken to be an empty category:

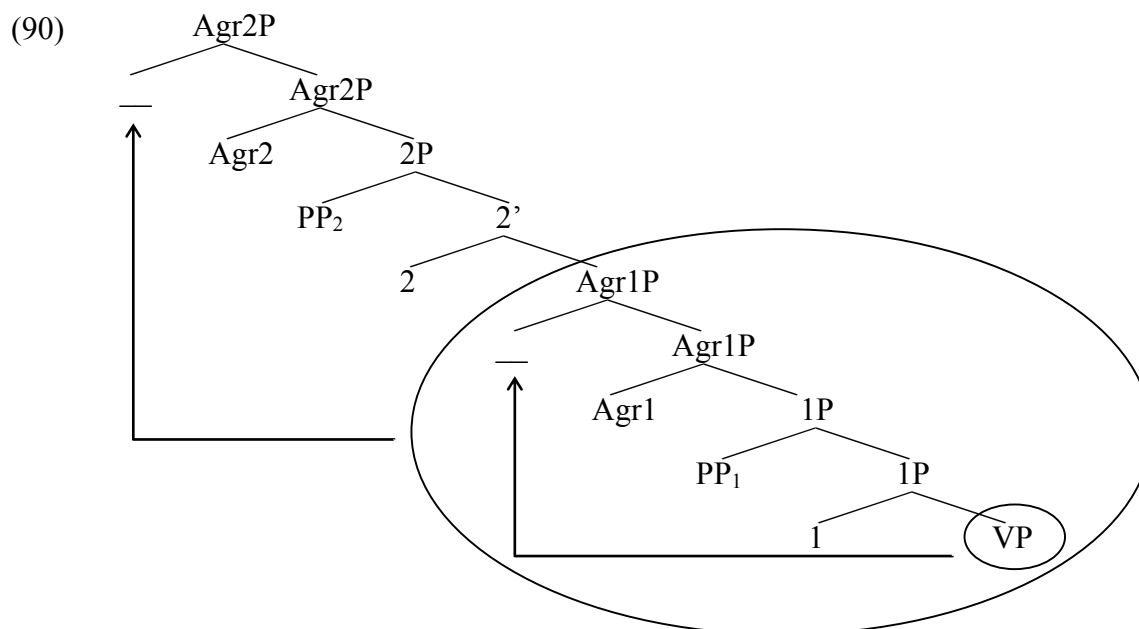(ii)   [XP … [:P *e*PP [**:** PP]] … V …] = [:P [XP … *e*PP … V …] [**:** PP]]

If applied to PP-over-V in this way, parallel construal shares crucial properties with rightward movement: there must be an empty category in preverbal position (*e*PP), and this empty category must be c-commanded by the

9. Pas: PP-over-V as roll-up movement

The third analysis of PP-over-V that I consider is an antisymmetric analysis modelled on Cinque's (2005) account of Universal 20. On this account, mirror image effects result from roll-up movement. Antisymmetry implies that (89) is the minimal representation that can accommodate two adverbial PPs.

(89)

```
            2P
       ┌────┴────┐
      PP₂        2P
             ┌───┴───┐
             2       1P
                 ┌───┴───┐
                PP₁      1P
                     ┌───┴───┐
                     1       VP
```

However, in order to allow for roll-up movement, and hence mirrored orders, additional landing sites must be postulated, as in (90).

(90)

```
              Agr2P
          ┌─────┴──────┐
          __          Agr2P
                  ┌─────┴─────┐
                 Agr2         2P
                        ┌──────┴──────┐
                       PP₂            2'
                                ┌─────┴─────┐
                                2         Agr1P
                                      ┌─────┴──────┐
                                      __          Agr1P
                                              ┌─────┴─────┐
                                             Agr1         1P
                                                    ┌──────┴──────┐
                                                   PP₁            1P
                                                           ┌──────┴──────┐
                                                           1             VP
```
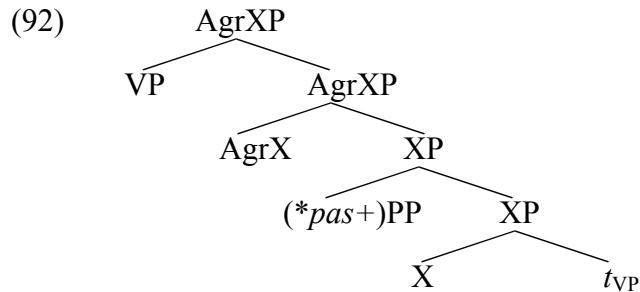
Notice that this analysis inherits some problems from Cinque's account of word order in the noun phrase. For instance, roll-up movement in the extended verbal projection is incompatible with the ban on the stranding of pied-piped material. In main clauses, the verb must be allowed to move out of a moved VP if that VP precedes any PP modifiers:

(91) $\ldots V_{\text{fin}} \ldots$ [[$_{\text{VP}}$ $\ldots$ t_{fin} $\ldots$] $\ldots$ [PP $\ldots$ t_{VP} $\ldots$]]

The antisymmetric analysis of PP-over-V in (90) faces two further significant problems when confronted with the distribution of *pas*.

---

extraposed category (**:**P). This means that much of the discussion of mirroring through rightward movement will potentially be relevant to parallel construal as well. Whether it is in fact depends on properties of the rule not spelled out in Koster 2000, 2001.
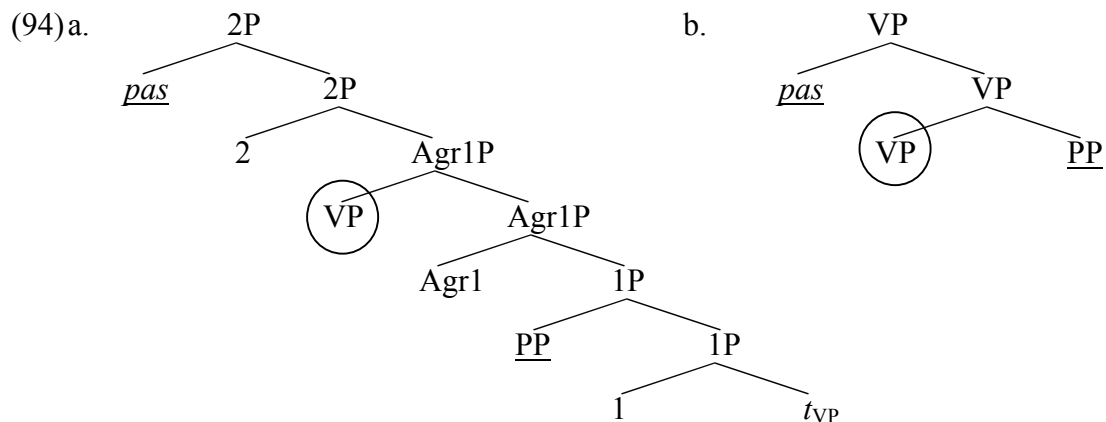
First, it cannot capture the fact that *pas*+PPs cannot surface in postverbal position (see (62)). Apparently, VP must be able to move across a PP, but not across a PP modified by *pas* (as shown in (92)). There is no obvious reason why this should be so. More specifically, there is no reason why PP modifiers should project some sort of minimality barrier for movement of VP, but only if accompanied by *pas*.

(92)

```
                AgrXP
          ┌───────┴───────┐
         VP             AgrXP
                   ┌──────┴──────┐
                 AgrX           XP
                          ┌──────┴──────┐
                    (*pas+)PP          XP
                                  ┌─────┴─────┐
                                  X          t_VP
```

Second – and that is the main argument of the paper – the antisymmetric analysis of PP-over-V is incompatible with (50), the locality constraint on association with *pas*. This incompatibility arises because on the antisymmetric analysis of PP-over-V the constraint in (50) is violated in certain grammatical structures. The crucial configuration is one in which *pas* precedes VP, while its associate is in postverbal position:
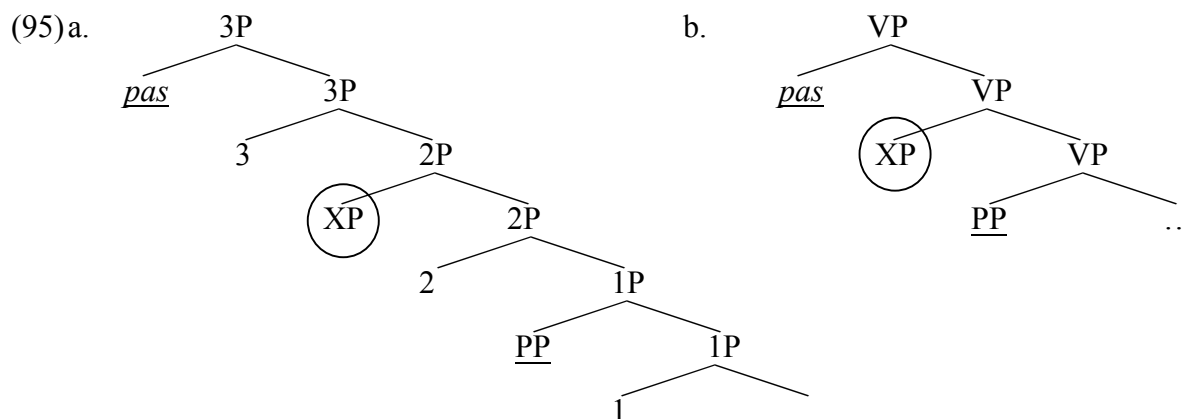
(93)   dat Jan <u>pas</u> [_VP een fiets   kocht] [_PP <u>na   drie jaar onderzoek</u>]
       that John PAS   a   bicycle bought   after three year research
       'that John only bought a bicycle after three years of research'

A partial antisymmetric representation of (93) is given in (94a). Notice that *pas* does not immediately c-command the PP it is associated with. After movement, the VP (i.e. *een fiets kocht* 'bought a bicycle') asymmetrically c-commands the PP and is asymmetrically c-commanded by *pas*. This makes (94a) exactly the kind of configuration that (50) is designed to rule out. I should emphasize that this difficulty is a direct consequence of the stretching of syntactic representations under antisymmetry. The more conventional structure in (94b) does satisfy (50).

(94) a.

```
            2P
      ┌──────┴──────┐
     pas           2P
             ┌──────┴──────┐
             2          Agr1P
                   ┌──────┴──────┐
                  (VP)         Agr1P
                          ┌──────┴──────┐
                        Agr1            1P
                                   ┌─────┴─────┐
                                  PP           1P
                                         ┌──────┴──────┐
                                         1            t_VP
```

b.

```
            VP
      ┌──────┴──────┐
     pas           VP
             ┌──────┴──────┐
           (VP)           PP
```

It is helpful to compare these structures with those assumed for sentences in which an intervening category XP blocks association with *pas*. While there is a clear difference between the symmetric structures in (94b) and (95b), the antisymmetric structures in (94a)

and (95a) are isomorphic in crucial respects. This means that a principle like (50) can differentiate between (94b) and (95b), but not between (94a) and (95a).

(95) a.

```
              3P
           /      \
        pas         3P
                 /      \
               3          2P
                       /      \
                    (XP)        2P
                             /      \
                           2          1P
                                   /      \
                                 PP         1P
                                         /      \
                                       1          …
```

b.

```
              VP
           /      \
        pas         VP
                 /      \
              (XP)        VP
                       /      \
                     PP          …
```

There is no easy way out of this problem. It cannot be that verbal categories do not count for (50), given that intervention of a VP in (59c) leads to ungrammaticality. It also cannot be that (50) may be satisfied prior to movement of VP ('at D-structure'). Other moved categories that surface in between *pas* and its associate do violate (50). For instance, the examples in (96) show that a so-called R-pronoun extracted from a PP can land above *pas* or below its PP associate, but not in between the two. The pattern in (97) is identical, except that the movement in this case is that of a contrastively focused PP.

(96) a. Jan heeft er pas [na drie jaar] wat t_R over gelezen.
   John has there PAS after three year something about read
   'John has only read something about that after three years'

 b. *Jan heeft pas er [na drie jaar] wat t_R over gelezen.
   John has PAS there after three year something about read

 c. Jan heeft pas [na drie jaar] er wat t_R over gelezen.
   John has PAS after three year there something about read

(97) a. Jan heeft DAAR-over pas [na drie jaar] wat t_{PP} gelezen.
   John has there-about PAS after three years something read
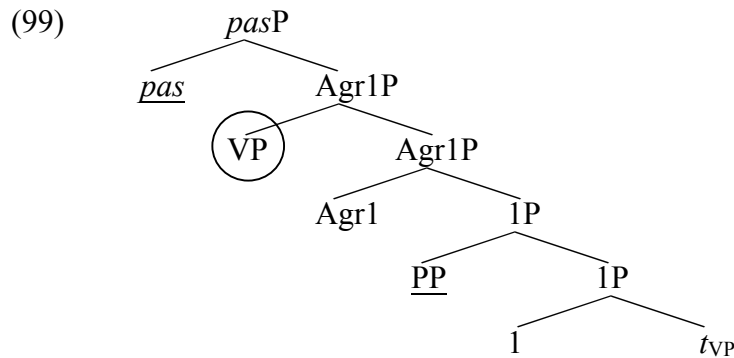   'John has only read something about THAT after three years'

 b. *Jan heeft pas DAAR-over [na drie jaar] wat t_{PP} gelezen.
   John has PAS there-about after three year something read

 c. Jan heeft pas [na drie jaar] DAAR-over wat t_{PP} gelezen.
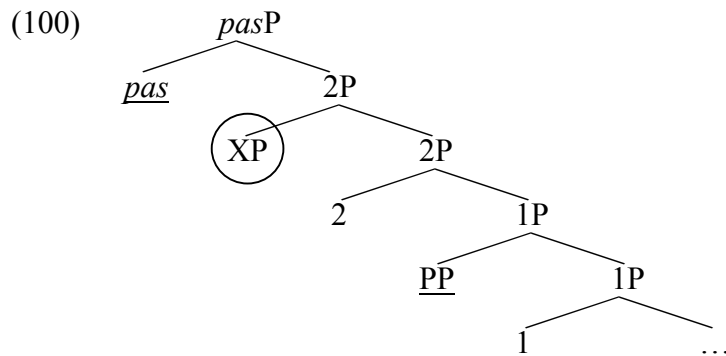   *John has PAS after three year there-about something read*

There is a way of ruling in examples like (93) on an antisymmetric approach. Kayne 1993 adopts a *Barriers*-style definition of c-command, roughly as in (98) (see May 1985 and Chomsky 1986). He also reanalyzes intermediate categories as the lower segments of a multi-segmented maximal projection. On these assumptions, it matters whether unattached *pas* is a maximal projection or a functional head. If it is a maximal projection, as in (94a), *pas* asymmetrically c-commands the fronted VP. However, if it is a functional head, as in (99), *pas* and the fronted VP stand in a relation of mutual c-command. That *pas* c-commands VP is

unsurprising. VP also c-commands *pas*, because it is only dominated by a single segment of the multi-segmented category Agr1P – therefore the first category that dominates VP is *pas*P, and *pas*P also dominates *pas*. The condition in (50) characterizes interveners for association with *pas* in terms of asymmetric c-command. VP therefore does not count as an intervener in (99), and consequently the grammaticality of (93) is now in line with expectations

(98) a. α c-commands β if and only if the first category that dominates α also dominates β.
　　 b. A category γ dominates α if every segment of γ dominates α.

(99)
```
                pasP
              /      \
           pas       Agr1P
                    /      \
                 (VP)      Agr1P
                          /      \
                       Agr1       1P
                                 /   \
                               PP     1P
                                     /   \
                                    1    t_VP
```

The fatal flaw in this proposal is that it does not just rule in examples like (93), but also examples that should be ruled out. Consider the structure in (100), where XP is a category merged between *pas* and its associate. In this structure, XP does not count as an intervenor either, because (on a *Barriers*-style definition of c-command and the assumption that *pas* is a functional head) it c-commands *pas*, just like the VP in (99).

(100)
```
                pasP
              /      \
           pas        2P
                    /     \
                 (XP)      2P
                          /    \
                        2       1P
                              /    \
                            PP      1P
                                  /    \
                                 1      …
```

As a consequence, the strict locality of association with *pas* can no longer be guaranteed. Instead, it is predicted – incorrectly – that *pas* can link to a prospective associate if no more than one maximal projection is merged between them. (A structure in which two maximal projections are merged between *pas* and its prospective associate is ruled out because the lower of the two maximal projections *will* be asymmetrically c-commanded by *pas*).

　　In conclusion, the interaction between association with *pas* and PP-over-V provides a strong argument against an antisymmetric analysis of mirror image effects modeled on Cinque 2005. Crucially, this is an argument of a type absent in Abels and Neeleman 2009, 2012. Antisymmetry is incompatible with the independently motivated constraint in (50), not because of the movements it relies on, but because of its stretched trees. In combination with the earlier argument about the inability of extraposition of *pas*+PP, this shows that an

analysis of PP-over-V modeled on Cinque's (2005) account of Universal 20 runs into serious trouble when confronted with the distribution of *pas*.

9. Roll-up movement in shrunken trees

The conclusion we can draw from the previous section is that, if Universal 20 and PP-over-V are to be treated on a par, the evidence favours symmetric over antisymmetric accounts. Abels and Neeleman 2012 already demonstrated that the extra movements involved in antisymmetric analyses violate independently motivated conditions on movement. I have now shown that the extra structure required by standard antisymmetry also leads to problems, namely in accounting for the distribution of qualifiers like *pas*.

At this point, it may be useful to consider the analysis of PP-over-V in Barbiers 1995. This is because Barbiers develops an account that is antisymmetric in outlook, but that does not involve stretched trees. As a consequence, it will be possible to determine to what extent the difficulties that standard antisymmetry runs into are rooted in the notion of antisymmetry itself and which in the stretched trees that standard antisymmetry requires.

The basic hypothesis explored by Barbiers is that all semantic relations are instantiated in syntax through a triple of nodes: two nodes α and β between which the relation holds, and a third node R that specifies the content of the relation. The configuration in which these nodes appear is regulated by the Principle of Semantic Interpretation:

(101)   A node R establishes a semantic relation between a node α and a node β if and only if α immediately c-commands R and R immediately c-commands β.

At first sight, these assumptions make it impossible for the syntax to encode monadic semantic relations. After all, monadic relations have the form $R(\alpha)$ and therefore appear to involve two, rather than three elements. However, Barbiers argues that monadic relations can be derived from the general dyadic scheme $R(\alpha, \beta)$ by equating α and β. There is more than one way of doing this. For the cases of interest here, it is achieved through movement: β is a trace of α.

Before looking at specific structures, I need to introduce one more component of Barbiers' theory, namely his definition of c-command. A simplified version of this definition appears in (102) (I have removed aspects not relevant to PP-over-V).

(102)   A node α c-commands a node β if and only if
    (i)   α does not dominate β and β does not dominate α, and
    (ii) there is a path of left branches from γ, the minimal node that dominates α and β, to α.
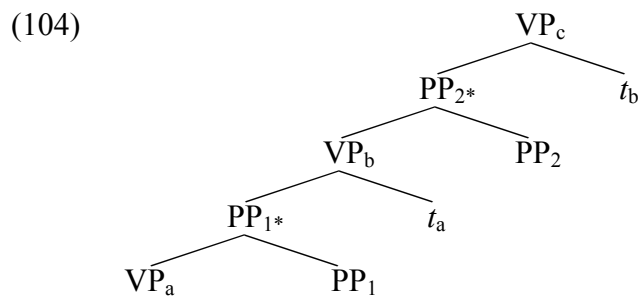
I cannot discuss this definition in detail, but it is important to realize that it differs from the standard first-branching-node definition in two important ways. First, it allows c-command out of constituents on a left branch. Second, it implies that c-command is exclusively left-to-right.

The stage is now set for the analysis of PP-over-V. Barbiers takes PP modifiers to be left-adjoined to VP, as in (103). In this structure PP_1 and PP_2 are intended to modify VP_a and VP_b, respectively. However, the structure as it stands does not permit this. The relationship of modification that connects each PP to its VP sister is monadic. While PP_1 immediately c-

commands VP_a and PP_2 immediately c-commands VP_b, there are no copies of these VPs that c-command the PPs in return, so that the structure in in danger of violating the Principle of Semantic Interpretation.
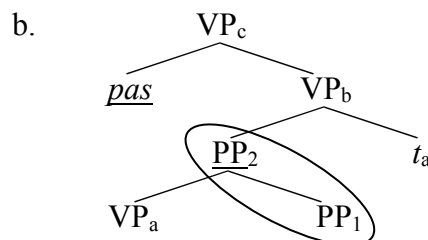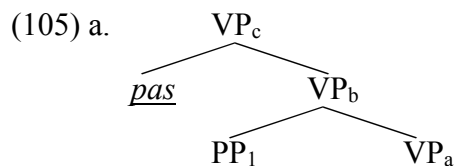
(103)

```
            VPc
          /      \
       PP2        VPb
                 /    \
              PP1      VPa
```
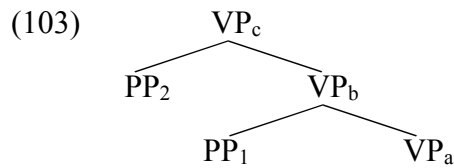
Barbiers argues that this can be fixed through roll-up movement: VP_a and VP_b each move and adjoin to their PP sister, as in (104). Note that these movements are licit, given that on the definition in (102) the fronted VPs c-command their traces. The movements in (104) add two further relevant c-command relations: VP_a immediately c-commands PP_1, and VP_b immediately c-command PP_2. This means that two triplets have now been created – $<VP_a$, PP_1, $t_a>$ and $<VP_b$, PP_2, $t_b >$ – that each encode a monadic semantic relation in a manner consistent with the Principle of Semantic Interpretation.

(104)

```
                            VPc
                          /      \
                      PP2*        tb
                     /     \
                  VPb       PP2
                 /    \
             PP1*      ta
            /    \
         VPa      PP1
```

If these movements may be either overt or covert, the free ordering of PPs with respect to the verb is captured, as well as the mirror image effect observed by Koster (1974).

Exactly because (104) is not 'stretched' in the standard antisymmetric way, Barbiers' analysis makes it possible to associate both pre- and postverbal PPs with *pas* while respecting the strict locality condition in (50).[22] Consider first the representation in (105a): since *pas* is merged immediately above the PP, association is possible. Crucially, the same is true of (105b). In contrast to its counterpart in (94a), the fronted VP in (105b) does not count as an intervener for association with *pas*. By (102), domination precludes c-command. The fact that VP_a is adjoined to PP_2 therefore implies that VP_a does not c-command PP_2 and consequently cannot be a closer c-commanding category either.

(105) a.

```
            VPc
          /      \
       pas        VPb
                 /    \
              PP1      VPa
```

b.

```
            VPc
          /      \
       pas        VPb
                 /    \
              PP2       ta
             /    \
          VPa      PP1
```
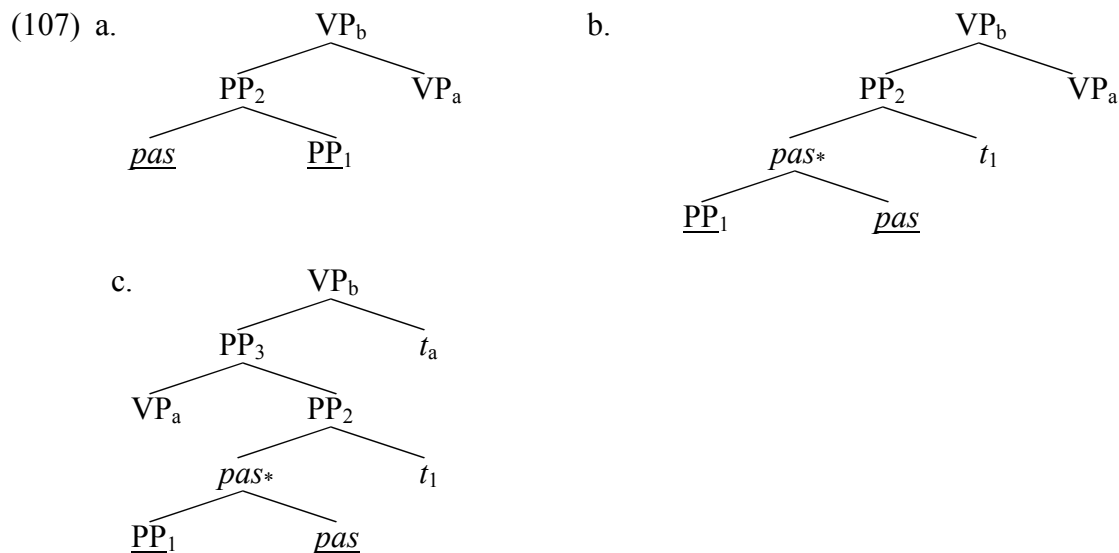
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[22] In fact, this condition is subsumed under the Principle of Semantic Interpretation, which requires immediate c-command (i.e. c-command without an intervenor). For details see immediately below.

The actual analysis that Barbiers offers for *pas* is more complicated. The reason for this is that the relation between *pas* and its associate is monadic, which implies that the associate must move to c-command *pas*. Barbiers assumes that it attaches to *pas*, in much the same way that a VP moves and adjoins to a PP modifier. Thus, the derivation in (105) must continue to yield (106).

(106)

$$VP_c$$

pas_* — VP_b

PP_2 — *pas* | t_2 — t_a

VP_a — PP_1
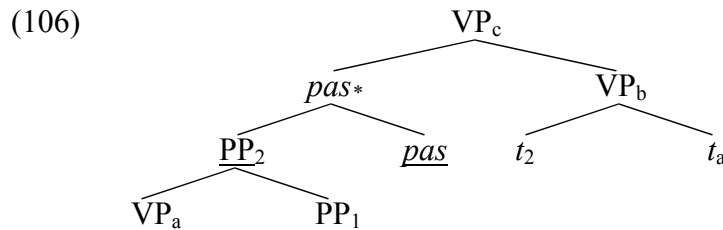
In the same vein, when *pas* is directly merged with a PP modifier, as in (107a), two movements must take place, one that facilitates association with *pas* (see (107b)) and one that facilitates modification of VP (see (107c)).

(107) a.

$$VP_b$$

PP_2 — VP_a

pas — $\underline{PP_1}$

b.

$$VP_b$$

PP_2 — VP_a

pas_* — t_1

$\underline{PP_1}$ — *pas*

c.

$$VP_b$$

PP_3 — t_a

VP_a — PP_2

pas_* — t_1

$\underline{PP_1}$ — *pas*

Not only the movement of VP to PP must be allowed to be either overt or covert, but so must the movement of PP to *pas*. This is because both the order *pas*–PP and the order PP–*pas* are grammatical. Thus, the derivations in (105)/(106) and (107) generate the following strings.

(108)

	(105)/(106)	(107)
No overt movement.	*pas*–PP–VP	*pas*–PP–VP
PP moves overtly.	PP–*pas*–VP	PP–*pas*–VP
VP moves overtly.	*pas*–VP–PP	**VP–*pas*–PP**
PP and VP move overtly.	**VP–PP–*pas***	**VP–PP–*pas***

Among these orders there are two that are in fact ungrammatical (those boldfaced in (108); see (62)).[23] Thus, while Barbiers' analysis is an improvement over a standard antisymmetric

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[23] Barbiers suggests that the order V-$\underline{PP}$-*pas* is grammatical, basing himself on the example in (i) (see also footnote 17).

account in that it is consistent with the strict locality that association with *pas* is subject to, it is not clear that it captures the fact that PP-over-V does not affect *pas*+PP.

There are two other downsides to Barbiers reinterpretation of antisymmetry. The first of these it inherits from standard antisymmetric mirroring through roll-up movement: the account is incompatible with certain constraints on movement. (i) VP must be transparent for extraction after it has adjoined to PP, in contravention of the adjunct island constraint (see (109)). Barbiers suggests that extraction from the base position may provide a way out, but this is likely to go against restrictions on interacting movements (see Williams 2003, Abels 2008, and Neeleman and Van de Koot 2010).

(109) a. Wat heeft Jan [VP [PP in Amsterdam] [VP t_{Wh} gekocht]]?
       what has John   in Amsterdam   bought
       'What did John buy in Amsterdam?'
   b. What heeft Jan [VP [PP [VP t_{Wh} gekocht] in Amsterdam] t_{VP}]?
       what has John   bought   in Amsterdam

(ii) Stranding of pied-piped material must be permitted, as a finite verb moves to C in main clauses even if VP has moved across a PP. (iii) The account violates antilocality (see Abels 2003, 2012). If a head and a complement cannot recombine through movement because they are sisters in the underlying representation, then the fact that VP and PP are sisters ought to also block recombination through movement.

The second downside of Barbiers' analysis has to do with the definition of c-command that it relies on. Whereas the standard first-branching-node definition can be derived from more fundamental phrase-structural notions (see Neeleman and van de Koot 2002), this is unlikely to be true of the definition in (102). Given that c-command, if taken as a primitive, is quite a baroque notion, this constitutes a problem.

None of these issues affects the base-generation account of PP-over-V. My assessment, then, is that while it is a good first step to remove the stretched trees required by standard antisymmetry, it is even better to do away with antisymmetry altogether.

10. Conclusions

Let me summarize the main conclusions of this paper.

First, Universal 20 and the distribution of PPs in Dutch must be regarded as instances of the same phenomenon (mirroring plus movement of the lexical head or a constituent containing the head). This is because of the similarity of the data patterns in in (4) and (7).

(i)   Jan   heeft gewerkt in EEN stad pas.
         John has   worked in one city PAS
         'John has worked in only one city.'

This is *pas* in its guise as a numeral qualifier (see footnote 11). However, as a numeral qualifier, *pas* could be attached to the DP *EEN stad* 'one city' rather than to the extraposed PP *in EEN stad* 'in one city' (see (ii)). Hence, it is not clear that this example shows what it is supposed to show. If the structure of the extraposed PP in (i) is [*in* [[*EEN stad*] *pas*]], the example does not bear on the issue at hand.

(ii)   Jan   heeft gewerkt [in [pas [EEN stad]]].
         John has   worked in PAS one city
         'John has worked in only one city.'

Second, existing accounts of Universal 20 suggest that PP-over-V should not result from PP movement, whether leftward or rightward. This is confirmed by the distribution of the qualifier *pas*. *Pas* cannot be associated with the traces left behind by these putative movements, and modification by *pas*+PP cannot be rely on reconstruction.

Third, the distribution of *pas* is at odds with standard antisymmetric analyses of mirror image effects in terms of roll-up movement. A standard antisymmetric account is incompatible with the strict locality condition that governs association with *pas*, and it also cannot explain why *pas*+PP should block roll-up movement.

Fourth, roll-up movement in shrunken trees, as proposed in Barbiers (1995), explains why PP-over-V does not affect association with *pas*. However, it has some difficulty in explaining why *pas*+PP must appear preverbally, and it is incompatible with independently motivated syntactic restrictions.

The only theory compatible with all the data discussed above treats mirror image effects as resulting from variation in linearization, in line with the supposition that symmetry needs no explanation.

Acknowledgments

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