PP-over-V meets Universal 20

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It has proven hard to force a decision between rival analyses of Universal 20. 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 1996. 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. There is no a priori reason, then, to expect any correspondence. Yet the parallel between the two sets of data is so clear as to seem undeniable. This is interesting in itself. However, the reason that I want to look at the two phenomena in tandem is that a comparison is likely to be mutually informative: insights into Universal 20 may bear on the analysis of the distribution of PPs and insights into the distribution of PPs may bear on the analysis of Universal 20.

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 strict 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.

It is important to realize that Universal 20 must be construed as 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 ɖàxó 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 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. Ultimately, the dispute goes back to 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 (see also Barbiers 1996):[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

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

(6) a. dat Jan zijn moeder opbelde
that John his mother up-called
'that John called up his mother'

[1] In addition to PP-over-V, Dutch allows right dislocation. The two processes can be distinguished by a simple

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

This fact about right-dislocation can be understood under 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). The ungrammaticality of (ia) then follows from the fact that *Ik heb die jas gekocht* 'I have bought that coat' is not a felicitous answer to the question *when did you buy that coat?*.

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 (p=0.00014).

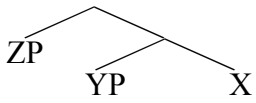
(7)

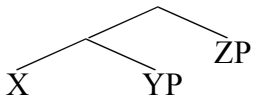
	I	II	III	IV
a.	$PP_3\ PP_2\ PP_1\ V$	$V\ PP_1\ PP_2\ PP_3$	$V\ PP_3\ PP_2\ PP_1$	$PP1\ PP_2\ PP_3\ V$
b.	$PP_3\ PP_2\ V\ PP_1$	$PP_1\ V\ PP_2\ PP_3$	$PP_3\ V\ PP_2\ PP_1$	$PP_1\ PP_2\ V\ PP_3$
c.	$PP_3\ PP_1\ V\ PP_2$	$PP_2\ V\ PP_1\ PP_3$	$PP_1\ V\ PP_3\ PP_2$	$PP_2\ PP_3\ V\ PP_1$
d.	$PP_3\ V\ PP_1\ PP_2$	$PP_2\ PP_1\ V\ PP_3$	$V\ PP_2\ PP_1\ PP_3$	$PP_3\ PP_1\ PP_2\ V$
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 explore the implications of the hypothesis that Universal 20 and the distribution of PPs in Dutch are – at an abstract level – the same phenomenon. 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. The remainder of the paper (sections 6 to 10) deals with the syntax of the particle *pas* 'only', which can associate with temporal PPs under very strict locality (Barbiers 1996). This strict locality makes it possible to test exactly what mirroring device is involved in PP-over-V. First, the data show that, as predicted if Universal 20 and the distribution of PPs are of a kind, PP-over-V cannot be dealt with through PP movement. Second, the data show that it 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.

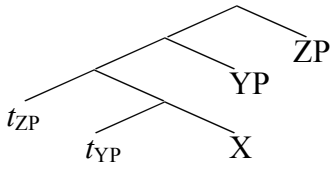
2. Three ways of mirroring

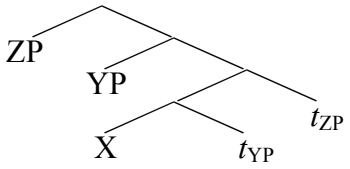
As will be clear from the introduction, the syntax of mirroring is central to the issues dealt with in this paper. There are three options that I will consider. The first is that mirror image effects result from variation in the linearization of trees. If ZP must c-command YP when both are merged in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

(8) a. 

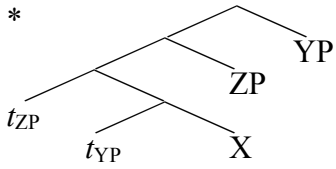
b. 

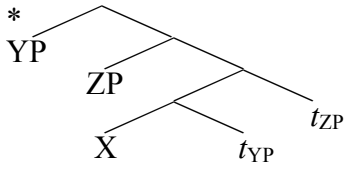
While variation in linearization is certainly the simplest way of deriving mirror image effects, it is not the only way. One alternative is to make use of movement of ZP and YP, the 'dependents' of X. This kind of analysis comes in two variants: it could rely on rightward movements that link the base structure in (8a) to a representation like (9a), or on leftward movements that link the base structure in (8b) to a representation like (9b).

(9) a. 

b. 

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 (8a) to (10a), or (8b) to (10b).

(10) a. * 

b. * 

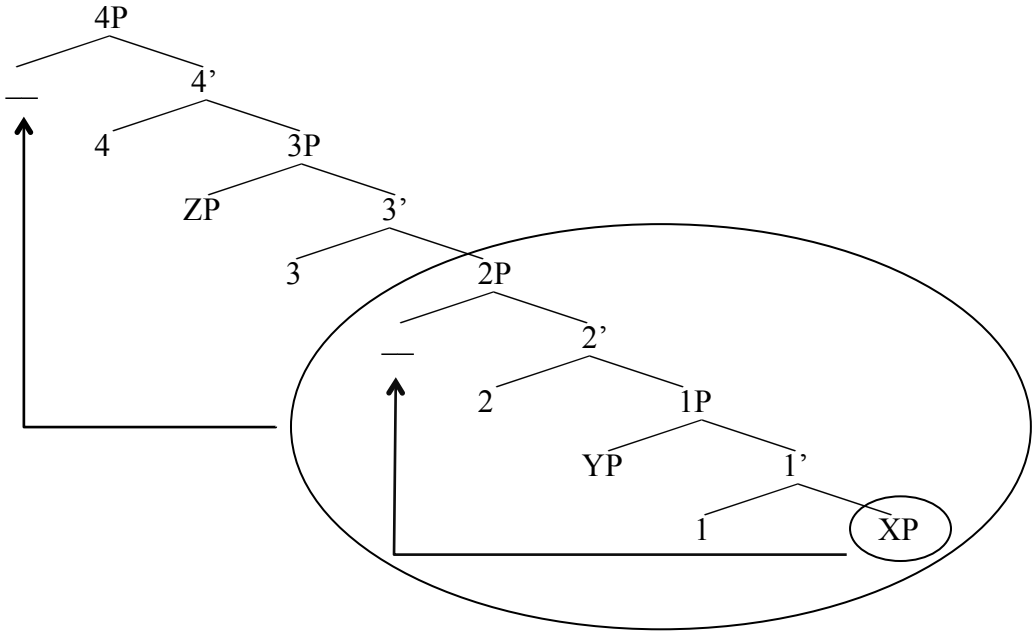
There is an off-the-shelf solution for this in the form of a chain-based version of Relativized Minimality (as proposed in Starke 2001). The main difference between this constraint and standard Relativized Minimality is that interveners are not simply constituents in the path of movement, but rather full chains (that is, a constituent and all its traces). The constraint can be formulated as in (11).

(11) 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. However, in case the movements in question all involve movements of dependents across the lexical head of an extended projection, (11) bans a non-mirroring order of landing sites. Thus, it rules out the representations in (10), because in both (10a) and (10b) YP is structurally separated from its trace by a full chain {ZP, t_{ZP}}. By contrast, (9a) and (9b) are well formed, because neither YP nor ZP is structurally separated from its trace by a full chain: YP is merely separated from its trace by the chain link t_{ZP}, while ZP is merely separated from its trace by the chain link YP.

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 a underlying structure that is rightward descending. Specifiers of functional heads can host ZP and YP in such a structure, making it possible to base-generate the ZP-YP-X order. The reverse order is derived by first moving XP across YP and subsequently moving a category that dominates XP in its derived position across ZP. 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:

(12)

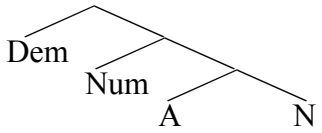


All three techniques of capturing mirror image effects have precedents in the literature. The analyses of Universal 20 sketched in the next two sections use variation in linearization and roll-up movement, respectively. Mirroring through rightward movement is used in Koster's (1974) analysis of PP-over-V. Koster (2001) advocates an alternative notion of 'parallel construal'. However, parallel construal shares crucial properties with rightward movement: there is an empty category in preverbal position that must be c-commanded by the postverbal PP. Hence, much of the discussion of mirroring through rightward movement is relevant to parallel construal as well.

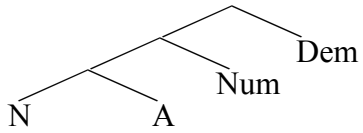
3. Universal 20 Symmetric

The pattern in (3) permits a simple analysis based on mirroring though variation in linearization (see Ackema and Neeleman 2002; for an earlier anti-symmetric 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:[2]

(13) a.

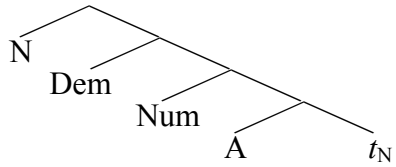


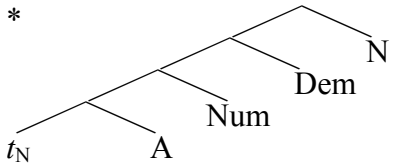
b.



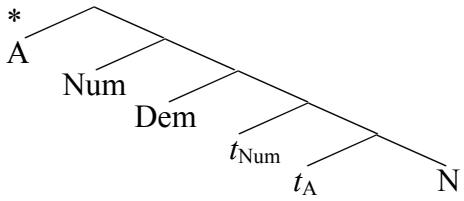
The second assumption is that neutral word order can result from leftward, but not rightward noun movement. This allows the attested order in (3III) to be derived from (13a), but blocks a derivation in which (3IV) is derived from (13b):

[2] The trees in this section are highly underspecified. This is intentional. As long as the constraints in (16) are in place, the pattern in (4) is generated, 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).

(14) a. 

b. * 

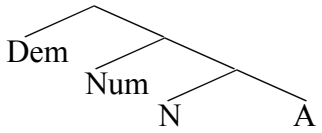
The third assumption is that neutral orders cannot be derived by movement of a dependent of the head noun. Otherwise, leftward movement of the adjective and the numeral could produce the unattested order in (3IV) after all (see (15)). This is not a surprising restriction. While head movement typically 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.

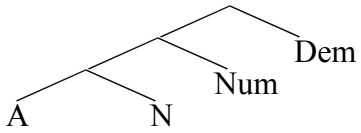
(15) * 

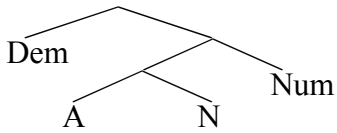
The account developed so far can be summarized as follows:

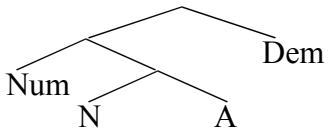
(16) (i) There is a universal hierarchy Dem > Num > A > N.
(ii) Neutral orders are base-generated or derived by X^0-movement. (to be revised)
(iii) X^0-movement is asymmetric: it must be is leftward. (to be revised)

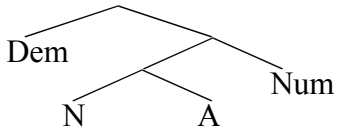
So far I have limited myself to the mini-paradigm in (3). Does the account scale up to reality? That is, can it capture the full set of data in (4)? Abels and Neeleman (2012) argue that it does, with one minor adjustment. In addition to the structures in (13), three other symmetric pairs can be generated without movement. The relevant trees are given in (17a,b), (17c,d) and (17e,f); they deliver the attested orders in (4Ib,IIb), (4Ic,IIc) and (4Id,IId), respectively.

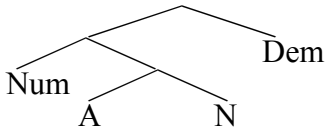
(17) a. 

b. 

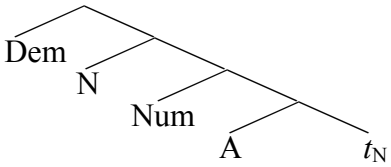
c. 

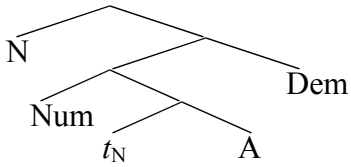
d. 

e. 

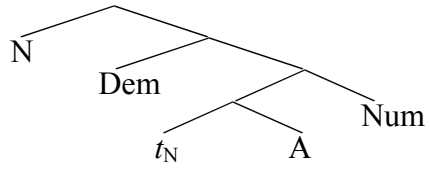
f. 

In addition to (14a), three more grammatical structures can be generated by movement of the noun, as demonstrated by the trees in (18), which deliver the attested orders in (4IIIa,d,e).

(18) a. 

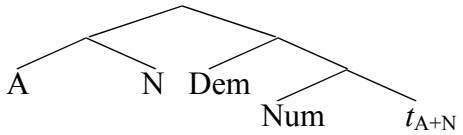
b. 

c.

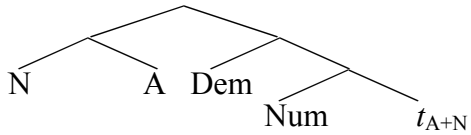


The final two attested orders in (4IIIc,f) can also be generated though movement if a small adjustment is made to the assumptions in (16ii,iii): Noun movement must be allowed to pied-pipe adjectives, as in (19). In order to accommodate pied-piping, I have substituted X^+ for X^0 in the revised conditions below – X^+ stands for the lexical head or a constituent containing the lexical head.

(19) a.



b.



(16) (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)

Notice that none of the orders derived by movement has a symmetrical counterpart, as expected if the asymmetry in the system is due to a ban on rightward movement of N (or N+A).

Let me conclude this section with a brief discussion of how the unattested orders in (4) are ruled out. Given the hierarchy of merger in (16ii), 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 (16) to separate an adjective and a noun if they come in this order (see (20a)). Similarly, given that numerals must be adjacent in any base-generated structure to the substring comprising the adjective and the noun, the order in (20b) is excluded. As a consequence, (4Ie,f) and all of (4III) are ruled out.

(20) a. *A … X … N
b. *Num … X … A+N

Two unattested orders remain, namely (4IIe,f). In these orders, the adjective and the noun are separated, suggesting that N has moved (leftward, as required). But if so the base structure for both (4IIe) and (4IIf) must have been either Num-Dem-A-N or Num-Dem-N-A. Neither of these orders can be generated under the assumptions in (16) (compare (4IIIc,f)).

4. Universal 20 Antisymmetric

The analysis of Universal 20 outlined in the previous section is a reinterpretation of the antisymmetric analysis in Cinque 2005, which I summarize in (21). 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 (16i) must be implemented in a expanded structure (as expressed in (21i)). Second, there is only one base-generated order, namely Dem-Num-A-N; every other order must be derived by N^+-movement. In particular, mirror image effects must result from roll-up movement, rather than variation in linearization. This is why (21i) mentions AgrW, AgrZ and AgrY, whose specifiers function as landing sites for movement.

Third, given its characterization of the syntax as fundamentally asymmetric, the LCA demands that movement be leftward. A moving category will simply not find c-commanding positions to its right.

(21) (i) The underlying structure of the extended projection of the noun is projected from a series of heads that come in a fixed hierarchy:
AgrW > W > AgrZ > Z > AgrY > Y > N, where
a. W hosts DemP in its specifier
b. Z hosts NumP in its specifier, and
c. Y 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 (21i) unfolds as in (22), where the positions labeled 1,2 and 3 are landing sites for movement. All derivations have this representation as their starting point.

(22) [$_{AgrWP}$ $\underset{3}{\_\_}$ Agr_W [$_{WP}$ **Dem** W [$_{AgrZP}$ $\underset{2}{\_\_}$ Agr_Z [$_{ZP}$ **Num** Z [$_{AgrYP}$ $\underset{1}{\_\_}$ Agr_Y [$_{YP}$ **A** Y **NP**]]]]]]

The simplest derivation involves no movement at all and therefore yields Dem-Num-A-N. But all other attested orders can be derived as well. Their derivations are given in (23b-n).

(23) a.	Ia: No movement	(Dem-Num-A-N)
b.	Ib: NP moves to 1	(Dem-Num-N-A)
c.	Ic: AgrYP moves to 2	(Dem-A-N-Num)
d.	Id: NP moves to 1, AgrYP moves to 2	(Dem-N-A-Num)
e.	IIa: NP moves to 1, AgrYP moves to 2, AgrXP moves to 3	(N-A-Num-Dem)
f.	IIb: AgrXP moves to 3, AgrYP moves to 2	(A-N-Num-Dem)
g.	IIc: Agr XP moves to 3, NP moves to 1	(Num-N-A-Dem)
h.	IId: AgrXP moves to 3	(Num-A-N-Dem)
i.	IIIa: NP moves to 3	(N-Dem-Num-A)
j.	IIIb: NP moves to 2	(Dem-N-Num-A)
k.	IIIc: AgrYP moves to 3	(A-N-Dem-Num)
l.	IIId: Agr XP moves to 3, NP moves to 2	(N-Num-A-Dem)
m.	IIIe: AgrYP moves to 2, NP moves to 3	(N-Num-A-Dem)
n.	IIIf: NP moves to 1, AgrYP moves to 3	(N-Dem-A-Num)

Equally importantly, none of the unattested word orders in (4) can be derived under the assumptions in (21). 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 is very similar ways. I illustrate this for N-Dem-A-Num in (24a,b) and for N-A-Num-Dem in (25a,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.

(24) a. [$_{AgrWP}$ **NP** [$_{WP}$ **DemP** [$_{AgrXP}$ [$_{AgrYP}$ $\mathbf{t_{NP}}$ [$_{YP}$ **AP** t_{NP}]] [$_{XP}$ **NumP** t_{AgrYP}]]]]
b. [**N** [**Dem** [[$\mathbf{t_N}$ **A**] **Num**]]]

(25) a. $[_{AgrWP}\ [_{AgrXP}\ [_{AgrYP}\ \mathbf{NP}\ [_{YP}\ \mathbf{AP}\ t_{NP}\ ]\ ]\ [_{XP}\ \mathbf{NumP}\ t_{AgrYP}\ ]\ ]\ [_{WP}\ \mathbf{DemP}\ t_{AgrXP}\ ]\ ]$

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:

(26) *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 us the sister of the trace's mother.
c. Prune all non-branching non-terminals, maintaining dominance.

(27) *Stretching* (partial definition, for right adjuncts/specifiers only)
In a structure $[_Y\ X\ \alpha]$, where Y is projected from X and α is N, 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 $Agr_{F\alpha}P$.
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 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, then, is whether the extra movements and extra structure required by antisymmetry are harmful.

Abels and Neeleman (2012) do not find 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, in that 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 look at the issue raised by the ban on stranding of pied-piped material. The effects of this constraint are illustrated in (28c), 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 (28a,b) show that each of the movements in (28c) is well formed in itself; it is the specific combination of movements that is ruled out.

(28) a. $[_{PP}$ With which friend] did you say $[t_{PP}$ that she went home $t_{PP}]$
b. $[_{NP}$ Which friend] did you say $[t_{NP}$ that she went home with $t_{NP}]$
c. *$[_{NP}$ Which friend] did you say $[[_{PP}$ with $t_{NP}]$ that she went home $t_{NP}]$

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 (24a)). By contrast, the symmetric analysis in (24b) 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 (28c) and related data.

Below, I will show 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.[3] 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 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 (29)), the order of the corresponding postverbal PPs in Dutch is variable (as shown in (30)). This contrast is obviously something that requires analysis.

(29) a. John thought of his father during the break.
b. ??John thought during the break of his father.

(30) a. Jan dacht aan zijn vader tijdens de pauze.
John though of his father during the break
b. Jan dacht tijdens de pauze aan zijn vader.
John thought during the break of his father

Koster's explanation of the contrast between (29) and (30) is based on the observation (by now familiar) that in Dutch embedded clauses prepositional phrases mirror around the verb:

(31) a. ??dat Jan aan zijn vader tijdens de pauze dacht.
John though of his father during the break
b. dat Jan tijdens de pauze aan zijn vader dacht.
John thought during the break of his father

(32) a. dat Jan dacht aan zijn vader tijdens de pauze.
John though of his father during the break
b. ??dat Jan dacht tijdens de pauze aan zijn vader.
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 (33a) – the scheme for embedded clauses – only one order of PPs can be generated (PP_1-PP_2). However, following the verb in (33b) – the scheme for main clauses – two orders are admissible (PP_2-PP_1, PP_1-PP_2).

(33) 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 English is a VO language, the only admissible order is the one that results from base-generating the PPs in postverbal position: 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 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

[3] The pattern has also been identified in German, although the data are possibly not as crisp as they are in Dutch (see Schweikert 2005).

gives rise to the scheme in (34a), or (34b) once verb movement is factored in. Fixing the position of the PPs in (34b) in various ways yields the orders in (35a-d), but crucially (35e,f) cannot be generated.

(34) 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>]

(35) 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, these predictions can be tested. The examples in (36) 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.

(36) 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
'He has 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 (37a-d) are grammatical, but the ones in (37e,f) are not.

(37) 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:[4]

[4] PPs can undergo A'-movements of various kinds, including fronting to the left periphery of main clauses. The table in (7) abstracts away from such movement.

(7)

	I	II	III	IV
a.	$PP_3\ PP_2\ PP_1\ V$	$V\ PP_1\ PP_2\ PP_3$	$V\ PP_3\ PP_2\ PP_1$	$PP_1\ PP_2\ PP_3\ V$
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.	$PP_1\ PP_3\ V\ PP_2$	$PP_2\ V\ PP_3\ PP_1$	$V\ PP_1\ PP_3\ PP_2$	$PP_2\ PP_3\ PP_1\ V$

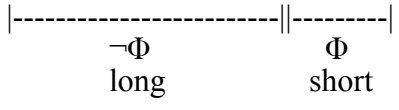
This pattern is largely identical to the one established by Cinque for the typology of the noun phrase (see ((4)). There are three cells where the correlation breaks down (namely (7IIIb,c,f)). It is not a mystery why this should be so. First, verb second (as opposed to noun movement) takes the verb all the way to the left periphery of its extended projection, ruling out (7IIIb). Second, verb second (as opposed to noun movement) does not permit pied-piping, ruling out (7IIIc) and (7IIIf). These are properties specific to verb second. One would therefore expect that in a typological study (which should uncover a larger range of V^+ movements) there will be 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 (16ii,iii) or (21ii,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 (16ii) and (21ii)). Second, Dutch should have no rightward verb movement (as this is ruled out by (16iii) and (21iii)). 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 in section 8 below.

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 most of the observations that follow are his.[5] The analysis sketched in this section also adopts many of Barbiers' theoretical claims, but crucially not all of them – see section 10 for discussion.[6] 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:

(38)


[5] *Pas* has a second use as a numeral qualifier. In this guise, it appears local to a numeral that 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. Barbiers unifies these two usages of *pas*, but for reasons of space I cannot go into this here.

[6] To be concrete, I adopt from Barbiers the hypothesis that *pas* means 'long(¬Φ)' (see immediately below) and the locality restriction in (46). The idea that *pas* introduces a selectional requirement [QL] is mine.

All else being equal, this suggests that the truth of Φ is recent. Indeed, *pas* is interpreted in this way in examples like (39): the period following John's move to Amsterdam is taken to be short compared to the period preceding that event.

(39) 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 (40). We can depict the semantic contribution of these modifiers as in (41).

(40) 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 sinds ten minutes again laugh
'John is able to laugh again since ten minutes.'

(41) 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 (42) differ from those in (40) in that a subjective judgment is expressed about the length of the ten-minute period the modifiers measure. In (42a) this period is characterized as long (see (43a), while in (42b) it is characterized as short compared to the preceding period in which John was not able to laugh (see (43b). (Throughout I use underlining to indicate association.)

(42) 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.'

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

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

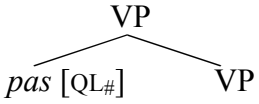
In this regard, *pas* differs from temporal adverbials like *recent* 'recently', which do not permit such alignment under association. Thus the examples in (44) are interpreted with 'recently' modifying 'was able to laugh again after ten minutes'. While such an interpretation is acceptable in (44a), it is very strange in (44b).

(44) 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 pas 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 modifies the structure to which it is attached and in addition it can be associated with a temporal modifier. Modification and association are subject to distinct syntactic constraints.

The syntax of modification, I assume, involves a selectional requirement introduced by *pas* and satisfied under sisterhood by 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:[7]

(45)

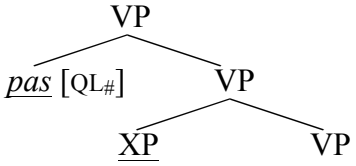


The syntax of association with *pas* is largely regulated by a very strict locality constraint. Barbiers (1995) shows that *pas* must immediately c-command its associate – more precisely, *pas* is subject to the condition in (46).

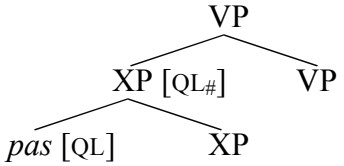
(46) *Pas* must c-command its associate, and there can be no XP such that (i) *pas* c-commands XP, (ii) XP c-commands the associate, and (iii) the associate does not c-command XP.

This constraint allows *pas* and its associate to be merged separately, as in (47a) (this option was presupposed in the discussion above). In addition, *pas* can form a constituent with its associate, as in (47b). In the latter case, I assume that [QL] is copied upwards to the node dominating *pas* and satisfied there.

(47) a.



b.



Both structures indeed exist. The examples in (48) 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.

(48) a. [PP Na hoeveel jaar therapie] praatte Jan volgens jou pas t_{PP} zonder blozen?
after how many year therapy talked John according.to you PAS without blushing
'After how many years of therapy did you say that John could talk without blushing?'
b. [PP Na tien jaar therapie] praatte Jan volgens mij pas t_{PP} zonder blozen.
after ten year therapy talked John according.to me PAS without blushing
'I think that John talked without blushing only after ten years of therapy.'

[7] On Neeleman and Van de Koot's (2002, 2010) analysis of syntactic dependencies, [QL] would have to be satisfied under direct domination. Therefore, it would be copied to the higher VP segment in (45) and be satisfied there by the lower VP segment. I will omit this step of percolation for presentational reasons.

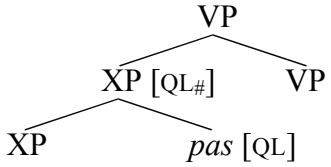
In the examples in (49) *pas* and its associate are fronted together. This shows that *pas* and its associate can indeed form a constituent.

(49) a. [$_{PP}$ Pas [$_{PP}$ na tien jaar therapie]] praatte Jan volgens mij t_{PP} zonder blozen.
only after ten year therapy talked John according.to me 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} zonder blozen.
after ten year therapy only talked John according.to me 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 (47b), the structure in (50) is well-formed. (I will come back to this in the next section.)

(50)



The XP-*pas* order is of course also found when no fronting takes place:

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

The very strict locality imposed by (46) is not surprising. *Pas* can associate with a wide range of categories. These include PPs (as illustrated above), AdvPs (see (52a)), DPs (see (52b)), and CPs (see (52c)). 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.

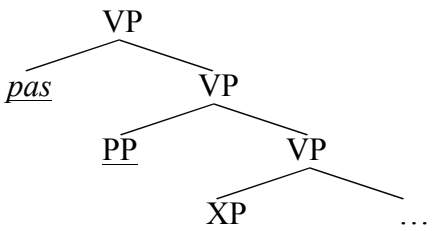
(52) a. Jan ging pas [$_{AdvP}$ gisteren] naar huis.
John went PAS yesterday to home
'John went home only yesterday.'

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.'

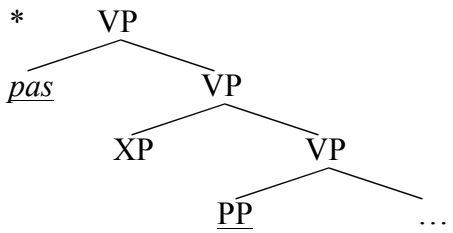
c. Jan ging pas naar huis [$_{CP}$ toen de wijn op was].
John went PAS to home when the wine up was
'John went home only when the wine ran out.'

However that may be, it follows from (46) that when *pas* and its associate do not form a constituent, they cannot be linearly separated in head-final structures. A structure like (53a) is ruled in, but in (53b) XP is c-commanded by *pas* and c-commands the intended associate, in violation of the requirement of immediate c-command.

(53) a.



b. *



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 (54a) and (54b) (both non-root clauses):

(54) a. dat Jan [[volgens mij]$_3$ [pas [[na tien jaar therapie]$_2$ [[zonder blozen]$_1$ praatte]]]]
that John according.to me PAS after ten year therapy without blushing talked
'that John talked without blushing only after ten years of therapy, I think'
b. *dat Jan [pas [[volgens mij]$_3$ [[na tien jaar therapie]$_2$ [[zonder blozen]$_1$ praatte]]]]
that John PAS according.to me after ten year therapy 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 (55) for intervening DPs, AdvPs and VPs. (Although I will not demonstrate this here, the category of the associate does not matter either.)

(55) a. *dat Jan pas [$_{DP}$ het boek] [na tien jaar] gelezen heeft
that John PAS the book after ten years read has
b. *dat Jan een boek pas [$_{AdvP}$ vaak] [na tien jaar] leest
that John a book PAS often after ten year reads
c. *dat Jan pas [$_{VP}$ aan Marie denkend] [na tien minuten] zag dat ik voor 'm stond.
that John PAS of Mary thinking after ten minutes saw that I before him stood

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 (56) show that the associate can appear to the right of the verb, and that it can be preceded by other postverbal PPs.

(56) a. dat Jan [volgens mij]$_3$ pas [zonder blozen]$_1$ praatte [na tien jaar therapie]$_2$.
John talked according.to me PAS without blushing after ten years therapy
'I think John talked without blushing only after ten years of therapy.'
b. dat Jan [volgens mij]$_3$ pas praatte [zonder blozen]$_1$ [na tien jaar therapie]$_2$.
John talked according.to me PAS without blushing after ten years 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 this combination as *pas*+PP):[8]

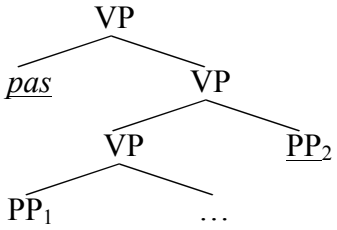
(57) a. *dat Jan zonder blozen praatte [$_{PP}$ pas [$_{PP}$ na tien jaar therapie]]
that John without blushing talked only after ten year therapy
that John talked without blushing only after ten years of therapy'
b. *dat Jan zonder blozen praatte [$_{PP}$ [$_{PP}$ na tien jaar therapie] pas]
that John without blushing talked after ten year therapy only
'that John talked without blushing only after ten years of therapy'

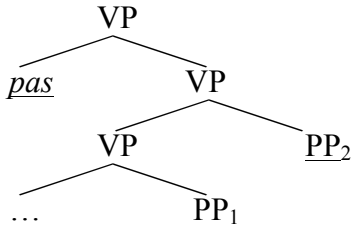
I will look at four analyses of PP-over-V, which respectively capture the mirror-image effect uncovered by Koster in terms of variation in linearization (section 7), PP-movement (section 8), roll-up movement in standard antisymmetric trees (section 9) and roll-up movement in shrunken trees (section 10).

[8] The inability of *pas*+PP to appear in postverbal position might follow on an analysis in which pas is never attached to its associate (compare Büring and Hartmann). However, I am skeptical of such an approach, partly because of examples like (49b).

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

Weerman (1989) was the first to suggest an account of PP-over-V that relies on variation in linearization. Such an account can deal in a straightforward manner with the fact that PP-over-V does not seem to affect association with *pas*. If linear order can vary while dominance and labeling relations remain constant, (46) permits linear separation of *pas* and its associate if the associate is an extraposed PP merged high enough. This is shown in (58); except for their linearization, the representations given are identical to the tree in (53a) (with XP instantiated as PP_1), and therefore they satisfy the requirement of direct c-command.

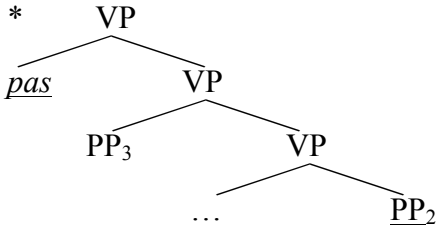
(58) a.


b.


This explains the grammaticality of the examples in (56), for which I give structures below:

(59) a. dat Jan [[volgens mij]$_3$ [pas [[[zonder blozen]$_1$ praatte] [na tien jaar therapie]$_2$]]
that John according.to me PAS without blushing talked after ten year therapy
b. dat Jan [[volgens mij]$_3$ [pas [[praatte [zonder blozen]$_1$] [na tien jaar therapie]$_2$]]]
that John according.to me PAS talked without blushing 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 (60), PP_3 is c-commanded by *pas* and c-commands PP_2, the intended associate, in violation of the requirement of direct c-command.

(60) *


Indeed, if *pas* is generated too high, it cannot associate with a PP, whether that PP is pre- or postverbal. The examples in (61) are as bad as the one in (54b):

(61) a. *dat Jan [pas [[volgens mij]$_3$ [[[zonder blozen]$_1$ praatte] [na tien jaar therapie]$_2$]]]
that John PAS according.to me without blushing talked after ten year therapy
b. *dat Jan [pas [[volgens mij]$_3$ [[praatte [zonder blozen]$_1$] [na tien jaar therapie]$_2$]]]
that John PAS according.to me talked without blushing 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 affect 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 head parameter has proven too course-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,

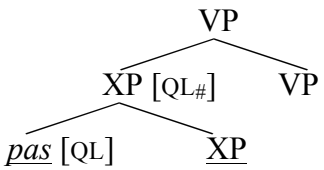
too, the head parameter must be unpacked into various category-specific linearization rules. For example, while in Dutch DP arguments precede V, PPs may precede or follow and CP-complements must follow (a fact not illustrated here).[9] The question, then, is what linearization rule regulates the placement of *pas*.

My proposal is that there is no rule that mentions *pas* as such, but that categories in which [QL] is satisfied must precede their sister, as in (62).[10]

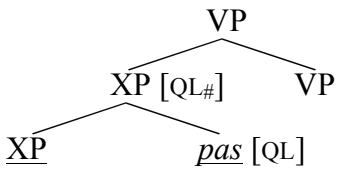
(62) If [QL] is satisfied in XP, the XP precedes its sister.

This proposal captures three generalizations. First, it has the consequence that *pas*, if attached to its associate, can either precede or follow its sister, a fact that was already illustrated in (49). 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:

(63) a.

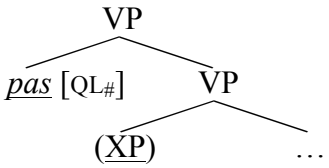


b.

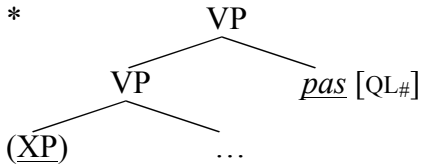


Second, if *pas* is merged separately from its associate or if it does not have an associate at all, then it must precede its sister. In that case [QL] must be satisfied in *pas*:

(64) a.



b. *



This accounts for the ungrammaticality of examples like (65), where *pas* immediately c-commands its associate, as required, but appears postverbally. The example in (65a) has the structure in (64b), with XP present; (65b) has the same structure except that XP follows rather than precedes its sister.

(65) a. *dat Jan [[[na tien jaar therapie]$_2$ [[zonder blozen]$_1$ praatte]] pas]
that John after ten year therapy without blushing talked PAS

b. *dat Jan [[[[zonder blozen]$_1$ praatte] [na tien jaar therapie]$_2$] pas]
that John without blushing talked after ten year therapy PAS

It also accounts for the fact that *pas* must be preverbal in the absence of an associate.[11] The example in (66) has the structure in (64b), with XP absent.

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[9] 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.

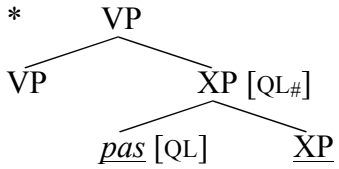
[10] On Neeleman and Van de Koot's (2002, 2010) analysis of syntactic dependencies (see footnote 7), the rule in (62) would have to be formulated slightly differently:

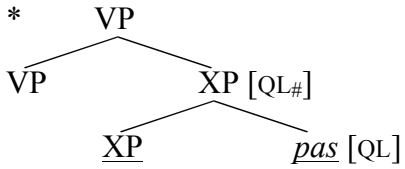
(i) If [QL] is satisfied in XP, then the daughter of XP in which [QL] originates precedes its sister.

[11] 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, to the extent that postverbal *pas* exists, it certainly cannot be used to answer *wh*-questions:

(66) *[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.'

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

(67) a. 

b. 

This, of course, accounts for the data in (57).

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:

(68) a. Jan heeft [volgens mij] [op z'n minst] [tien boeken] gekocht.
John has according.to me at his 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 his 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 his least bought
d. [[Op z'n minst] tien boeken] heeft Jan volgens mij gekocht.
at his least ten books has John according.to me bought
e. [TIEN boeken [op z'n minst]] heeft Jan volgens mij gekocht.
ten books at his least has John according.to me bought

Crucially, *op z'n minst* (and other qualifying PPs) cannot be extraposed:[12]

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

This follows from the rule in (62) if *op z'n minst* is indeed a qualifier. In that case, 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 (62), captures all core observations about the distribution of *pas*.

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

An obvious alternative to a treatment of PP-over-V as base generation is to make use of a movement operation that shifts PPs across the verb (or the verb's trace in main clauses). In

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

So, the star in (66) reflects the ungrammaticality of extraposition of *pas* other than through right dislocation.

[12] To the extent that this example is well formed, it must have the intonation of right dislocation under focus:

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

fact, this is the analysis assumed in Koster (1974). PP-over-V is taken to result from the transformational rule in (70), which is meant to apply to preverbal PPs from left to right.

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

If applied in this way, (70) will generate mirror orders. Starting with the string in (71a), a first application of the rule will deliver (71b). A second application will tuck PP_1 in below the surface position of PP_2, as in (71c). This is because the rule states that each PP is shifted to the immediate right of the verb.

(71) 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. I first consider a reinterpretation of Koster's analysis in which PPs move, with the order of their landing sites regulated by the chain-based version of Relativized Minimality in (11), repeated here for convenience:

(11) 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 (11) yields mirror orders in case two or more movements of the same type cross the lexical head of an extended projection. Thus, (72a) is grammatical, because PP_1 is separated from its trace by none of the chain links of $\{PP_2, t_2\}$, and (72b) is grammatical because only t_2 intervenes. But the anti-mirror order in (72c) is ruled out, because PP_1 is now separated from its trace by the full chain $\{PP_2, t_2\}$.

(72) a. $[[t_2 [[t_1$ V] $PP_1]]$ $PP_2]$
b. $[[[t_2 [t_1$ V]] $PP_1]$ $PP_2]$
c. *$[[[t_2 [t_1$ 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 plus leftward movement of PPs (henceforth 'PP intraposition'). The structures in (73) have the same properties as those in (72), except for linear order:

(73) a. $[PP_2 [[PP_1 [V\ t_1]]\ t_2]]$
b. $[PP_2 [PP_1 [[V\ t_1]\ t_2]]]$
c. *$[PP_1 [PP_2 [[V\ t_1]\ t_2]]]$

One complication with this way of deriving mirror image effects is that it relies on a notion of type-identical chain. While it is eminently sensible that multiple instances of PP extraposition or intraposition should be 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 (11), 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):

(74) a. *[Num [Dem [t_{Num} N]]]
b. *[A [Num [t_A N]]]
c. *[A [Dem [t_A N]]]

Although movement regulated by (11) 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-introposition 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 by proponents of 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:

(75) [[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 (62):

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

If we want to maintain that (62) regulates the position of *pas*+PP, a very similar assumption must be made on the PP-intraposition analysis. The problem for this analysis is that intraposition of *pas*+PP must be made obligatory, and the only way this can be achieved is by stipulating that [QL] can be satisfied in the head of the chain created by PP intraposition:

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

It is an open question whether the hypothesis that [QL] allows or requires satisfaction in the head of a movement chain can be made to fit in with a more general theory of modification. However that may be, this exceptional behaviour means that the distribution of *pas*+PP can only be accounted for if any trace of PP movement is ignored. 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 and PP intraposition leave a trace. First, consider what is predicted if PP extraposition did. We might expect it to be possible for *pas* to associate with the trace, while the PP takes scope in its derived position. Recall from (48) that *pas* can associate with a trace (the examples are repeated below for convenience).

(48) a. [PP Na hoeveel jaar therapie] praatte Jan volgens jou pas t_{PP} zonder blozen?
after how many year therapy talked John according.to you PAS without blushing

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

Alternatively, *pas* could associate with the moved PP, while its scope is computed under reconstruction. After all, reconstruction for scope is commonplace. Moreover, there can be no doubt that *pas* can associate with extraposed PPs. In the following coordinate structure, association with the putative traces of extraposition is impossible, as these traces are too deeply embedded, given (46):

(78) dat Jan [pas [t_1 zonder blozen praatte [na tien *e*]$_1$], en [t_2 zonder blozen danste
that John PAS without blushing talked after ten, and without blushing danced
[na vijftien jaar therapie]$_2$]]
after fifteen years therapy
'that John only talked without blushing after ten years of therapy, and only danced without blushing after fifteen'

In other words, there would be evidence for a trace of extraposition if it is possible to separate the scopal position of an extraposed PP from the position in which it associates with *pas*. We can determine whether such separation is possible by considering the structures in (79) (where α is an adverbial). If the PP's scopal position and the position in which it associates with *pas* can be distinct, then (79a) should permit a reading in which the PP takes scope over α (low association with *pas*; high scope), while (79b) should should allow a reading in which α takes scope over the PP (high association with *pas*; low scope).

(79) a. [α [*pas* [t_1 V]]] PP$_1$
b. [*pas* [[α [t_1 V]] PP$_1$]]

However, the fact of the matter is that such readings do not exist. The order in (79a) requires that α takes scope over the PP, while the order in (79b) requires that the PP takes scope over α. This is demonstrated by the examples below. The example in (80a) unambiguously expresses that John often wants to see two successful trials of a dish before he prepares it for guests. The example in (80b) unambiguously expresses that only after two successful trials will John prepare a dish for guests on a regular basis.

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

So, 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 (81). The example in (82) shows that this prediction is incorrect:

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

(82) *dat Jan [[volgens mij]$_3$ [[na tien jaar therapie]$_2$ [[zonder blozen]$_1$ [pas praatte]]]]
that John according.to me PAS after ten year therapy without blushing talked
'that John talked without blushing only after ten years of therapy, I think'

So, there is also no evidence from the distribution of *pas* for a trace of intraposition.

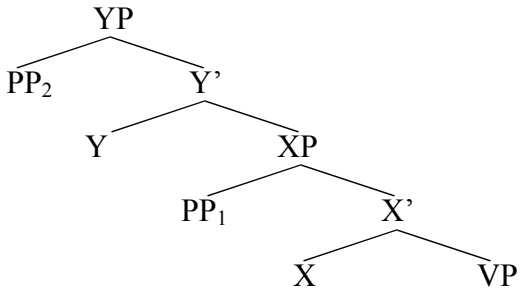
While the absence of evidence for traces is predicted by the base generation account, it remains unexplained on PP-movement accounts why the various relations a PP enters into cannot be distributed across chain members.

As already mentioned, Koster (2001) analyzes PP-over-V through a rule of parallel construal, which he explicitly argues is not an instance of movement, but which shares with movement a requirement of c-command, with a null category in the lower position and the overt PP in the higher one. The fact that parallel construal relates two positions implies that it is subject to the same criticism as the PP extraposition account discussed above.

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

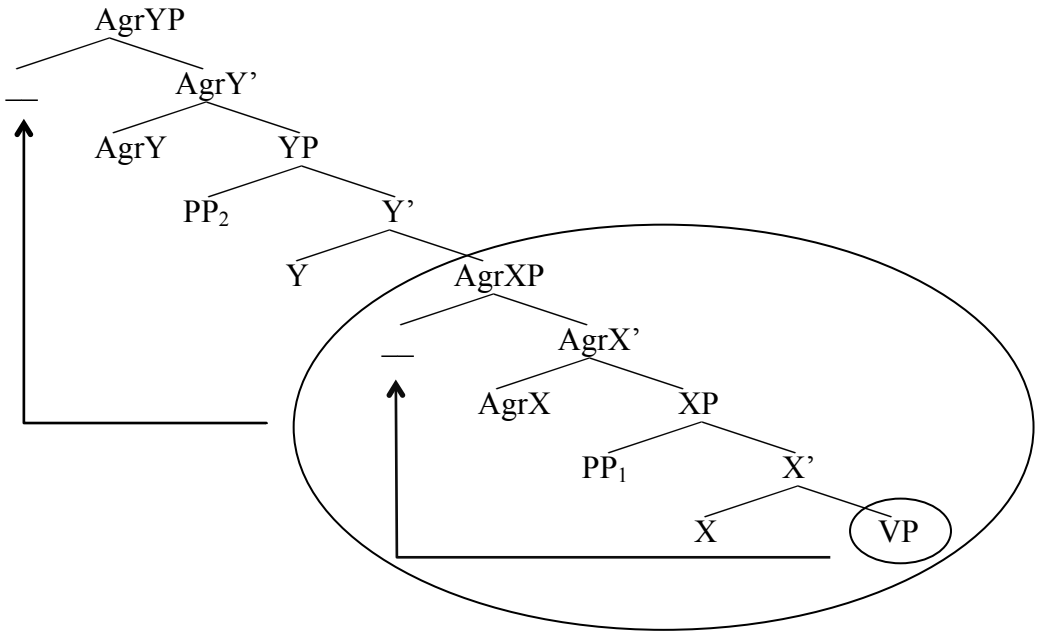
The third account of PP-over-V I consider is an antisymmetric analysis modelled on Cinque's (2005) account of Universal 20. On this account, mirror image effects result from roll-up movement. Antisymmetry implies that (83) is the minimal representation that can accommodate two adverbial PPs.

(83)



However, in order to allow for roll-up movement, and hence mirrored orders, additional landing sites must be postulated, as in (84).

(84)



Notice that this analysis inherits some problems from the account that it is based on. Like Cinque's account of word order in the noun phrase, 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 move out of a moved VP if that VP precedes any PP modifiers:

(85) …V_{fin} … [[$_{VP}$ … t_{fin} …] … [PP … t_{VP} …]]

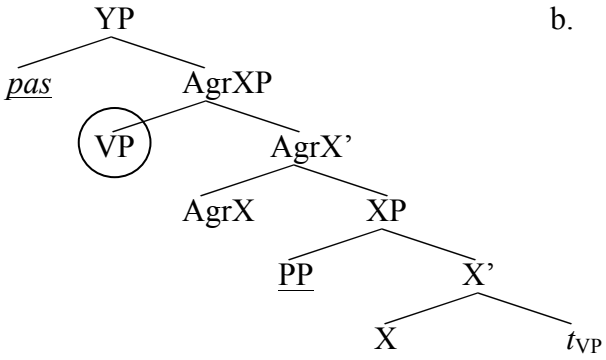
The antisymmetric analysis of PP-over-V in (84) faces two further significant problems when confronted with the distribution of *pas*.

First, it is incompatible with (46), the locality constraint on association with *pas*, because on the proposed analysis of PP-over-V this constraint is violated in certain grammatical structures. The crucial configuration is one in which *pas* precedes V, while its associate is in postverbal position:

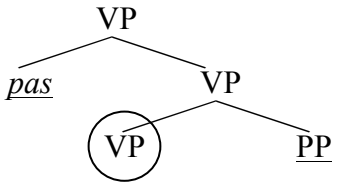
(86) dat Jan pas [$_{VP}$ een fiets kocht] [$_{PP}$ na drie jaar onderzoek]
that John PAS *a bicycle bought after three year research*
'that John only bought a bicycle after three years of research'

In (87a), the partial antisymmetric representation assigned to (86), *pas* does not immediately c-command the PP it is associated with. After movement, VP (i.e. *een fiets kocht*) c-commands the PP and is c-commanded by *pas*. This makes (87a) is exactly the kind of configuration that (46) is designed to rule out. I should emphasize that this difficulty is a direct consequence of the stretching of syntactic representations under antisymmetry. The conventional structure in (87b) satisfies (46).

(87) a



b.



There is no easy way out of this problem. It cannot be that verbal categories do not count for (46), given that intervention of a VP in (55c) leads to ungrammaticality. It also cannot be that (46) may be satisfied prior to movement of VP ('at D-structure'). Other moved categories that surface in between *pas* and its associate do violate (46). For instance, the examples in (88) 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 (89) is identical, except that the movement in this case is that of a contrastively focused PP.

(88) a. Jan heeft er pas na drie jaar wat t_R over gelezen.
John has there PAS *after three years 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 two years something about read*
c. Jan heeft pas na drie jaar er wat t_R over gelezen.
John has PAS *after three years there something about read*

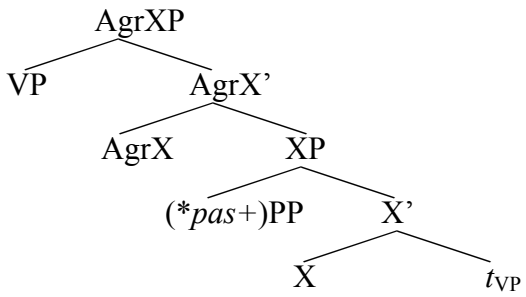
(89) a. Jan heeft DAARover pas na drie jaar wat t_{PP} gelezen.
John has there-about PAS *after three years something read*
'John has only read something about THAT after three years'

b. *Jan heeft pas DAARover na drie jaar wat t_{PP} gelezen.
John has PAS there-about after two years something read
c. Jan heeft pas na drie jaar DAARover wat t_{PP} gelezen.
John has PAS after three years there-about something about read

In sum, 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 lacking in Abels and Neeleman 2012. Antisymmetry is incompatible with the independently motivated constraint in (46), not because of the movements it relies on, but because of its stretched trees.

The antisymmetric account of PP-over-V faces a second problem that has to with the distribution of *pas*. Recall that pas+PPs cannot appear in postverbal position (see (57)). This fact is not easy to capture on the analysis in (84). As shown in (90), VP must be able to move across a PP, but not across a PP modified by *pas*. There is no obvious reason why this should be so. In particular, there is no reason why PP modifiers should project some sort of minimality barrier for movement of VP, but only if modified by *pas*.

(90)



Notice that since the problem involves a restriction on VP movement, any appeal to the linearization rule in (62) must remain unsuccessful.

In sum, 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*.

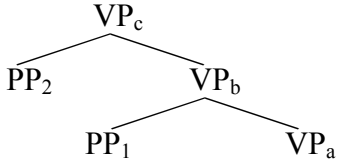
9. Roll-up movement in shrunken trees

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 shown that, in addition, the extra structure required by antisymmetry leads to problems 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. Barbiers develops an analysis that is antisymmetric in its outlook, but that does not involve stretched trees. I will not go into the various technicalities this involves, but will simply discuss how this analysis handles the distribution of *pas*.

Barbiers takes PP modifiers to be left-adjoined to VP, as in (91).

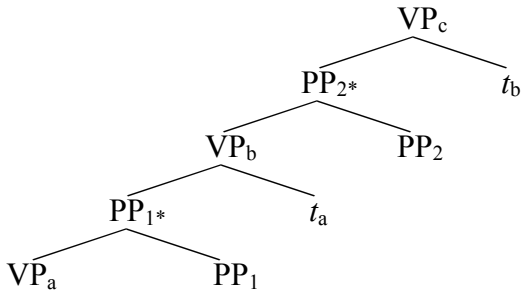
(91)



As on the standard antisymmetric account discussed in the previous section, PPs end up in postverbal position through roll-up movement. However, the crucial innovation of Barbiers'

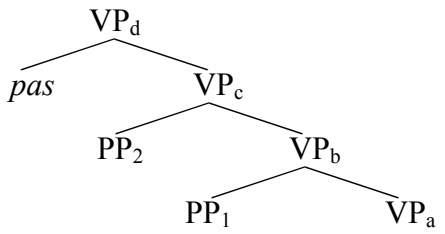
account is that this movement regime is executed though attachment of segments of VP to their PP sisters, as in (92).

(92)

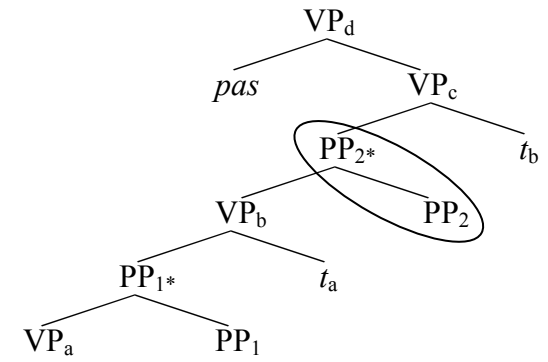


Exactly because (92) is not 'stretched' in the standard antisymmetric way, Barbiers' analysis makes it possible to account for the distribution of *pas*. The actual proposal is subtle and intricate, and I will not be able to do it justice here. For my current purposes, it suffices that (46) yields the right results when applied to representations like (91) and (92): if *pas* is merged higher that PP_2, it can associate with PP_2 (but not with PP_1), as required. This is obvious for (93a). But notice that, in contrast to the standard antisymmetric representation in (87a), it is also true of the mirrored structure in (93b). Crucially, the fronted VP in this structure does not count as an intervener for association with *pas* – partly because Barbiers uses shrunken trees and partly because he uses unusual labeling: if VP_b attaches to PP_2, the node that immediately dominates VP_b in its derived position is a projection of PP_2).

(93) a.



b.



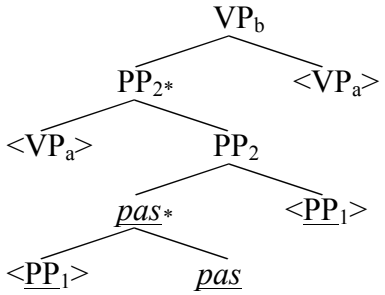
Barbiers argues that the movements in (93b) are triggered by a semantic requirement. His Principle of Semantic Interpretation allows modification only if two conditions are met: the modifier must immediately c-command the modified category (as per (46)), and the modified category must move and adjoin to the modifier by LF. If a PP is to modify a VP, the VP node that is sister to the PP must therefore move and attach to it. This may happen in over syntax or after spell-out, giving rise to the apparent optionality of PP-over-V.

I now turn to the question why PP-over-V does not affect *pas*+PP (see (57)). The question to be addressed is whether the strings *V-*pas*-PP and *V-PP-*pas* are ruled out on Barbiers' account.[13] Here, things get more involved. Barbiers' analysis of *pas* is different from the one sketched in section 6 in that there is no counterpart of [QL]. The analysis is based on the assumption that the only semantic contribution that *pas* makes is through association; when there apparently is no associate, VP fulfills this function. In addition, Barbiers argues that, like PP modifiers, *pas* is subject to the Principle of Semantic Interpretation. This means that the associate must move and attach to *pas* by LF. With this in mind, consider the representations in (94), where I have indicated the movements required by

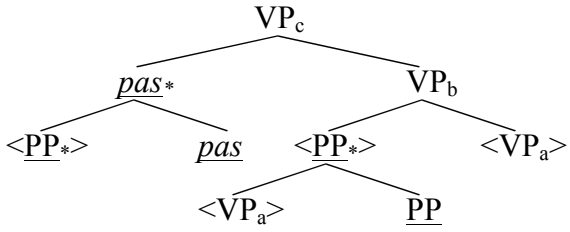
[13] See footnote 11 for some remarks on the marginal ability of *pas* to appear postverbally when it has no associate and is interpreted as 'recently'.

the Principle of Semantic Interpretation: (i) a segment of VP attaches to PP, and (ii) a segment of PP attaches to *pas* (given that we are interested in readings in which *pas* associates with the PP).

(94) a.



b.



If both movements may take place in overt syntax or be postponed until LF, the representation in (94a) yields the four orders in (95), while the represention in (94b) yields the four orders in (96).

(95) a. *pas* PP$_1$ VP$_a$
b. PP$_1$ *pas* VP$_a$
c. VP$_a$ *pas* PP$_1$
d. VP$_a$ PP$_1$ *pas*

(96) a. *pas* PP VP$_a$
b. *pas* VP$_a$ PP
c. PP VP$_a$ *pas*
d. VP$_a$ PP *pas*

Among the orders in (95) and (96) we find the two under discussion: *V-*pas*-PP and *V-PP-*pas*.[14] In addition, it turns out that *PP-V-*pas* can be generated – this order is ungrammatical as well (see (65a)). It is certainly possible that I am overlooking something, but my impression is that as the proposal stands, it is not possible to block the derivations that give rise to this order (as far as I can work out from the discussion in Barbiers 1995:97ff).

In sum, Barbiers' proposal explains why PP-over-V does not affect association with *pas* (when merged separately). On my reading, it has more trouble explaining why PP-over-V does not affect *pas*+PP. Overall, however, the proposal is considerably more successful than the standard antisymmetric one discussed in the previous section. Yet, the proposal has various downsides, some of which it inherits from standard antisymetry:

- The analysis is incompatible with the adjunct island constraint, given that VP is transparent for extraction after it has adjoined to PP. Barbiers suggests that extraction

[14] Barbiers suggests that the order V-PP-*pas* is grammatical, basing himself on the example in (i).

(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 5). 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 (although on my account it would probably require that the rule in (62) applies only to nonnumerical qualification or only to verbal sisters).

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

from the base position may be possible, but this is likely to go against restrictions on interacting movements (see Williams 2003, Abels 2008, and Neeleman and Van de Koot 2010).

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

- It is incompatible with the ban on stranding of pied-piped material, as a finite verb moves to C in main clauses even if VP has moved across a PP.

Two other issues are a direct consequence of using roll-up movement in shrunken trees:

- The analysis is incompatible with the standard definition of c-command, as by that definition a VP that is adjoined to a PP does not c-command its trace. Barbiers uses an adjusted definition, but whereas the standard 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 adjusted definition.
- It is incompatible with the notion of 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.

None of these problems holds of 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. Conclusion

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).

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*, which cannot be associated with putative traces left behind by this movement and which cannot accompany extraposed PPs.

Third, the distribution of *pas* seems at odds with standard antisymmetric analyses of mirror image effects in terms of roll-up movement.

Fourth, roll-up movement in shrunken trees, as proposed in Barbiers (1995), is (largely) compatible with the distribution of *pas*, but 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.

11 February 2016

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