CONSTRAINT SYMMETRY IN OPTIMALITY THEORETIC SYNTAX

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1   Introduction

As Sells (2001a) has noted, few of the directional constraints thus far motivated in Optimality Theoretic Lexical Functional Grammar seem truly symmetrical in their application. It is clear that there are languages that attempt to align interrogatives, foci, and topics with the left edge of a clause (WH-L, FOC-L, TOP-L) and languages that attempt to align the head of a phrase with the left edge of that phrase (HEAD-L) (Choi 1999, Lee 2001, Morimoto 2001). It is less clear that WH-R, FOC-R, or TOP-R is well motivated.[1] Although the existence of HEAD-R might seem necessary, Sells (2001a) has argued that the effects of this constraint can be better captured with an asymmetrical constraint SPINE-R. The question naturally arises—are all syntactic constraints fundamentally asymmetric or are there constraints that operate symmetrically, with both left and right variants?

This paper pursues a constraint-based account of consistency effects. I'll use *consistency* as a general label for whatever constrains branching on the non-recursive side of a phrase. In particular, it appears that consistency constraints operate symmetrically, affecting right branches in some languages and left branches in others.

2   Zapotec pied-piping with inversion

San Dionicio Ocotepec Zapotec (hereafter SDZ) is an Otomanguean language spoken in Oaxaca, Mexico.[2] The basic word order of this language is VSO, with head-initial NPs and PPs:

1)   Ù-dííny   Juáàny bèh'cw=rè'   cùn   yààg.
      com-hit   Juan dog=that with stick

      'Juan hit that dog with a stick'.

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[1] However, see Van Valin and LaPolla (1997) for arguments in favor of a right-edge focus in some languages.

[2] SDZ is an Otomanguean language spoken in San Dionicio Ocotepec, Oaxaca, Mexico by 2,000 - 3,000 people. I thank Farrell Ackerman, Peter Austin, Chris Barker, Lee Bickmore, Cheryl Black, Joan Bresnan, Yehuda Falk, Ed Keer, Pamela Munro, Jerrold Sadock, Peter Sells, Yuching Tseng, and Robert Van Valin for useful discussion of this material. Special thanks to Luisa Martínez, who provided all the SDZ data. Most of the material discussed here is published as Broadwell (2001); earlier versions of the analysis appear as Broadwell (1999a,b).

The orthography for SDZ is adapted from the practical orthographies for other Zapotec languages spoken in the Valley of Oaxaca. In the SDZ orthography symbols have their usual phonetic values, with the following exceptions. <x> = /ʒ/ before a vowel and /ʃ/ before a consonant, <xh> = /ʃ/, <dx> = /dʒ/, <ch> = /tʃ/, <c> = /k/ before back vowels, <qu> = /k/ before front vowels, <rr> = trilled /r/, and <eh> = /ɛ/. Doubled vowels are long. SDZ is a language with four contrastive phonation types: breathy <Vj>, creaky <V'V>, checked <V'>, and plain <V>.

Glosses use the following abbreviations: a=animal, aff = affirmative, cer = certainty, com = completive aspect, con = continuative aspect, cs = causative, def = definite future aspect, dem = demonstrative, foc = focus, hab = habitual aspect, neg = negative, p = possessed, plur = plural, pot = potential aspect, q = question, r=respect, ref=reflexive, rel = relative, stat= stative aspect, top=topic.

However, there are some contexts in which this head-initial order gives way to a head final order. Suppose we question the object of the PP:

2)   ¿Xhíí   cùn ù-dííny   Juààny bèh'cw?
       what   with com-hit   Juan   dog

      'What did Juan hit the dog with?'

Now the PP is head final:
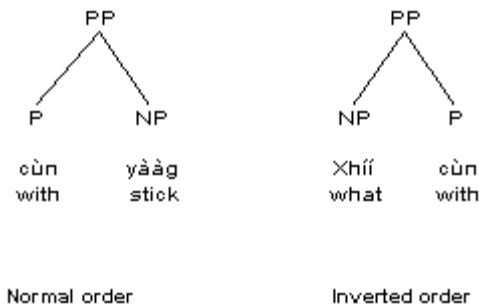
Figure 1 Normal and inverted orders for PP

Inverted, head-final orders are found in some other contexts as well, as we'll see in the following sections. Smith Stark (1988) was the first to draw attention to this pattern, and labelled it 'pied-piping with inversion' (PPI).

SDZ shows PPI is found with PPs, NPs, and QPs. For reasons of space, inversion in NP and QP doesn't receive an explicit analysis in this paper. See Broadwell (2001) for a fuller account.

3   **Pied-piping with inversion and constraint interaction**

Let's look at how these results can be obtained in an optimality-theoretic approach to syntax. We can express the idea that in the unmarked order heads precede both their complements and specifiers through constraints of the following sort:

3)   Head ≺ Spec

      A head must precede its specifier.

4)   Head ≺ Comp

      A head must precede its complement.

My claim is that the PPI phenomenon arises from the interaction of these ordering principles with another constraint that forces the wh-word to appear at the left edge of CP.

SDZ has obligatory wh-movement as shown by the following examples:

5)   a.   ¿Túú   ù-dííny Juààny cùn   yààg?
         what   com-hit Juan   with   stick

         'What (anim.) did Juan hit with a stick?'[3]

     b.   *¿Ù-dííny Juààny túú cùn   yààg?   *wh-in-situ
          com-hit Juan   what with   stick

Wh-phrases appear in [Spec,CP]. The fact that wh-movement is obligatory suggests that SDZ shows the effects of a constraint like the following:

6)   Align (IntF, L, CP, L) = Wh-L

     Align the left edge of an interrogative focus phrase with the left edge of CP.[4]

4   Wh-L and PPs

Pied-piping with inversion is found with the objects of most prepositions.[5]

7)   ¿Xhíí   cùn ù-dííny   Juààny bèh'cw?   ✓PPI
       what   with com-hit   Juan   dog

     'What did Juan hit the dog with?'

8)   ¿Xhíí dèjts   zúú bèh'cw?   ✓PPI
       what behind lie dog

     'What is the dog behind?'

Though my consultant reports a preference for the inverted form, the uninverted form is also acceptable for these prepositions:

9)   ¿Cùn   xhíí   ù-dííny Juààny bèh'cw?   ✓PP without inversion
       with what com-hit   Juan   dog

     'With what did Juan hit the dog?'

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[3] SDZ uses the wh-words *xhíí* 'what, which' for inanimates and *túú* 'who, what, which' for animates (both people and animals). I've glossed the examples with the appropriate English wh-word.

[4] In what follows below, I have assumed that Wh-L is interpreted in a gradient manner, so that each word that intervenes between the wh-element and the left edge of CP triggers an additional violation.

[5] As discussed in Broadwell (2001), there is a small set of preposition, mostly those borrowed from Spanish, which fail to invert. For reasons of time, I will not discuss these cases here.

10)   ¿Dèjts   xhíí   zúú bèh'cw?   ✓*PP without inversion*
           behind what lie dog

        'Behind what is the dog?'

Most prepositions show this pattern of optional inversion.
           Preposition stranding is completely disallowed:

11)   *¿Xhíí ù-dííny   Juààny bèh'cw cùn?   **P-stranding*
            what com-hit   Juan   dog   with

         (What did Juan hit the dog with?)

The ungrammaticality of these examples seems to be due to an undominated constraint in SDZ that forbids preposition stranding. For our current purposes, the constraint can be stated as follows:[6]

12)   *Prep-Strand

         The object of a preposition must form a c-str constituent with the preposition.

The optionality of inversion for most prepositions indicates that the constraints Wh-L and Head<Comp are equally ranked.

		*Prep-Strand	Wh-L	Head < Comp
a.	¿Xhíí zúú bèh'cw dèjts? (What lies dog behind?)	*!		
b.	☞¿Dèjts xhíí zúú bèh'cw? (Behind what lies dog ?)		*	
c.	☞¿Xhíí dèjts zúú bèh'cw? (What behind lies dog?)			*

5   Consistency

         The constraints posited above correctly account for simple cases of pied-piping with inversion. But what about cases where we expect two flips? These are unexpectedly bad.

13)   *¿ Xhíí   yààg cùn ù-dííny Juààny bèh'cw?
            which stick with com-hit Juan   dog

         'With which stick did Juan hit the dog?'

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[6] For a more careful formulation of this constraint, see Broadwell (2001).

With our current constraints, the structure that we would predict would be as follows:
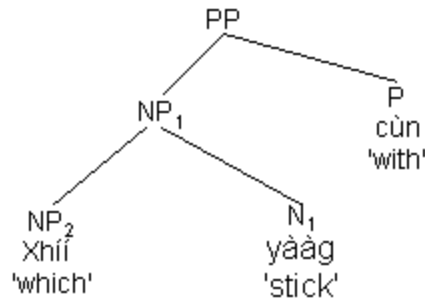
Figure 2 Double inversion with PP

I'll call this the 'double inversion' structure because it involves two inversion of the normal head-initial structure – one in the PP and the second in NP$_1$.

According to the argument so far, the tableau for such cases ought to look as follows:[7]

		Wh-L	Head <Comp
a.	¿Cùn yààg xhíí ù-dííny Juáàny bèh'cw? (with stick which hit Juan dog)	**	
b. [inversion of NP]	☞¿Cùn xhíí yààg ù-dííny Juáàny bèh'cw? (with which stick hit Juan dog)	*	
c. [double inversion]	☞¿Xhíí yààg cùn ù-dííny Juáàny bèh'cw? (which stick with hit Juan dog)		*
d. [inversion of PP]	¿Yààg xhíí cùn ù-dííny Juáàny bèh'cw? (stick which with hit Juan dog)	*	*

The unexpectedly bad candidate is (c).

I suggest that the double inversion examples are bad due to the interaction of another constraint, Consistency. For all the cases under consideration, the double inversion configuration is ungrammatical. Consider the phrase structure tree that results from double inversion:

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[7] For the sake of clarity, I have omitted from this tableau the penalty associated with violating the Head ≺ Spec constraint, since the Specifier *xhíí* 'which' precedes the head *yààg* 'stick'. Since the relevant candidates all violate the constraint to the same degree, this constraint doesn't play a crucial role in distinguishing the candidates under discussion.
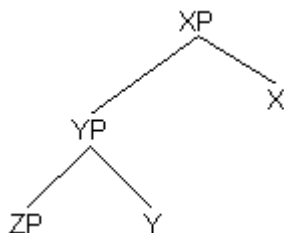
Figure 3 Prohibited double
inversion structure

I want to argue that a tree of this sort violates a constraint on permissable branching types, modifying an idea originally due to Longobardi (1991). We can state the restriction as follows:

14)   Consistency (San Dionicio Ocotepec Zapotec)

     If a phrase XP is right-headed, then a constituent which is located on a left branch of XP may not branch.

There is an additional kind of evidence for this restricion, found in 'vexation interrogatives'. SDZ has expressions of the following sort:

15)   ¿Xhíí chìngáàd ù-dàù Juáàny?
          what the:hell com-eat Juan

          'What the hell did Juan eat?'

16)   ¿Túú chìngáàd ù-tò'   x-còch-á'?
          who the:hell   com-sell p-car-1s

          'Who the hell sold my car?'

These have the form of a Zapotec interrogative followed by the borrowed 'vexifier' *chìngáàd* (<Span. *chingada)*. I've glossed and translated this using 'the hell' as an approximate English equivalent.
     When a vexation interrogative is the object of a preposition, we also see lack of pied-piping with inversion:

17)   *¿Túú chìngáàd cùn ù-tò'=èhby x-còch-á'?   [double inversion]
          who the:hell with com-sell=3s p-car-1s

          (Who the hell did he sell my car to?)

Assume that the relevant portion of the tree in the ungrammatical (17) looks like this:
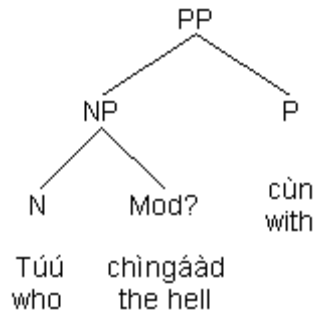
Figure 4 Inversion with a
vexation interrogative

Then the problem seems to be that this PP is right-headed, but the complement is branching in violation of the Consistency condition.

In terms of the optimality-theoretic treatment of pied-piping with inversion, we want to say that the Consistency constraint dominates Wh-L. Consider again the case of PPs with branching objects.

18)   *¿ Xhíí   yààg cùn ù-dííny Juààny bèh'cw?
    which stick with com-hit Juan   dog

'With which stick did Juan hit the dog?'

If we add Consistency to the tableau, then the double inversion candidate is correctly ruled out.

		Consi stency	Wh-L	Head < Comp
a.	¿Cùn yààg xhíí ù-dííny Juáàny bèh'cw? (with stick which hit Juan dog)		**	
b.	☞¿Cùn xhíí yààg ù-dííny Juáàny bèh'cw? (with which stick hit Juan dog)		*	
c. [double inversion]	¿Xhíí yààg cùn ù-dííny Juáàny bèh'cw? (which stick with hit Juan dog)	*!		*
d.	¿Yààg xhíí cùn ù-dííny Juáàny bèh'cw? (stick which with hit Juan dog)		*	*

Other Mesoamerican languages that allow PPI frequently disallow it in cases where a Consistency violation would obtain, so there is strong cross-linguistic support for a constraint of this sort.[8]

6   **Amharic**[9]

Amharic (Semitic, Ethiopia) is a predominantly head-final, left-branching language. Sentences are verb final and noun phrases are noun-final:

19) [[Yïh t'ïllïk' säw]_{NP} t'ïru näw.]_S
    this big   man   good is:3ms

    'This big man is good.'

The only exception to this branching pattern is found with prepositional phrases and complementizers.

6.1   The variety of adpositional phrases

Amharic has prepositions, postpositions, and circumpositions.[10] Some examples of prepositions:

20) [**wädä** bet-u]_{PP}
    toward house-def

    'toward the house'

21) [**bä**=bet-u]_{PP}   'in the house'
    in=house-def

As the last example shows, monosyllabic prepositions are proclitic on the following word. Postpositions are shown in the following examples:

22) Bet-u   [č'akka-w **dar**]   näw.
    house-def woods-def edge is

    'The house is at the edge of the woods.' Leslau 1995:648

23) [Tärara-w   **lay**] bïzu zaf allä.
    mountain-def   on many tree exist

    'There are many trees on the mountain.' Leslau 1995:619

Circumfixes are shown in the following examples:

24) [**Ï**-bet **wïst'**] gäbba-hu-iñ.
    in-house in enter-1s-1s

    'I entered (into) the house.'

The possessive preposition is the proclitic *yä*, which attaches to the possessor. This preposition is normally obligatory.

25) a.)   [[yä=Yohannïs]_{PP} bet]_{NP}   b.)*Yohannïs bet
             of=John   house   John   house

             'John's house'

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[10] I follow the traditional grammars of Amharic (Leslau 1995) in recognizing prepositions, postpositions, and circumpositions in the language. Some recent GB-oriented work on Amharic syntax (Tremblay and Kabbaj 1989, Halefom 1994) treats the prepositions as case markers. So far as I can see, this doesn't provide any explanation of the *yä*-deletion facts.

In particular, the subset of phrase structure rules that we are interested is as follows:[11]

> NP ➔ PP Adj N
> PP ➔ Prep NP

Prepositional phrases appear to be left-headed, right-branching structures. They impose a peculiar restriction on their complements, which we can state as follows:

26) Consistency (Amharic)

If a phrase XP is left-headed, then a constituent located on a right branch of XP may not contain a branching phrase YP.

As a result of this restriction, the object of an Amharic preposition can be a simple noun, or a noun with an adjective or determiner:

27) [wädä   tïllïk'-u bet]$_{PP}$
    toward big-def   house

'toward the big house'

However, the object cannot contain a prepositional phrase, since it that would be a right-branching phrase.

28) *wädä [[yä=Yohannïs]$_{PP}$ bet]]$_{NP}$
    toward of=John   house

('toward John's house')

In such a case, the lower preposition, *yä*, must be deleted:

29) wädä [[Yohannïs]$_{PP}$ bet]]$_{NP}$
     toward John   house

'toward John's house'

The same restriction is not found for the object of a postpositional phrase. In this case, the preposition *yä* is optionally deleted:

30) [[(Yä=)Yohannïs t'äräp'p'eza]$_{NP}$ lay]$_{PP}$ bïzu sahïn-očč all-u.
    (of=) John   table   on   many plate-pl exist-3pl

'There are many plates on John's table.'

Circumfixes show the same pattern as prepositions—the *yä* is obligatorily deleted. In the following example, *bä... atäggäb* means 'near'.

31) Wïšša-w bä=Daniel   bet   atäggäb näw.
    dog-def near=Daniel house near   is

'The dog is near Daniel's house.'

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[11] I will assume that all nodes are optional due to the principle of economy of expression (Bresnan 2001:91ff). Hence the following PS-rules don't include any parentheses.

*Wïšša-w bä=yä=Daniel bet　　atäggäb näw.
　　　dog-def　near=of=Daniel house near　　　is

　　　'The dog is near Daniel's house.'

There is also a purely postpositional variant of this adposition, which is *atäggäb* 'near'. Note that with the postpositional variant, the *yä* is again optional.

　　32)　Wïšša-w (yä)=Daniel bet atäggäb näw.
　　　　　dog-def　(of)=Daniel house near　is

　　　　　'The dog is near Daniel's house.'

When not the object of an adposition, deletion of *yä* is bad:

　　33)　Yä=Yohannïs bet　　tïllïk' näw.
　　　　　of=John　　　　house big　is

　　　　　'Our house is big.'

　　　　　*Yohannïs bet　　tïllïk' näw.
　　　　　John　　　house big　is

6.2　　　An OT approach to *yä* deletion

　　　　Let us consider the phrase structure of an ungrammatical example like the following, repeated from above:

　　34)　*wädä [[yä=Yohannïs]$_{PP}$ bet]]$_{NP}$
　　　　　toward of=John　　　　　house

　　　　　('toward John's house')
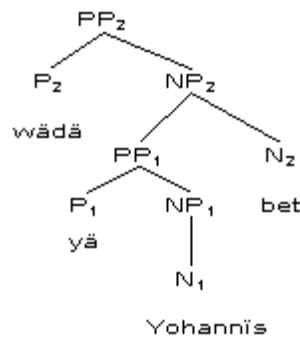
Figure 5 PP with object containing a branching phrase

This structure violates Consistency because PP$_2$ is a left-headed phrase, NP$_2$ is located on a right branch of this phrase, and NP$_2$ contains PP$_1$, which is branching. The grammatical alternative deletes P$_1$.

　　　　However, recall that deletion of *yä* is ungrammatical outside the context of a PP:

　　35)　Yä=Yohannïs bet　　　　tïllïk'　näw.
　　　　　of=John　　　house　　　big　　is

　　　　　'John's house is big.'

$$\text{*Yohannïs bet} \qquad \text{tïllïk'} \quad \text{näw.}$$

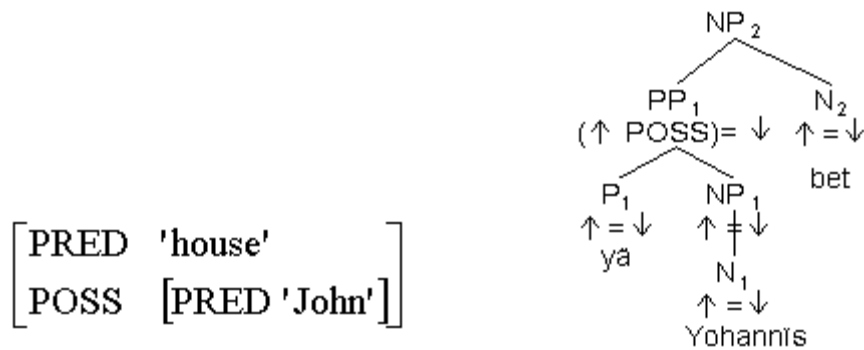| *Yohannïs	bet	tïllïk'	näw.
John	house	big	is

Therefore there must be a penalty associated with the deletion of the preposition *yä*. We might call it Max(Prep):

> 36) Max(Prep) (preliminary)
>
> Do not delete a preposition.

However, this may be too broad. So far as I know, *yä* is the only Amharic preposition that ever deletes. We might understand that as a consequence of the fact that the f-str corresponding to a possessive structure contains no element corresponding to *yä*.

The f-structure and annotated c-structure for an Amharic possessive should look approximately as follows:[12]

$$
\begin{bmatrix}
\text{PRED} & \text{'house'} \\
\text{POSS} & [\text{PRED 'John'}]
\end{bmatrix}
$$

```
                        NP₂
                      /      \
                   PP₁        N₂
             (↑ POSS)= ↓     ↑ = ↓
                  /    \
                P₁      NP₁        bet
               ↑ = ↓   ↑ ≠ ↓
                yä
                        N₁
                       ↑ = ↓
                     Yohannïs
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That is, P₁ here is purely 'functional' preposition, as opposed to other lexical prepositions. The situation is analogous to the categories CP and DP in English, as discussed by Bresnan (2001:134). Since Comp and Det are functional heads, they may be absent from the phrases they head, in contrast to lexical heads. Bresnan argues that the endocentricity requirement of English applies only to phrases headed by lexical categories.

Bresnan's (2001) endocentricity is stated categorically, rather than in terms of a violable constraint. Applied to Amharic prepositional phrases, it works best to think of an Endocentric-PP constraint with stronger and weaker versions.

> 37) Endocentric-PP(Lexical)   Endo-PP(Lex)
>   A lexical PP must contain a head.
>
> 38) Endocentric-PP(Functional)   Endo-PP(Fun)
>   A functional PP must contain a head.

The ranking we want is Endo-PP(Lex), Consistency ≫ Endo-PP(Fun). This will produce results like the following:

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[12] The structure given here is parallel to that proposed by Chisarek and Payne (2001) for English possessives like *the daughter of the king*, though I have retained the function POSS, rather than choose between SUBJ and NCOMP.

[PRED 'toward(OBJ)' OBJ [PRED 'house' POSS [PRED 'John']]]		Endo-PP(Lex)	Consistency	Endo-PP (Fun)
a	wädä yä=Yohannïs bet toward of=John house		*!	
b	☞wädä Yohannïs bet toward John house			*
c	yä=Yohannïs bet of=John house	*!		

Contrast this with the situation where we have a postposition instead of a preposition. Recall that in this case, deletion of *yä* is optional.

39) (Yä=)Yohannïs t'äräp'p'eza lay bïzu sahïn-očč all-u.
(of=)John   table   on many plate-pl exist-3pl

'There are many plates on John's table.'

[PRED 'on (OBJ)' OBJ [PRED 'table' POSS [PRED 'John']]]		Endo-PP(Lex)	Consis-tency	Endo-PP(Fun)
a	☞yä=Yohannïs t'äräp'p'eza lay of=John table on			
b	☹ Yohnnïs t'äräp'p'eza lay John table on			*
c	yä=Yohannïs t'äräp'p'eza of=John table	*!		

Now the problem is that these constraints predict that only the fully faithful candidate (a) should be optimal. However, Amharic speakers also accept the (b) candidate.

It appears that there is some additional constraint violation in the (a) candidate that degrades its grammaticality and makes (b) equivalent in grammaticality. It is not clear what the best formulation of this constraint should be. I tentatively propose the following:

40) Consistency (categorial)
If a phrase XP contains a phrase YP, and X and Y belong to the same syntactic category, then X and Y must both align with the same side of the phrase.

The intuition behind this constraint is that languages prefer consistently right- or left-headed phrases, especially when a phrase XP contains a phrase YP of the same categorial type. So if one PP contains another, both should be consistently prepositional or postpositional.

If we add this constraint to the tableau, weighted equally with Endo-PP (Fun), then we get the following result:

$\begin{bmatrix} \text{PRED} & \text{'on(OBJ)'} \\ \text{OBJ} & \begin{bmatrix} \text{PRED 'table'} \\ \text{POSS} & [\text{PRED 'John'}] \end{bmatrix} \end{bmatrix}$	Endo-PP(Lex)	Consistency	Endo-PP(Fun)	Consist (Cat)
a	☞ yä=Yohannïs t'äräp'p'eza lay of=John　　table　　on				*
b	☞ Yohannïs t'äräp'p'eza lay John　　table　　on			*	
c	yä=Yohannïs t'äräp'p'eza of=John table	*!			

Now the (a) and (b) candidate both incur one violation, and we correctly predict that both are acceptable.

7 Consistency effects in English and the typology of consistency

7.1 Prenominal adjectives

English also shows effects of the Consistency constraint. There is a well-known restriction on adjective phrases in English—a prenominal adjective phrase may be composed of an adjective or an adjective plus a modifier:

41) a proud mother
a very proud mother

But the adjective phrase cannot contain another phrase.

42) *a proud of her son mother

The Italian facts are exactly the same, as discussed by Longobardi (1991).
We can state the English restriction in the same terms as the constraint found in Amharic:

43) Consistency (English AdjP)

If a phrase XP is located on a left branch, then it may not contain a branching phrase YP.

7.2 Consistency and sluicing

A less well known example involves PPs in sluicing contexts, as discussed by Merchant (to appear):

44) John was talking, but I don't know ?with who(m)/[**who with**].

Merchant labels the inversion of PPs that occurs in sluicing contexts *swiping* (for sluiced wh-word inversion with prepositions in Northern Germanic).
Merchant notes that for such inversion to occur, the wh-word must be 'minimal'. Consider the following contrasts:

45) John was talking, but I don't know who with.
*John was talking, but I don't know which guy with.

46) They were arguing; God only knows what about.
*They were arguing; God only knows what problem about.

Merchant's solution is to suggest that the wh-word incorporates (undergoes head movement) into the

preposition in PF. Since this is head movement, only a single wh-word may move; a wh-phrase may not.[13]

       Instead, I would suggest that it may be more productive to analyze the English PP inversion in the same way as the Zapotec inversion – the wh-word is still the complement of the P head, but exceptionally the complement precedes the head in this case. In this case, the ungrammatical examples in (76) and (77) above are violations of Consistency, and we may use the same variant of the constraint seen in Zapotec.[14]

47) Consistency (English swiping)

If an XP is right-headed, then a constituent which located on a left branch of XP may not branch.

       Why should inversion occur in this context in English? Merchant suggests that the inversion is prosodically driven. Modifying his argument slightly, note that sluicing generally involves coordinated sentences, with focal stress on the final element of both.

48) John was TALKING, but
    a.) ✓I don't know [who WITH]
    b.) * I don't know [WHO with]

    c.) ? I don't know [with WHO]
    d.) * I don't know [WITH who]

Examples where the focal stress falls earlier than the final word are bad (b, d). The example where focal stress falls on WHO is also slighly marked, and this seems related to the fact that focal stress indicates *contrastive* focus, while wh-word show *interrogative* focus. It appears to be difficult or impossible for an interrogative to bear focal stress:

49) JOHN will pick up Mary, but SUE will pick up Ralph.
    *? JOHN will pick up Mary, but WHO will pick up Ralph?

We might call this constraint *FocStr (Interrogative). If *FocStr (Interrogative) is equally ranked with Head ⋖ Complement, then the optionality of swiping can be seen as choice between two alternatives— one places focal stress on the interrogative and the other uses a marked word order..

	*FocStr (Int)	Head < Comp
☞... but I don't know [who WITH]		*
☞... but I don't know [with WHO]	*	

However, Consistency outranks both of these constraints, making inversion unavailable for branching wh-phrases:

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[13] But this is an odd sort of incorporation, considered from a cross-linguistic perspective. Note, for example, that multiple word vexation interrogatives may invert in swiping contexts:
    They were arguing, but I don't know what on earth about.
    In general, incorporation should only affect a N^0. However, it seems questionable to treat items like *what on earth* as a single N. Vexation interrogatives do behave in certain respects like a single lexical item, but lexical items may be larger than a single lexical head.

[14] However, Zapotec inversion disallows vexation interrogatives, while they seem relatively good in English swiping. It is possible that the difference is be due to the syntax or lexical status of the vexation interrogatives in the two languages. Alternately, the constraints may need to to be further differentiated in some way.

	Consistency	*FocStr (Int)	Head < Comp
... but I don't know [which person WITH]	*		*
☞... but I don't know [with WHICH PERSON]		*	

7.3 A typology of Consistency constraints

Consider again the Consistency constraints we have identified so far:

50) Consistency (San Dionicio Ocotepec Zapotec)

If a phrase XP is right-headed, then a constituent which located on a left branch of XP may not branch.

51) Consistency (Amharic)

If a phrase XP is left-headed, then a constituent located on a right branch of XP may not contain a branching phrase YP.

52) Consistency (English swiping)

If an XP is right-headed, then a constituent which located on a left branch of XP may not branch.

53) Consistency (English AdjP)

If a phrase XP is located on a left branch, then it may not contain a branching phrase YP.

Why should the constraints work in this way? The crucial intuition is that languages restrict what may appear on the non-recursive side of a phrase. Restrictions on the size or branching of constituents on the non-recursive side of the phrase appear to be quite common cross-linguistically. These seem to be of two types—1) either the constituent cannot branch, or 2) the constituent cannot contain a branching phrase.

It will be helpful to introduce the term *maximal branching depth* here. If a language allows no constituent at all in a position, then the maximal branching depth for this constituent is zero. If the language allows a non branching constituent, but not a branching constituent, then its maximal branching depth for this position is one. And a language which allows a branching constituent, but not one that contains a second branching constituent has a maximal branching depth of two.

In English, at least, the selection of maximal branching depth seems to be related to the depth of embedding. A constituent on the non-recursive side is most heavily restricted when it is a sister to the head; it has a maximal branching depth of one. A constituent is less heavily restricted when an adjunct to X', and has a maximal branching depth of two. When constituents appear in the specifier position they are (apparently) not restricted at all.

The correlation between maximal branching depth and position in the tree Consistency constraints might be schematized in the following way:
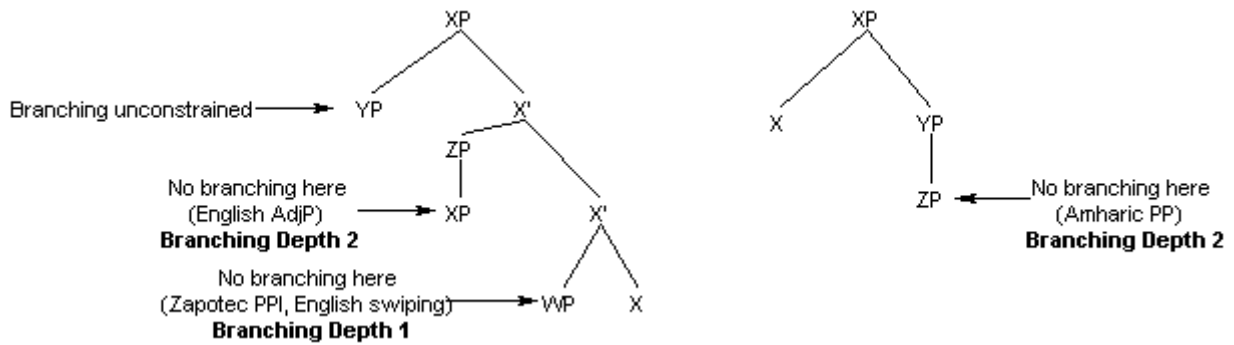
Although the correlation between depth of embedding and the degree to which branching is constrainted is intriguing, it doesn't seem to be possible to completely predict the form of the Consistency constraint from the complement/adjunct/specifier status of a constituent. In our data, for example, Amharic allows 2 deep complements, while Zapotec and English allow only 1 deep complements.

So far, we have interpreted the constraint Head ⊰ Comp constraint categorially; either a head precedes its complement or it does not. If we interpret it gradiently, it may be possible to do away with a distinct Consistency constraint in favor of a revised ordering constraint. Let us think of the ordering constraints in terms of their inverses:

54) *Comp ⊰ Head (n)
A complement (of branching depth n) must not precede its head

55) *Head ⊰ Comp (n)
A head must not precede a complement (of branching depth n)

When $n = 0$, then these constraints are equivalent to the categorial versions seen before. When $n > 0$, they restrict successively larger and more complex types of constituents. We would expect larger branching depths to outrank smaller branching depths. Inverted or 'flipped' word orders result when some constraint is interpolated among the ordering constraints.

The constraint ranking relevant to English swiping would be as follows:

56) *Comp ⊰ Head (2) ≫ *Comp ⊰ Head (1) ≫ *FocStr (Interrog) ≫ *Comp ⊰ Head (0) ≫
Wh-L

The constraint ranking for Zapotec would be

57) *Comp ⊰ Head (2) ≫ *Comp ⊰ Head (1) ≫ Wh-L ≫ *Comp ⊰ Head (0) ≫ *FocStr
(Interrog)

The constraint ranking for Amharic would be

58) *Head ⊰ Comp (2) ≫ Align (P, L, PP, L) ≫ *Head ⊰ Comp (1) ≫ *Head ⊰ Comp (0) ≫
Wh-L, *FocStr (Interrog)

Many languages appear to be completely consistent in their branching order (e.g. Biblical Hebrew, Japanese). In such languages the *Comp ⊰ Head (or *Head ⊰ Comp) constraints would be undominated.

The relevant ranking for English AdjP is less clear. Is there a parallel *Adjunct ⊰ Head constraint? As Dryer (1988) has shown, statistically there is no clear correlation between the order of Adj and N and the OV/VO distinction (contra Greenberg 1966). I will leave this problem for future research.

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