

**ALIGNMENT, PRECEDENCE, AND THE TYPOLOGY OF
PIED-PIPING WITH INVERSION**

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ABSTRACT: Pied-piping with inversion is a phenomenon in a number of head-initial languages in which fronted interrogative phrases show an inverted, head-final word order. This paper is a typological survey of this phenomenon in nine languages. The survey supports the following conclusions: a.) Head-initial order in phrases is due to alignment constraints, b.) head-initial order in the phrases NP, PP, and QP must be due to different alignment constraints, since these phrase types often show different behavior in pied-piping with inversion contexts, and c.) alignment constraints appear to be superior to precedence constraints in describing pied-piping with inversion.

1 Introduction – pied-piping with inversion and OT

Optimality-theoretic approaches to word order have taken two different paths in formulating the relevant ordering constraints. One line of thought, following ideas that date back to GPSG (Gazdar, Pullum, Kline, and Sag 1985), uses *precedence constraints*, such as Head < Complement.¹ Broadwell (1999, 2001) has used constraints of this sort in OT-LFG. Another line of thought uses *alignment constraints*, such as Align (X, L, XP, L), which seek to align designated members of a phrase with the edge of that phrase. Sells (2001b), Morimoto (2001) and others have used this type of constraint in OT-LFG.

For many problems, both alignment and precedence constraints yield equivalent predictions. Consider the following data from San Dionicio Ocotepc Zapotec (SDZ). This is a VSO language, where phrases are normally head-initial:

- 1) Cù'á Juààny [_{NP} x-pèh'cw Màríí].
 com:grab Juan p-dog Mary
 'Juan grabbed Mary's dog.'
- *Cù'á Juààny [_{NP} Màríí x-pèh'cw].
 com:grab Juan Mary p-dog

In wh-questions, there is obligatory fronting of a [+wh]-phrase. If the [+wh]-phrase is contained in a NP, PP, or QP, then this phrase pied-pipes. The following example shows this for NP:

- 2) ¿[_{NP} Túú x-pèh'cw] cù'á Juààny?
 who p-dog com:grab Juan
 'Whose dog did Juan grab?'

¹The idea that linear-precedence is due not to PS-rules, but to other principles of grammar is found in several syntactic theories. In Lexical Functional Grammar, such ideas are found in Falk (1983). Within early versions of Government-Binding theory, such ideas were proposed by Farmer (1980, 1984) and Stowell (1981).

*¿_[NP X-pèh'cw túú] cù'á Juààny?
 p-dog who com:grab Juan

However, the pied-piped phrase now shows the order [_{NP} Poss N], so the head of NP is no longer initial. This pattern is known as pied-piping with inversion (PPI), and was named and identified as an areal characteristic of Mesoamerican languages in Smith Stark (1988).

OT can provide an insightful account of PPI. This paper has two goals – a.) to discuss two alternative ways of formulating word order constraints (alignment constraints and precedence constraints), and b.) to discuss the typology of PPI with an eye towards using this phenomenon to help us decide on the better alternative.

2 Precedence and alignment compared

In Broadwell (2001), I posited the following constraints:

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

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

- 4) Head <Non-head

A head must precede its specifier.

- 5) Tableaux for (2) and (1)

		Wh-L	Head <Non- head
The interrogative order [Poss N]			
a.	¿ _[Túú x-pèh'cw] cù'á Juààny? (Whose dog grabbed Juan?)		*
b.	¿ _[X-pèh'cw túú] cù'á Juààny? (Dog whose grabbed Juan?)	*!	
The non-interrogative order [N Poss]			
c.	Cù'á Juààny [Màríí x-pèh'cw] (grabbed Juan Mary dog)		*
d.	¿ Cù'á Juààny [x-pèh'cw Màríí] (grabbed Juan dog Mary)		

Head <Non-head is a precedence constraint. We could equally propose an alignment constraint for heads of phrases, along the following lines:

- 6) Align (X, L, XP, L) = X-Left
Align the left edge of a head X^0 with the left edge of XP

Substituting this constraint makes no difference in prediction for these data:

7)

		Wh-L	X-Left
The interrogative order [Poss N]			
a.	☞ ¿[Túú x-pèh'cw] cù'á Juààny? (Whose dog grabbed Juan?)		*
b.	¿[X-pèh'cw túú] cù'á Juààny? (Dog whose grabbed Juan?)	*!	
The non-interrogative order [N Poss]			
c.	Cù'á Juààny [Màríí x-pèh'cw] (grabbed Juan Mary dog)		*
d.	☞ Cù'á Juààny [x-pèh'cw Màríí] (grabbed Juan dog Mary)		

So the questions to be examined in this paper are the following: Are there any empirical differences in the predictions that alignment and precedence constraints make about linear precedence? More generally, does the inventory of constraint types contain both alignment and precedence, or can one of these types be eliminated?

To answer these questions, this paper examines nine languages with PPI and compares alignment and precedence accounts of the phenomenon. In particular, it looks at how certain types of typological variation in these systems can be modelled in Optimality Theory.

3 Variation among phrase types in PPI systems

The phrase types that typically show PPI are NP, PP, and QP. However, it has not been sufficiently appreciated that these different phrase types may show different behavior in the PPI construction. Some phrases pied-pipe and show obligatory inversion, as is the case with NPs in San Dionicio Zapotec. However, for other phrase types in SDZ, pied-piping is found, but inversion is optional or prohibited.

Consider the following examples of pied-piped QP, where inversion is optional:

- 8) a) ζ [Xhíi tyóp] ù-dàw Juààny?
 what two com-eat Juan
 ‘What did Juan eat two of?’
- b) ζ [Tyóp xhíi] ù-dàw Juààny?
 two what com-eat Juan
 ‘What did Juan eat two of?’

This can be modeled in OT by letting the constraint which is responsible for the head-initial position of Q overlap the Wh-Left constraint. However, since Wh-Left strictly dominates the NP-constraint we just discussed, the QP-constraint must be distinct.

Since these constraints show different positions in the constraint ranking, it is not possible to have a single X-Left or Head <Non-head constraint. Instead, we need different constraints which are responsible for head-initial order in NP and QP.

If we choose alignment constraints, then we appear to need two constraints like the following:

- 9) Align (Q, L, QP, L) = Q-Left
 Align the left edge of a head Q^0 with the left edge of QP
- Align (N, L, NP, L) = N-Left
 Align the left edge of a head N^0 with the left edge of NP

If we pursue precedence constraints, then how do we differentiate NP and QP? In Broadwell (2001), I suggested that the relevant distinction is the X-bar theoretic status of the non-head material. So in NP, the possessor is in the Spec position. In QP, the restriction of the quantifier is in the Complement position.

That suggests the following constraints:

- 10) Head <Comp
 A head must precede its complement.
- Head <Spec
 A head must precede its specifier.

Under the alignment scenario, the constraint ranking would be

- 11) Q-Left, Wh-Left » N-Left

Under the precedence scenario, the constraint ranking would be

- 12) Head <Comp, Wh-Left » Head <Spec.

Under either scenario, the relevant tableau would be as follows:

13)

		Head <Comp or Q-Left	Wh-Left
a.	¿Xhíí t́yop ù-dàù Juààny? (What two ate Juan?)	*	
b.	¿Tyóp xhíí ù-dàù Juààny? (Two what ate Juan?)		*

4 The problem with prepositions

Prepositions have a problematic status in many Mesoamerican languages. In Zapotec languages all or most locative prepositions are homophonous with body-part nouns. For example, SDZ *dèhjts* means both ‘behind’ and ‘back’, so a phrase like the following has two meanings:

- 14) *dèhjts* *Juààny*
back/behind Juan
‘behind Juan’
‘Juan’s back’

Other prepositions of this type are *cuèh* ‘side/beside’, *lòò* ‘face/to’, and *nì* ‘foot/under’. I have labelled this group the *invertible prepositions*.

These body-part prepositions contrast in the PPI construction with a smaller number of prepositions such as *dèhsputèhhs* ‘after’, *ààxt* ‘toward’, *áántèhs* ‘before’, and *zì’cy* ‘like’. This group is made up of most borrowed prepositions plus a few native non-locative prepositions, and is labelled the *non-invertible prepositions*.

Invertible prepositions show optional inversion in the PPI context:

- 15) a) ¿Dèhjts túú?
behind who
- b) ¿Túú dèhjts?
who behind
‘Behind who?’

Note that optional inversion here is found only when *dèhjts* has its prepositional interpretation. If

categorial features. There are two ways to do this for the invertible prepositions, and so they are subject to two analyses.

If they are treated as purely prepositional, then they obey the P-Left constraint, and they have a tableau like the preceding results, in which the uninverted candidate emerges as optimal. If they are treated as nominal, then they are subject to the Head <Spec constraint, and the inverted candidate will be optimal. The two tableaux are shown below:

20)

	(prepositional analysis)	P-Left	Wh-L	Head <Spec
a.)	☞ ¿Dèjts xhíi zúú bèh'cw? (Behind what lies dog ?)		*	inapplicable
b.)	¿Xhíi dèjts zúú bèh'cw? (What behind lies dog?)	*!		

	(nominal analysis)	P-Left	Wh-L	Head <Spec
a.)	¿Dèjts xhíi zúú bèh'cw? (Behind what lies dog ?)	inapplicable	*!	
b.)	☞ ¿Xhíi dèjts zúú bèh'cw? (What behind lies dog?)			*

This analysis gets the facts right, but note that it resorts to an alignment constraint (P-Left) to account for the head-initial property of non-invertible prepositions.

P-Left is used in this account because there does not seem to be a natural account using a precedence constraint. Head <Comp is already present among the constraints and overlaps Wh-Left. Since P-Left outranks Wh-Left, the ordering between non-invertible P and its complement must be due to some other constraint. But there is no good reason that the head-initial nature of PPs should be due to alignment, while head-initiality in NP and QP is due to precedence.

The solution in Broadwell (2001) uses both precedence constraints and alignment constraints to describe the tendency for heads to be initial in their phrases. But a simpler solution seems possible. If we take the alignment view, then there are three head alignment constraints (N-Left, Q-Left, P-Left), ranked as follows:

21) P-Left » Q-Left, Wh-Left » N-Left

That is a more satisfying analysis than my earlier proposal:

22) P-Left » Head <Comp, Wh-Left » Head <Spec

5 Relativized precedence?

A possible answer to this critique of precedence constraints is to change the constraints so that they do not refer generically to heads, but are relativized to particular kinds of heads. I'll call this alternative *relativized precedence*. Under this view, we do not have a single Head <Comp or Head <Spec constraint. Instead, we have separate constraints like the following:

- 23) N <Comp
- P <Comp
- Q <Comp
- N <Spec
- P <Spec
- Q <Spec

Such an approach would clearly answer the objection to the non-uniform treatment of SDZ. We could replace P-Left with P <Comp. Filling in the specific heads involved for the other constraints, this would give us the following constraint ranking:

- 24) P <Comp » Q <Comp, Wh-Left » N <Spec

Now all the head-initiality is explained through precedence constraints.

However, such an account seems less satisfactory in a few particulars. First, of the six relativized precedence constraints, only three seem to be needed for the account. It is not clear what would count as a specifier of P or Q in this language.²

English does have a c-structure contrast between noun complements and noun specifiers in cases like the following:

- 25) John's picture of Mary
- spec* *comp*

However, we do not seem to find such a c-structure contrast in many other languages. In SDZ, the following phrase is compatible with two interpretations – one where Maria is the possessor, and another where she is the depicted:

- 26) x-rrèrààt Màrì

² Some earlier X-bar treatments of English (e.g. Jackendoff 1977) put degree adverbials like *relatively* or *quite* in specifier positions (e.g. *quite close to the edge, relatively few men*). It is likely that these proposals are no longer tenable. Note that they violate the Structure-Function association principles of Bresnan (2001:102ff), which say that c-structure elements in specifier position should correspond to f-structure constituents with a DF function. Since these adverbials correspond to f-structure ADJUNCTs, they ought to appear in adjoined positions, rather than Spec positions.

p-photo Maria
 ‘The photo of Maria’ *possessor*
 ‘Maria’s photo’ *depicted*

There is no way to express ‘Juan’s picture of Maria’ without using a relative clause. If we use an interrogative with a picture noun of this type, inversion is still obligatory in PPI, regardless of the interpretation:

- 27) a) ¿Túú x-rrètrààt?
 who p-photo
- b) *¿X-rrètrààt túú?
 p-photo who
 ‘Whose photo?’ (*possessor or depicted interpretation*)

Relativized precedence makes the prediction that languages might show different PPI possibilities in NP due to different rankings of the N <Spec and N <Comp constraints. However, SDZ does not have such a difference, nor do any of the other languages surveyed so far. Future research may turn up such a language, but at the moment relativized precedence seems to predict a typological option which is not attested.

One might also formulate a kind of relativized precedence constraint in which heads precede everything in their phrase, disregarding the complement/specifier distinction:

- 28) N <Non-head
 P <Non-head
 Q <Non-head

However, this formulation seems to me to be almost indistinguishable from the alignment constraints in its predictive value. It may well be a notational variant of the alignment theory. A formulation in terms of alignment with the edge of a constituent does equally well, and is in accord with the constraint families which are already in use in Optimality Theoretic morphology and phonology.

6 Typological variation in PPI systems

A typological study of PPI in nine languages reveals a large range of variation in this construction. The data come from four Zapotec languages (San Dionicio, Tlacolula, Macuiltianguis, and Quiegolani), two Mixtecan languages (Ocotepc Mixtec and Copala Trique), two Mayan languages (Kiche and Tzotzil) and one Austronesian language (Sasak).³ Zapotec and

³ The survey includes my own data from San Dionicio Ocotepc Zapotec, Tlacolula Zapotec (discussed in more detail in Broadwell and Lillehaugen 2006), Macuiltianguis Zapotec, Copala Trique (discussed in more detail in Broadwell and Key 2004), and Kiche Mayan. Quiegolani Zapotec data is taken from Black (2000), Tzotzil data from Aissen (1996), Ocotepc

Mixtecan both have the time-depth comparable to Romance and they are two branches of a larger family called Oto-Manguean, which is comparable in time-depth to Indo-European. Mayan is not related to Oto-Manguean, but the two share a number of areal features.

I will describe the typological variation using alignment terminology, but return at the end to ask whether precedence constraints would serve as well.

For this study, I was interested in the following kinds of questions:⁴

- a.) Which phrase types pied-pipe in questions? For these phrases, is inversion obligatory, optional, or prohibited?
- b.) What is the implied constraint ranking for each of the languages?
- c.) Are all orderings of the constraints possible?

All of the languages in the survey are V-initial – either VSO or VOS.

6.1 Phrase types and the possibility of inversion

A useful way to characterize the typological variation is by looking at the ranking of the Wh-Left constraint relative to the constraints which are responsible for head-initial position in the phrase. The approach followed here infers the constraint ranking from the obligatory, optional, or prohibited nature of inversion in pied-pied phrases, using the following correlation:

29) Order in pied-piped phrase	Implied constraint ranking
[X Wh], *[Wh X]	X-Left » Wh-Left
[X Wh], [Wh X]	X-Left, Wh-Left (constraint overlap)
[Wh X], *[X Wh]	Wh-Left » X-Left

For a number of languages in the survey, we do not have information on pied-piping of QP or on possible differences among prepositions. However, all the languages in this survey show pied-piping of both NP and PP.

6.1.1 High Wh languages

Three languages in the survey (Quiégolani Zapotec, Tzotzil, Ocotepec Mixtec) report the

Mixtec data from Eberhart (1999), and Sasak data from Austin (2001).

⁴ An additional question of interest concerns the question of whether all interrogatives behave the same in PPI. See Broadwell and Lillehaugen (2006) for more discussion of Tlacolula de Matamoros, a language in which animate interrogatives appear to be associated with a more highly-ranked Wh-Left constraint than inanimate interrogatives. Macuilianguis Zapotec shows a similar system in which discourse-linked interrogatives (*which*) show stronger tendencies for left alignment. Space prevents fuller discussion of these issues in this paper.

same pattern – obligatory inversion in both PP and NP, resulting from an undominated Wh-Left constraint. Consider the following data from Quiegolani Zapotec (Black 2000:135):

30) **Quiegolani Zapotec**

- | | | |
|--------|--|---------|
| a) | [Txu lo] n-dux xnaa noo?
who to STAT-angry mother 1EX
‘With whom was my mother angry?’ | [Wh P] |
| b) | *[Lo txu] n-dux xnaa noo?
to who STAT-angry mother 1EX | *[P Wh] |
| 31) a) | [Txu xnaa] n-dux lo de?
who mother STAT-angry to you
‘Whose mother is angry with you?’ | [Wh N] |
| b) | *[Xnaa txu] n-dux lo de?
mother who STAT-angry to you | [*N Wh] |

We find the same pattern in Ocotepéc Mixtec (Eberhardt 1999):

32) **Ocotepéc Mixtec**

- | | |
|--|---------|
| [Ní nuu] ndée ñā?
where face con:sit she
‘Where does she live?’ | [Wh P] |
| 33) [Na nuu] xehē de tūtu?
what face COM:give he:RES paper
‘To whom did he give the paper?’ | [Wh P] |
| 34) *[Nuu na] xehē de tūtu?
face who COM:give he:RES paper | *[P Wh] |
| 35) [Na sehē] kúū xīn?
who child CON:be he:FAM
‘Whose child is he?’ ⁵ | [Wh N] |

The implied constraint hierarchy for Quiegolani Zapotec, Ocotepéc Mixtec, and other languages with this pattern is as follows:

36) **Quiegolani Zapotec and Ocotepéc Mixtec Constraint ranking**

⁵ Uninverted NPs are said to be ungrammatical, but the forms are not cited.

Wh-Left » P-Left, N-Left

Note that much of the original work attempting to explain PPI (Aissen 1996, Trechsel 2000) assumes that this type of PPI is the only kind found cross-linguistically.

6.1.2 High P languages

Several of the Otomanguean languages in the survey (Zapotec and Trique) show systems in which the head-ordering constraint for Prepositions dominates the Wh-Left constraint. We have already seen an extended example of this for San Dionicio Ocotepéc Zapotec.

Note that in these languages the majority of prepositions are homophonous with body-part nouns, so the high ranking of P-Left is seen primarily with a smaller group of non-locative, non-body-part, or borrowed prepositions.

Consider the following examples which contrast invertible and non-invertible prepositions in Copala Trique. The Copala Trique interrogative ‘what’ is composed of two parts – an interrogative *me*³ and the pronoun *ze*³² ‘it’. For invertible prepositions there are three options – PPI, stranding of the preposition, and an unusual order I label ‘disconnected’ where the preposition appears between the two parts of the interrogative:

37) Copala Trique invertible prepositions

- | | | |
|----|--|--------------------------|
| a) | ¿Me ³ ze ³² xra ¹ nicun ^{’3} chuvee ^{4?}
WH N behind stand dog | <i>PPI</i> |
| b) | *? ¿Xra ⁴ me ³ ze ³² nicun ^{’3} chuvee ^{4?}
behind WH N stand dog | <i>*PP w/o inversion</i> |
| c) | ¿Me ³ ze ³² nicun ^{’3} chuvee ⁴ xra ⁴ ?
WH N stand dog behind | <i>P-stranding</i> |
| d) | ¿Me ³ xra ¹ ze ³² nicun ^{’3} chuvee ^{4?}
WH behind N stand dog
‘What is the dog standing behind?’ | <i>disconnected</i> |

For the non-invertible prepositions, only pied-piping without inversion is possible:

38) Copala Trique non-invertible prepositions

- | | | |
|----|--|-------------------------|
| a) | ¿Naa ¹³ me ³ chuma ^{’3} chee ⁵ Waan ^{4?}
toward WH town walk Juan | <i>PP w/o inversion</i> |
| b) | *¿Me ³ chuma ^{’3} naa ¹³ chee ⁵ Waan ^{4?}
WH town toward walk Juan | <i>PPI</i> |

- c) *_iMe³ naa¹³ chuma^{'3} chee⁵ Waan^{4?} *disconnected*
 WH toward town walk Juan
- d) *_iMe³ chuma^{'3} chee⁵ Waan⁴ naa^{13?} *P-stranding*
 WH town walk Juan toward
 'Which town did Juan walk toward?'

So San Dionicio Ocotepc Zapotec, Copala Trique and other languages of this type show a partial constraint ranking of the following sort:

39) P-Left » Wh-Left

6.1.3 High N languages

Sasak, an Austronesian language of Indonesia, shows obligatory PPI in PPs, but prohibits inversion in NPs (Austin 2001):

- 40) **Sasak**
 [Sai kance]=m bedait léq peken? [Wh P]
 who with=2 meet loc market
 'Who are you meeting with in the market?'
- 41) [Guru-n sai] yaq=m dengah léq masjid? [N Wh]
 teacher-link who fut=2 listen loc mosque
 'Whose teacher will you hear at the mosque?'

Sasak is very important from a typological perspective because it is the only language where N-Left dominates P-Left.

From the point of view of alignment constraints, the implied constraint hierarchy for Sasak is as follows:

42) **Sasak constraint ranking**

N-Left » Wh-Left » P-Left

Note that the relative ranking of N-Left and P-Left in Sasak is the reverse of the ranking in SDZ:

43) **San Dionicio Ocotepc Zapotec constraint ranking**

P-Left » Wh-Left, Q-Left » N-Left

That seems to show us rather clearly that no principle of Universal Grammar is forcing these

constraint rankings.

6.1.4 High Q languages

Kiche Mayan shows a pattern where Q-Left dominates Wh-Left. QPs in this language show pied-piping in questions, but the pied-piped constituent may not invert:

44) Kiche Mayan QPs

- a) [Juntir jäs] x-u-tij l-a Xwan?
all WH:NHUM COM-3SERG-eat DET-CL Juan
'What did Juan eat all of?'
- b) *[Jäs juntir] x-u-tij l-a Xwan?
WH:NHUM all COM-3SERG-EAT DET-CL Juan

PPs, by contrast, show optional inversion:

45) Kiche Mayan PPs

- a) [Chuxe' jäs] k'o wi le tz'i'?
under:3SERG WH:NHUM exist LOC DET dog
'What is the dog under?'
- b) [Jäs chuxe'] k'o wi le tz'i'?
WH:NHUM under:3SERG exist LOC DET dog
'What is the dog under?'

This implies a partial constraint ranking for Kiche Mayan like the following:⁶

46) Kiche Mayan constraint ranking

Q-Left » Wh-Left, P-Left

6.1.5 Summary

Space doesn't allow us to fully discuss and motivate all the constraints and their rankings

⁶ It is not clear whether NPs show PPI in Kiche. Possessed NPs (e.g. *whose son*) cannot pied-pipe, but appear in a clefted construction instead. NPs of the [*Which N*] type do pied-pipe and show Wh-initial order, but it is not clear that this is an inverted order, since several types of determiners usually precede N in Kiche. See Broadwell (2005) for more discussion.

for the languages in the survey. However, the following chart shows the results of the study. (A blank cell shows that the source provides no information on this question.)

Language	NP	PP [native/ body-part]	PP [borrowed/ non-locative]	QP
San Dionicio Zapotec	obligatory	optional	prohibited	optional
Copala Trique	obligatory	obligatory	prohibited	obligatory
Tlacolula Zapotec	optional (who) prohibited (what)	optional (who) prohibited (what)	prohibited	obligatory (who) optional (what)
Macuiltianguis Zapotec	optional (whose) obligatory (which)	optional	prohibited	optional
Kiche Mayan	(no pied-piping with NP)	optional	--	prohibited
Ocoatepec Mixtec	obligatory	obligatory	--	--
Quiegolani Zapotec	obligatory	obligatory	--	--
Sasak	prohibited	obligatory	--	--
Tzotzil	obligatory	obligatory	--	--

The implied constraint hierarchies are as follows:

47) **Constraint rankings for nine languages with PPI**

Type	Language	Constraint ranking
High Wh	Ocoatepec Mixtec	Wh-Left » P-Left, N-Left
	Quiegolani Zapotec	
	Tzotzil	
High P	San Dionicio Zapotec:	P-Left » Wh-Left, Q-Left » N-Left
	Copala Trique	P-Left » Wh-Left » N-Left, Q-Left

	Tlacolula Zapotec	P-Left » Wh[+anim]-Left, N-Left » Wh[-anim]-Left, Q-Left
	Macuiltianguis Zapotec	P-Left, Wh[+d]-Left » Wh[-d]-Left, Q-Left, N-Left
High Q	Kiche Mayan	Q-Left » Wh-Left, P-Left
High N	Sasak	N-Left » Wh-Left » P-Left

7 Conclusions

Let us return to the question of the best way to formulate the constraints that produce head-initial order. So far I have formulated the typological results with alignments constraints. Could they have been equally formulated as precedence constraints? The answer appears to be no.

If we formulate the precedence constraints as Head <Spec and Head <Comp, then the typological results are very difficult to account for. PP and QP are the two phrase types which typically occur with interrogative complements, while NP occurs with an interrogative specifier.

So a Head <Comp constraint would predict that PP and QP should behave alike in PPI constructions. However, there seems to be no typological support for this. As we can see, the P-Left and Q-Left constraints do not show any tendency to be at the same position in the constraint ranking.

Looking at the question from another angle, we can ask ourselves how many head-ordering constraints are necessary to account for the orders found in PPI. We can see this in a language like San Dionicio Ocotepc Zapotec, where the constraint ranking is P-Left » Wh-Left, Q-Left » N-Left. In this language, at least three head-ordering constraints need to be ranked relative to the Wh-Left constraint. So a precedence theory with two constraints like Head <Spec and Head <Comp will not be adequate.

A relativized precedence theory (with six potential ordering constraints) can handle the data, but seems too strong in predicting typological results that are not attested. Relativized precedence constraints of the Q <Non-head type do not seem to make any interestingly different predictions from alignment constraints.

Alignment constraints are well-motivated in other parts of syntax, morphology, and phonology and thus the need for this constraint type is clear. What is not clear is whether there is any evidence that we need precedence constraints.

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Copala Trique: The orthography used is based on the practical orthography developed by Barbara and Bruce Hollenbach of SIL for their translation of the New Testament. We follow their usage in the representation of the consonants, including the following conventions: <x> = [ʃ], <xr> = [ʂ] (a retroflex alveopalatal sibilant), <ch> = [tʃ], <chr> = [tʂ], <c> = [k] (before front vowels), <qu> = [k] before back vowels, [v] = [β] and <j> = [h]. <Vn> represents a nasalized vowel. Trique has five level tones (1, 2, 3, 4, 5) and three contour tones (13, 31, 32), as discussed in Hollenbach (1984). Since the practical orthography does not distinguish all eight tones, we use the numerical superscripts of Hollenbach (1984, 1992) for our tonal representations.

Glosses use the following abbreviations: COM = completive aspect, DEC = declarative, P = possessed form.

Trique data were gathered from three Copala Trique speakers – José Fuentes, Irma Fuentes, and Roman Vidal López. I thank them, as well as Michael Parrish Key, who was my coauthor for an earlier (Broadwell and Key 2004) which dealt with these facts. I also thank Barbara Hollenbach, who graciously answered a number of questions via e-mail.

Kiche Mayan: This paper uses the conventions of the national orthography, in which <x> = a voiceless alveopalatal sibilant (IPA [ʃ]), <tz> = a voiceless dental affricate (IPA [ts]), <ch> = a voiceless alveopalatal affricate (IPA [tʃ]), <ä> = schwa (IPA [ə]), <q> is a uvular stop and apostrophe = glottal stop (following a vowel) or glottalization (following a consonant). However, Kiche dialects differ in the number of phonemic vowels and in the phonemic status of vowel length. The national orthography distinguishes long and short versions of the five cardinal vowels (thus *a, aa, e, ee, i, ii, o, oo, u, uu*). The Cantel dialect has no length distinction and instead has six phonemic vowels (*a, ä, e, i, o, u*). I write only these vowels here.

Glosses use the following abbreviations: Abs = absolutive, cl = personal classifier (markers of the age and sex of human referents), com = completive aspect, det = determiner, Erg = ergative, hum = human, inc = incompletive aspect, loc = locational focus (a particle that appears postverbally in sentences with a focussed locative phrase), nhum = nonhuman, p = plural, plain = plain status (a suffix which appears on a phrase-final verb), pass = passive, s = singular, wh = interrogative.

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Macuiltianguis Zapotec: In the orthography used here, symbols have their standard phonetic values, with the following exceptions. <c> = /k/, /x/ = /ʃ/, <yh> = /ž/, <th> = /θ/, <ch> = /č/, <'> = /ʔ/, and doubled vowels are long.

The following abbreviations appear in the glosses: cl = clitic, com = completive aspect, foc = focus, hab = habitual aspect, indef = indefinite, invis = determiner for unseen things, neg = negative, pl = plural, 3 = 3rd person.

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San Dionicio Ocotepéc Zapotec: The orthography for SDZ is adapted from the practical orthographies for other Zapotec languages spoken in the Valley of Oaxaca. In the SDZ orthography, <x> = /ɣ/ before a vowel and /ʃ/ before a consonant, <xh> = /ʃ/, <dx> = /ɟʃ/, <ch> = /tʃ/, <c> = /k/ before back vowels, <qu> = /k/ before front vowels, <eh> = /ɛ/ and <ehh> = /ɛɛ/. Doubled vowels are long. SDZ is a language with four contrastive phonation types: breathy <Vj>, creaky <V'V>, checked <V'>, and plain <V>. High tone is marked with an acute accent, low with a grave. Nominal tones are affected by position within the intonational phrase, and so nouns may show slightly varying tones from example to example.

Ordinary affixes are separated from the stem by the hyphen; clitics are separated by =. Glosses use the following abbreviations: an = animative, com = completive aspect, hab = habitual aspect, in = inanimate, neg = negative, loc = locative, p = possessed, pot = potential aspect, q = question, 1s = 1st person singular, 3 = 3rd person human (ordinary respect level), 3i = 3rd person inanimate.

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