

Wordhood and constituency in Chichewa

Jeff Good (based on joint work with Adam Tallman)
University at Buffalo and Humboldt Universität zu Berlin

Humboldt Universität zu Berlin

11 June 2024

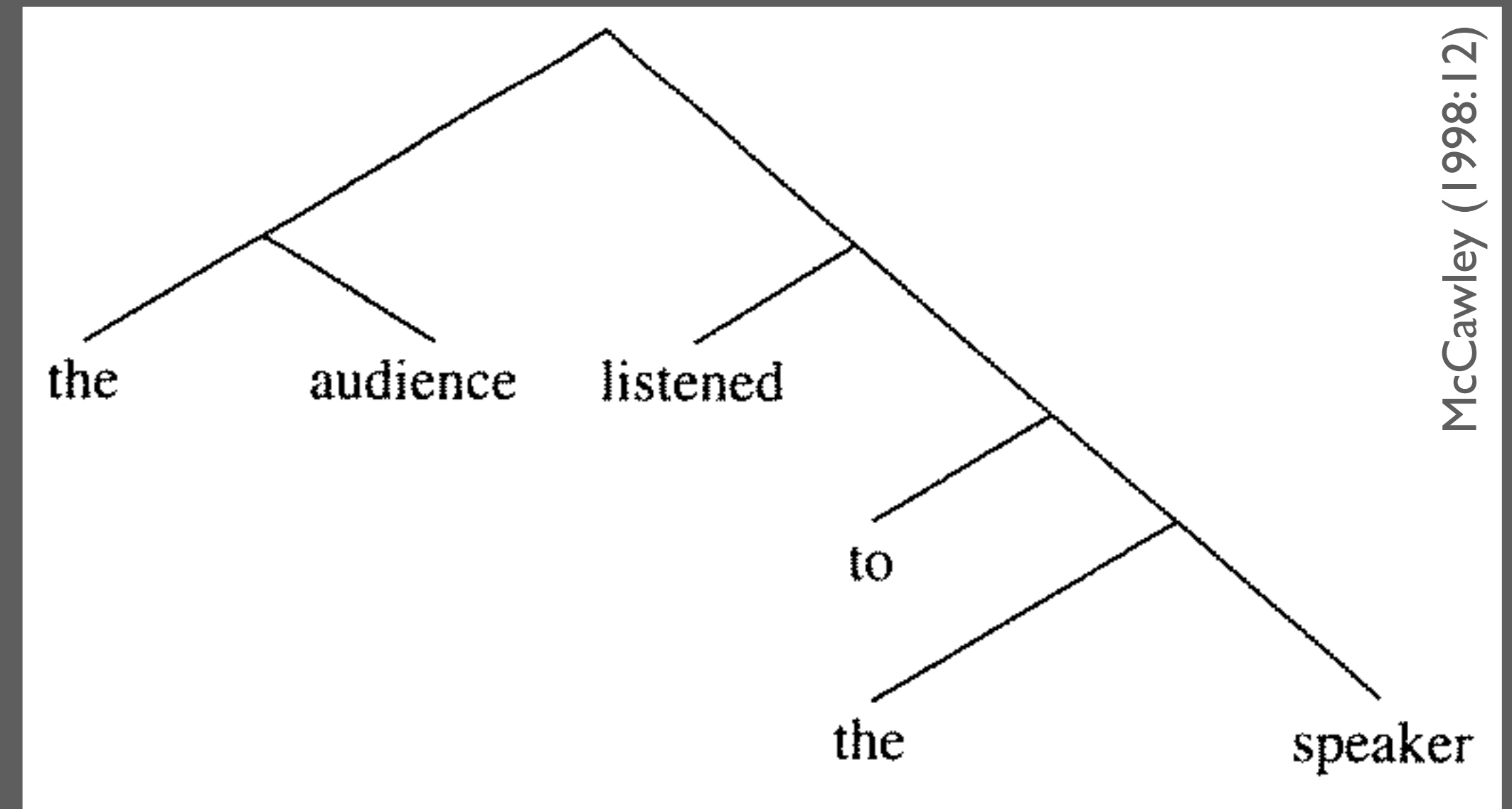
jcgood@buffalo.edu

Plan of talk

- Introduce (or re-introduce) constituency, as well as my perspective on its analysis
- Present two approaches to the study of constituency from a cross-linguistic, typological perspective, using Chichewa as a test case, focusing on
 - The overlap (or non-overlap) of the domains of linguistic processes
 - The nature of the linear restrictions found within a given construction
- The presentation is based on joint work with Adam Tallman of Friedrich-Schiller-Universität Jena

Constituency in grammar

- Constituency in linguistics is understood as a kind of part–whole structure
- Constituents have played a central role in linguistic theory since the mid-20th century
- They have been proposed for phonological, morphological and syntactic domains
- There are, often very strong, claims in the literature about the relationship between constituency and other phenomena
- These include: head–dependent relationships, government relationships, binding relationships, etc.

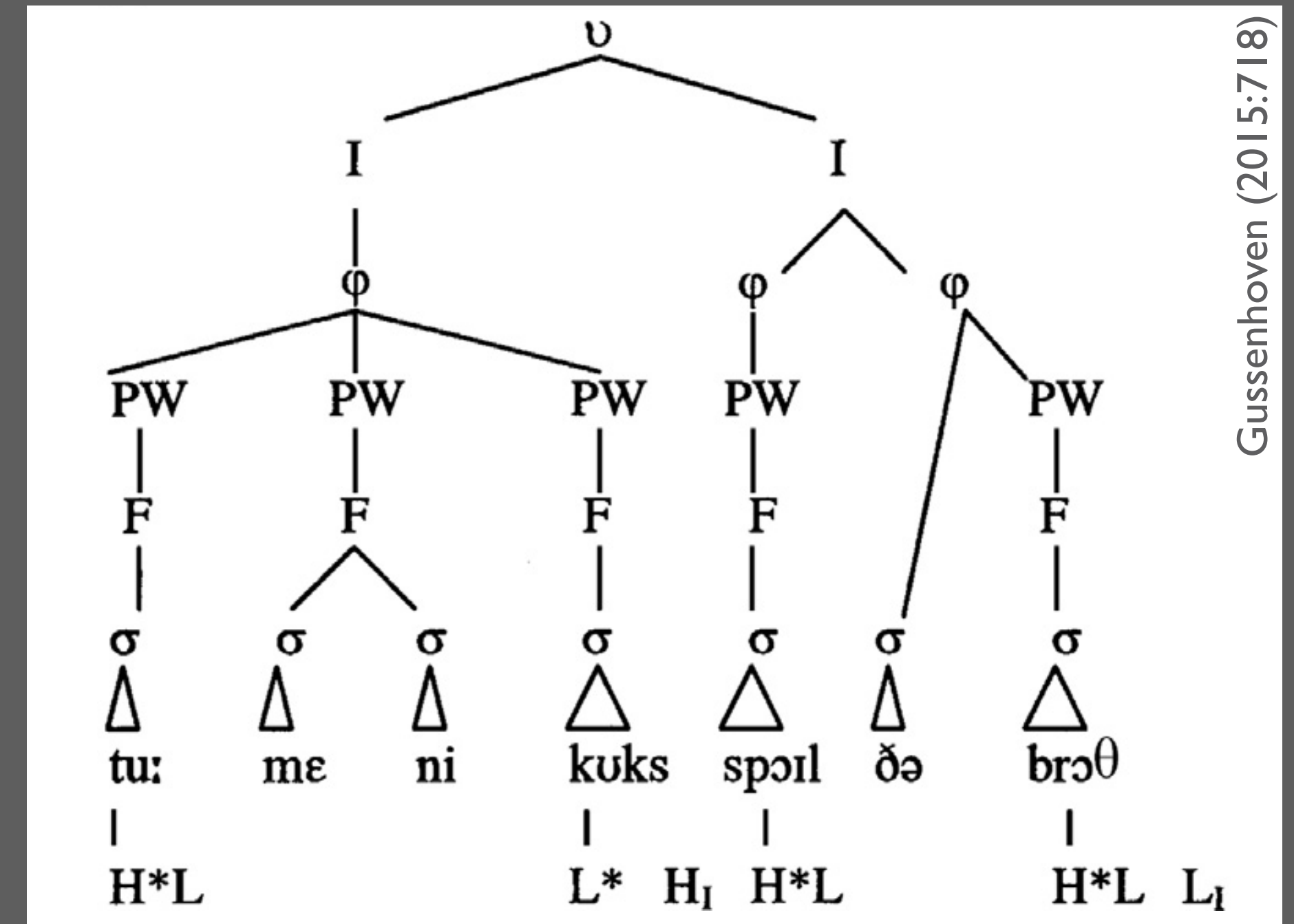


Example of a syntactic constituency diagram

- Represents only constituency
- Implicitly encodes a distinction between morphology and syntax

Constituency in grammar

- Constituency in linguistics represents a kind of part–whole structure
- Constituency has played a central role in linguistic theory since the mid-20th century
- It can apply to phonological, morphological and syntactic domains
- There are, often very strong, claims in the literature about the relationship between constituency and other phenomena
- These include: head–dependent relationships, government relationships, binding relationships, etc.



Example of a prosodic constituency diagram

- Represents constituency and categories
- Adds a separate layer of representation for intonational patterns

Constituency tests

- In principle, constituency is determined through constituency tests
 - Coordination
 - Clefting
 - Substitution
 - Free occurrence
 -
- See Osborne (2018) for more examples

Coordination (constituency + same category)

(1) The king and the queen are an amiable couple.

Clefting

(2a) It's your notes that John wants to look at.

(2b) It was for two hours that his speech lasted.

Substitution

(3) the first problem about ellipsis and the one about anaphora

Free occurrence

(4) When has Frank been working on the first problem? – At night.

Examples drawn from McCawley (1998) and Osborne (2018)

Lack of convergence and resolution

[The coordination] test is prone to false positives. For example, it would appear as if the subjects and the verbs form constituents as distinct from the object in the following right-node-raising sentence:

[Bruce loved] and [Dory hated] tuna salad sandwiches. (Carnie 2008:20)

- (1) Fred must [have been singing songs], and Nancy must \emptyset , too.
- (2) Fred must have [been singing songs], and Nancy must have \emptyset , too.
- (3) Fred must have been [singing songs], and Nancy must have been \emptyset , too.
- (4) Fred must have been [singing songs], and Nancy, too. (different construction)

? [Fred] **[must]** [have been both singing songs]
? [Fred] **[must** [have been both singing songs]] (McCawley 1998:216)

Maybe constituents don't exist?

...we have no good basis for a general, cross-linguistically viable word concept, and hence no basis for a general bifurcation between morphology and syntax.

–Haspelmath (2011:32)

Textbooks which discuss arguments for constituency (e.g. McCawley 1998) use a variety of criteria to establish constituency relations. But these arguments are also instances of language internal methodological opportunism...In the rest of this section, I will discuss a number of arguments for constituency, and show how they do not satisfy the requirement for a cross-linguistically valid criterion for putative constituency relations.

–Croft (2001:186)

From assumptions to hypotheses

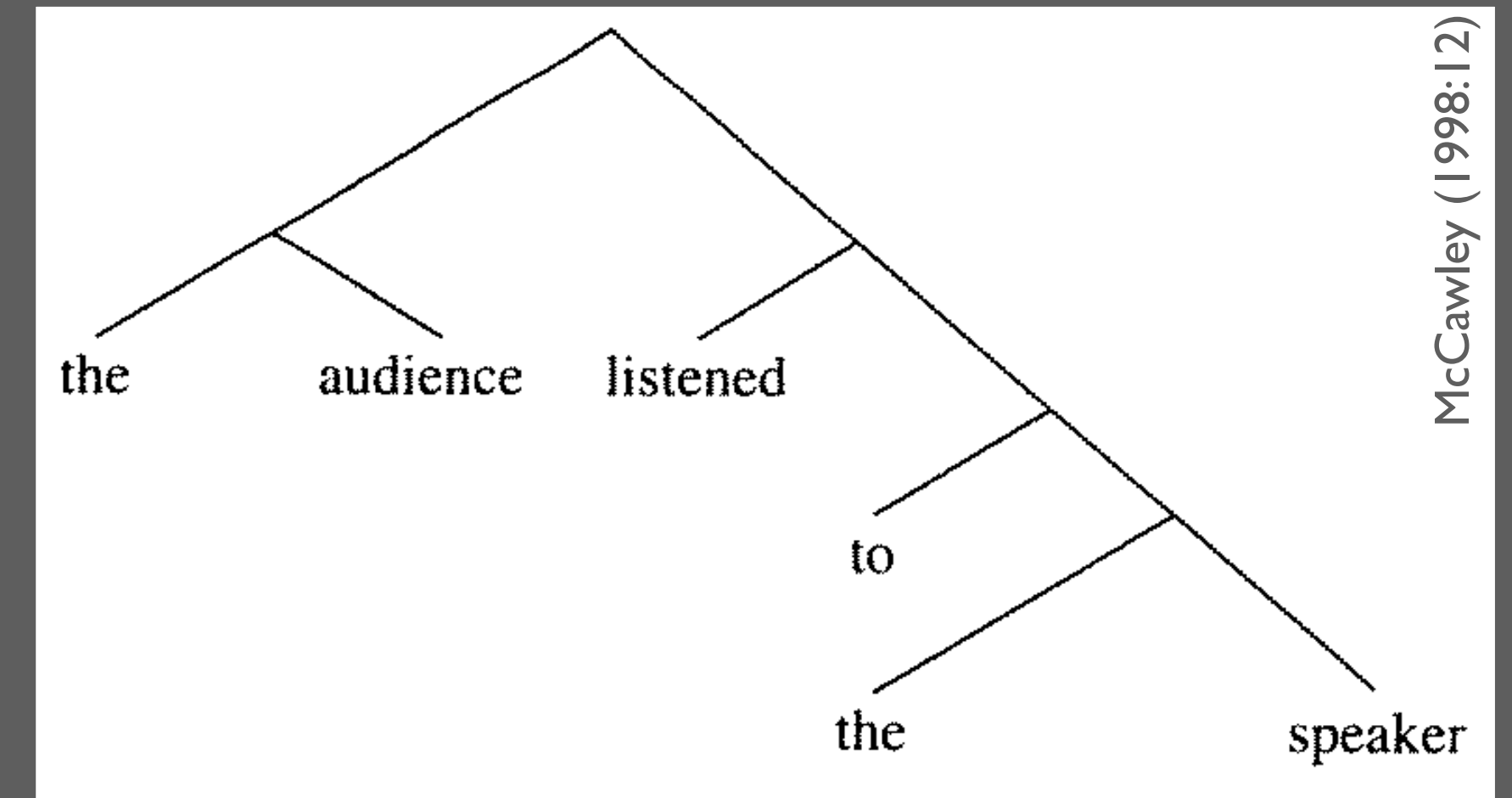
- What if we neither assume constituents do exist or do not exist, but rather reframe the issue in terms of hypotheses?
 - *In English, constituency tests will converge on a relatively small domain that can be clearly identified as the word in English.*
 - *Cross-linguistically, constituency tests will converge on a relatively small domain in all languages that can be identified as the word in each of those languages.*
 - *Cross-linguistically, the domains of constituency tests will structure in terms of nested sets which can be associated with a single tree-based representation.*
 - ...
- Such hypotheses could be tests in either categorical or probabilistic terms

What is “constituency” anyway?

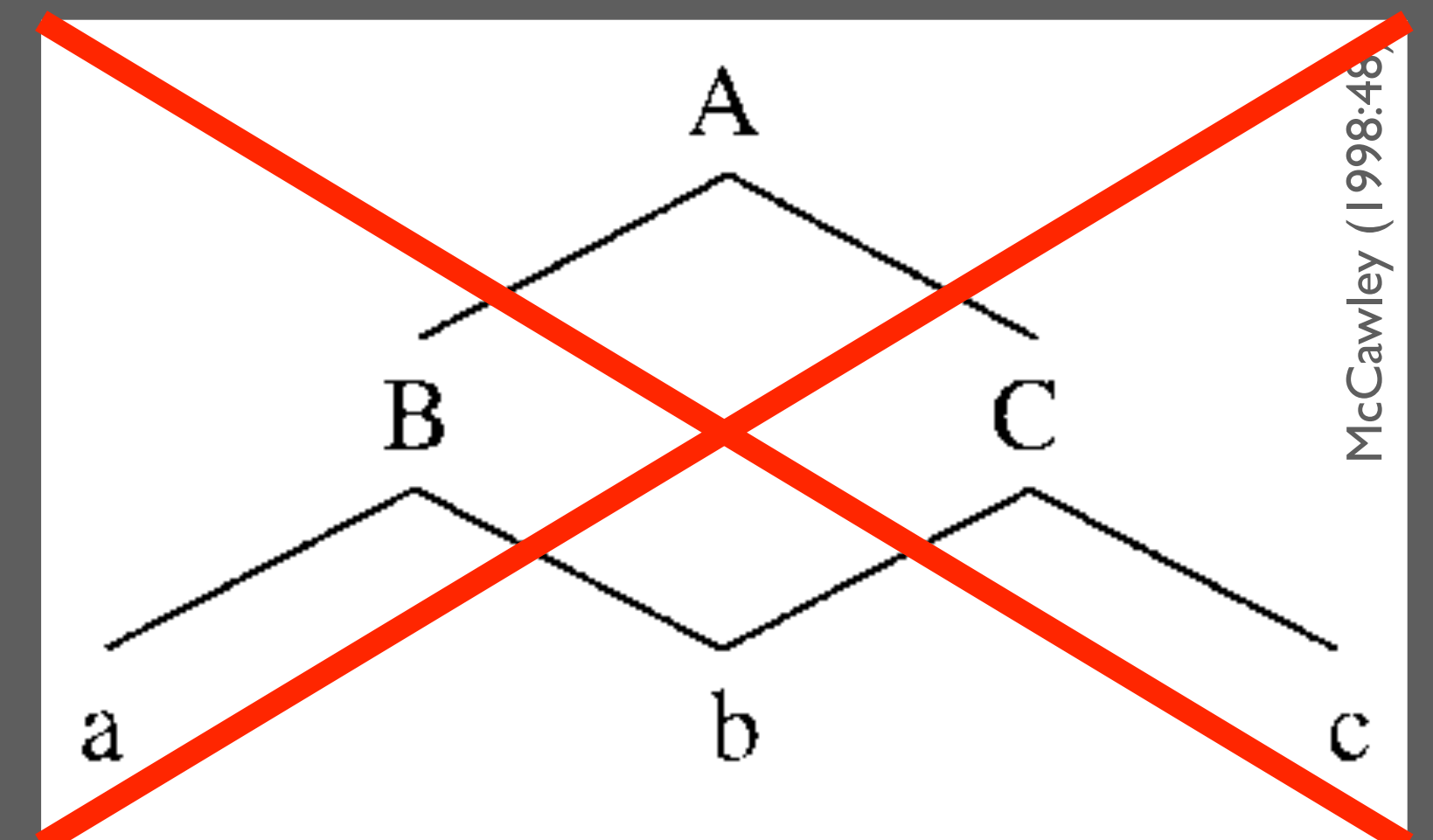
- While often presented as a “package”, constituency embeds within it several logically separable properties
 - “Clean” nesting of constituents within each other
 - Domain-based separation of generalizations (e.g., phonological vs. morphological vs. syntactic)
 - Quantal clustering of generalizations (i.e., “jumps” in the domains over which linguistic processes apply)

What is “constituency” anyway?

- While often presented as a “package”, constituency embeds within it several logically separable properties
- “Clean” nesting of constituents within each other
- Domain-based separation of generalizations (e.g., phonological vs. morphological vs. syntactic)
- Quantal clustering of generalizations (i.e., “jumps” in the domains over which linguistic processes apply)



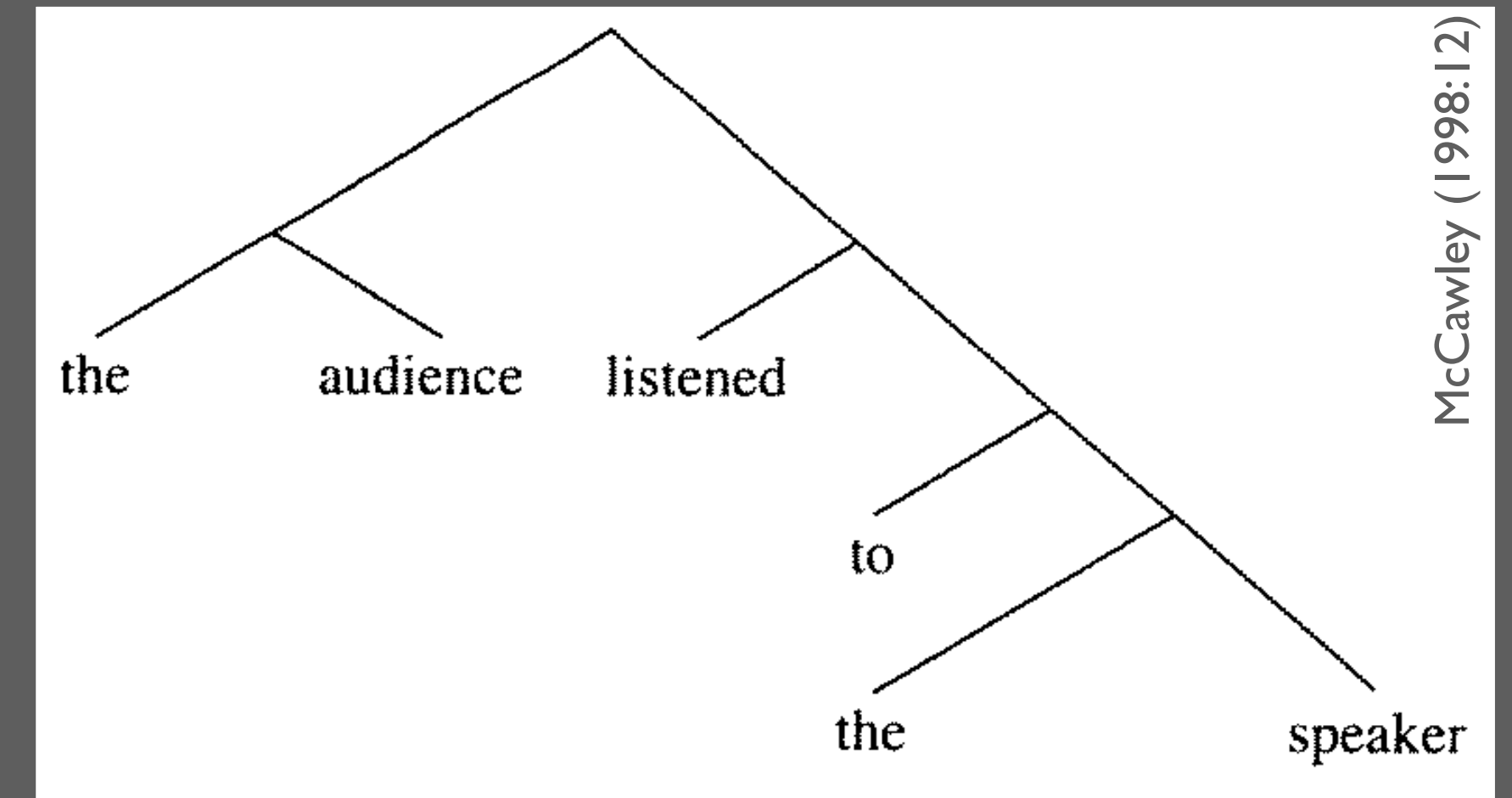
Complete nesting of constituents



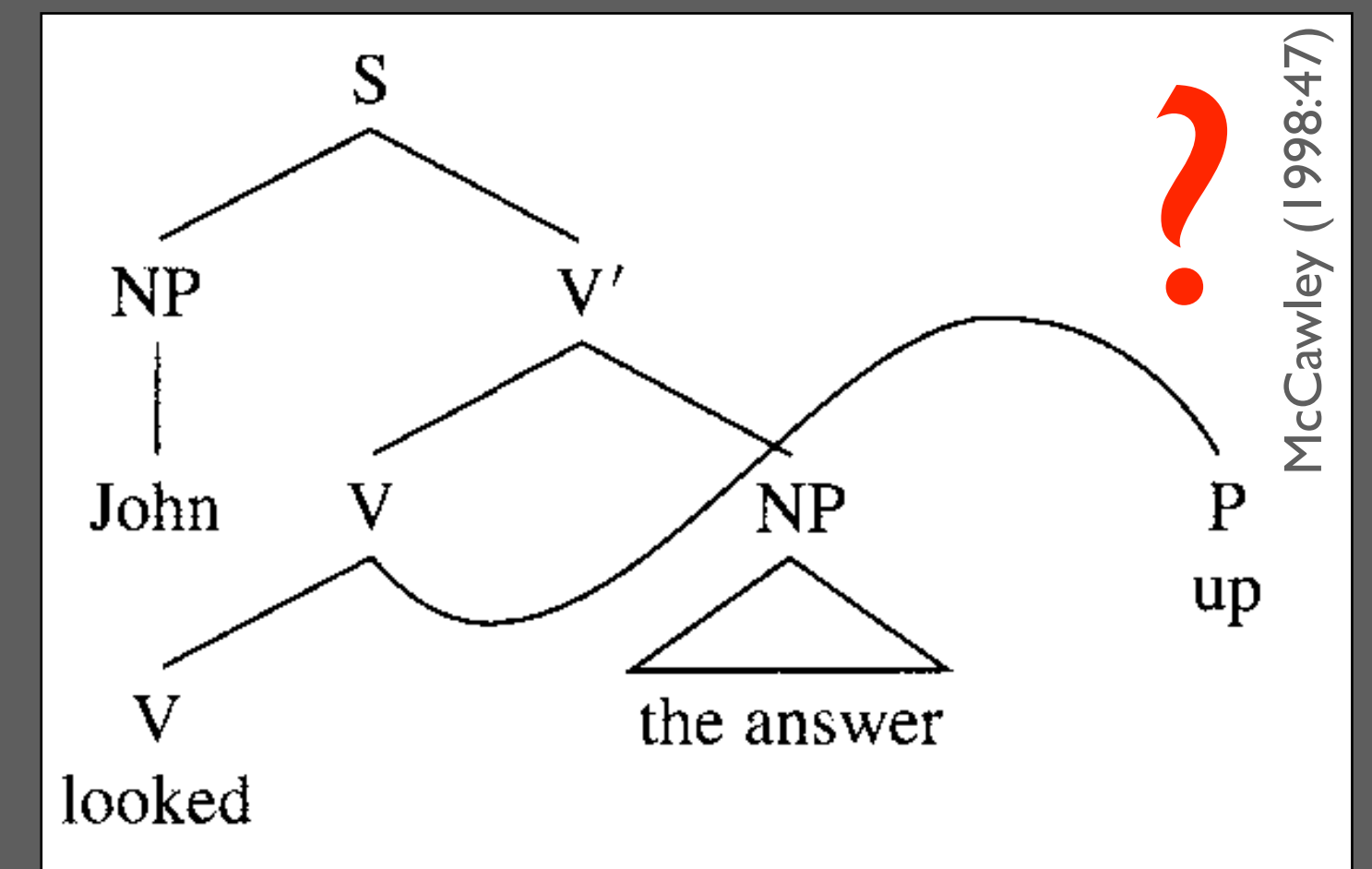
Overlap (non-nesting) of constituents

What is “constituency” anyway?

- While often presented as a “package”, constituency embeds within it several logically separable properties
- “Clean” nesting of constituents within each other
- Domain-based separation of generalizations (e.g., phonological vs. morphological vs. syntactic)
- Quantal clustering of generalizations (i.e., “jumps” in the domains over which linguistic processes apply)



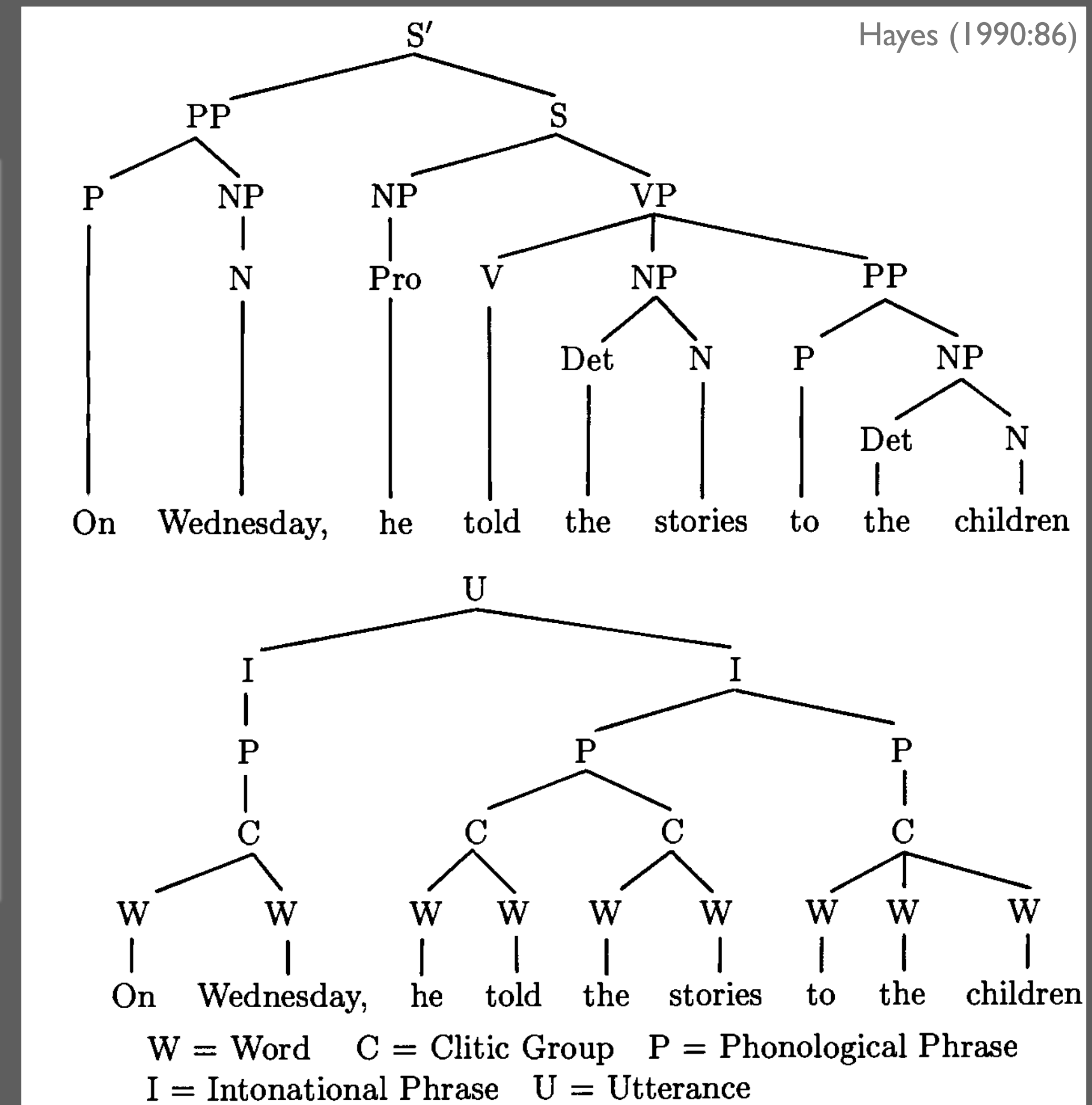
Complete nesting of constituents



Discontinuous, but maybe nested?

What is “constituency” anyway?

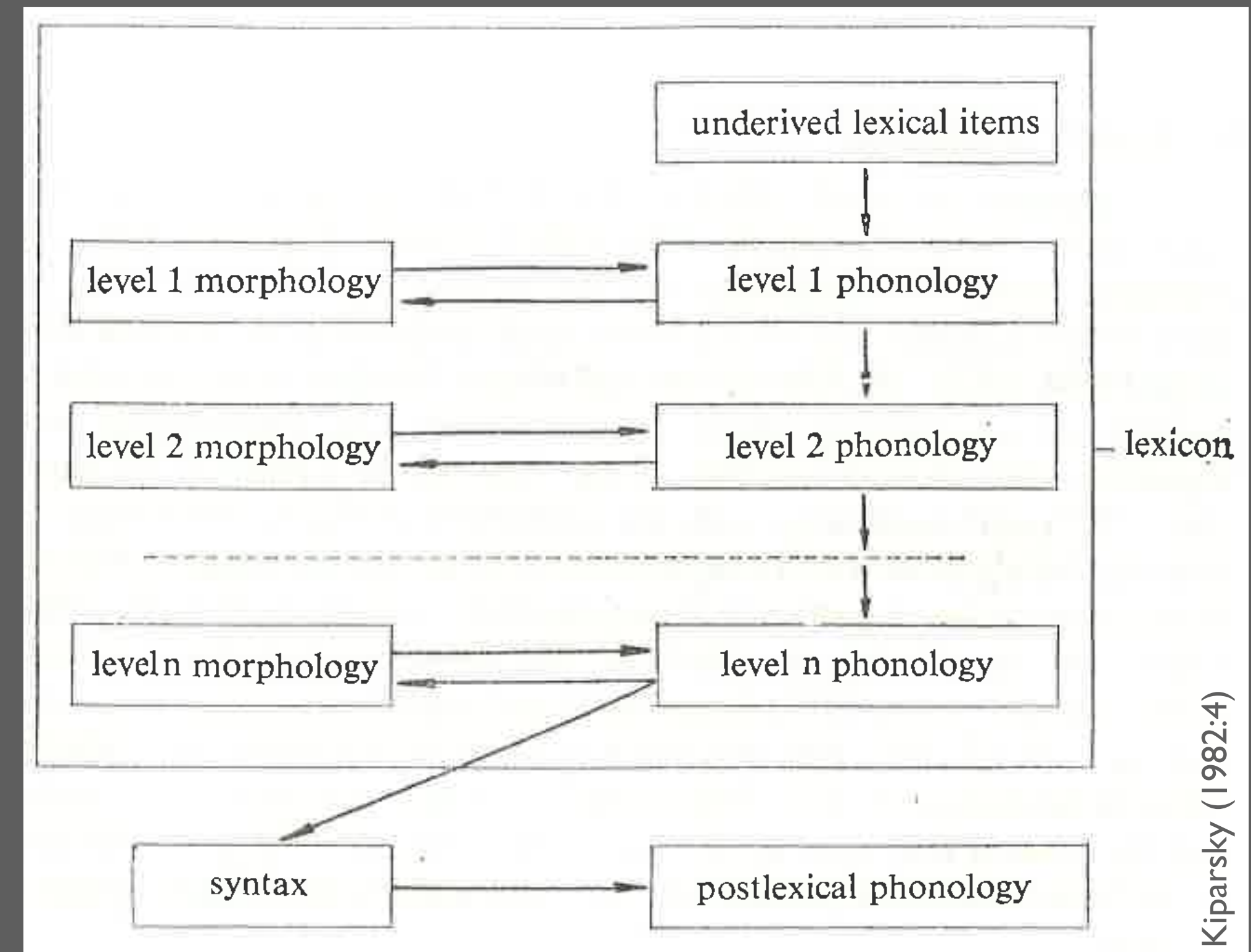
- While often presented as a “package”, constituency embeds within it several logically separable properties
- “Clean” nesting of constituents within each other
- Domain-based separation of generalizations (e.g., phonological vs. morphological vs. syntactic)
- Quantal clustering of generalizations (i.e., “jumps” in the domains over which linguistic processes apply)



Syntactic vs. prosodic constituency

What is “constituency” anyway?

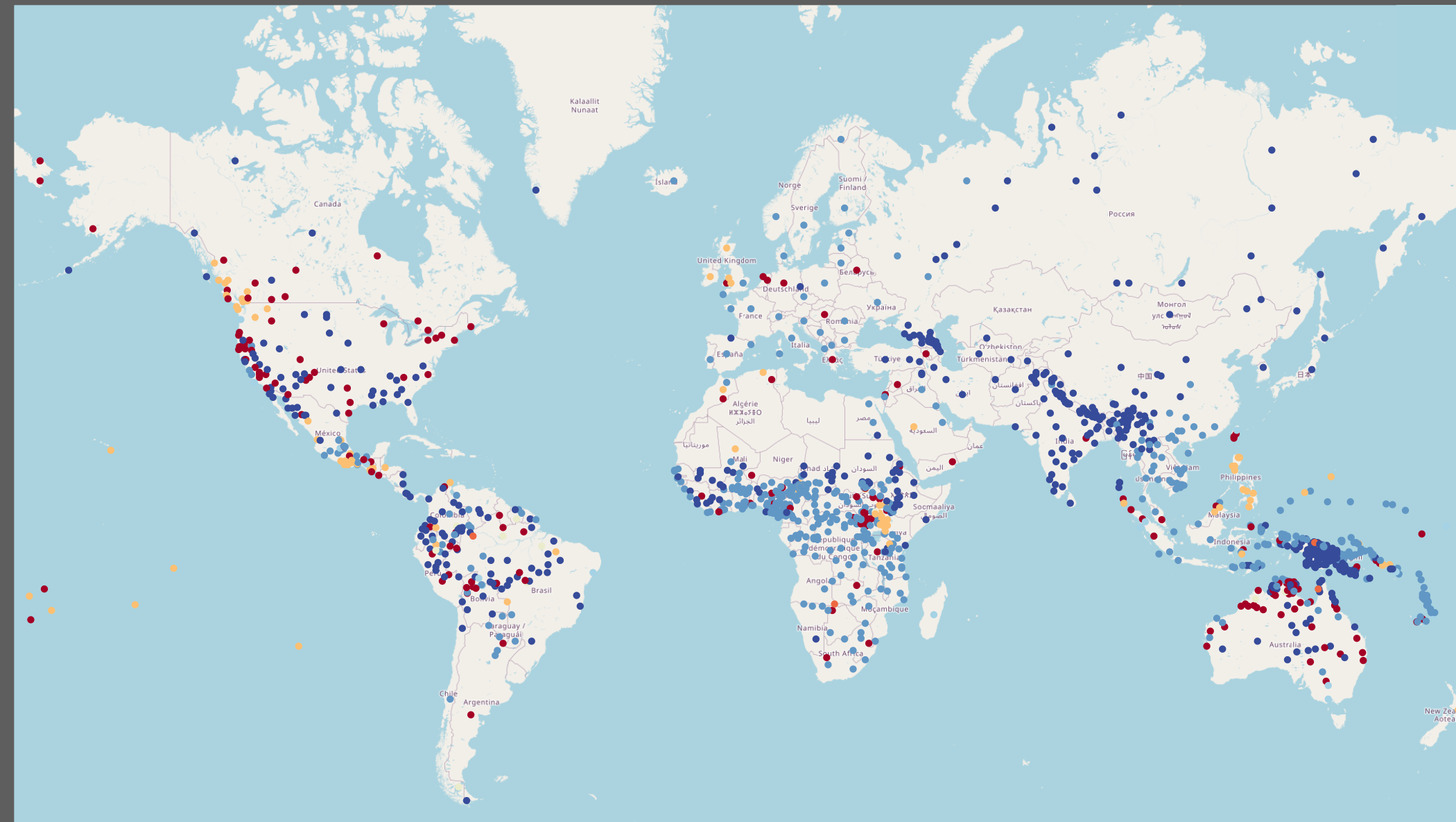
- While often presented as a “package”, constituency embeds within it several logically separable properties
- “Clean” nesting of constituents within each other
- Domain-based separation of generalizations (e.g., phonological vs. morphological vs. syntactic)
- Quantal clustering of generalizations (i.e., “jumps” in the domains over which linguistic processes apply)



Model for Lexical Phonology

Typology and constituency

- Exploratory approach to typology (based on Greenberg's foundational work)
 - Start with a domain and a model of its variation (e.g., basic word order as SOV, SVO, VSO, etc.)
 - Survey attested variation across a sample of languages, paying attention to consistency in coding
 - Examine the data for potential universals (e.g., Verb and Object tend to be adjacent, providing possible evidence for a verb phrase)



Hypothesis testing via typology

- Testing a hypothesis using typological methods requires a different approach to avoid circularity in the analysis
 - Develop a hypothesis (e.g., *domains of linguistic generalizations will have a nested set structure*)
 - Develop a coding scheme that does not inadvertently assume the hypothesis in whole or part (e.g., do not presuppose a *word vs. phrase* distinction)
 - Determine what kinds of qualitative and quantitative analysis can be used to validate the hypothesis
- Rest of the talk: Two approaches to examining constituency as a hypothesis
- Each approach can be seen as an extension of Bickel's (2010) proposals for multivariate typology

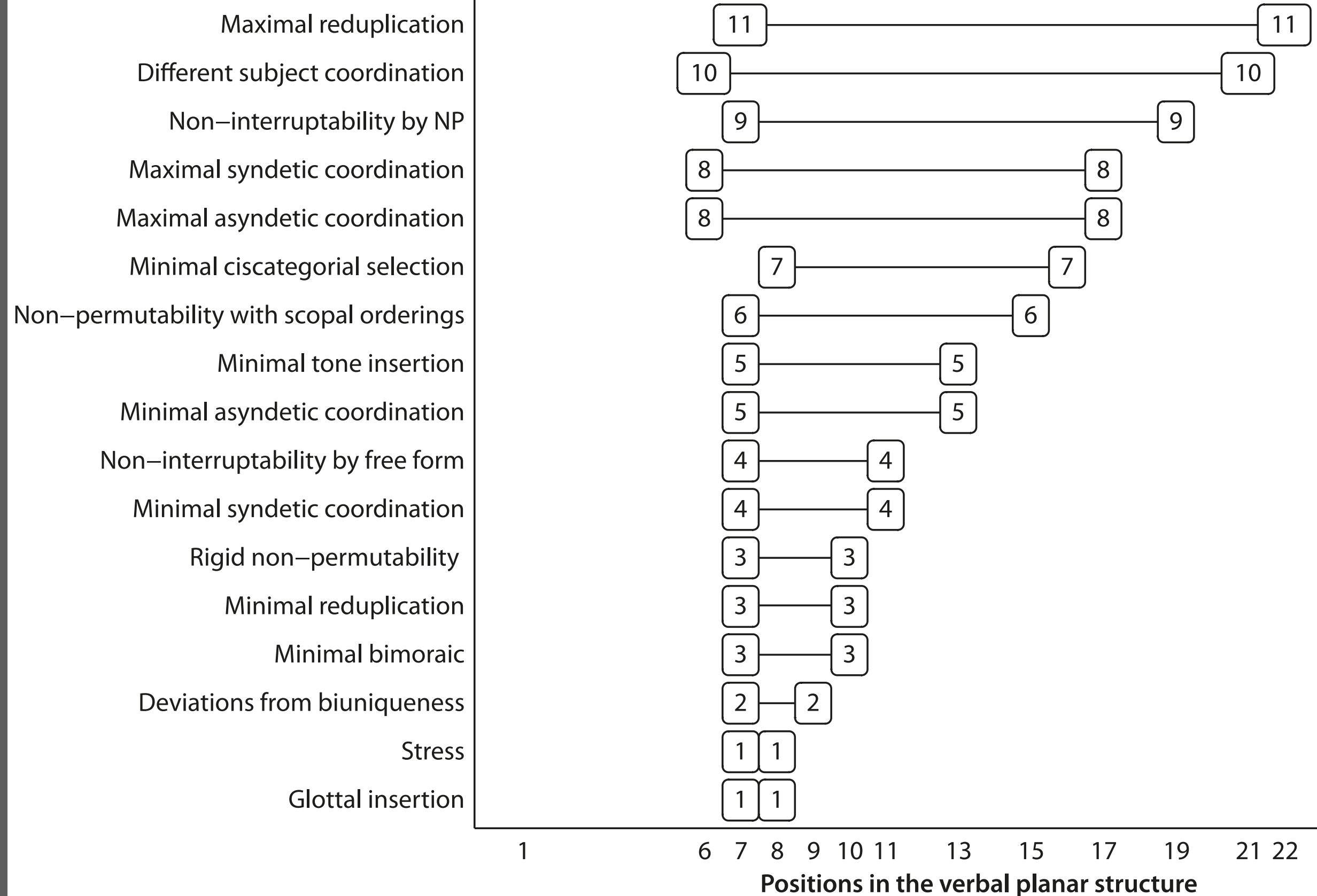


Study I: Planar structures
Do constituents emerge from diagnostics?

Tallman (2021): Constituency in Chácobo

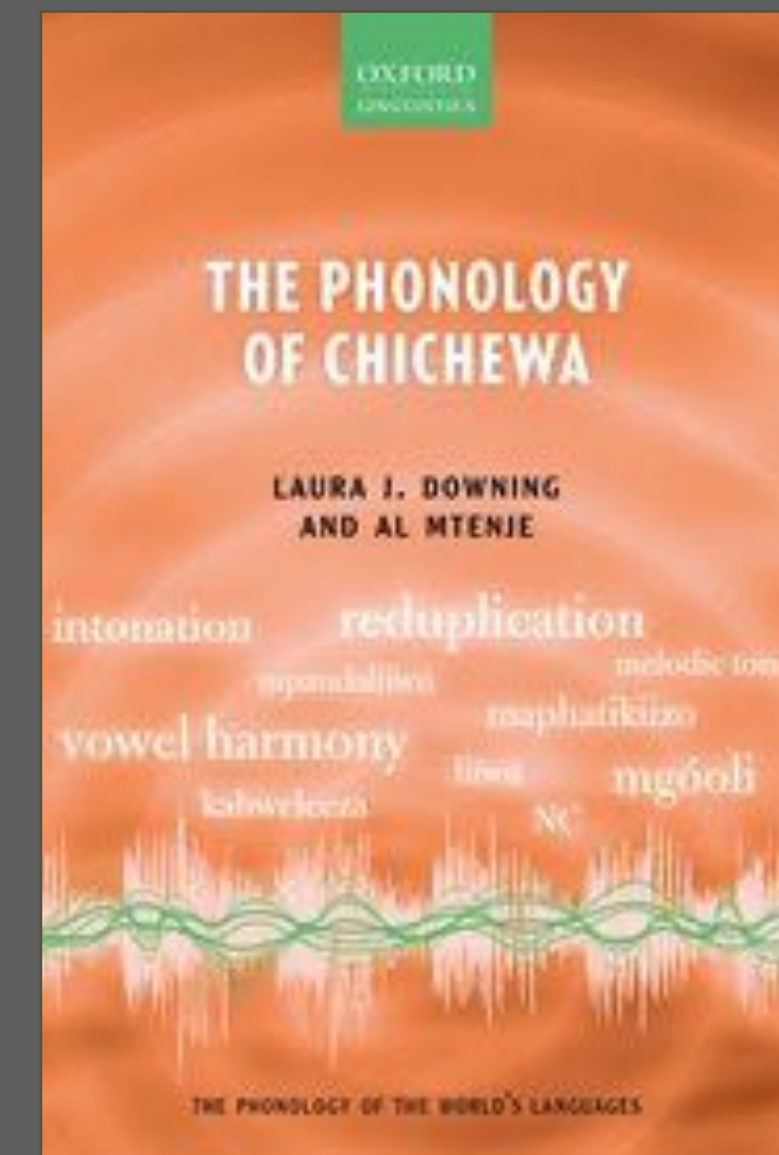
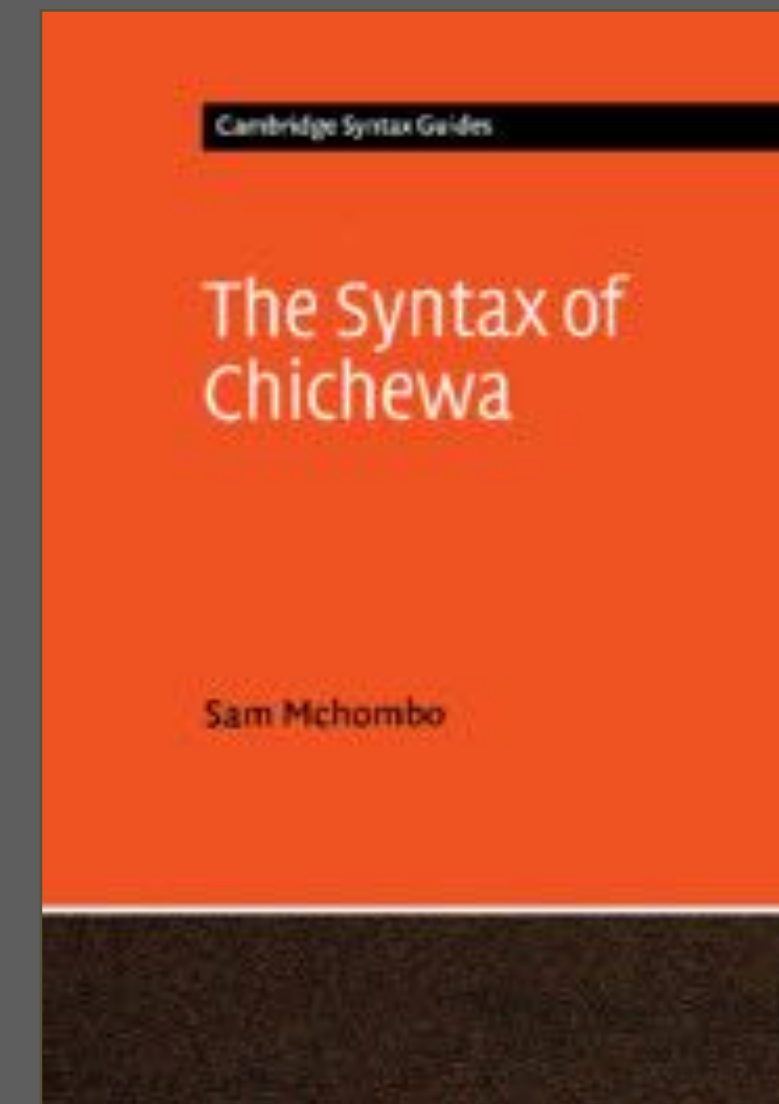
- Tallman (2021) develops a model for examining the nesting and quantal aspects of models of constituent structure
- The notion of a *planar structure* is developed to encode positions around a core element
- The positions for a number of constituency tests in Chácobo are then coded
- The model requires some assumptions regarding morphemes and clauses...
- ...but it does not assume words or phrasal constituents

6 8 9 [17] 6 8 9 [17] 20
waka atf -a =tikí(n)=kiá notí niş -a =tiki(n)=kiá adaŋ=
 COW grab -TR =AGAIN=CNTRFCT canoe tie -TR =AGAIN=CNTRFCT Adam=ERG
 21 24
 =wa =ki
 =TR =DEC:P
 ‘Adam attempted to grab the cow again and attempted to tie the canoe again.’



Chichewa as a test language

- For my own examination of this approach, I made use of data from the Bantu language Chichewa
- This was due to the fact that I had decent knowledge of the language and the availability of reference sources
- Approach
 - Create a Chichewa planar structure
 - Find all morphosyntactic and phonological generalizations that could be considered constituency tests
 - Code their domains in terms of planar positions
- Future work: Compare Chichewa with other languages coded in this way as part of a general consideration of diversity in constituency



Position	Type	Elements
1	Slot	Q
2	Zone	PRESUBJ
3	Slot	SUBJ
4	Slot	NEG
5	Slot	SM
6	Zone	TAMP
7	Slot	OM
8	Slot	ROOT
9	Slot	UNPROD EXT
10	Slot	STAT
11	Slot	CAUS
12	Slot	APP
13	Slot	RECIP
14	Slot	PASS
15	Slot	FINAL
16	Slot	POSTFINAL2P
17	Zone	POSTFINALENC
18	Slot	OBJ
19	Zone	POSTOBJ

[Sí]₄-[ú]₅-[kú-ká-ngo]₆-[zí]₇-[thyól]₈-[ets]₁₂-[el]₁₃-[á]₁₆-[nso]₁₈
 NEG-3SM-PRS-GO-JUST-10OM-break-CAUS-APPL-FV-too

[mipando]₂₀

4.chairs

“It is not just going to have the chairs broken for them as well (too).” (Mchombo 2004:69)

Position	Type	Elements
1	Slot	Q
2	Zone	PRESUBJ
3	Slot	SUBJ
4	Slot	NEG
5	Slot	SM
6	Zone	TAMP
7	Slot	OM
8	Slot	ROOT
9	Slot	UNPROD EXT
10	Slot	STAT
11	Slot	CAUS
12	Slot	APP
13	Slot	RECIP
14	Slot	PASS
15	Slot	FINAL
16	Slot	POSTFINAL2P
17	Zone	POSTFINALENC
18	Slot	OBJ
19	Zone	POSTOBJ

Orthographic word

[Sí]₄-[ú]₅-[kú-ká-ngo]₆-[zí]₇-[thyól]₈-[ets]₁₂-[el]₁₃-[á]₁₆-[nso]₁₇
 NEG-3SM-PRS-GO-JUST-10OM-break-CAUS-APPL-FV-too

[mipando]₁₈

4.chair

“It is not just going to have the chairs broken for them as well (too).” (Mchombo 2004:69)

Position	Type	Elements
1	Slot	<i>Q</i>
2	Zone	PRESUBJ
3	Slot	<i>SUBJ</i>
4	Slot	NEG
5	Slot	<i>SM</i>
6	Zone	<i>TAMP</i>
7	Slot	OM
8	Slot	<i>ROOT</i>
9	Slot	UNPROD EXT
10	Slot	STAT
11	Slot	CAUS
12	Slot	APP
13	Slot	RECIP
14	Slot	PASS
15	Slot	<i>FINAL</i>
16	Slot	POSTFINAL2P
17	Zone	POSTFINALENC
18	Slot	<i>OBJ</i>
19	Zone	POSTOBJ

[Kodí]₁ [anyaní á mísala]₃
 Q 2.baboon 2.ASS 4.madness

[a]₅-[ku]₆-[phwány]₈-[á]₁₅ [chiyáni]₁₈?
 2SM-PRES-smash-FV what

“What are the mad baboons smashing?”
 (Mchombo 2005:69)

What do the diagnostics look like?

Anyání á-ma-[mang-its-il-án-á]-[mang-its-il-án-á] zi-sakasakwá míkângo.
2-baboons 2sM-HAB-build-CAUS-APPL-RECIP-FV 8.huts by 4.lions
“The baboons frequently get huts built for each other by the lions.”

Reduplication

an instance of subspan repetition

What do the diagnostics look like?

Sí-ú-kú-ká-ngo-zí-thyól-ets-el-á-nso mipando

NEG-3SM-PRS-GO-JUST-100M-break-CAUS-APPL-FV-too 4.chair

“It is not just going to have the chairs broken for them as well (too).”

Affixal selection

an instance of ciscategorial selection

What do the diagnostics look like?

INFINITIVE	APPLICATIVE	APPLICATIVE+CAUSATIVE	GLOSS
ku-phíik-a	ku-phíik-il-a	ku-phíik-il-its-a	'cook'
ku-méeny-a	ku-méeny-el-a	ku-méeny-el-ets-a	'hit'

Vowel harmony

What do the diagnostics look like?

TONELESS VERB	GLOSS	HIGH-TONED VERB	GLOSS
<i>ii-ph-a</i>	'kill'		
<i>meeny-a</i>	'hit'	<i>peéz-á</i>	'find'
<i>yang'aan-a</i>	'look'	<i>namiíz-á</i>	'deceive'
<i>fotokooz-a</i>	'explain'	<i>thamaáng-á</i>	'run'
<i>tembenuuz-a</i>	'turn around'	<i>khululuk-iíl-á</i>	'pardon'
<i>vundukul-iits-a</i>	'make uncover'	<i>thamang-iíts-á</i>	'chase'

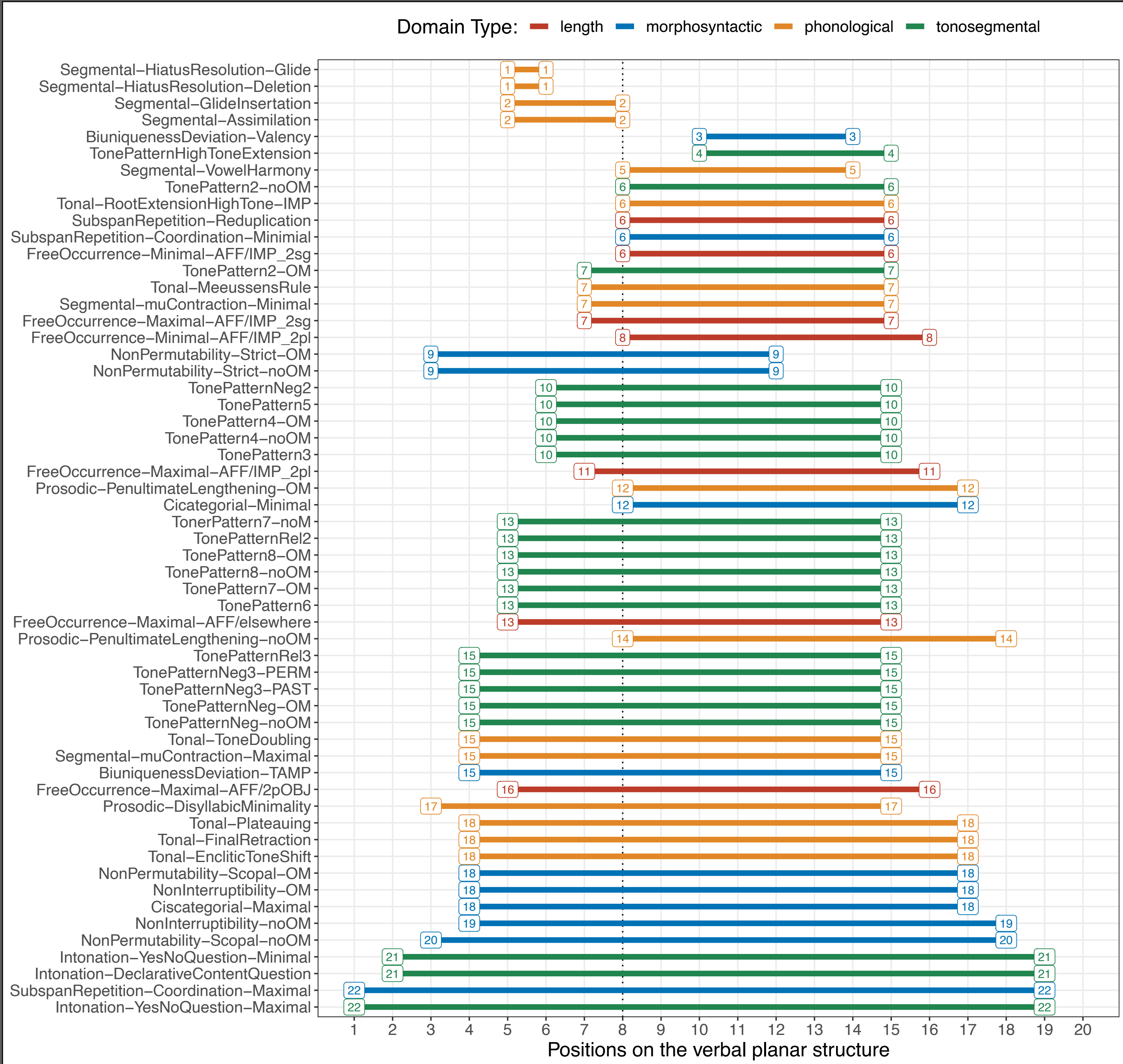
Tone Pattern 1

TONELESS VERB	GLOSS	HIGH-TONED VERB	GLOSS
<i>tií-ph-é</i>	'let's kill'		
<i>ti-meény-é</i>	'let's hit'	<i>ti-peéz-é</i>	'let's find'
<i>ti-yang'aán-é</i>	'let's look'	<i>at ti-namiíz-é</i>	'let's deceive'
<i>ti-fotokoóz-é</i>	'let's explain'	<i>ti-thamaáng-é</i>	'let's run'
<i>ti-tembenuúz-é</i>	'let's turn over'	<i>ti-khululuk-iíl-é</i>	'let's pardon'
<i>ti-sokoneéz-é</i>	'let's mess up'	<i>ti-tambalaál-é</i>	'let's stretch legs'

Tone Pattern 2

Morphological tone-segment association

Position	Type	Elements
1	Slot	Q
2	Zone	PRESUBJ
3	Slot	SUBJ
4	Slot	NEG
5	Slot	SM
6	Zone	TAMP
7	Slot	OM
8	Slot	ROOT
9	Slot	UNPROD EXT
10	Slot	STAT
11	Slot	CAUS
12	Slot	APP
13	Slot	RECIP
14	Slot	PASS
15	Slot	FINAL
16	Slot	POSTFINAL2P
17	Zone	POSTFINALENC
18	Slot	OBJ
19	Zone	POSTOBJ

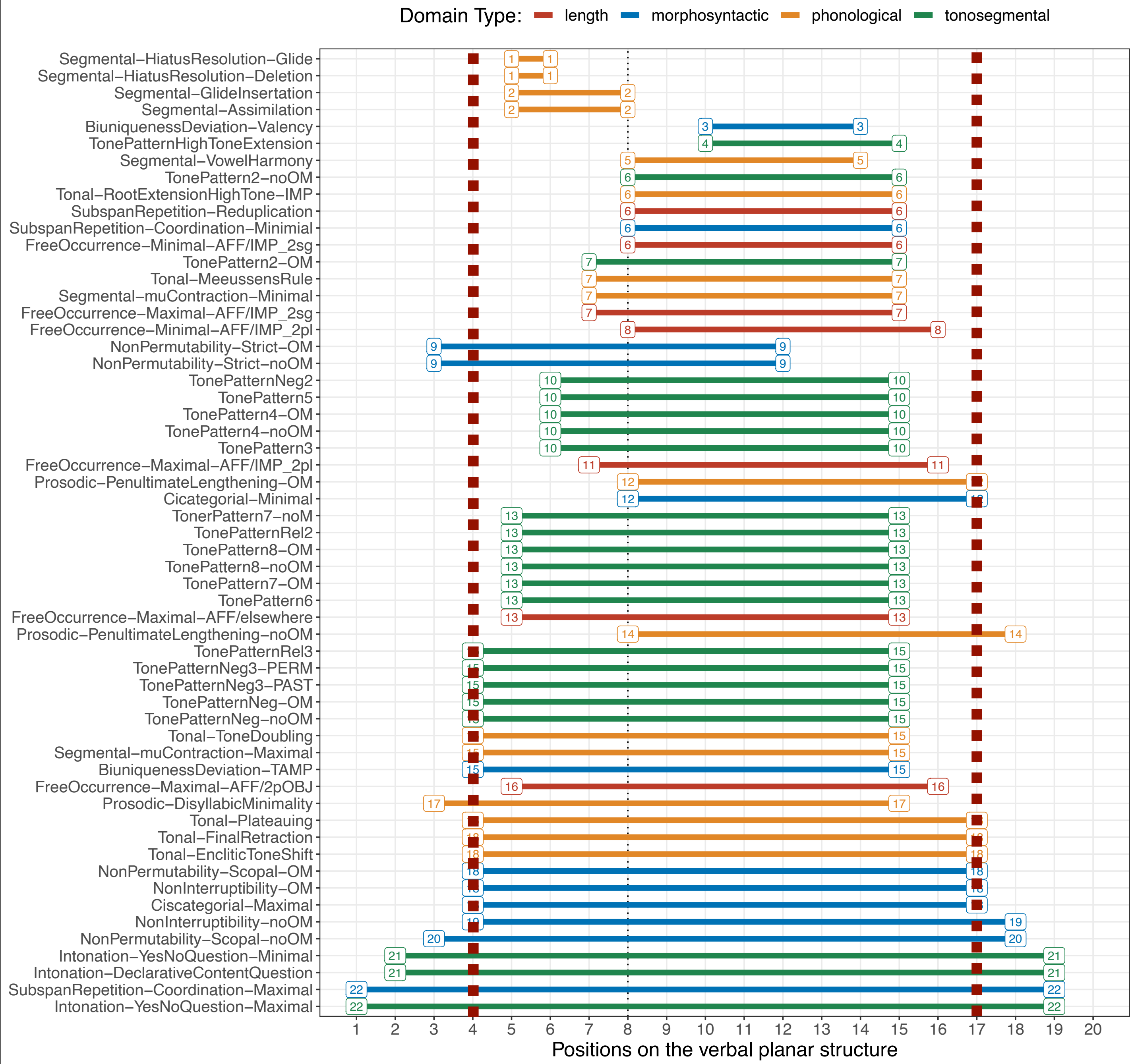


34 domains coded

22 layers identified

Position	Type	Elements
1	Slot	Q
2	Zone	PRESUBJ
3	Slot	SUBJ
4	Slot	NEG
5	Slot	SM
6	Zone	TAMP
7	Slot	OM
8	Slot	ROOT
9	Slot	UNPROD EXT
10	Slot	STAT
11	Slot	CAUS
12	Slot	APP
13	Slot	RECIP
14	Slot	PASS
15	Slot	FINAL
16	Slot	POSTFINAL2P
17	Zone	POSTFINALENC
18	Slot	OBJ
19	Zone	POSTOBJ

Orthographic word

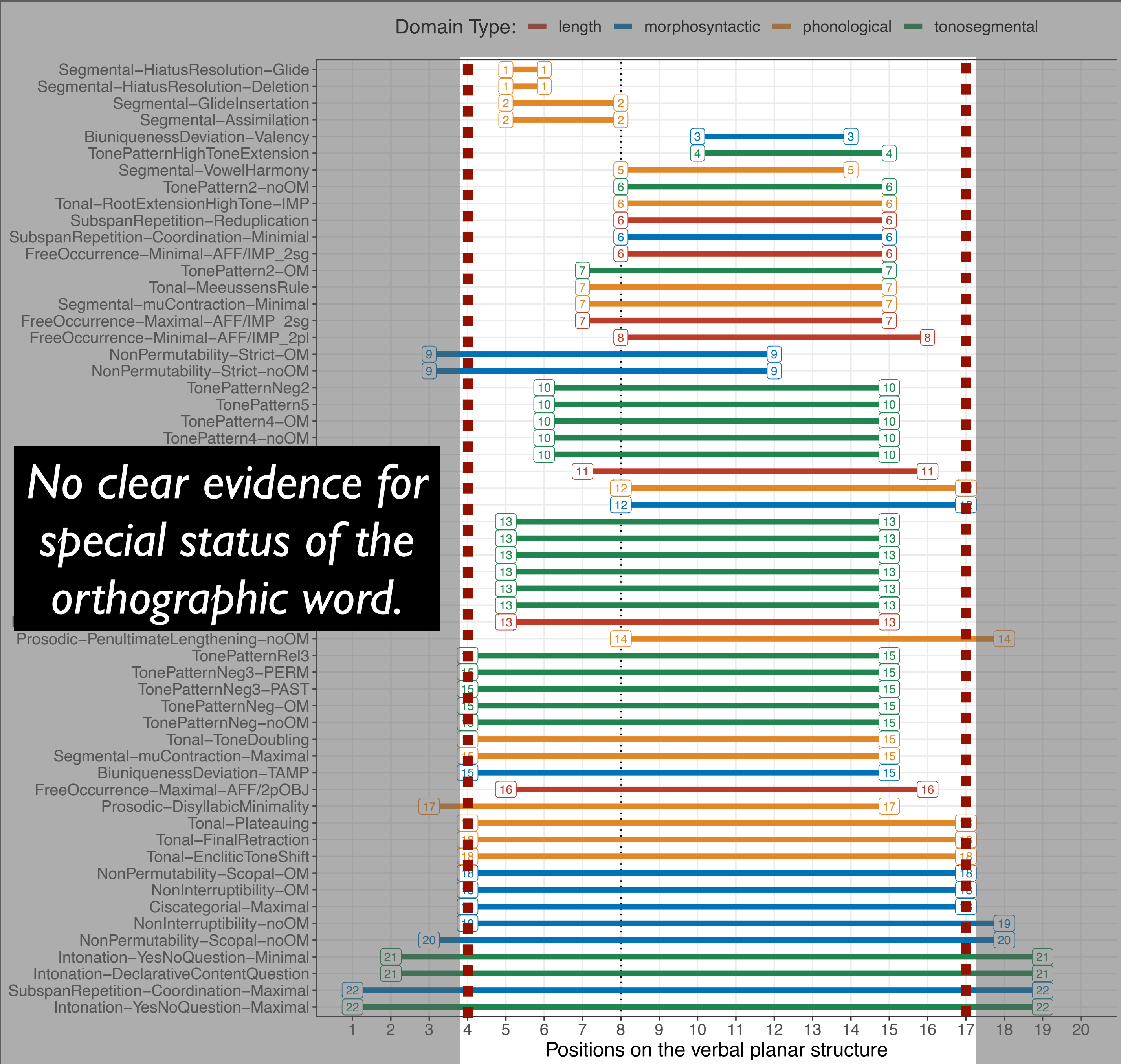


34 domains coded

22 layers identified

Position	Type	Elements
1	Slot	Q
2	Zone	PRESUBJ
3	Slot	SUBJ
4	Slot	NEG
5	Slot	SM
6	Zone	TAMP
7	Slot	OM
8	Slot	ROOT
9	Slot	UNPROD EXT
10	Slot	STAT
11	Slot	CAUS
12	Slot	APP
13	Slot	RECIP
14	Slot	PASS
15	Slot	FINAL
16	Slot	POSTFINAL2P
17	Zone	POSTFINALENC
18	Slot	OBJ
19	Zone	POSTOBJ

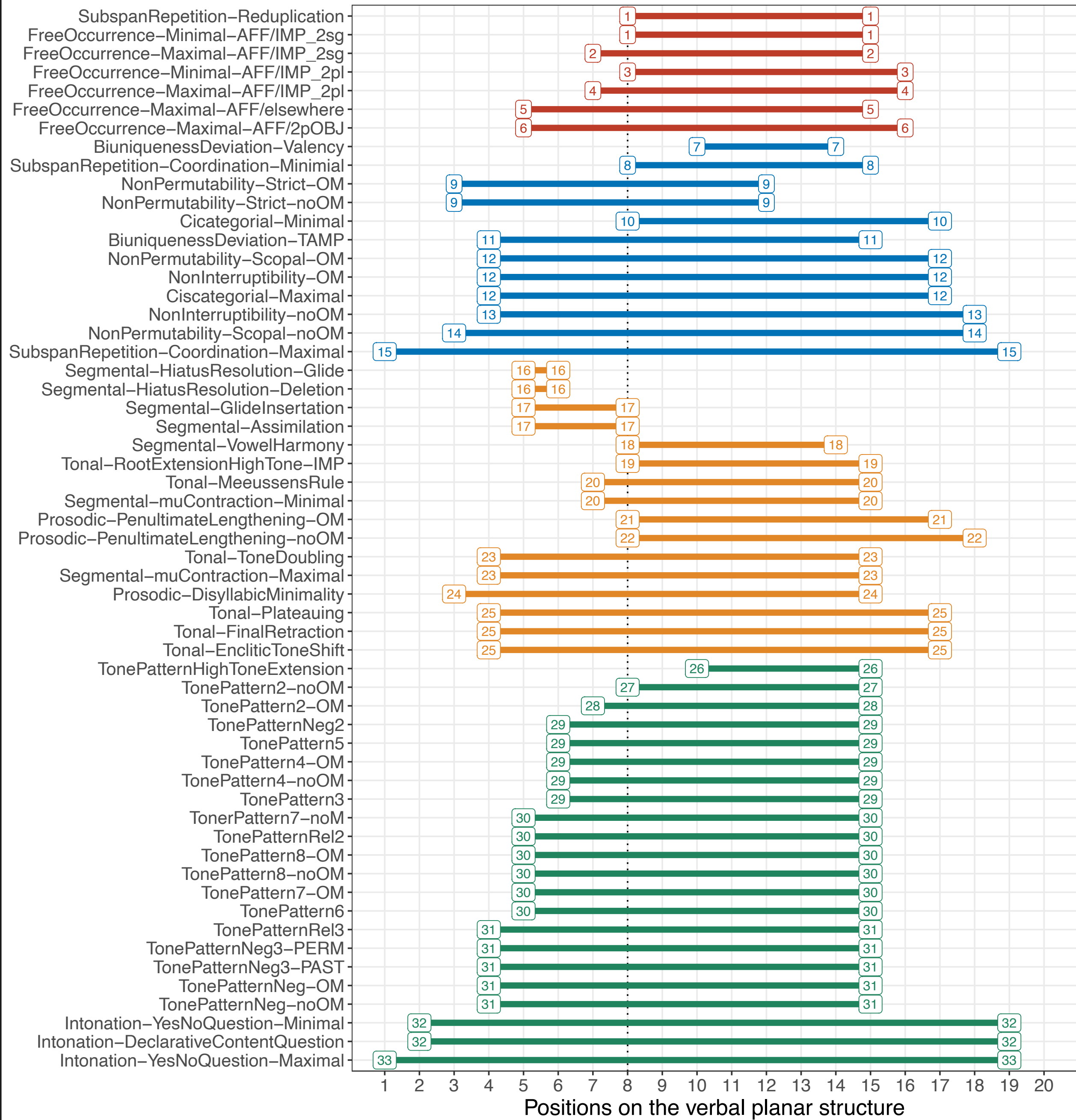
Orthographic word



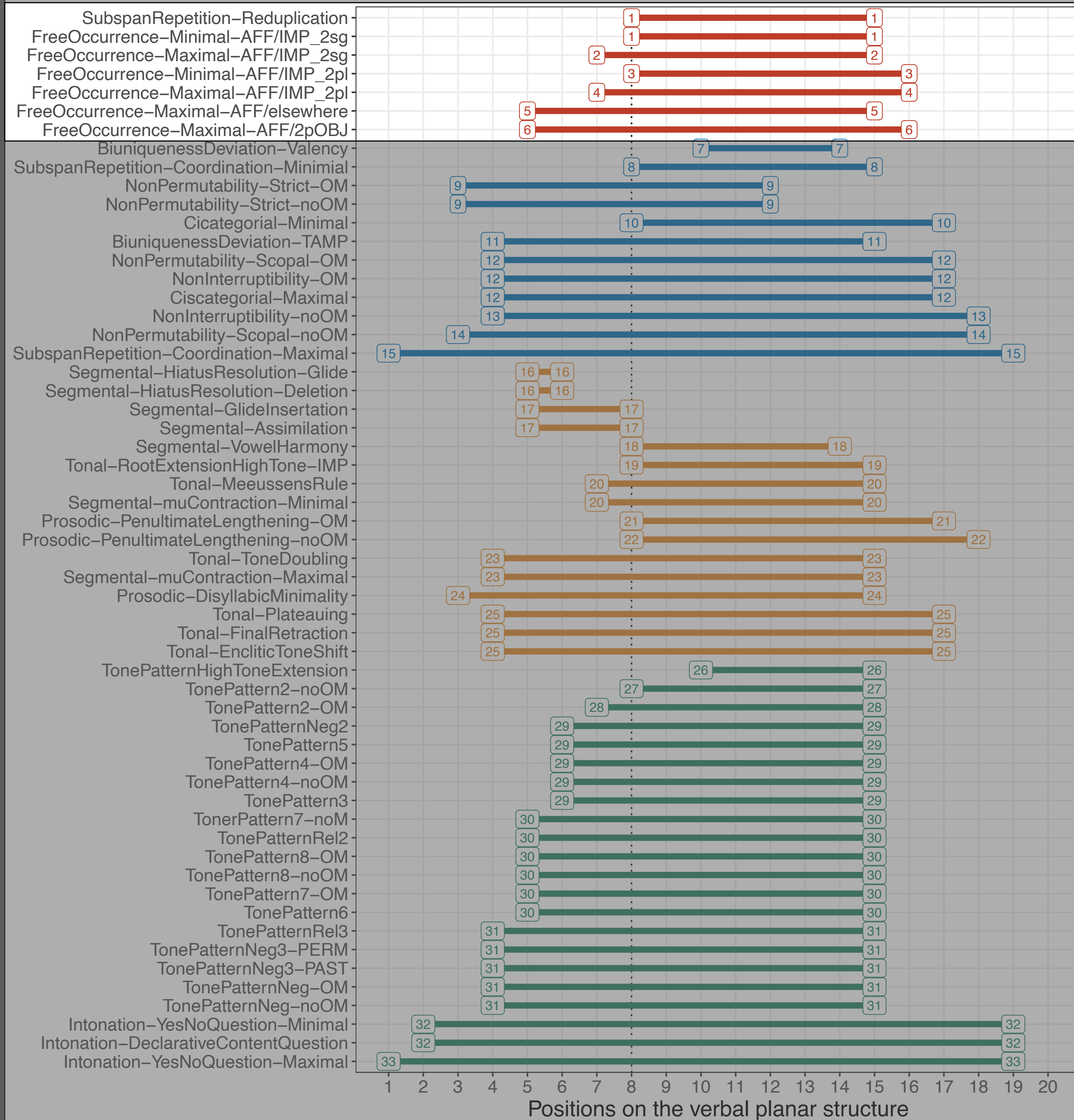
34 domains coded

22 layers identified

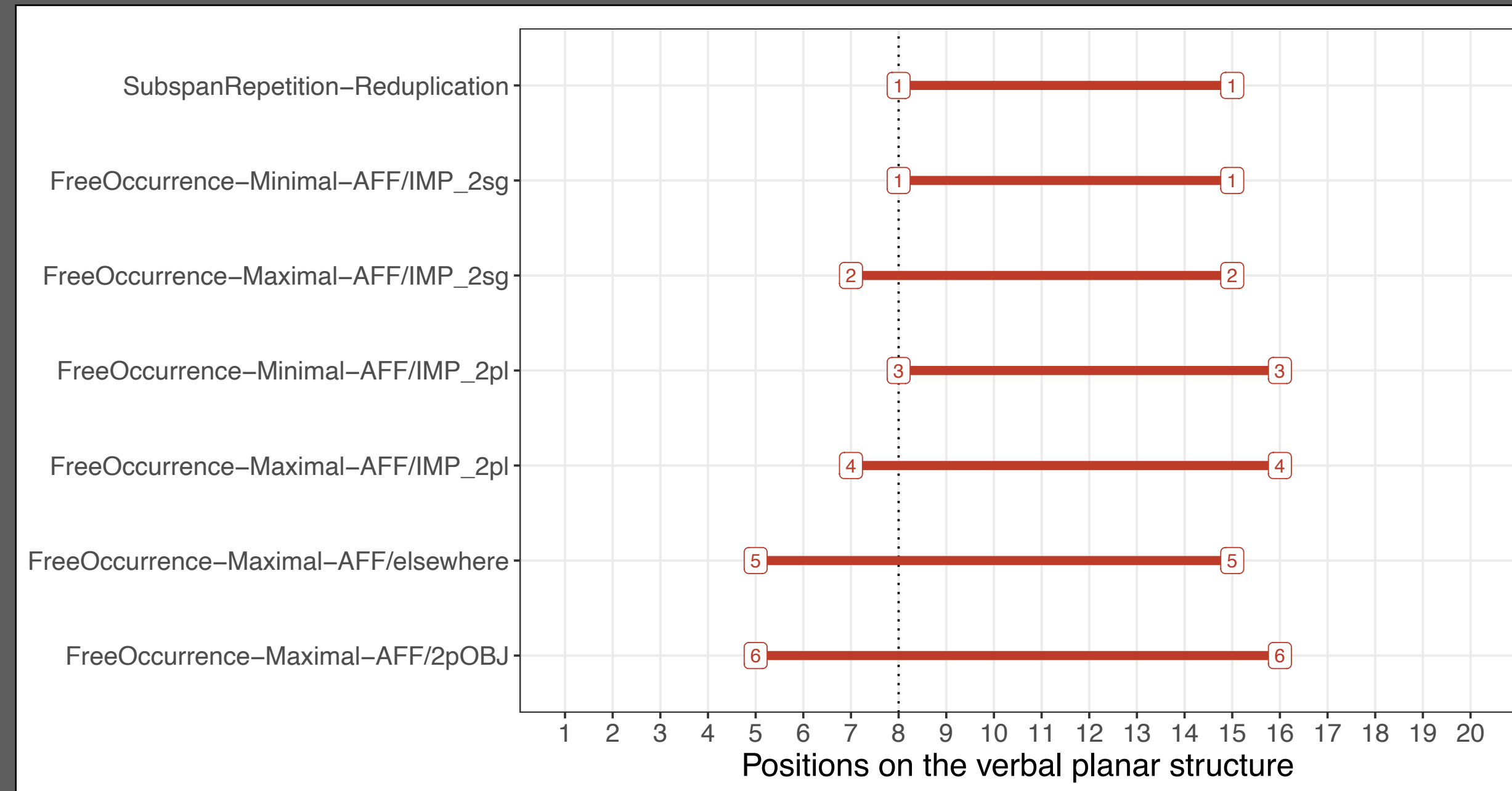
Domain Type: ■ length ■ morphosyntactic ■ phonological ■ tonosegmental



Domain Type: length morphosyntactic phonological tonosegmental

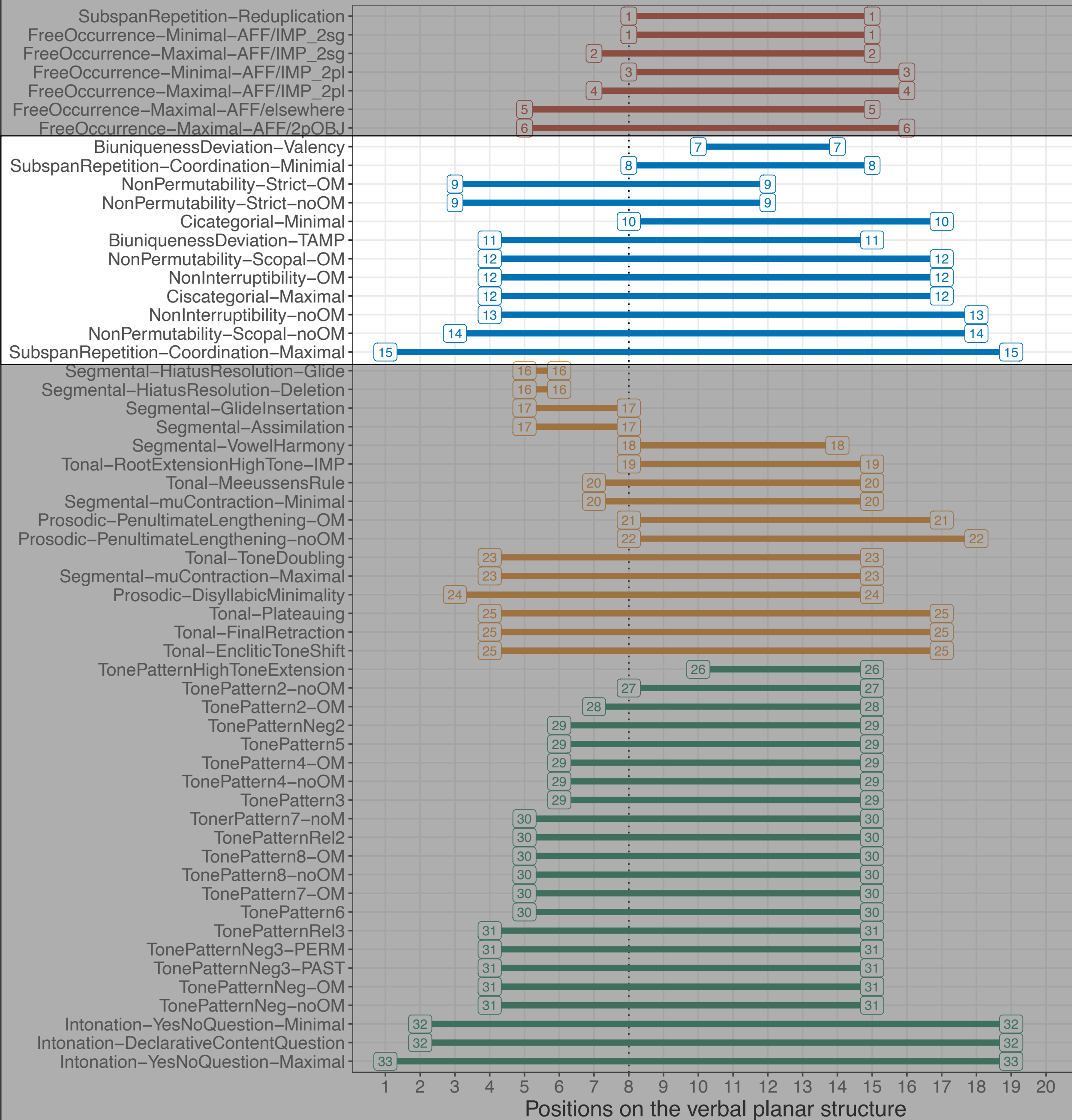


Domains based on length: Free occurrence and reduplication

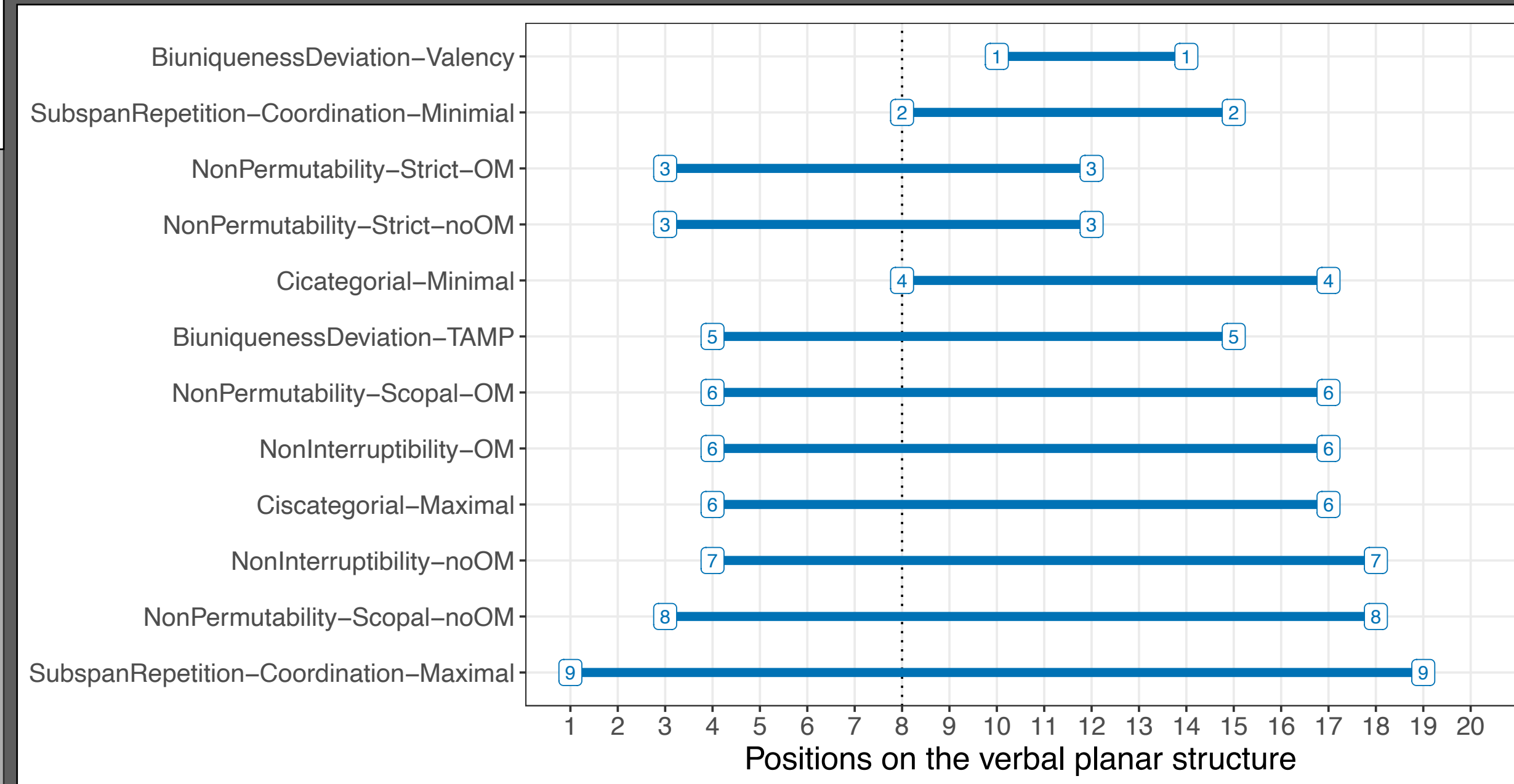


Some deviations from a nesting pattern

Domain Type: length morphosyntactic phonological tonosegmental

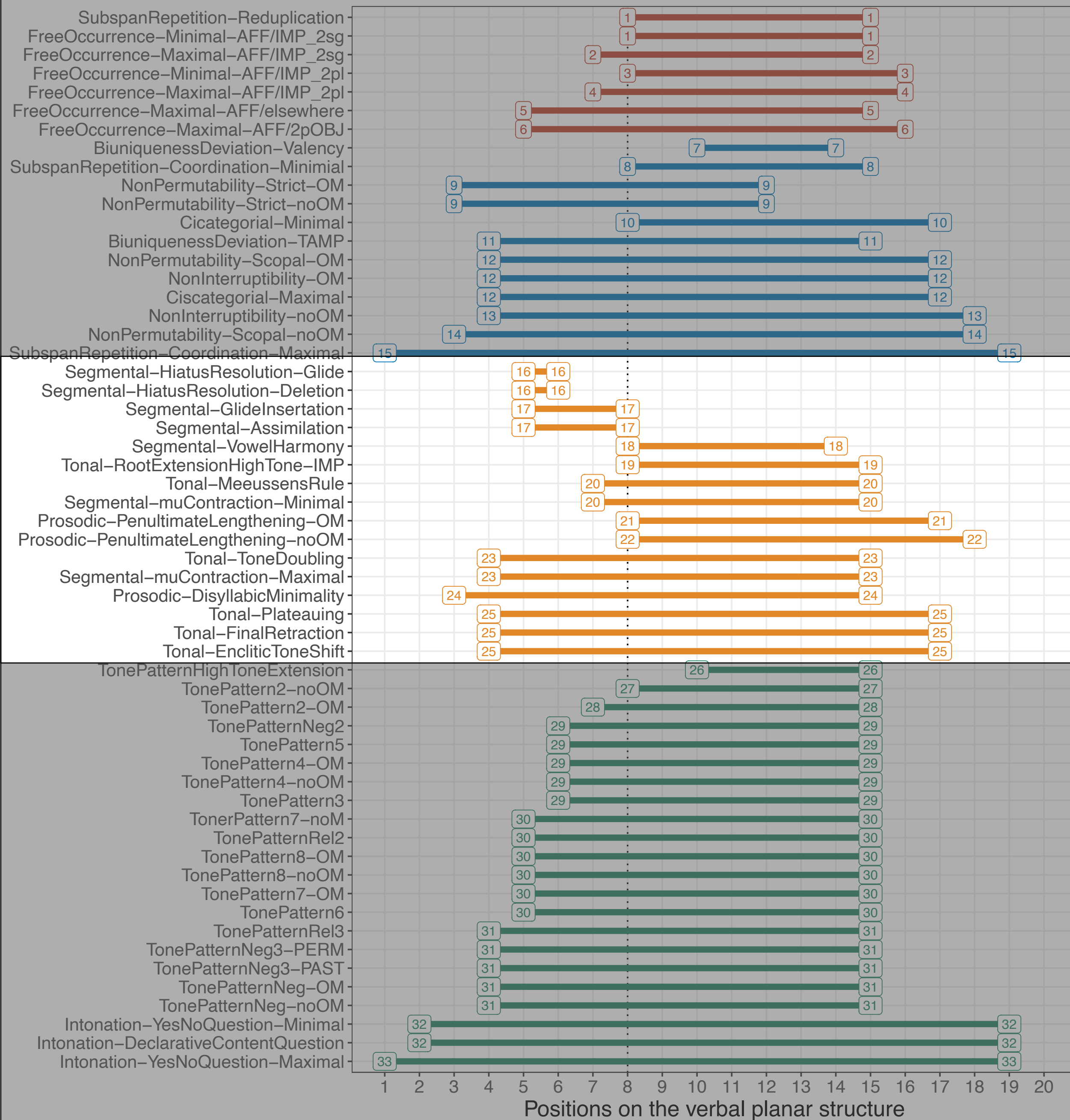


Morphosyntactic domains

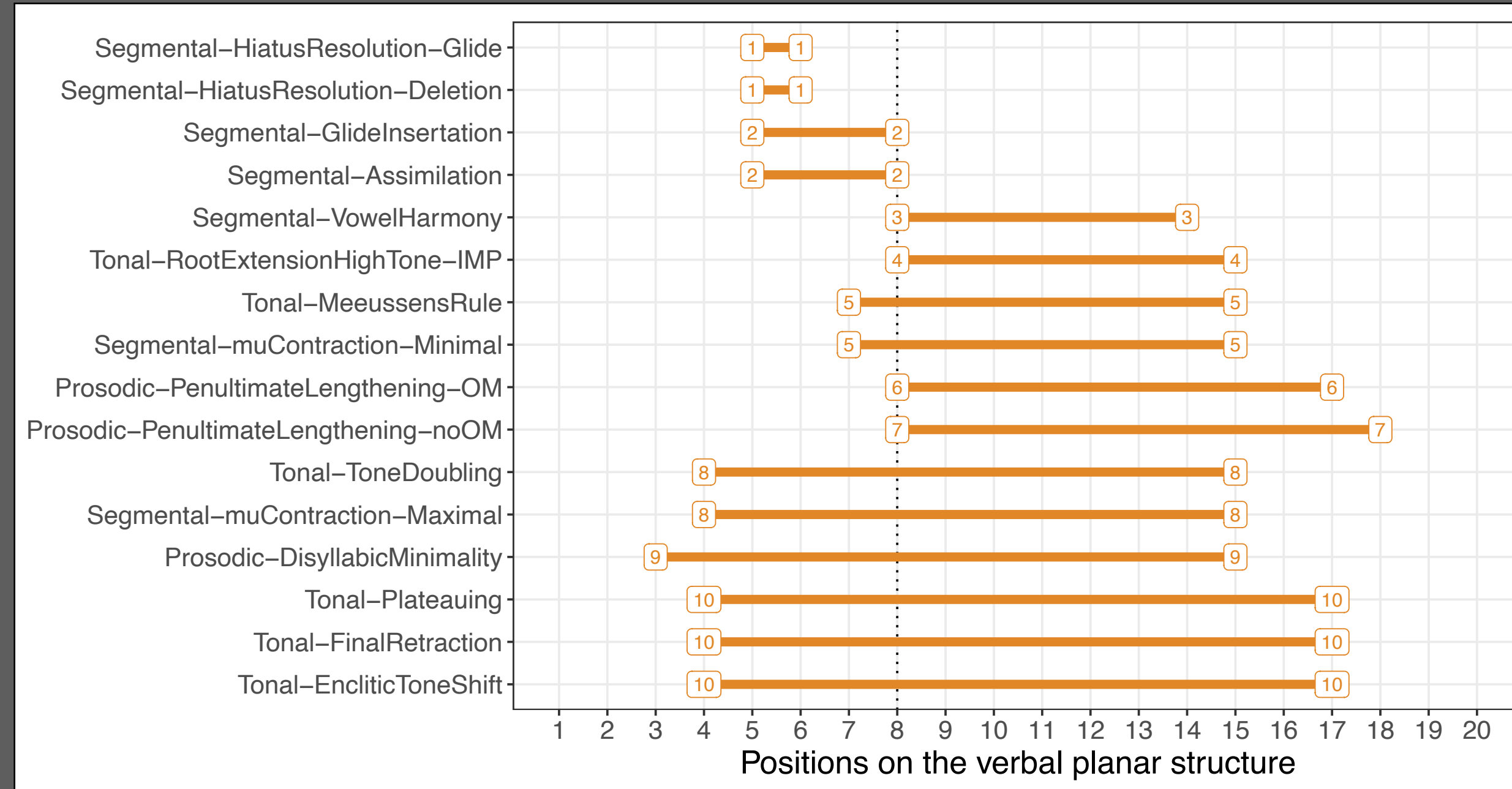


Clear deviations from a nesting pattern

Domain Type: length morphosyntactic phonological tonosegmental

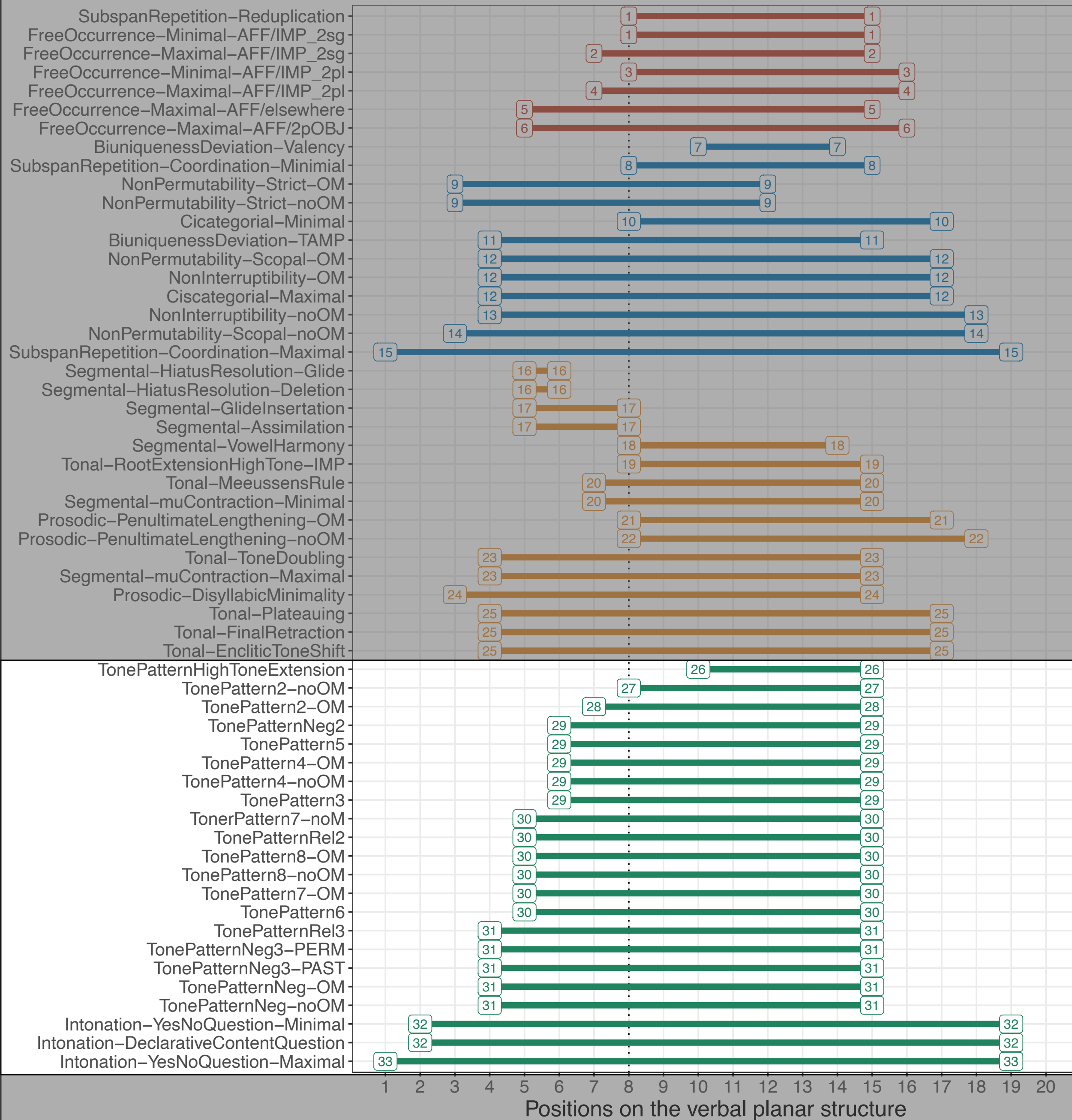


Phonological domains

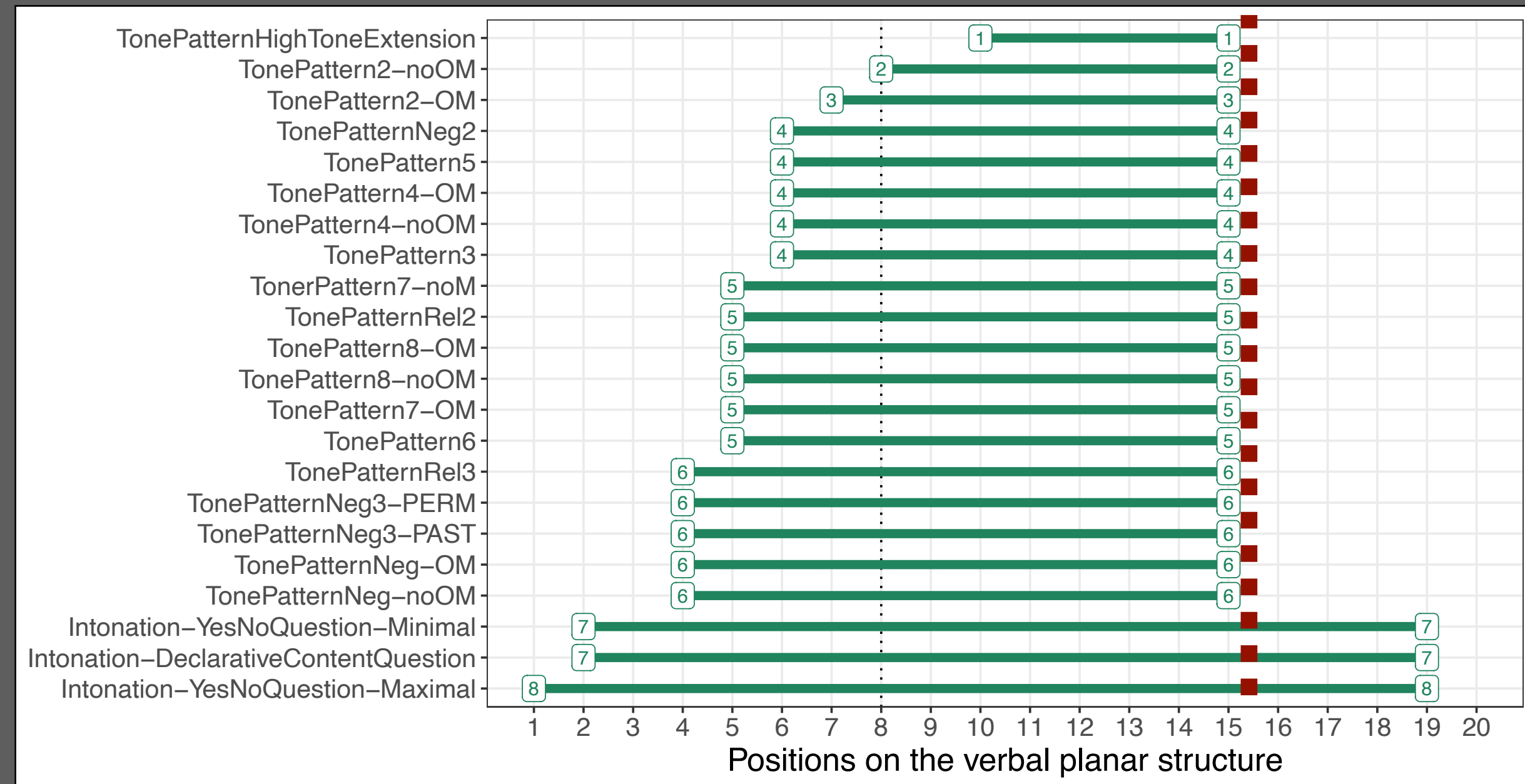


Clear deviations from a nesting pattern

Domain Type: ■ length ■ morphosyntactic ■ phonological ■ tonosegmental

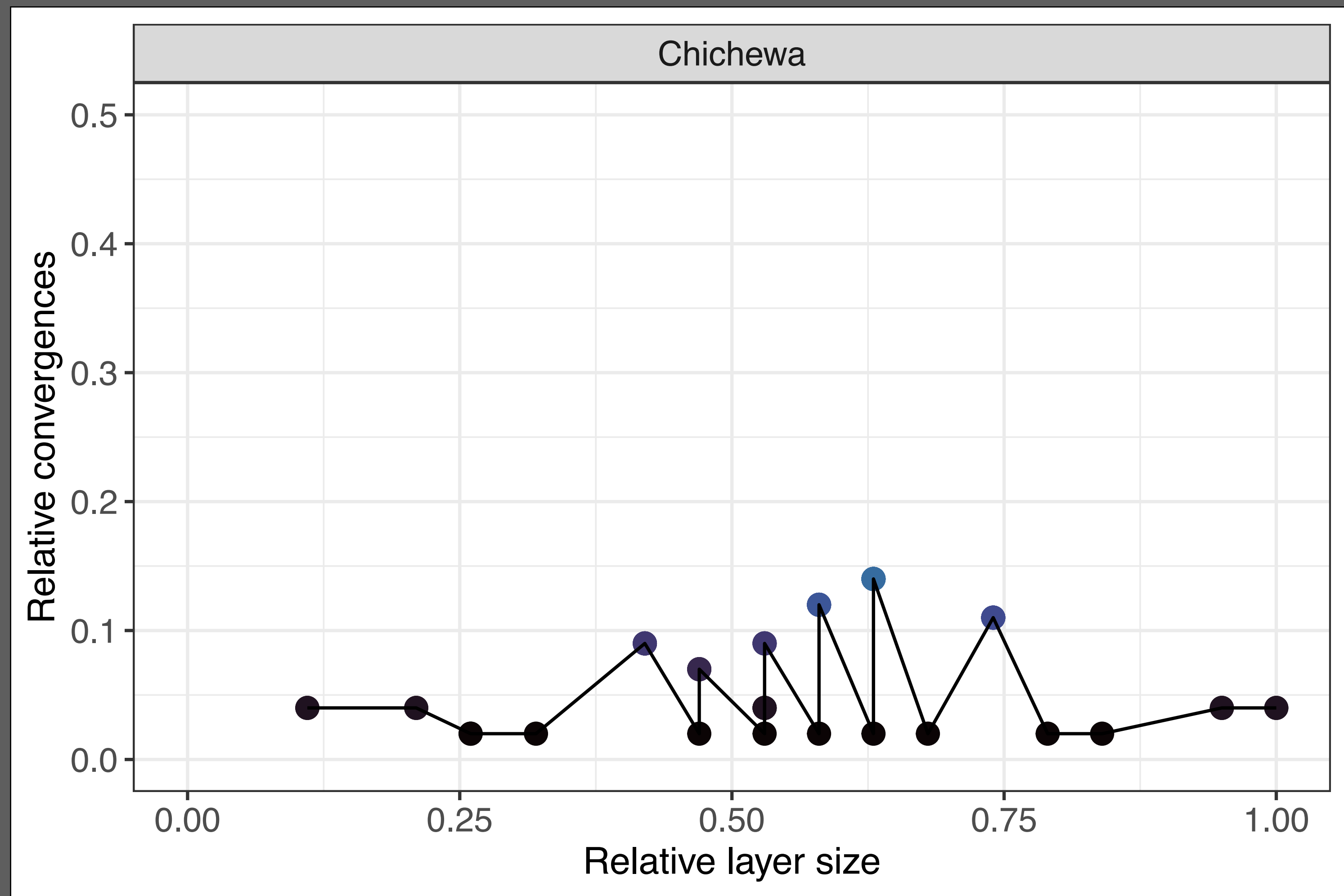
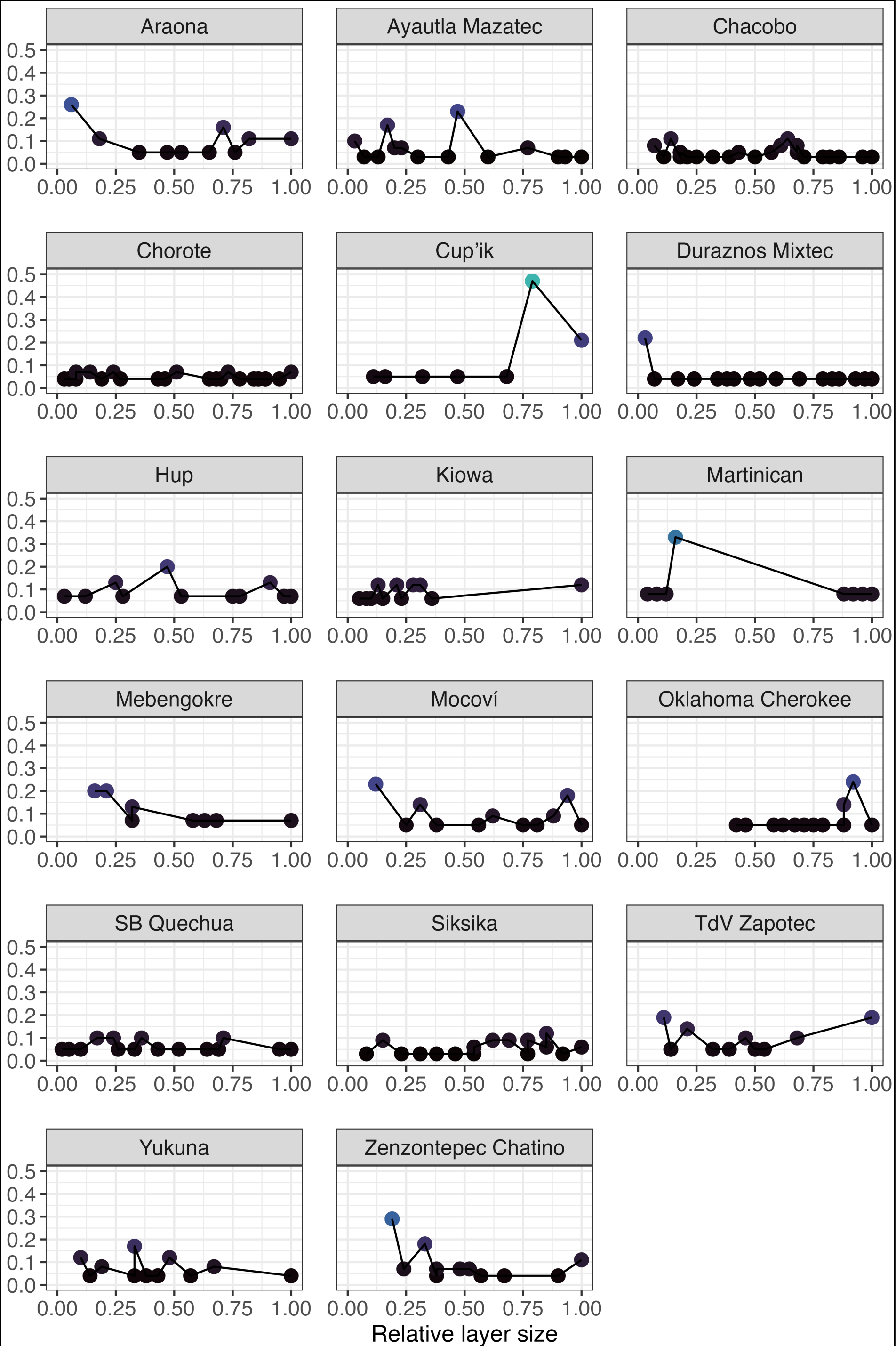


Tonosegmental domains

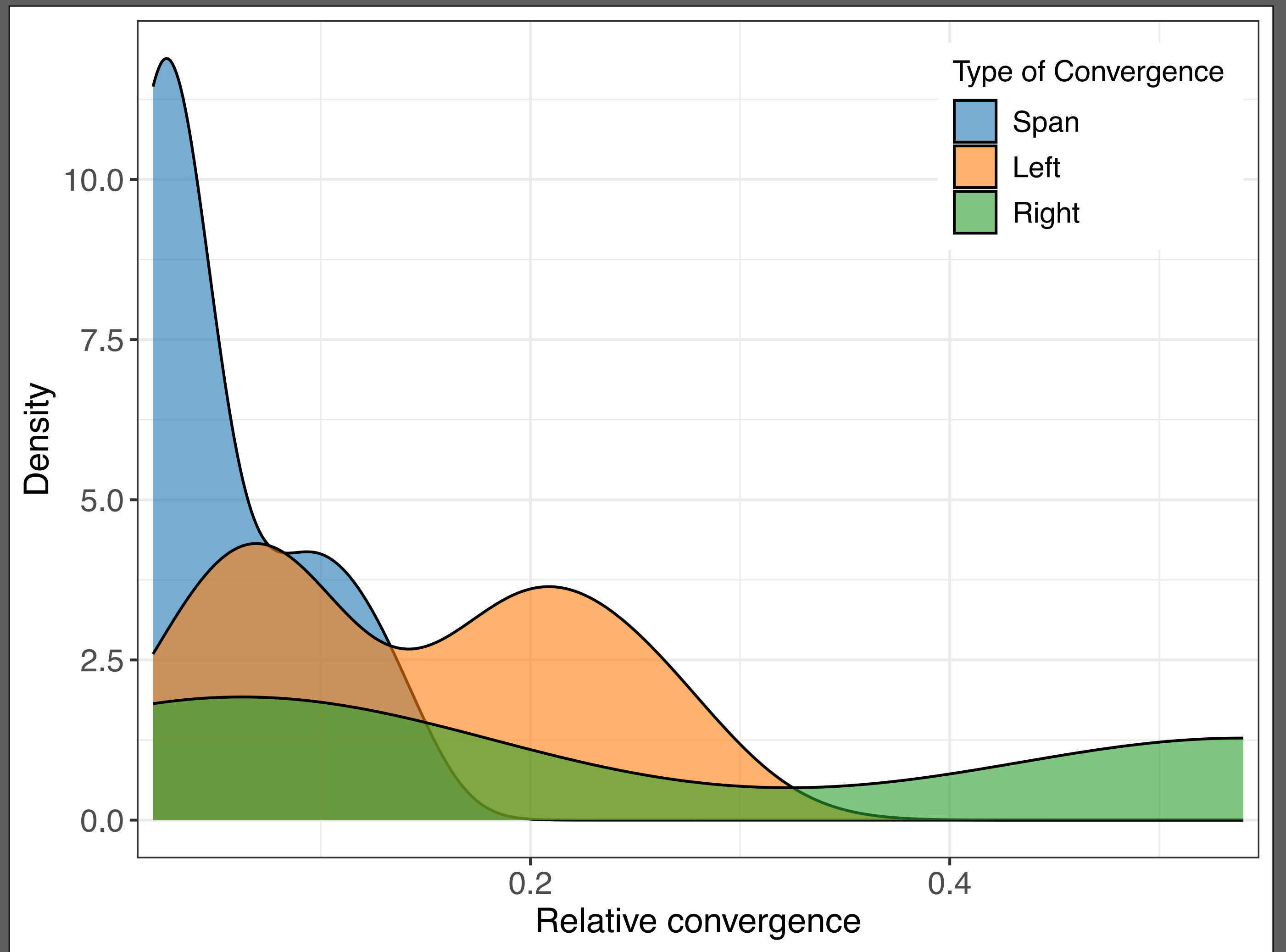
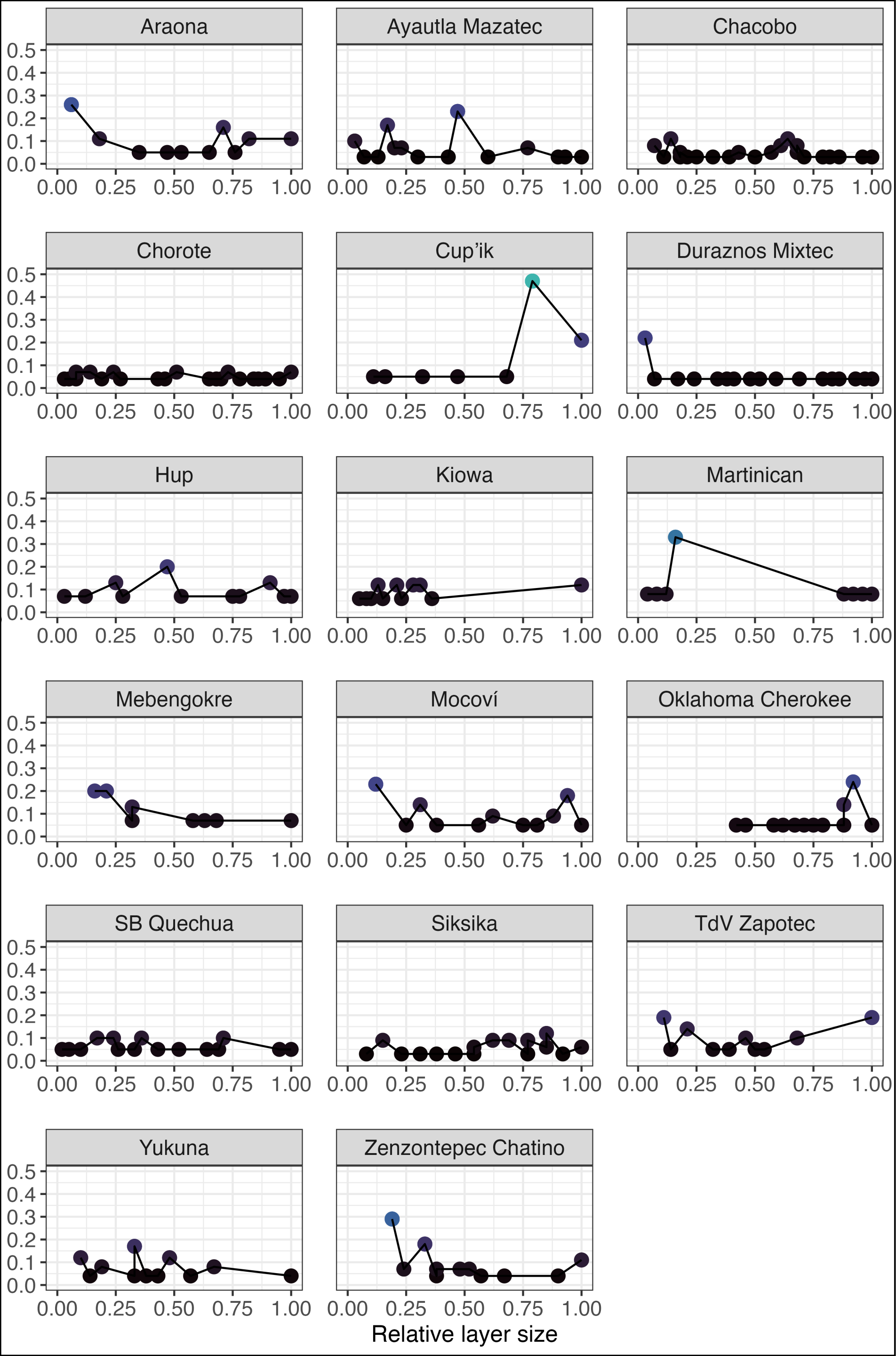


Nesting pattern maintained

Distinctive left edge boundary that could be seen as a quantal word boundary



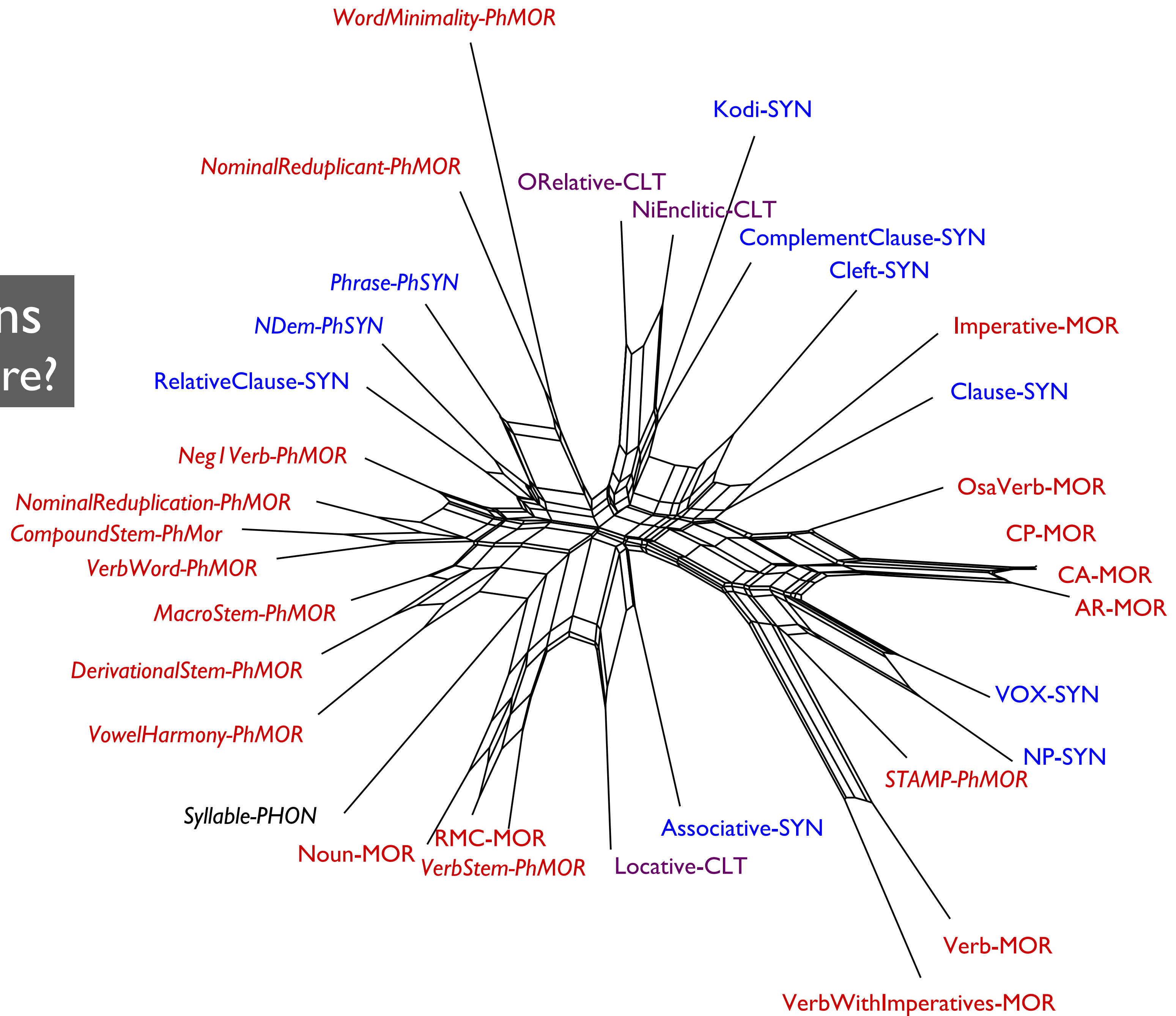
Convergences vs. layer size
Chichewa vs. languages of the Americas
 (Auderset et al. to appear)



Convergence across entire space, just the left edge, and just the right edge

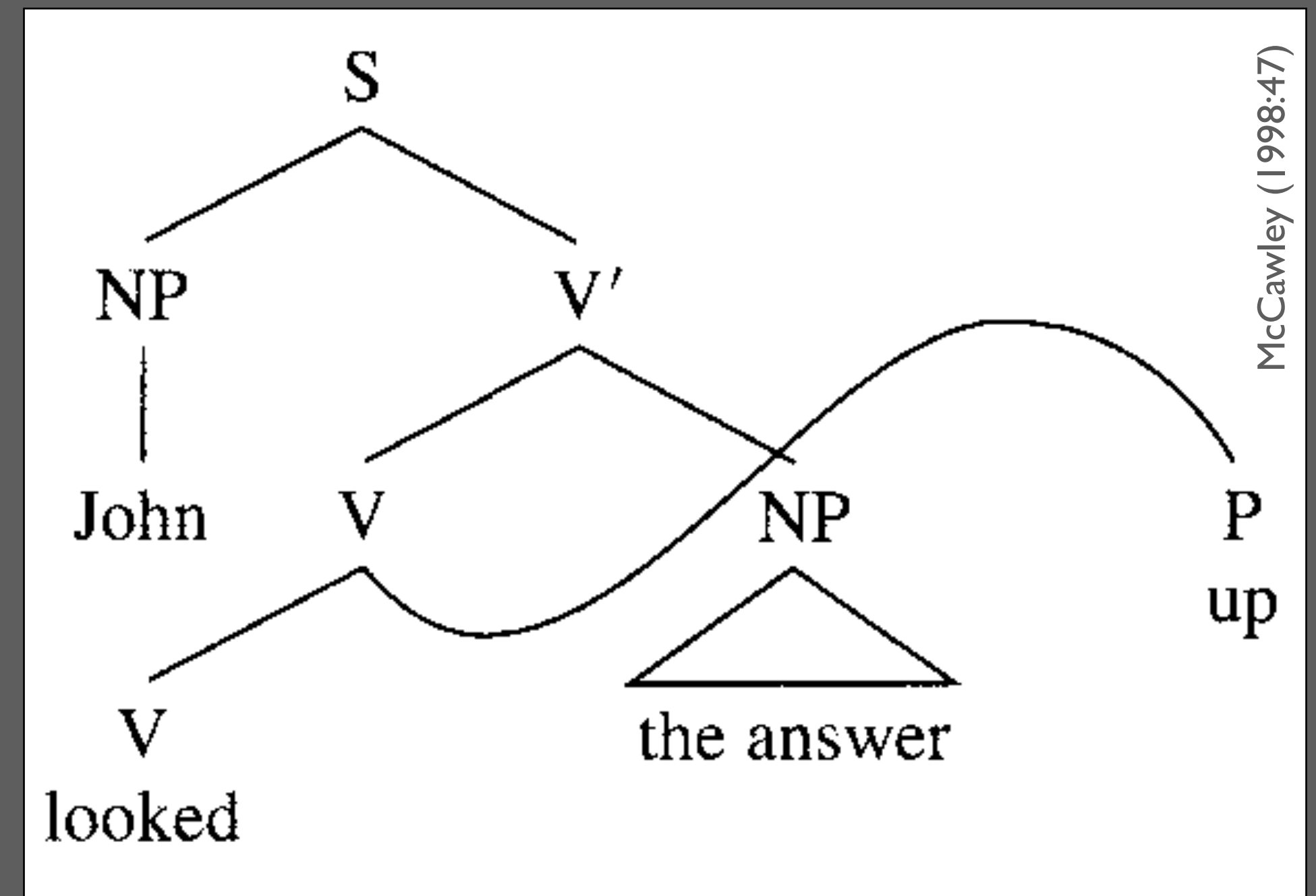
Study 2: Linearization restrictions

How do different constituents compare?



Constituency and linearization

- Logically speaking, constituents do not need to form linear bundles
- Most approaches take this to be the default
- It also appears to be in line with the results of most constituency diagnostics
- *The single cross-linguistically valid syntactic criterion for formal grouping is the CONTIGUITY of elements in the utterance. (Croft 2001:190)*
- Can we detect constituency in patterns of linearization?
- This study will involve comparison across constituent-like structures than attempting to discover constituents in the first place

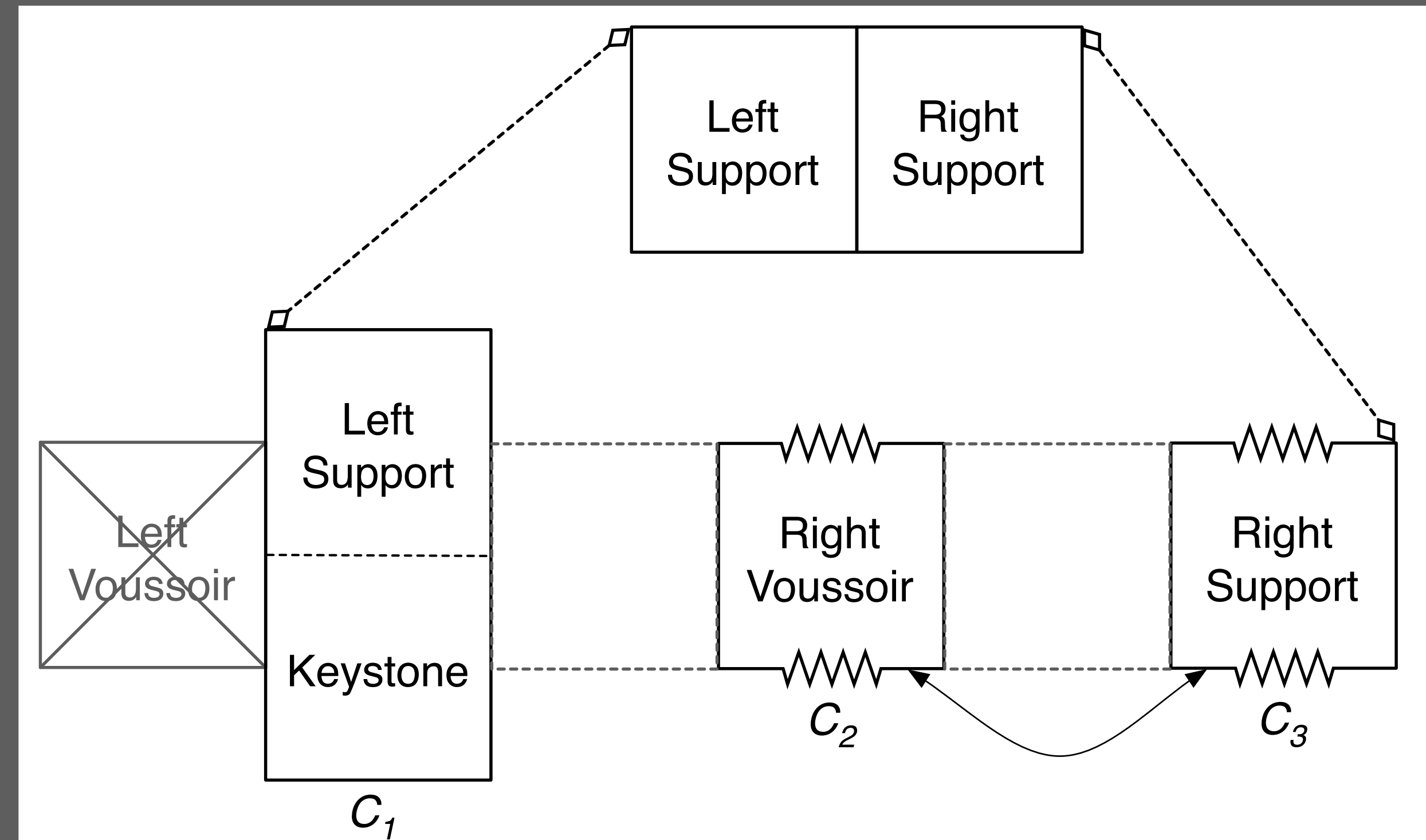


Categorizing linear restrictions

- There is much more to linearization than implied by string-based representations of linguistic structures
- Good (2016) proposes to typologize linearization using the following parameters
 - **Stricture**: High-level categorization of linear restrictions (e.g., length vs. ordering)
 - **Foundation**: Categorization of the relations among a linearization construction's component "constituents"
 - **Violability**: Whether the apparent linearization restrictions can be violated and if, so, what kinds of violations are allowed (e.g., lexical)
 - **Conditioning**: The context over which the linearization restrictions operate (e.g., phonological or morphosyntactic)

Classifying components

- Each component of a linearization pattern can also be typologized
 - Its role in its foundation
 - The kinds of elements that appear within it (whether they form a coherent class or not)
 - How many elements can appear within it, e.g., whether it is a “slot” or “field”/“zone”
 - Whether it exhibits a dependency within another component
- Taken together, the coding system allows for the description of linearization patterns as a distinct domain of constituent-like relations



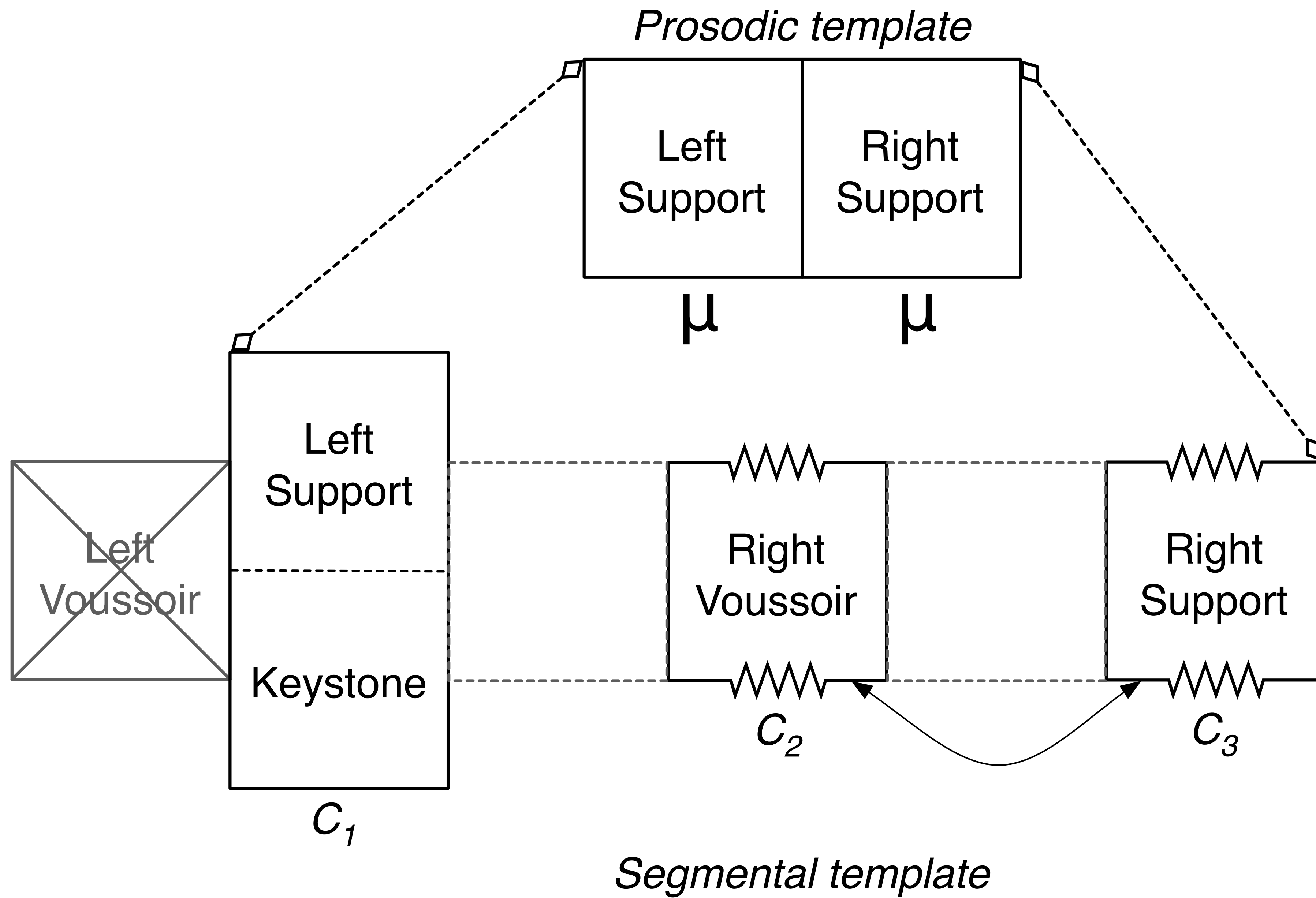
Representation of paired grouping of linearization restrictions in Tiene

Tiene derived verb stem
(Hyman 2010)

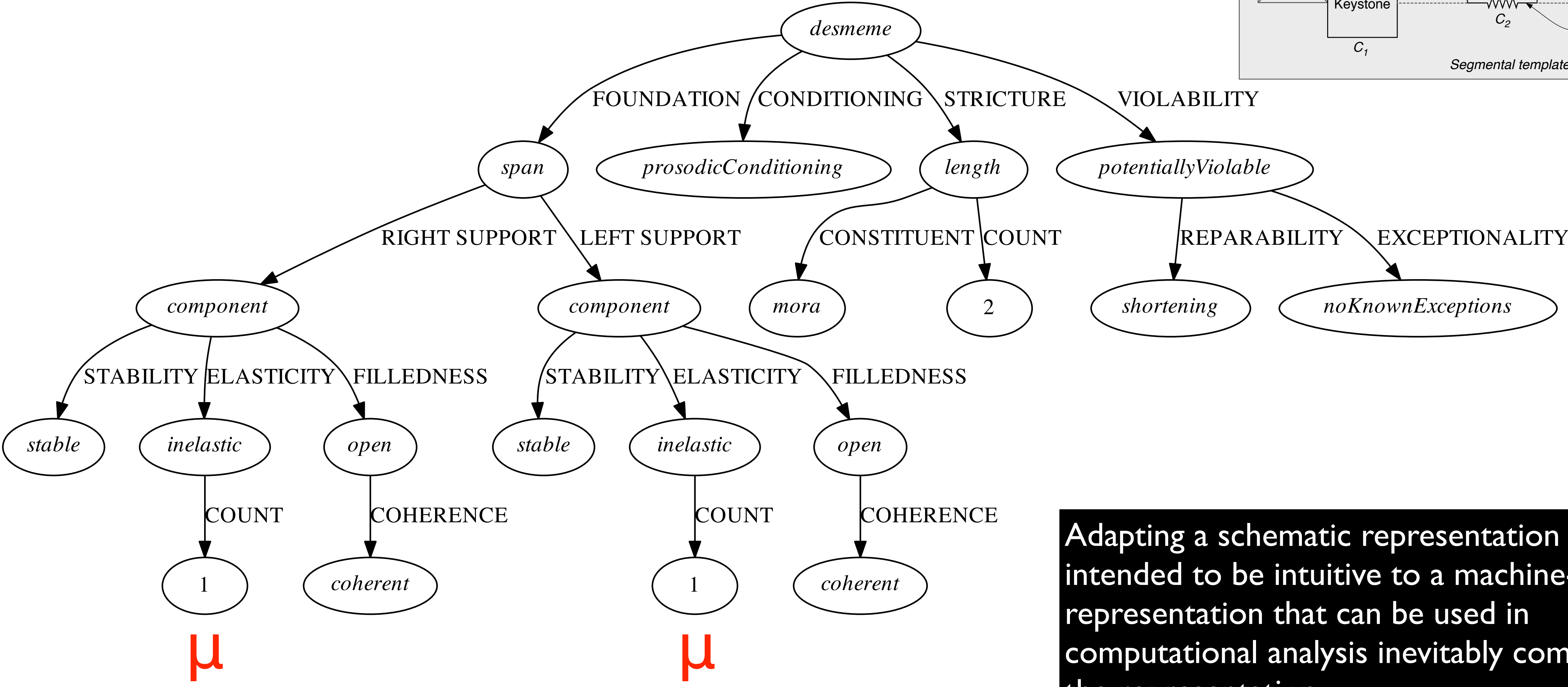
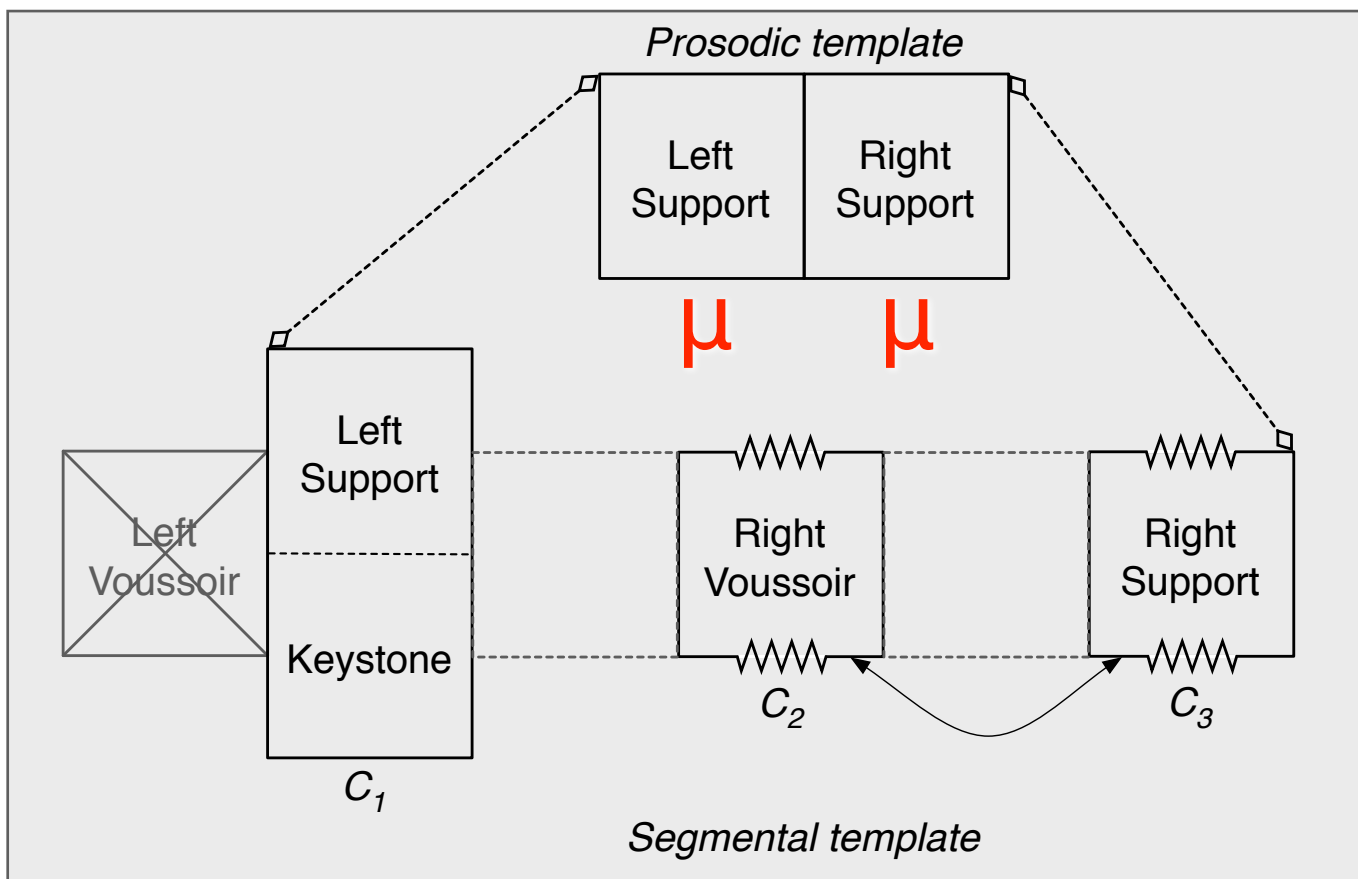
- Bimoraic size constraint
- C1: Unrestricted
- C2: Only coronal
- C3: Only Non-coronal
- C2 and C3 must match in nasality

STEM	CAUS	GLOSS
<i>-lɛ</i>	<i>-lées-</i>	‘eat’
<i>-bany-</i>	<i>-baas-</i>	‘be judged’
<i>-mat-</i>	<i>-maas-</i>	‘go away’
<i>-pal-</i>	<i>-paas-</i>	‘arrive’
<i>-piin-</i>	<i>-piis-</i>	‘be black’
<i>-lab-</i>	<i>-lasab-</i>	‘walk’
<i>-lók-</i>	<i>-lósek-</i>	‘vomit’
<i>-suɔm-</i>	<i>-sɔsɔb-</i>	‘borrow’
<i>-tóm-</i>	<i>-tóseb-</i>	‘send’

[μ μ] DERIVED STEM
-CVTVK-



Graph description of Tiene prosodic template



Adapting a schematic representation that is intended to be intuitive to a machine-readable representation that can be used in computational analysis inevitably complicates the representation.

Coding Chichewa linearization constructions

- 34 different constructions were coded
 - 9 “morphological” constructions (**MOR**)
 - 8 “syntactic” constructions (**SYN**)
 - 3 “clitic” constructions (**CLT**)
 - 11 “morphophonological” constructions (**PhMOR**)
 - 2 “phonosyntactic” constructions (**PhSyn**)
 - 1 purely phonological construction (the syllable)

The verbal construction

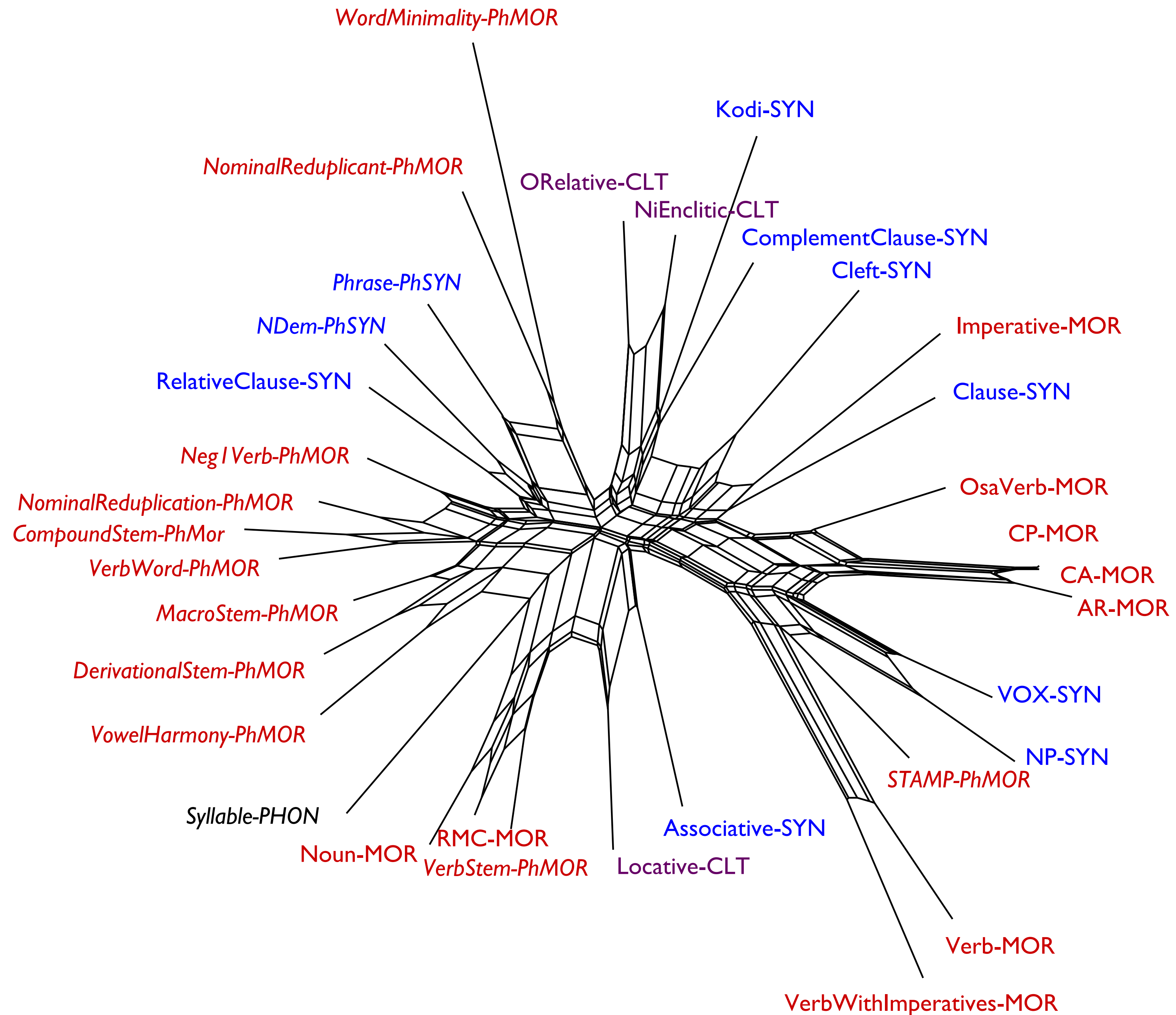
Sí-ú-kú-ká-ngo-zí-thyól-ets-el-á-nso
NEG-3SM-PRS-GO-JUST-100M-break-CAUS-APPL-FV-too
mipando
4.chairs
“It is not just going to have the chairs broken for them as well (too).” (Mchombo 2004:69)

The kodí question construction

Kodí	anyaní	á	mísala
Q	2.baboon	2.ASS	4.madness
a-ku-phwány-á		chiyáni?	
2SM-PRES-smash-FV		what	

“What are the mad baboons smashing?”
(Mchombo 2005:69)

Component nodes included



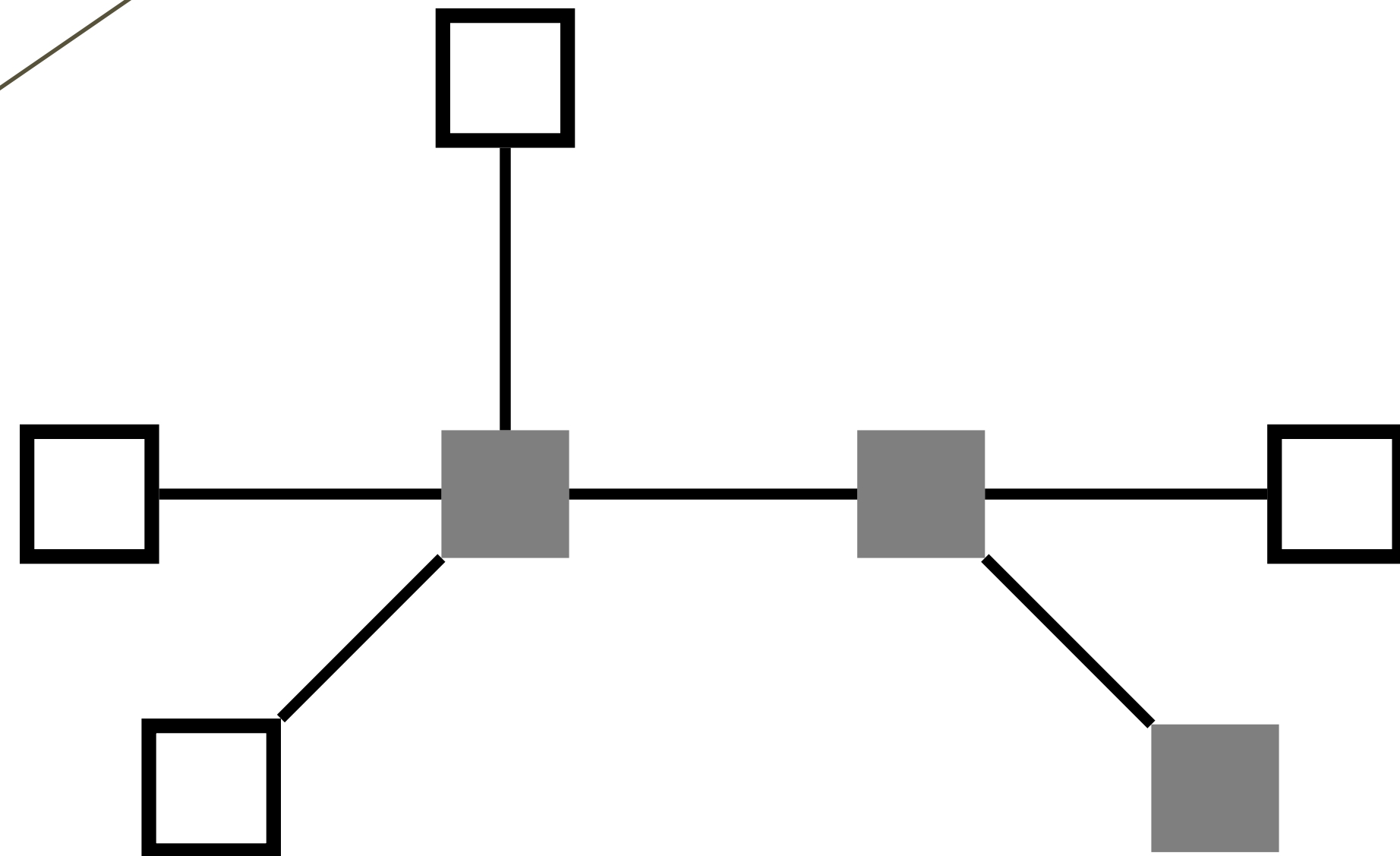
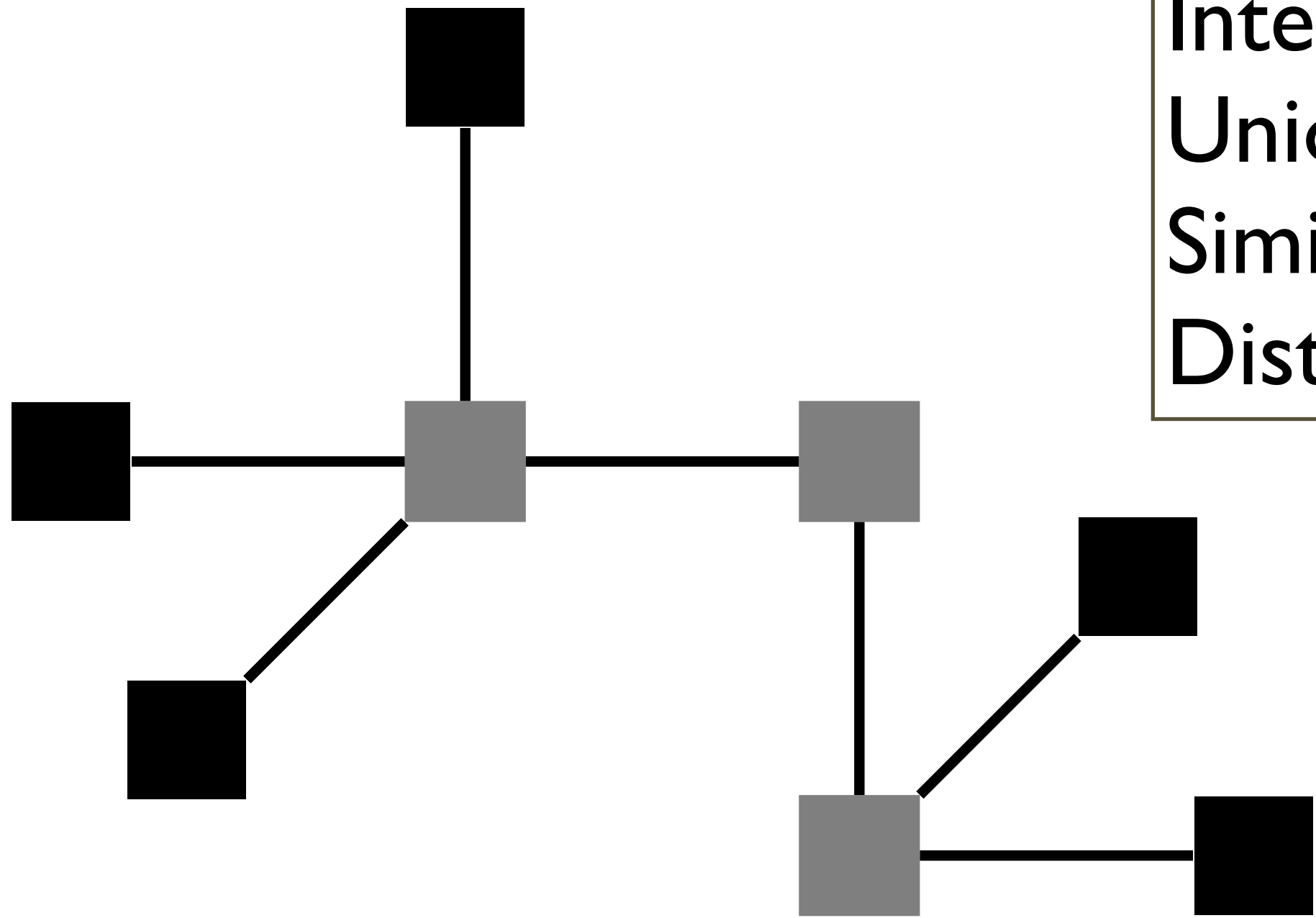
- Morphological construction
- Syntactic construction
- Clitic construction

Italics = phonologically defined

Comparing graph structures

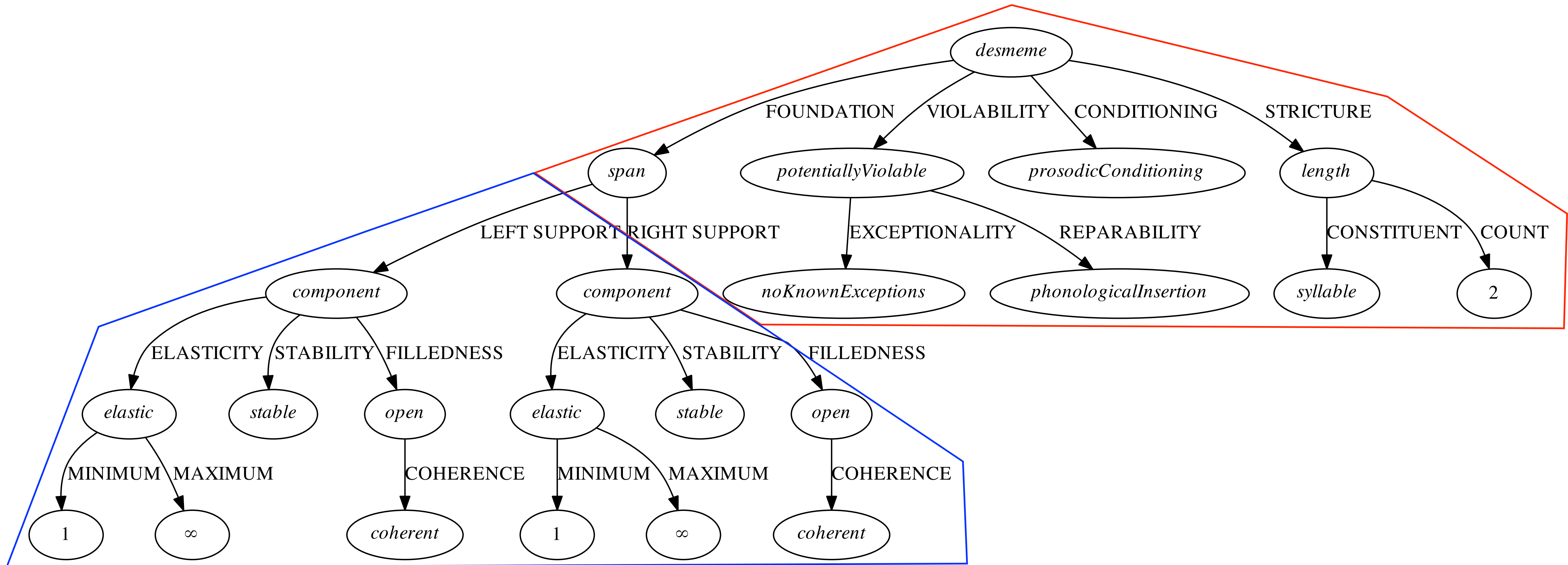
- The typological coding system used for this work does not lend itself to simple methods of comparison
- Instead, algorithms designed for comparison of graph-based structures need to be used
- One relatively straightforward one is the simUI method of Gentleman (2013)
- This can be used to create a distance matrix based on the graph-based representations

Intersection: 3 nodes
Union: 12 nodes
Similarity: $3/12 = 0.25$
Distance: $1 - 0.25 = 0.75$



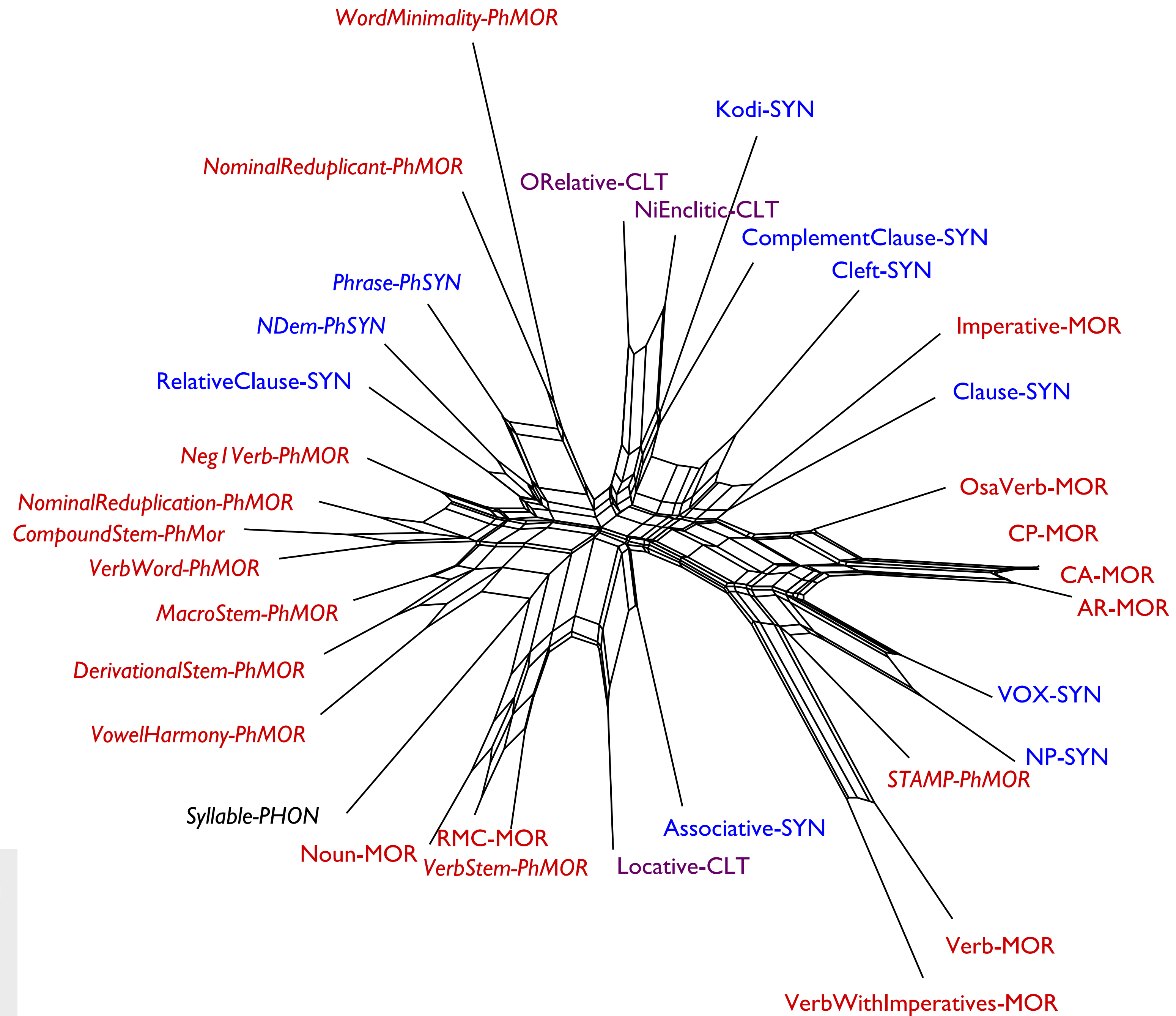
Chichewa word minimality linearization domain

Categorization without components



Categorization of components

Component nodes included

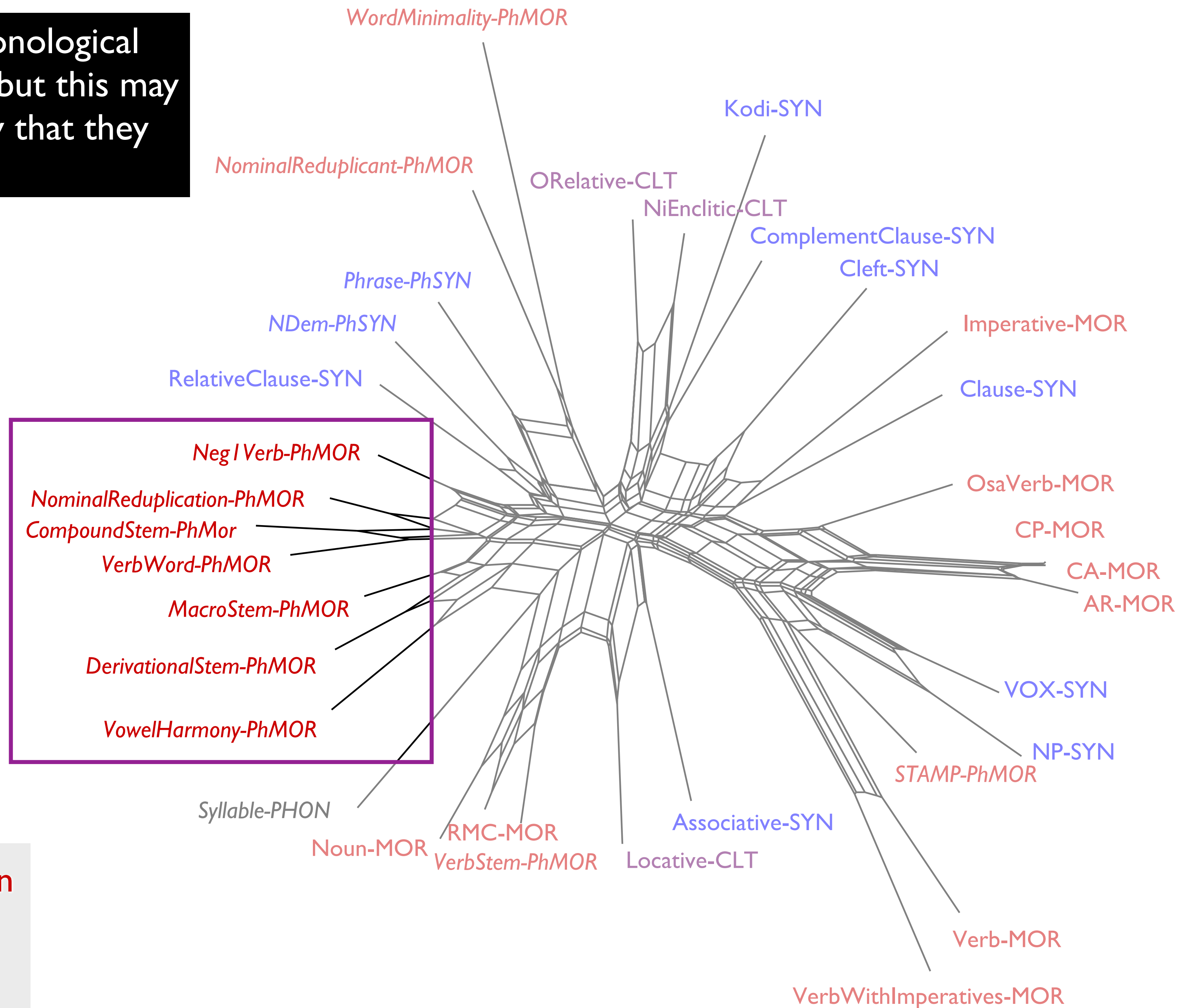


- Morphological construction
- Syntactic construction
- Clitic construction

Italics = phonologically defined

Component nodes included

A cluster of morphophonological constructions is visible, but this may be an artifact of the way that they were analyzed.

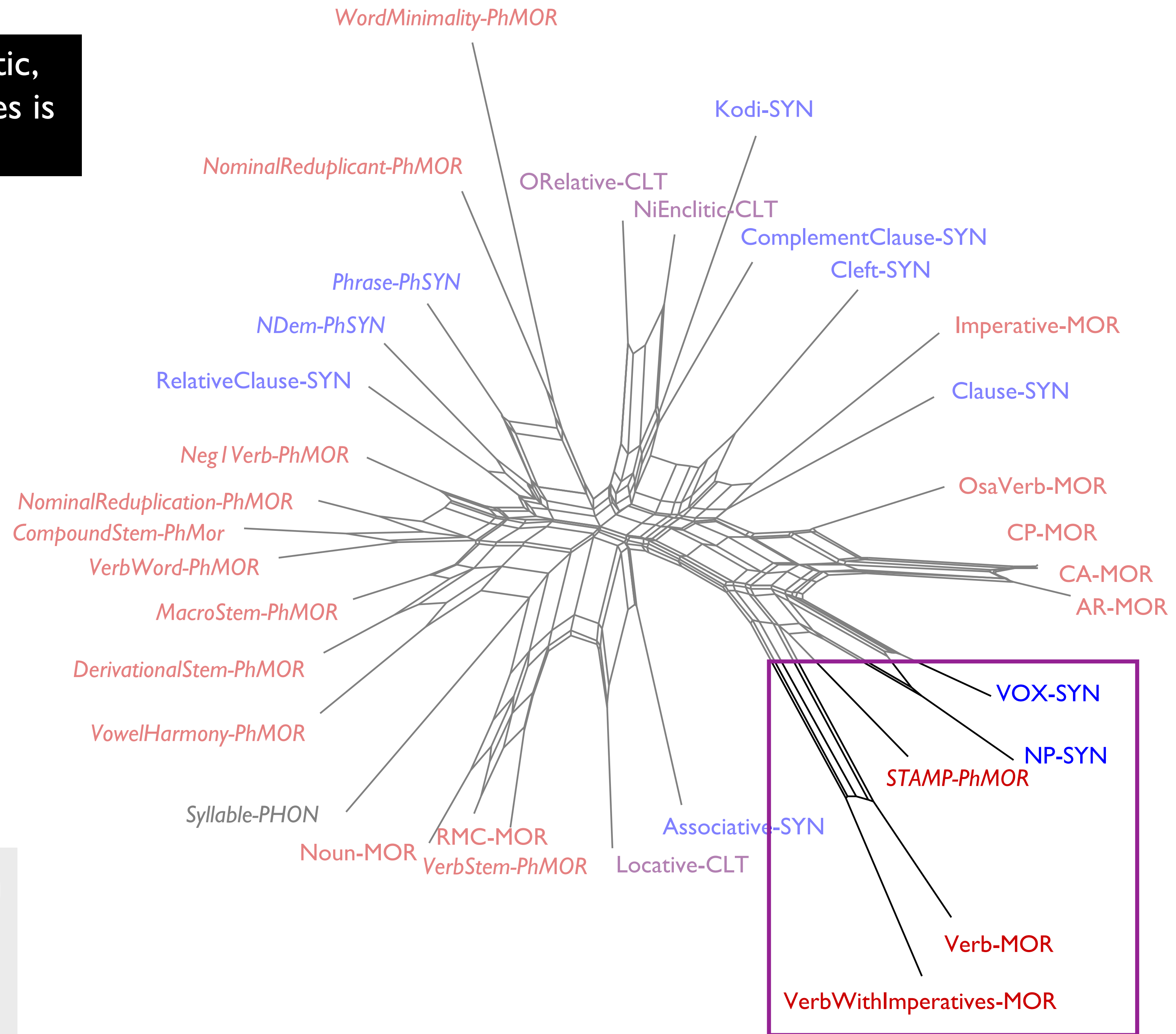


- Morphological construction
- Syntactic construction
- Clitic construction

Italics = phonologically defined

A cluster mixing syntactic, morphological structures is surprising.

Component nodes included

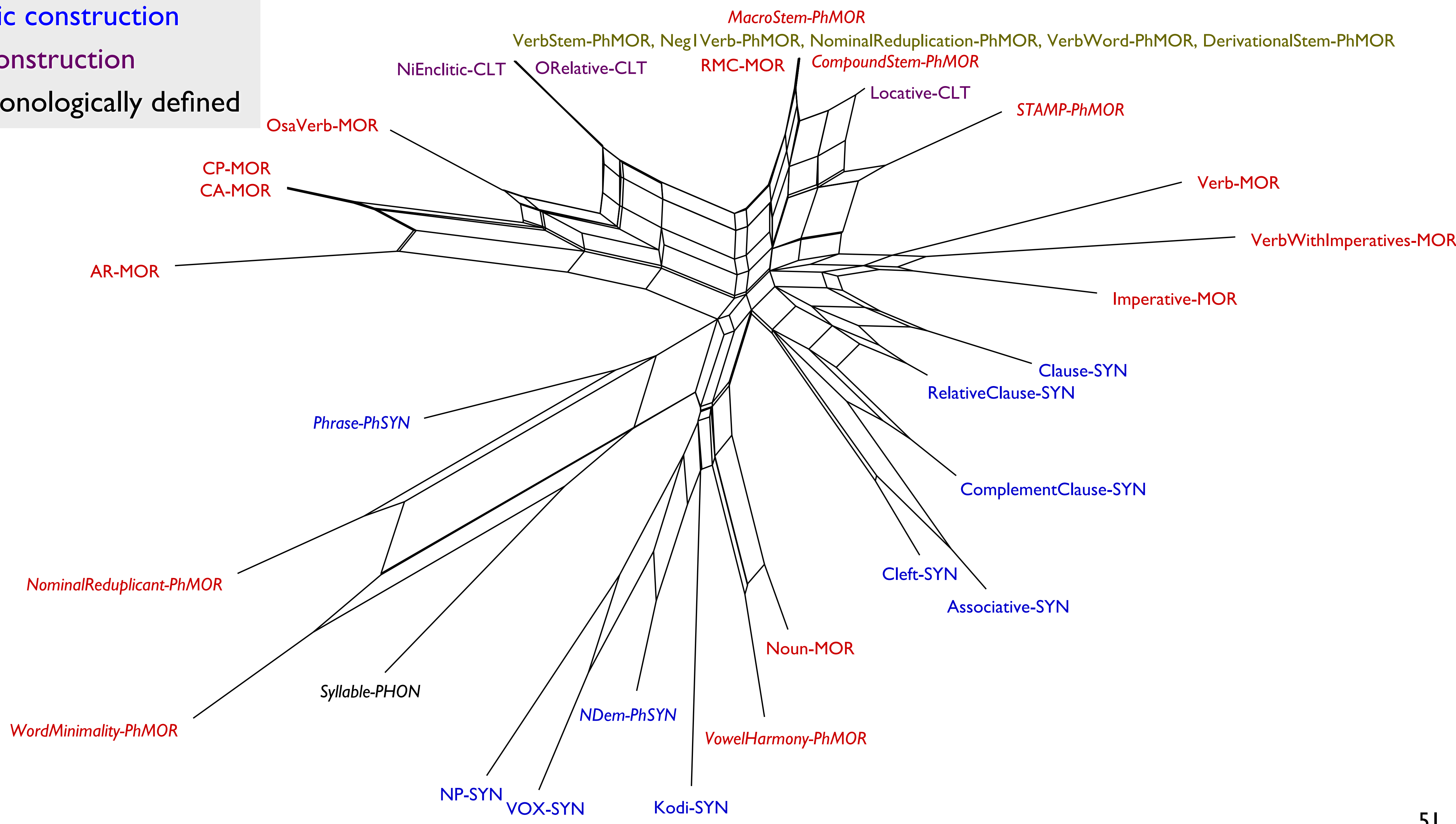


- Morphological construction
- Syntactic construction
- Clitic construction

Italics = phonologically defined

■ Morphological construction
■ Syntactic construction
■ Clitic construction
Italics = phonologically defined

Component nodes excluded



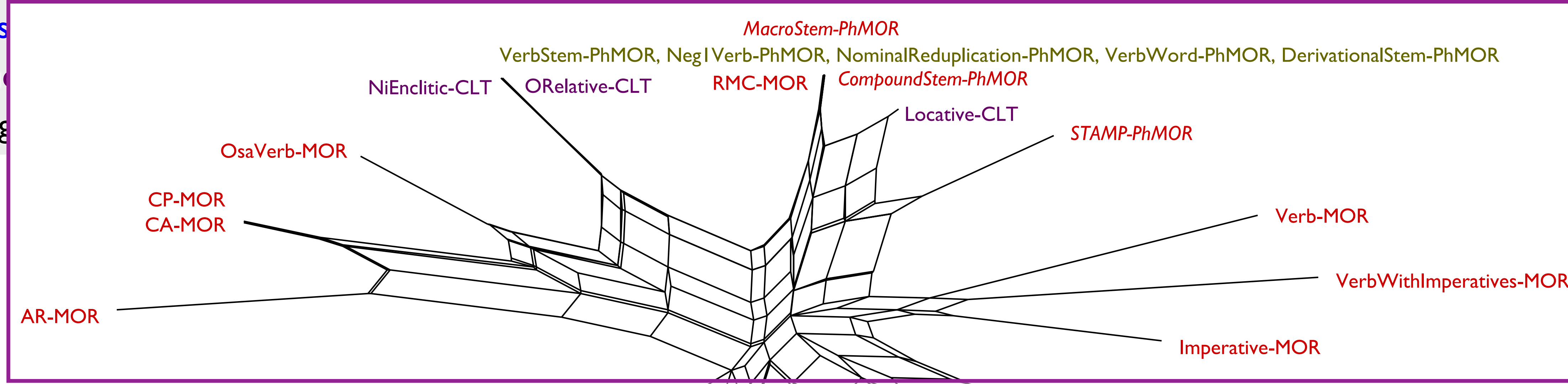
Morphological construction

Syntactic construction

Clitic construction

Italics = phonological

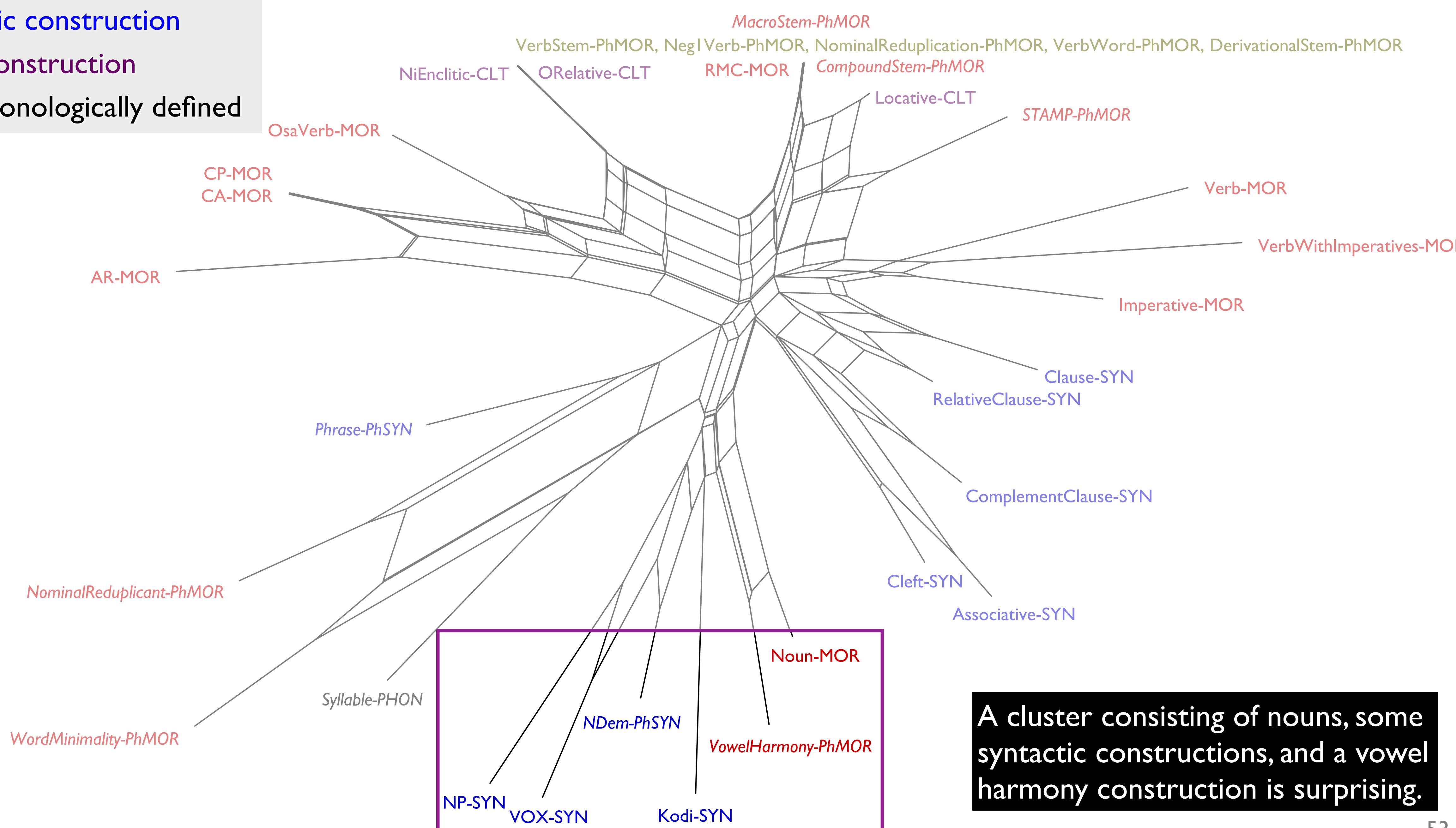
Component nodes excluded



A number of verbal morphological constructions cluster at the top of the figure.

■ Morphological construction
■ Syntactic construction
■ Clitic construction
Italics = phonologically defined

Component nodes excluded

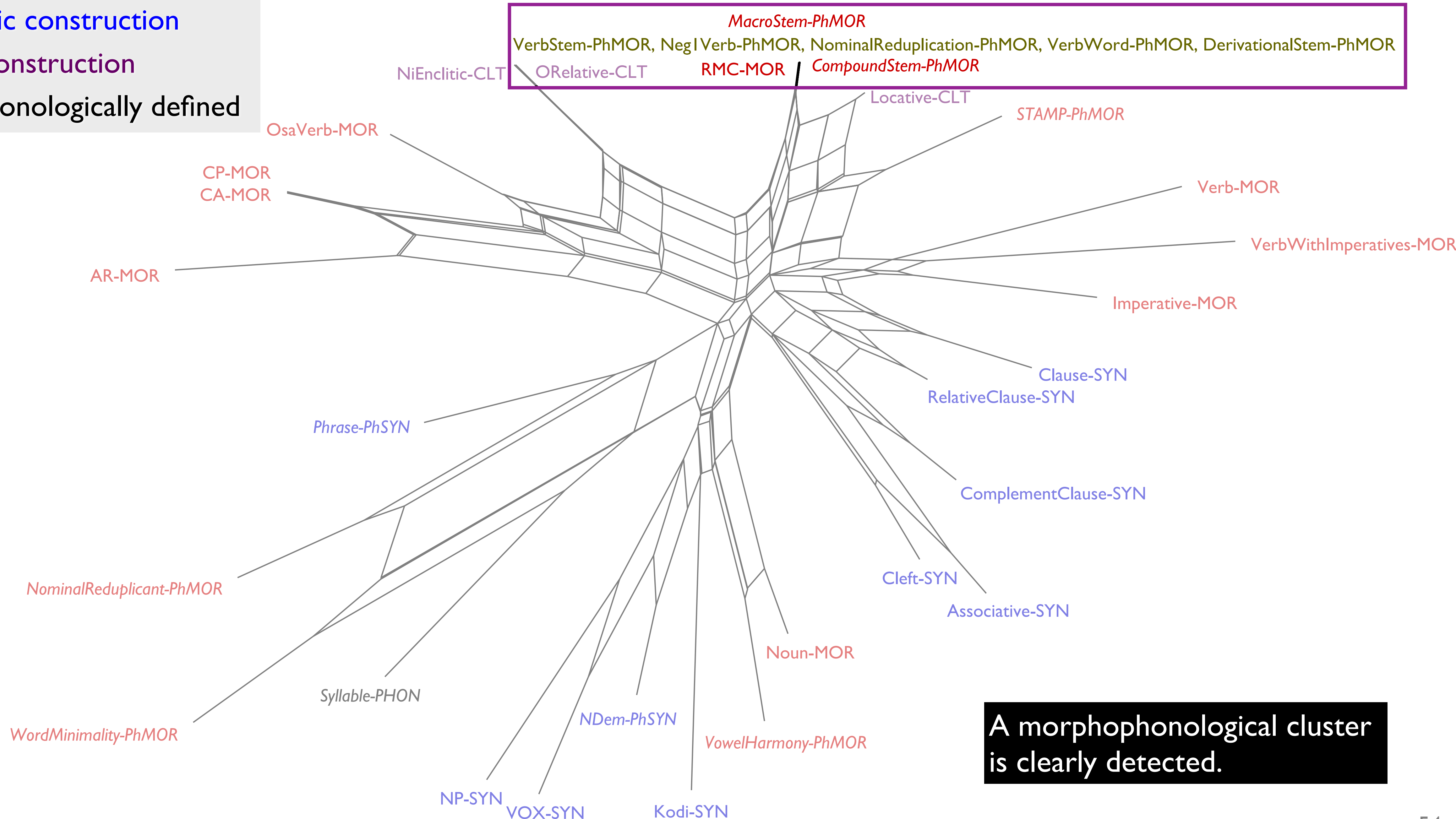


A cluster consisting of nouns, some syntactic constructions, and a vowel harmony construction is surprising.

■ Morphological construction
■ Syntactic construction
■ Clitic construction
Italics = phonologically defined

Component nodes excluded

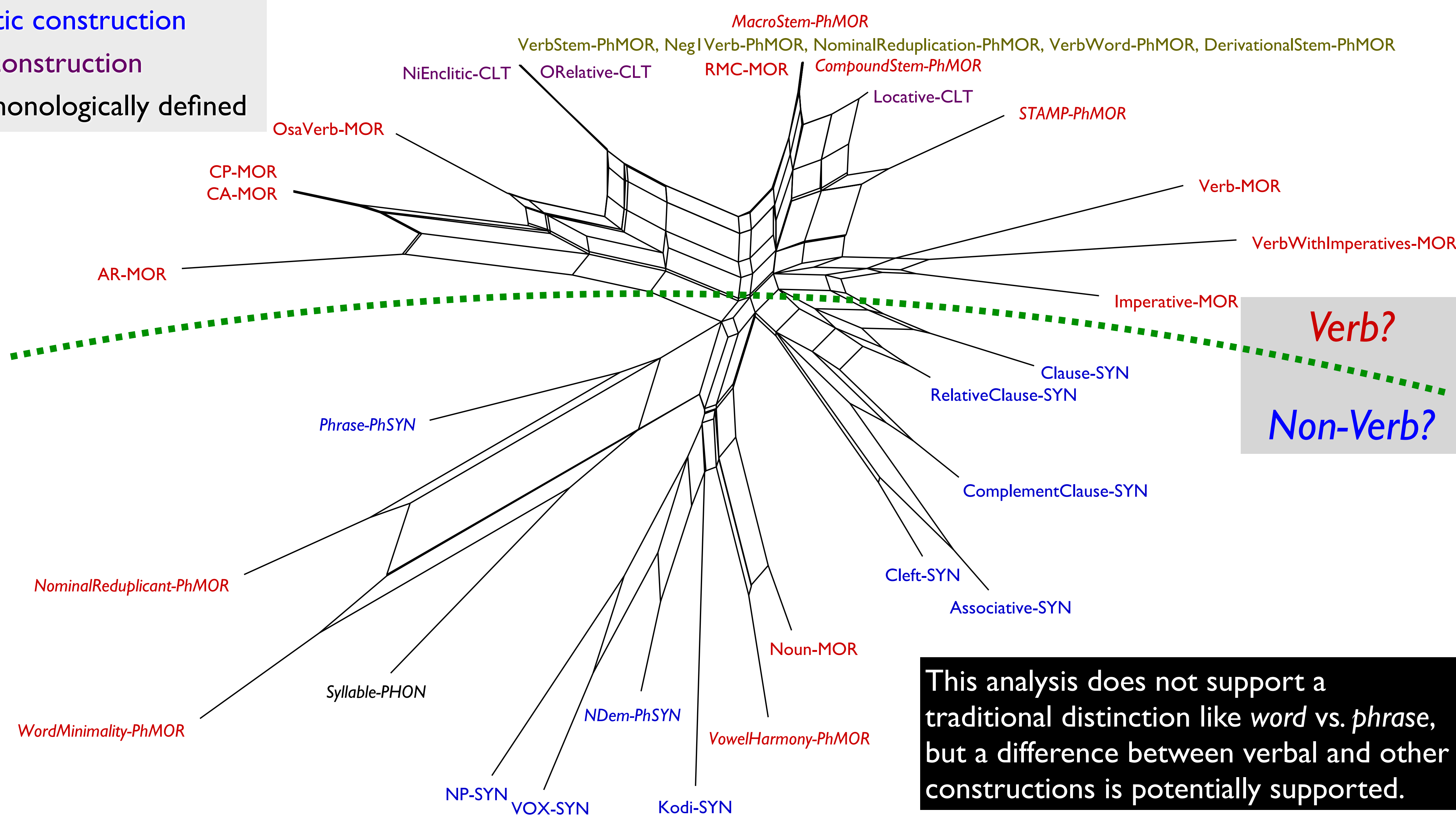
MacroStem-PhMOR
 VerbStem-PhMOR, NegIVerb-PhMOR, NominalReduplication-PhMOR, VerbWord-PhMOR, DerivationalStem-PhMOR
RMC-MOR *CompoundStem-PhMOR*



A morphophonological cluster is clearly detected.

■ Morphological construction
■ Syntactic construction
■ Clitic construction
Italics = phonologically defined

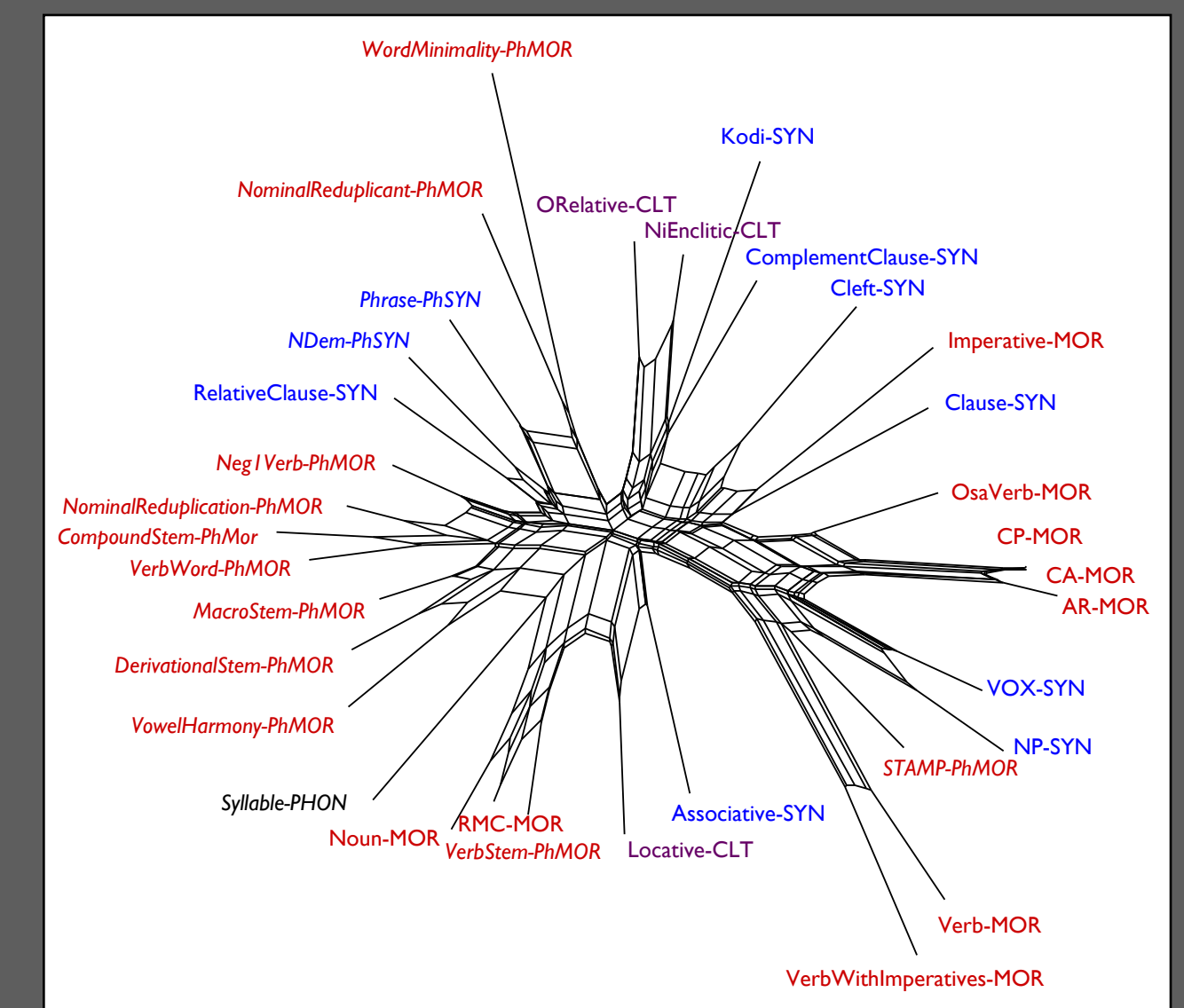
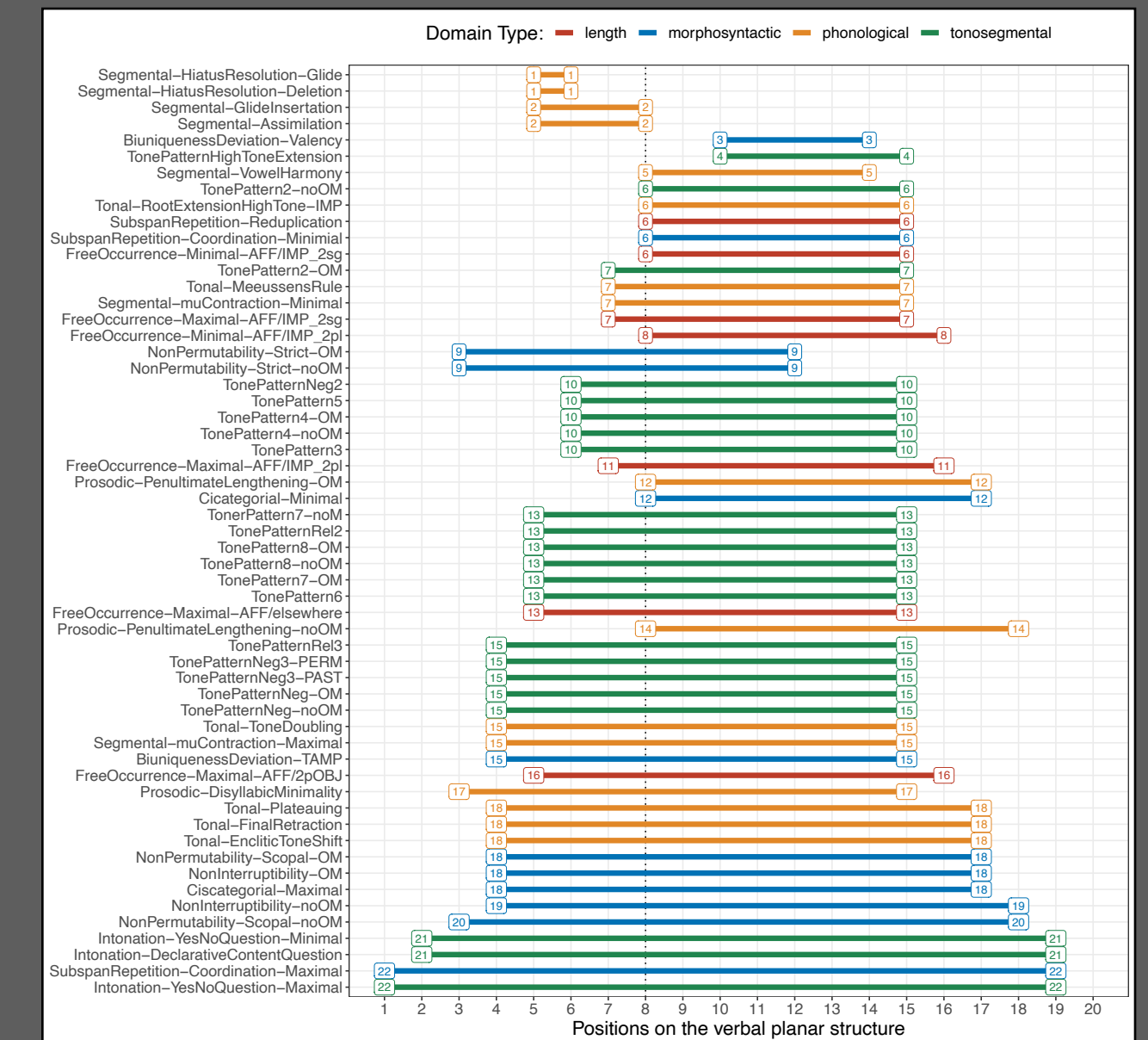
Component nodes excluded



This analysis does not support a traditional distinction like *word vs. phrase*, but a difference between verbal and other constructions is potentially supported.

Finding constituents

- If we assume that all linguistic constructions subdivide cleanly into constituents, we will always find evidence to justify this analysis
- If we want to see if evidence for constituents emerges—in particular cross-linguistically and across multiple possible analytical dimensions—we'll need different approaches
- This requires more complicated systems of coding than are typical of most current typological work
- It also requires experimentation with new methods
- Fortunately, the accessibility of computational and statistical methods has vastly improved in the last two decades



References

- Sandra Auderset, Caroline de Becker, Gladys Camacho Rios, Eric W. Campbell, Javier Carol, Minella Duzerol, Patience Epps, Ambrocio Gutiérrez, Cristian R. Juárez, Magdalena Lemus Serrano, Stephen Francis Mann, Taylor L. Miller, Shun Nakamoto, Zoe Poirier Maruenda, Andrés Salanova, Hiroto Uchihara, Natalie Weber, Anthony C. Woodbury, Dennis Wylie & Adam J. R. Tallman. to appear. Constituency and convergence in the Americas – Results and discussion. In Adam J.R. Tallman, Sandra Auderset & Hiroto Uchihara (eds.), *Constituency and convergence in the Americas*, 725–767. Berlin: Language Science Press.
- Bickel, Balthasar. 2010. Capturing particulars and universals in clause linkage: A multivariate analysis. In Isabelle Bril (ed.), *Clause-hierarchy and clause-linking: The syntax and pragmatics interface*, 51–102. Amsterdam: Benjamins.
- Carnie, Andrew. 2008. *Constituent structure*. Oxford: OUP.
- Croft, William. 2001. *Radical Construction Grammar*. Oxford: OUP.
- Gussenhoven, Carlos. 2015. Suprasgmentals. In James D. Wright (ed.), *International Encyclopedia of the Social & Behavioral Sciences* (second edition), 714–721. Amsterdam: Elsevier.
- Downing, Laura & Al Mtenje. 2018. *The phonology of Chichewa*. Oxford: OUP.
- Dryer, Matthew S. Order of subject, object and verb. In Matthew S. Dryer & Martin Haspelmath (eds.) 2013. *The World Atlas of Language Structures online*. Leipzig: Max Planck Institute for Evolutionary Anthropology. <https://wals.info/>.
- Gentleman, R. 2013. Visualizing and distances using GO. <http://www.bioconductor.org/packages/2.13/bioc/vignettes/GOstats/inst/doc/GOvis.pdf>.
- Good, Jeff. 2016. *The linguistic typology of templates*. Cambridge: CUP.
- Hayes, Bruce. 1990. Precompiled phrasal phonology. In S. Inkelas and D. Zec (Eds.), *The phonology-syntax connection*, 85–108. Stanford: CSLI.
- Hayes, Bruce. 1990. Precompiled phrasal phonology. In Sharon Inkelas and Draga Zec (Eds.), *The phonology-syntax connection*, 85–108. Stanford: CSLI.
- Haspelmath, Martin. 2011. The indeterminacy of word segmentation and the nature of morphology and syntax. *Folia Linguistica* 45. 31–80.
- Hyman, Larry M. 2010. Affixation by place of articulation: The case of Tiene. In Jan Wohlgemuth & Michael Cysouw (eds.), *Rara and rarissima: Collecting and interpreting unusual characteristics of human languages*, 145–184. Berlin: De Gruyter Mouton.
- Kiparsky, Paul. 1982. *Lexical phonology and morphology*. *Linguistics in the morning calm: Selected papers from SICOL-1981*, 3–91. Seoul: Hanshin.
- McCawley, James D. *The syntactic phenomena of English* (second edition). Chicago: University of Chicago Press.
- Mchombo, Sam. 2004. *The syntax of Chichewa*. Cambridge: CUP.
- Moroz, George, Kirill Koncha, Mikhail Leonov, Anna Smirnova & Ekaterina Zalivina. 2024. lingtypology: Linguistic typology and mapping. <https://CRAN.R-project.org/package=lingtypology>.
- Osborne, Timothy. 2018. Tests for constituents: What they really reveal about the nature of syntactic structure. *Language Under Discussion* 5(1). 1–41. <https://doi.org/10.31885/lud.5.1.223>
- Tallman, Adam. 2021. Constituency and coincidence in Chácobo (Pano). *Studies in Language*. <https://doi.org/10.1075/sl.19025.tal>.