

Phonological Properties of Portuguese Clitics

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HPSG 2001

August 3–5, 2001

Trondheim, Norway



1 The lexical vs. postlexical status of EP clitics

- Portuguese clitics confront us with conflicting evidence concerning lexical/postlexical status
 - Morphological evidence suggests affixal status
 - Clitic placement w.r.t. host (proclisis vs. enclisis; Crysmann, 1997, 2000c) & Wide Scope Over Coordination (Crysmann, 2000a) require syntactic transparency

Criterion	Lexical	Postlexical
Promiscuity (A)	yes	no
Arbitrary Gaps (B)	yes	no
Morphophonological Idiosyncrasy (C)	yes	no
Semantic Idiosyncrasy (D)	yes	no
Syntactic Opacity (E)	no	yes
Infixation (F)	yes	no
Wide Scope over Coordination	no	yes
Rigid & Idiosyncratic Ordering	yes	no

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- Vigário (1999a,b) claims that EP clitics
 - constitute exceptions to otherwise regular lexical phonological processes
 - behave similar to function words w.r.t. external sandhi
- Vigário's conclusion: EP clitics cannot be derived in the lexicon

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- Postlexical account of EP clitics is unattractive
 - Morphophonological idiosyncrasy and allomorphy must be relegated to phrasal phonology (Hayes, 1990)
 - Syntax is burdened with arbitrary gaps, idiosyncratic ordering, and semantic idiosyncrasy
- Conclusion: Vigário's evidence is worth reconsidering

2 Lexical signs and Domain Objects: Multiple dimensions of wordhood

- Paradox between affixal status and syntactic transparency can be resolved by means of lexical introduction of multiple domain objects
- Type of analysis successfully applied to similar paradoxes in unrelated languages:
 - Fox complex predicates (Crysmann, 1999)
 - Udi subject agreement (Crysmann, 2000b)
- Alternation between proclisis and mesocclisis/enclisis syntactically determined (precedence of a local licenser)
- Alternation between enclisis and mesocclisis morphotactically determined

⇒ Morphs are only partially ordered

⇒ Placement possibilities emerge from alignment of morphs with domain objects

- (1) a. O João comprava-o.
John buy.IMP-it
'John bought it'.
- b. *o João o comprava
- c. que o João o comprava.
that John it buy.IMP
'that John bought it'.
- d. *que o João comprava-o

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- (2) a. O João comprá-lo-á.
John buy it will
'John will buy it'.
- b. *o João o comprará
- c. que o João o comprará.
that John it buy will
'that John will buy it'.
- d. *que o João compra-lo-á

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$$(3) \quad \left[\begin{array}{l} \text{DOM} \left\langle \left[\begin{array}{l} \text{PH} \quad \boxed{1} \oplus \textit{list} \\ \text{SS} \quad \boxed{0} \left[\text{L} \mid \text{C} \mid \text{HD} \textit{verb} \right] \end{array} \right] \right\rangle \circ \textit{list} \\ \text{SS} \quad \boxed{0} \\ \text{M} \quad \left\langle \left[\begin{array}{l} \text{PH} \quad \boxed{1} \\ \text{SS} \quad \boxed{0} \end{array} \right] \right\rangle \circ \textit{list} \end{array} \right]$$

$$\left[\begin{array}{l} \textit{plain-verb} \\ \text{DOM} \quad \left\langle \left[\right] \right\rangle \\ \text{M} \quad \textit{list}(\neg \textit{cl}) \end{array} \right] \quad \left[\begin{array}{l} \textit{clitic-verb} \\ \text{DOM} \quad \left\langle \left[\text{PH} \quad \boxed{1} \oplus \textit{list} \right] \right\rangle \circ \left\langle \left[\right] \right\rangle \\ \text{M} \quad \textit{list}(\neg \textit{cl}) \oplus \left\langle \left[\begin{array}{l} \textit{cl} \\ \text{PH} \quad \boxed{1} \end{array} \right] \right\rangle \oplus \textit{list} \end{array} \right]$$

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$$\left[\begin{array}{l} \textit{word} \\ \text{SS} \mid \text{L} \mid \text{CAT} \mid \text{HD} \left[\begin{array}{l} \textit{verb} \\ \text{VFORM } \textit{fin} \end{array} \right] \\ \text{M } \textit{list}(\neg \textit{tns-aff}) \oplus \textit{list}(\textit{tns-aff}) \oplus \textit{list}(\neg \textit{tns-aff}) \end{array} \right]$$

(4)

$$\begin{array}{l} \left[\begin{array}{l} \textit{head-aligned} \\ \text{HD} \left[\begin{array}{l} \square \\ \text{VFORM } \neg(\textit{fut} \vee \textit{cond}) \end{array} \right] \\ \text{M } \textit{list} \oplus \left\langle \left[\begin{array}{l} \textit{stem} \\ \text{HD} \left[\begin{array}{l} \square \end{array} \right] \end{array} \right], [\textit{tns-aff}] \right\rangle \oplus \textit{list} \end{array} \right] \end{array} \quad \left[\begin{array}{l} \textit{edge-aligned} \\ \text{HD} \left[\begin{array}{l} \square \\ \text{VFORM } \textit{fut} \vee \textit{cond} \end{array} \right] \\ \text{M } \textit{list} \oplus \left\langle [\textit{tns-aff}] \right\rangle \end{array} \right]$$

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(5) Proclisis:

$$\left[\begin{array}{l} \text{DOM} \left\langle \left[\text{PH } \boxed{0} \oplus \text{list} \right], \left[\begin{array}{l} \text{PH } \boxed{1} \oplus \boxed{2} \oplus \text{list} \\ \text{SS } \boxed{3} \end{array} \right] \right\rangle \\ \text{SS} \left[\boxed{3} \text{ LOC | CAT | HD } \left[\begin{array}{l} \text{verb} \\ \text{VFORM } \text{ vform} \end{array} \right] \right] \\ \text{M} \left\langle \left[\begin{array}{l} \text{cl} \\ \text{PH } \boxed{0} \end{array} \right] \right\rangle \oplus \text{list}(\text{cl}) \oplus \left\langle \left[\begin{array}{l} \text{stem} \\ \text{PH } \boxed{1} \\ \text{SS } \boxed{3} \end{array} \right] \right\rangle \oplus \left\langle \left[\begin{array}{l} \text{tns-aff} \\ \text{PH } \boxed{2} \end{array} \right] \right\rangle \oplus \text{list}(\text{tns-aff}) \end{array} \right]$$

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(6) Mesocclisis:

$$\left[\begin{array}{l} \text{DOM} \left\langle \left[\begin{array}{l} \text{PH} \quad \boxed{1} \\ \text{SS} \quad \boxed{3} \end{array} \right], \left[\text{PH} \quad \boxed{0} \oplus \textit{list} \oplus \boxed{2} \oplus \textit{list} \right] \right\rangle \\ \text{SS} \quad \boxed{3} \left[\text{LOC} \mid \text{CAT} \mid \text{HD} \quad \left[\begin{array}{l} \textit{verb} \\ \text{VFORM} \textit{ fut} \vee \textit{cond} \end{array} \right] \right] \\ \text{M} \quad \left\langle \left[\begin{array}{l} \textit{stem} \\ \text{PH} \quad \boxed{1} \\ \text{SS} \quad \boxed{3} \end{array} \right] \right\rangle \oplus \left\langle \left[\begin{array}{l} \textit{cl} \\ \text{PH} \quad \boxed{0} \end{array} \right] \right\rangle \oplus \textit{list}(\textit{cl}) \oplus \left\langle \left[\begin{array}{l} \textit{tns-aff} \\ \text{PH} \quad \boxed{2} \end{array} \right] \right\rangle \oplus \textit{list}(\textit{tns-aff}) \end{array} \right]$$

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(7) Enclisis:

$$\left[\begin{array}{l} \text{DOM} \\ \text{SS} \\ \text{M} \end{array} \left\langle \begin{array}{l} \left[\begin{array}{l} \text{PH} \quad \boxed{1} \oplus \boxed{2} \oplus \textit{list} \\ \text{SS} \quad \boxed{3} \end{array} \right], \left[\text{PH} \quad \boxed{0} \oplus \textit{list} \right] \\ \left[\begin{array}{l} \boxed{3} \text{ LOC | CAT | HD} \quad \left[\begin{array}{l} \textit{verb} \\ \text{VFORM } \neg(\textit{fut} \vee \textit{cond}) \end{array} \right] \\ \left\langle \begin{array}{l} \textit{stem} \\ \text{PH} \quad \boxed{1} \\ \text{SS} \quad \boxed{3} \end{array} \right\rangle \oplus \left\langle \begin{array}{l} \textit{tns-aff} \\ \text{PH} \quad \boxed{2} \end{array} \right\rangle \oplus \textit{list}(\textit{tns-aff}) \oplus \left\langle \begin{array}{l} \textit{cl} \\ \text{PH} \quad \boxed{0} \end{array} \right\rangle \oplus \textit{list}(\textit{cl}) \end{array} \right\rangle \right]$$

Centralisation before palatals

- Stressed ϵ obligatorily neutralises to a low central vowel before palatals (j,ʎ,ɲ)
- Centralisation is a word-bound rule

(10) a. tenho 'I have'; espelha 'it mirrors' [ɐ]/*[e]
b. dê-lha 'give it to him/her/them' *[ɐ]/[e]

- Centralisation equally fails to apply between enclitics and the host

Glide insertion

- Non-back glides are epenthesised into a sequence of two vowels, if the first one is a stressed /e/
- Epenthesis does not apply across word boundaries

(11) a. passe[j]o 'walk'; are[j]a 'sand'
b. rece[j]o 'I fear'; rece[j]a 'he fears'
c. vê (*[j])o João 'see John'
d. vê-(*[j])o 'see him'

- Verb-enclitic sequences do not display glide insertion either

3.2 External Sandhi

Back vowel deletion

- Sandhi rule that optionally applies at the juncture between two prosodic words

(12) $V_a[+\text{back}] \rightarrow \emptyset / [\dots [PW_d \dots _] [PW_d V_b \dots] \dots I^{max}]$ (Frota, 1998)

- Back Vowel Deletion does not apply between function words and their prosodic host
- Back Vowel Deletion does not apply between proclitics and their host
- With enclitics, a final back vowel may delete

(13) *music**o* *africano* ‘musician african’ [w]/∅

(14) *de**o* *arquivador* ‘of.the archivist’ [w]/*∅

(15) (*n*ã*o*) *tu* *aceito* ‘(I) (not) it.you accept’ [w]/*∅

(16) *deixo-tu* *admirar* ‘(I) let-it.you admire’ [w]/∅

- Applicability of Back Vowel-Deletion appears to be a good test for determining the boundary between two independent prosodic words
- Establishes (contra Barbosa 1996; Carvalho 1989) that EP clitics also attach to their host prosodically

Non-Back Vowel Deletion

- Obligatory application at PWD boundary, if following PWD vowel-initial
- Optional application with stressless function words and proclitics

- (17) a. *pele alva* ‘skin white’ *[ə]/*[j]/∅
b. *pede azeitonas* ‘asks for olives’ *[ə]/*[j]/∅
c. *(não) te agradava* ‘(not) you pleased’ *[ə]/[j]/∅
d. *de água* ‘of water’ *[ə]/[j]/∅

- Obligatory Intonation Phrase-finally (irrespective of segmental context)

- (18) *deu a pele* *[ə]/*[j]/∅
gave the skin
‘(he) gave a piece of leather’ (Vigário, 1999a, p. 267)

- Non-application between host and enclitics
- Obligatory application to final enclitic

- (19) a. *peço-te azeitonas* ‘(I) ask you (for) olives’ *[ə]/*[j]/∅
b. *pede-o* ‘(he) asks (for) it’ *[ə]/[j]/*∅

- Vigário claims that Non-Back Vowel Deletion applies irrespective of right segmental context
- Consequence: no final PWD-boundary between host and enclitics
- Postlexically, enclitics incorporate, rather than adjoin to their host

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- Obligatory vs. optional application depends on subsequent PWD (vowel-initial)
- Optional application to function words requires reference to initial boundary
- Reference to both final and initial boundaries is parallel to Back Vowel Deletion (Frota, 1998)

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(20) [_{PWD} ... *[ə]/[j]/∅ [_{PWD} V ...]] (Proclitics/Function words)

(21) [_{PWD} ... *[ə]/*[j]/∅] [_{PWD} V ...]

(22) [[_{PWD} ... *[ə]/[j]/*∅] V ... _{PWD}] (Enclitics)

3.3 Discussion

- Prosodic incorporation, instead of adjunction, is empirically underdetermined: data may equally well be captured by appealing to the presence/absence of a PWd-initial boundary
- Postlexical incorporation precludes purely prosodic treatment of regular word-level phonology, e.g. stress assignment:
distinction between minimal PWd and right-adjoined syllables is neutralised, and must be reinstated in terms of lexical/postlexical distinction
- Prosodic generalisations (e.g. stress assignment) are not true of surface PWds under Vigário's account
- Vigário's account highly procedural, relying heavily on extrinsic ordering
- Prosodic constituents have a very short life span under procedural analysis
- Right-adjunction of enclitics, by contrast, preserves prosodic constituency
- Word-level phonology can be captured by reference to the minimal PWd
- Sandhi can be described by reference to initial/final PWd boundaries

⇒ Apparent evidence for postlexical status of clitics is just an artefact of Vigário's analytical choice

4 Analysis

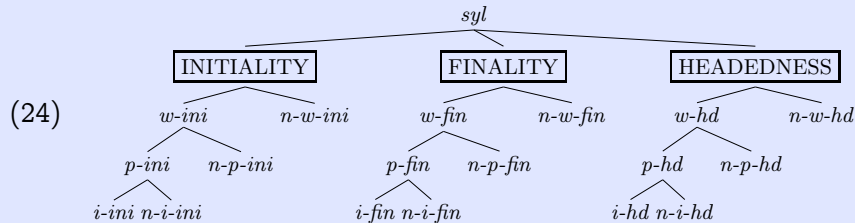
4.1 Representing Prosodic Constituency

- Prosodic constituency differs crucially from syntactic constituency
 - shallow
 - limited recursion
- Strict Layer Hypothesis (Nespor and Vogel, 1986; Selkirk, 1982)
- SLH has subsequently been weakened to allow for recursion within a level:
 - adjunction (e.g. Selkirk, 1995)
 - compounding (Ladd, 1986, 1996)
- Feature-based encoding (Klein, 2000) can model arbitrary context-free structures, but cannot be easily lexicalised
- Type-based, lexicalised encoding of prosodic hierarchy possible, if SLH is obeyed (Walther, p.c.)
- Adjunction is harmless for type-based encoding, as long as phonological processes uniformly target minimal or maximal constituents of the same type
- Empirical claim: phonological evidence for center self-embedding (arbitrarily nested instances of a single harmony process differing in value) expected to be non-existing

⇒ Prefer type-based encoding due to its restrictiveness

$$(23) \begin{bmatrix} \textit{phon} \\ \text{SEGS} & \textit{list(seg)} \\ \text{SYLS} & \textit{list(syl)} \end{bmatrix} \quad \begin{bmatrix} \textit{syl} \\ \text{ONS} & \textit{list(seg)} \\ \text{NUC} & \langle \textit{[seg]} \rangle \\ \text{COD} & \textit{list(seg)} \end{bmatrix}$$

- Complement description of segments with syllable structure
- Classify syllables (as minimal prosodic constituents) according to the role they play for higher-level constituents

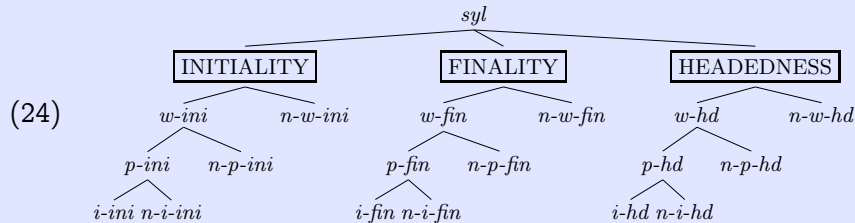


- General conditions on prosodic wellformedness can be imposed by principle, e.g.:
 - Headedness: Prosodic words must have exactly one prominent syllable

$$(25) \textit{phon} \rightarrow \neg \left[\text{SYLS } \textit{list} \oplus \left\langle \begin{bmatrix} \textit{w-ini} \wedge \\ \textit{w-fin} \wedge \\ \textit{n-w-hd} \end{bmatrix} \right\rangle \oplus \textit{list} \right]$$

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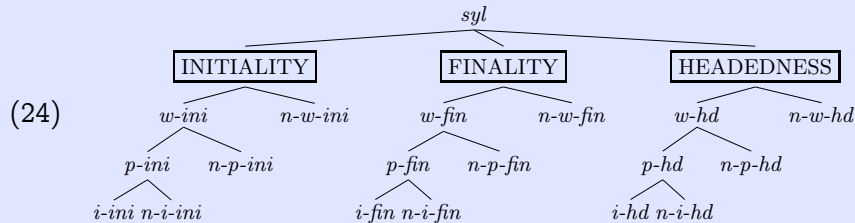


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$$(26) \textit{phon} \rightarrow \neg \left(\left[\begin{array}{l} \text{SYLS } \boxed{1} \oplus \langle [\textit{w-ini}] \rangle \oplus \textit{list} \left(\left[\begin{array}{l} \textit{n-w-ini} \\ \textit{n-w-fin} \end{array} \wedge \right] \right) \oplus \langle [\textit{w-fin}] \rangle \oplus \boxed{2} \end{array} \right] \wedge \left[\begin{array}{l} \text{SYLS } \boxed{1} \oplus \textit{list}(\textit{n-w-hd}) \oplus \boxed{2} \end{array} \right] \right)$$

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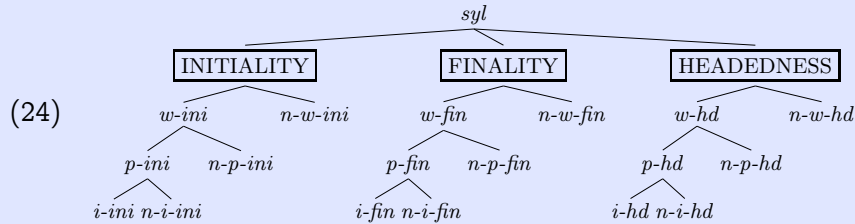


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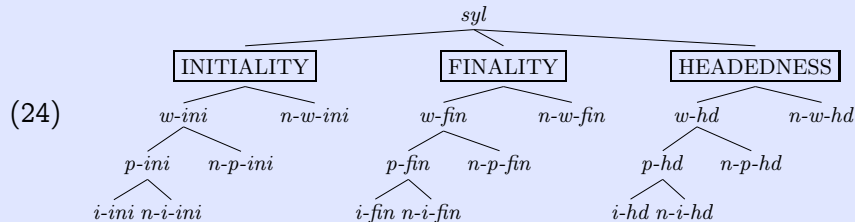


- General conditions on prosodic wellformedness can be imposed by principle, e.g.:
 - Prosodic Adjunction: adjoined material may not be prominent

$$(28) \textit{phon} \rightarrow \neg \left(\left[\begin{array}{l} \text{SYLS } \boxed{1} \oplus \langle [\textit{w-ini} \wedge \textit{n-w-fin}] \rangle \oplus \textit{list(n-w-fin)} \oplus \langle [\textit{w-ini}] \rangle \oplus \boxed{2} \end{array} \right] \wedge \left[\begin{array}{l} \text{SYLS } \boxed{1} \oplus \textit{list} \oplus \langle [\textit{w-hd}] \rangle \oplus \textit{list} \oplus \langle [] \rangle \oplus \boxed{2} \end{array} \right] \right)$$

$$(23) \begin{bmatrix} \textit{phon} \\ \text{SEGS} \quad \textit{list(seg)} \\ \text{SYLS} \quad \textit{list(syl)} \end{bmatrix} \quad \begin{bmatrix} \textit{syl} \\ \text{ONS} \quad \textit{list(seg)} \\ \text{NUC} \quad \langle \textit{[seg]} \rangle \\ \text{COD} \quad \textit{list(seg)} \end{bmatrix}$$

- Complement description of segments with syllable structure
- Classify syllables (as minimal prosodic constituents) according to the role they play for higher-level constituents



- General conditions on prosodic wellformedness can be imposed by principle, e.g.:
 - Prosodic Adjunction: adjoined material may not be prominent

$$(29) \textit{phon} \rightarrow \neg \left(\left[\begin{array}{l} \text{SYLS } \boxed{1} \oplus \langle \textit{[w-fin} \wedge \textit{]} \rangle \oplus \textit{list(n-w-ini)} \oplus \langle \textit{[w-fin]} \rangle \oplus \boxed{2} \wedge \\ \text{SYLS } \boxed{1} \oplus \textit{list} \oplus \langle \textit{[w-hd]} \rangle \oplus \textit{list} \oplus \langle \textit{[]} \rangle \oplus \boxed{2} \end{array} \right] \right)$$

4.2 Lexicalised Prosodic Alignment

- Basic assumption: lexical items are only partially prosodised
 - Syllabification in EP is progressive:
 - words may have an open onset
 - words may have trailing consonants
 - All words define an initial PWd boundary:
 - Only content words are full-fledged PWds and also set their final PWd boundary
 - Cliticised words require the head domain object to be a PWd, setting an initial and a final boundary
- ⇒ Lexical signs are either Pwds, or left-adjoin to a following PWd

$$(30) \text{ word} \rightarrow \left[\text{DOM} \left\langle \text{PH} \left[\begin{array}{l} \text{SKEL} \langle \underline{1} \rangle \oplus \text{list} \\ \text{SYLS} \left\langle \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \underline{1} \rangle \oplus \text{list} \\ w\text{-ini} \\ \text{NUC} \langle \underline{1} \rangle \end{array} \right] \right\rangle \oplus \text{list} \end{array} \right] \right\rangle \oplus \text{list} \right] \oplus \text{list}$$

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$$(31) \left[\begin{array}{l} \textit{word} \\ \text{HD } \textit{noun} \vee \textit{verb} \vee \textit{adjective} \end{array} \right] \rightarrow$$

$$\left[\text{DOM } \textit{list} \oplus \left\langle \text{PH} \left\{ \left[\begin{array}{l} \text{SKEL } \textit{list} \oplus \boxed{1} \\ \text{SYLS } \textit{list} \oplus \left\langle \left[\textit{w-fin} \right], \left[\begin{array}{l} \textit{w-ini} \\ \text{ONS } \boxed{1} \end{array} \right] \right\rangle \right] \right\} \right\} \left[\begin{array}{l} \text{SKEL } \textit{list} \oplus \left\langle \boxed{1} \right\rangle \oplus \boxed{2} \\ \text{SYLS } \textit{list} \oplus \left\langle \left[\begin{array}{l} \textit{w-fin} \\ \text{NUC } \left\langle \boxed{1} \right\rangle \\ \text{COD } \boxed{2} \end{array} \right] \right\rangle \right] \right\} \right\} \right]$$

4.2 Lexicalised Prosodic Alignment

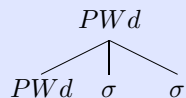
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$$(33) \left[\begin{array}{l} \text{word} \\ \text{DOM} \end{array} \left\langle \left[\left[\right], \left[\right] \right] \right\rangle \right] \rightarrow \left[\begin{array}{l} \text{DOM} \left\langle \begin{array}{l} \text{PH} \left[\begin{array}{l} \text{SKEL} \langle \boxed{1} \rangle \oplus \text{list} \\ \text{SYLS} \left\langle \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \boxed{1} \rangle \oplus \text{list} \end{array} \right] \right\rangle \\ \left[\begin{array}{l} w\text{-ini} \\ \text{NUC} \langle \boxed{1} \rangle \end{array} \right] \end{array} \right\rangle \oplus \text{list} \end{array} \right] \right\rangle \oplus \text{list} \\ \text{SS} \quad \boxed{0} \end{array} \right] \circ \left\langle \left[\left[\right] \right] \right\rangle \end{array} \right]$$

4.3 Word-level Phonology

- Basic assumption: EP pronominal affixes are prosodically weak

$$(34) \left[\begin{array}{l} cl \\ PH | SYLS \left\langle \left[n-w-hd \right] \right\rangle \end{array} \right]$$



- Domain objects which consist entirely of *n-w-hd* syllables cannot be a PWd and must either left- or right-adjoin
- Enclisis gives rise to right-adjoined structures
- Word-level phonology can be captured in terms of minimal PWds

- (35) a. [dizíamos *PWd*] — [[dizíamo *PWd*] lo *PWd*]
 b. [bat[ẽ]te *PWd*] — [[bat[ã]] *PWd*] te *PWd*]
 c. [esp[e]lha *PWd*] — [[d[ε] *PWd*] lha *PWd*]
 d. [rece*([j])o *PWd*] — [[dê*([j]) *PWd*] o *PWd*]

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$$(34) \left[\begin{array}{l} cl \\ PH | SYLS \left\langle \left[n-w-hd \right] \right\rangle \end{array} \right] \quad \begin{array}{c} PWd \\ / \quad | \quad \backslash \\ PWd \quad \sigma \quad \sigma \end{array}$$

- Domain objects which consist entirely of *n-w-hd* syllables cannot be a PWd and must either left- or right-adjoin
- Enclisis gives rise to right-adjoined structures
- Word-level phonology can be captured in terms of minimal PWds
- Stress constraint: *w-hd* cannot be followed by two non-final syllables

$$(35) \left[\begin{array}{l} clitic-verb \\ DOM \left\langle \left[PH | SYLS \left\langle \begin{array}{l} w-ini \\ ONS \langle d \rangle \\ NUC \langle i \rangle \\ COD \langle \rangle \end{array} \right] , \left[\begin{array}{l} w-hd \\ ONS \langle z \rangle \\ NUC \langle i \rangle \\ COD \langle \rangle \end{array} \right] , \left[\begin{array}{l} n-w-hd \\ ONS \langle \rangle \\ NUC \langle a \rangle \\ COD \langle \rangle \end{array} \right] , \left[\begin{array}{l} w-fin \\ ONS \langle m \rangle \\ NUC \langle u \rangle \\ COD \langle \rangle \end{array} \right] \right\rangle , \left[PH | SYLS \left\langle \begin{array}{l} n-w-hd \\ ONS \langle l \rangle \\ NUC \langle u \rangle \\ COD \langle \rangle \end{array} \right\rangle \right] \end{array} \right]$$

$$(36) \neg \left[PH | SYLS list \oplus \left\langle \left[w-hd \wedge w-n-fin \right], \left[w-n-fin \right], \left[w-n-fin \right] \right\rangle \oplus list \right]$$

4.4 External Sandhi

- Final schwa is underspecified for syllabic role:
 - nucleus (vocalic)
 - trailing onset (consonantal)
 - unparsed (zero)
- Function words like *de* ‘of’ give rise to 4 possibilities, depending on context
 - [ə] before consonant-initial PWd
 - [ə] before vowel-initial PWd (blocked by sandhi constraint)
 - [j] before vowel-initial PWd (resyllabification possible)
 - ∅ before vowel-initial PWd (resyllabification possible)
- Before consonant-initial PWds, realisation as [j] or ∅ ruled out:
 - (re-)syllabification into following onset impossible
 - nucleus-free syllable prosodically ill-formed

$$(39) \left[\text{PH} \mid \text{SYLS} \left\langle \begin{array}{l} w\text{-ini} \\ \text{ONS} \langle d \rangle \\ \text{NUC} \langle \text{ə} \rangle \\ \text{COD} \langle \rangle \end{array} \right\rangle, \begin{array}{l} w\text{-ini} \wedge n\text{-w-fin} \\ \text{ONS} \langle l \rangle \\ \text{NUC} \langle \text{e} \rangle \\ \text{COD} \langle j \rangle \end{array}, \begin{array}{l} w\text{-fin} \\ \text{ONS} \langle t \rangle \\ \text{NUC} \langle \text{ə} \rangle \\ \text{COD} \langle \rangle \end{array} \right\rangle \right]$$

$$(37) \left[\text{PH} \left[\begin{array}{l} \text{SEGS} \left\langle \begin{array}{l} \text{[1]} d, \text{[2]} \left\{ \begin{array}{l} \text{ə} \\ j \end{array} \right\} \end{array} \right\rangle \\ \left\langle \begin{array}{l} \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-hd} \\ \text{ONS} \langle \text{[1]} \rangle \\ \text{NUC} \langle \text{[2]} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \text{[1],[2]} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \text{[1]} \rangle \end{array} \right] \end{array} \right\rangle \end{array} \right]$$

$$(38) \text{Schwa Sandhi} \\ \neg \left[\text{PH} \mid \text{SYLS} \left\langle \dots \left[\begin{array}{l} \text{NUC} \langle \text{ə} \rangle \\ \text{COD} \langle \rangle \end{array} \right], \left[\text{ONS} \langle \rangle \right] \dots \right\rangle \right]$$

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$$(40) \left[\begin{array}{c} \text{PH} | \text{SYLS} \left\langle \begin{array}{l} w\text{-ini} \\ \text{ONS} \langle d \rangle \\ \text{NUC} \langle ə \rangle \\ \text{COD} \langle \rangle \end{array} \right\rangle, \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-fin} \\ \text{ONS} \langle \rangle \\ \text{NUC} \langle a \rangle \\ \text{COD} \langle \rangle \end{array} \right], \left[\begin{array}{l} w\text{-fin} \\ \text{ONS} \langle g, w \rangle \\ \text{NUC} \langle e \rangle \\ \text{COD} \langle \rangle \end{array} \right] \right\rangle \end{array} \right]$$

$$(37) \left[\begin{array}{c} \text{PH} \\ \text{SYLS} \end{array} \left\langle \begin{array}{l} \text{SEGS} \left\langle \begin{array}{l} \text{[1]} d, \text{[2]} \left\{ \begin{array}{l} ə \\ j \end{array} \right\} \end{array} \right\rangle \\ \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-hd} \\ \text{ONS} \langle \text{[1]} \rangle \\ \text{NUC} \langle \text{[2]} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \text{[1,2]} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \text{[1]} \rangle \end{array} \right] \end{array} \right\rangle \end{array} \right]$$

$$(38) \text{Schwa Sandhi} \\ \neg \left[\text{PH} | \text{SYLS} \left\langle \dots \left[\begin{array}{l} \text{NUC} \langle ə \rangle \\ \text{COD} \langle \rangle \end{array} \right], \left[\text{ONS} \langle \rangle \right] \dots \right\rangle \right]$$

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$$(41) \left[\text{PH} \mid \text{SYLS} \left\langle \begin{array}{l} \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-fin} \\ \text{ONS} \langle d, j \rangle \\ \text{NUC} \langle a \rangle \\ \text{COD} \langle \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-fin} \\ \text{ONS} \langle g, w \rangle \\ \text{NUC} \langle e \rangle \\ \text{COD} \langle \rangle \end{array} \right] \end{array} \right\rangle \right]$$

$$(37) \left[\text{PH} \left[\begin{array}{l} \text{SEGS} \left\langle \begin{array}{l} \boxed{1} d, \boxed{2} \left\{ \begin{array}{l} \text{ə} \\ j \end{array} \right\} \end{array} \right\rangle \\ \left\langle \begin{array}{l} \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-hd} \\ \text{ONS} \langle \boxed{1} \rangle \\ \text{NUC} \langle \boxed{2} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \boxed{1}, \boxed{2} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \boxed{1} \rangle \end{array} \right] \end{array} \right\rangle \end{array} \right]$$

$$(38) \text{Schwa Sandhi} \\ \neg \left[\text{PH} \mid \text{SYLS} \left\langle \dots \left[\begin{array}{l} \text{NUC} \langle \text{ə} \rangle \\ \text{COD} \langle \rangle \end{array} \right], \left[\text{ONS} \langle \rangle \right] \dots \right\rangle \right]$$

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$$(42) \left[\text{PH} \mid \text{SYLS} \left\langle \begin{array}{l} \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-fin} \\ \text{ONS} \langle d \rangle \\ \text{NUC} \langle a \rangle \\ \text{COD} \langle \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-fin} \\ \text{ONS} \langle gw \rangle \\ \text{NUC} \langle e \rangle \\ \text{COD} \langle \rangle \end{array} \right] \end{array} \right\rangle \right]$$

$$(37) \left[\text{PH} \left[\begin{array}{l} \text{SEGS} \left\langle \begin{array}{l} \boxed{1} d, \boxed{2} \left\{ \begin{array}{l} \text{ə} \\ j \end{array} \right\} \end{array} \right\rangle \\ \left\langle \begin{array}{l} \left[\begin{array}{l} w\text{-ini} \wedge n\text{-w-hd} \\ \text{ONS} \langle \boxed{1} \rangle \\ \text{NUC} \langle \boxed{2} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \boxed{1}, \boxed{2} \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle \boxed{1} \rangle \end{array} \right] \end{array} \right\rangle \end{array} \right]$$

$$(38) \textit{Schwa Sandhi} \\ \neg \left[\text{PH} \mid \text{SYLS} \left\langle \dots \left[\begin{array}{l} \text{NUC} \langle \text{ə} \rangle \\ \text{COD} \langle \rangle \end{array} \right], \left[\text{ONS} \langle \rangle \right] \dots \right\rangle \right]$$

- Non-Back Vowel Deletion is a regular phonological phenomenon, not a matter of lexical accident
- Distribution of vocalic, consonantal, and zero realisation must be constrained by principle
- Deletion in One.5-Level Phonology captured as Stray Erasure (Bird, 1995; Steriade, 1982):
Final segments may not be associated with a timing slot (SKEL), hence not parsed into syllable roles
- Non-Back Vowel Deletion
 - is obligatory in IP-final position: constraint *nbv-ip-fin* rules out non-deletion in *i-fin* syllables
 - applies before PWD-initial boundaries: *nbv-del* bans deletion in the context of *n-w-ini* syllables
 - is obligatory at the juncture between two PWDs: *nbv-non-del* sanctions non-deletion, if a final PWD boundary is followed by an initial one at the right edge of a *word*
- Back Vowel Deletion is restricted to the juncture between two independent PWD
 - *bvd-ini* bans deletion in left-adjoined contexts
 - *bvd-fin* bans deletion in right-adjoined contexts

$$(43) \quad \begin{array}{l} \text{nbv-ip-fin} \equiv \\ \left[\begin{array}{l} \text{word} \\ \text{DOM} \left\langle \begin{array}{l} \text{SEGS} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \langle \underline{2} \{ \ominus, \text{j} \} \rangle \\ \text{SKEL} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \langle \underline{2} \rangle \\ \text{SYLS} \quad \text{list} \oplus \langle [i\text{-fin}] \rangle \end{array} \right\rangle \end{array} \right] \bigcirc \text{list} \end{array}$$

$$(44) \quad \begin{array}{l} \text{nbv-del} \equiv \\ \left[\begin{array}{l} \text{word} \\ \text{DOM} \left\langle \begin{array}{l} \text{SEGS} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \langle \{ \ominus, \text{j} \} \rangle \\ \text{SKEL} \quad \text{list} \oplus \langle \underline{1} \rangle \\ \text{SYLS} \quad \text{list} \oplus \left\langle \begin{array}{l} [n\text{-w-ini} \wedge] \\ \neg i\text{-fin} \end{array} \right\rangle \end{array} \right\rangle \end{array} \right] \bigcirc \text{list} \end{array}$$

$$(45) \quad \begin{array}{l} \text{nbv-non-del} \equiv \\ \left[\begin{array}{l} \text{word} \\ \text{DOM} \text{list} \oplus \left\langle \begin{array}{l} \text{SEGS} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \langle \underline{2} \{ \ominus, \text{j} \} \rangle \\ \text{SKEL} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \langle \underline{2} \rangle \\ \text{SYLS} \quad \text{list} \oplus \langle [w\text{-fin}], [w\text{-ini}] \rangle \end{array} \right\rangle \end{array} \right]$$

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- Non-Back Vowel Deletion
 - is obligatory in IP-final position: constraint *nbv-ip-fin* rules out non-deletion in *i-fin* syllables
 - applies before PWD-initial boundaries: *nbv-del* bans deletion in the context of *n-w-ini* syllables
 - is obligatory at the juncture between two PWDs: *nbv-non-del* sanctions non-deletion, if a final PWD boundary is followed by an initial one at the right edge of a *word*
- Back Vowel Deletion is restricted to the juncture between two independent PWD
 - *bvd-ini* bans deletion in left-adjoined contexts
 - *bvd-fin* bans deletion in right-adjoined contexts

$$(46) \quad \left[\begin{array}{l} \text{word} \\ \text{DOM} \left\langle \begin{array}{l} \text{SEGS} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \left\langle \begin{array}{c} \text{u} \\ \text{w} \end{array} \right\rangle \\ \text{SKEL} \quad \text{list} \oplus \langle \underline{1} \rangle \\ \text{SYLS} \quad \text{list}(n-w-fin) \oplus \langle [w-ini] \rangle \end{array} \right\rangle \end{array} \right] \circ \text{list}$$

$$(47) \quad \left[\begin{array}{l} \text{word} \\ \text{DOM} \left\langle \begin{array}{l} \text{SEGS} \quad \text{list} \oplus \langle \underline{1} \rangle \oplus \left\langle \begin{array}{c} \text{u} \\ \text{w} \end{array} \right\rangle \\ \text{SKEL} \quad \text{list} \oplus \langle \underline{1} \rangle \\ \text{SYLS} \quad \text{list} \oplus \langle [w-fin], [n-w-ini] \rangle \end{array} \right\rangle \end{array} \right] \circ \text{list}$$

Example 1: Consonant-initial enclitics

(48)

$$\left[\text{DOM} \left\langle \text{SYLS} \left\{ \begin{array}{l} \left[\begin{array}{l} w\text{-ini} \\ \text{ONS } \langle p \rangle \\ \text{NUC } \langle \varepsilon \rangle \\ \text{COD } \langle \rangle \end{array} \right], \left[\begin{array}{l} w\text{-fin} \\ \text{ONS } \langle d \rangle \\ \text{NUC } \langle \emptyset \rangle \\ \text{COD } \langle \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini } \wedge \\ w\text{-fin} \\ \text{ONS } \langle p \rangle \\ \text{NUC } \langle \varepsilon \rangle \\ \text{COD } \langle \rangle \end{array} \right], \left[\begin{array}{l} n\text{-}w\text{-ini} \\ \text{ONS } \langle d, j \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini } \wedge \\ w\text{-fin} \\ \text{ONS } \langle p \rangle \\ \text{NUC } \langle \varepsilon \rangle \\ \text{COD } \langle \rangle \end{array} \right], \left[\begin{array}{l} w\text{-ini} \\ \text{ONS } \langle d \rangle \end{array} \right] \end{array} \right\} \right], \text{SYLS} \left\{ \begin{array}{l} \left[\begin{array}{l} w\text{-fin} \\ \text{ONS } \langle t \rangle \\ \text{NUC } \langle \emptyset \rangle \\ \text{COD } \langle \rangle \end{array} \right] \\ \left[\begin{array}{l} n\text{-}w\text{-ini} \\ \text{ONS } \langle tj \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS } \langle t \rangle \end{array} \right] \end{array} \right\} \right] \right]$$

SS 0

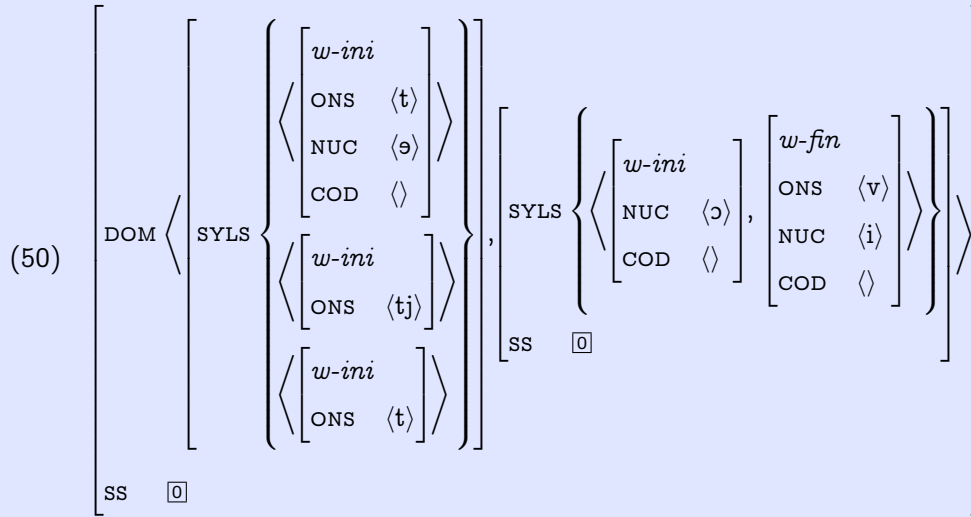
SS 0

Example 2: Vowel-initial enclitics

(49)

$$\left[\begin{array}{l} \text{DOM} \left\langle \begin{array}{l} \text{SYLS} \left\{ \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle p \rangle \\ \text{NUC} \langle \varepsilon \rangle \\ \text{COD} \langle \rangle \end{array} \right] , \left[\begin{array}{l} w\text{-fin} \\ \text{ONS} \langle d \rangle \\ \text{NUC} \langle \emptyset \rangle \\ \text{COD} \langle \rangle \end{array} \right] \right\} , \\ \left[\begin{array}{l} w\text{-ini} \wedge \\ w\text{-fin} \\ \text{ONS} \langle p \rangle \\ \text{NUC} \langle \varepsilon \rangle \\ \text{COD} \langle \rangle \end{array} \right] , \left[\begin{array}{l} n\text{-}w\text{-ini} \\ \text{ONS} \langle d, j \rangle \end{array} \right] \\ \left[\begin{array}{l} w\text{-ini} \wedge \\ w\text{-fin} \\ \text{ONS} \langle p \rangle \\ \text{NUC} \langle \varepsilon \rangle \\ \text{COD} \langle \rangle \end{array} \right] , \left[\begin{array}{l} w\text{-ini} \\ \text{ONS} \langle d \rangle \end{array} \right] \end{array} \right\} , \text{SYLS} \left\{ \left[\begin{array}{l} w\text{-fin} \\ \text{NUC} \langle u \rangle \\ \text{COD} \langle \rangle \end{array} \right] \right\} , \left[\begin{array}{l} \text{syl} \\ \text{ONS} \langle w \rangle \end{array} \right] \end{array} \right\} \right] \\ \text{SS } \boxed{0} \\ \text{SS } \boxed{0}
 \end{array}$$

Example 3: Proclisis and vowel-initial hosts



5 Mesoclis

- Prosodic adjunction of domain object holding clitic cluster follows from prosodic weakness of the clitics
- If non-head domain object contains strong (*w-hd*) syllable, it can prosodise into a PWD of its own
- Future/conditional markers bear main word stress
- With proclisis, or with plain verbs, stem must not be stressed
- With mesoclis, both stem-final syllable and tense marker bear primary stress

(51) a. [PW_d falaría]

b. * [PW_d falARía]

c. * [PW_d falARía]

(52) a. * [PW_d falar] [lhe-ía PW_d]

b. [PW_d falAr] [lhe-ía PW_d]

c. * [PW_d falAr] [lhe-ía PW_d]

- Future/conditional markers are prosodically strong and form a PWD with the preceding *morph*

$$(53) \left[\begin{array}{l} M \text{ list} \oplus \left\langle \left[\text{SYLS} \neg \left(\text{list} \oplus \left\langle \left[\begin{array}{l} w\text{-}fn \\ \text{NUC} \langle [] \rangle \end{array} \right] \right) \right] \right\rangle, \left[\begin{array}{l} tns\text{-}aff \\ \text{SYLS } w\text{-}hd \oplus \text{list} \end{array} \right] \right\rangle \\ \text{SS} | \text{L} | \text{CAT} | \text{HD} \left[\begin{array}{l} verb \\ \text{VFORM } fut \vee cond \end{array} \right] \end{array} \right]$$

5 Mesoclis

- Prosodic adjunction of domain object holding clitic cluster follows from prosodic weakness of the clitics
- If non-head domain object contains strong (*w-hd*) syllable, it can prosodise into a PWd of its own
- Future/conditional markers bear main word stress
- With proclisis, or with plain verbs, stem must not be stressed
- With mesoclis, both stem-final syllable and tense marker bear primary stress

(51) a. [_{PWd} falaría]

b. * [_{PWd} falAría]

c. * [_{PWd} falARía]

(52) a. * [_{PWd} falar] [lhe-ía _{PWd}]

b. [_{PWd} falAr] [lhe-ía _{PWd}]

c. * [_{PWd} falAr] [lhe-ía _{PWd}]

- Future/Conditional stem may carry final stress (last syllable underspecified for head status)

(54)
$$\left[\begin{array}{l} fut-stem \\ PH | SYLS \text{ list}(n-w-hd) \oplus \langle [syl] \rangle \end{array} \right]$$

5 Mesoclis

- Prosodic adjunction of domain object holding clitic cluster follows from prosodic weakness of the clitics
- If non-head domain object contains strong (*w-hd*) syllable, it can prosodise into a PWd of its own
- Future/conditional markers bear main word stress
- With proclisis, or with plain verbs, stem must not be stressed
- With mesoclis, both stem-final syllable and tense marker bear primary stress

(51) a. [_{PWd} falaría]

b. * [_{PWd} falAría]

c. * [_{PWd} falARía]

(52) a. * [_{PWd} falar] [lhe-ía _{PWd}]

b. [_{PWd} falAr] [lhe-ía _{PWd}]

c. * [_{PWd} falAr] [lhe-ía _{PWd}]

- If stem and tense affix are on the same domain object, prosodic wellformedness enforces single word stress on the tense affix
- If stem and tense affix are on different domain objects, prosodic alignment constraints and headedness constraints require both domain objects to be PWds:

Stem-final syllable is coerced into *w-hd*

5 Mesoclis

- Prosodic adjunction of domain object holding clitic cluster follows from prosodic weakness of the clitics
- If non-head domain object contains strong (*w-hd*) syllable, it can prosodise into a PWd of its own
- Future/conditional markers bear main word stress
- With proclisis, or with plain verbs, stem must not be stressed
- With mesoclis, both stem-final syllable and tense marker bear primary stress

(51) a. [_{PWd} falaría]

b. *_{PWd} falAría]

c. *_{PWd} falARía]

(52) a. *_{PWd} falar] [lhe-ía _{PWd}]

b. [_{PWd} falAr] [lhe-ía _{PWd}]

c. *_{PWd} falAr] [lhe-ía _{PWd}]

- Postlexical account would predict a PWd-final boundary after the enclitic, triggering obligatory application of Non-Back Vowel Deletion, contrary to fact

(55) falar-lhe-ía ‘he would speak to him’ [j]/*∅

(Vigário, 1999b, p. 233)

6 Conclusion

- Phonological evidence in favour postlexical status of EP clitics has been shown to be empirically underdetermined
- Type-based representation of prosodic constituency has been proposed to facilitate a lexicalised account of sandhi phenomena
- Distinction between different dimensions of wordhood (maximal lexical signs vs. minimal surface-syntactic objects) has been shown to be crucial for the alignment of prosodic constituents
- Phonological evidence compiled by Vigário (1999a,b) lends further support to the hybrid status of EP clitics as syntactically transparent pronominal affixes

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