The Role for Prosodic Markedness Constraints in Phonological Phrase Formation in Two Pitch Accent Languages

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This paper reviews some well-known facts from TJ and NBB which show that prosodic markedness constraints have a role to play in determining the phonological domain structure for the tonal and intonational phenomena of sentences in these languages. Facts like these are highly relevant to ongoing debates about the nature of the syntax-phonology interface: the very existence of a role for such constraints tells us that the domain structure for phonological and phonetic phenomena cannot be identified with syntactic constituency itself (contra Arregi 2002, 2006, Wagner 2005, 2010, Pak 2008 and others), but must be an independent prosodic structure. In the view presented here, and elsewhere, the prosodic structure of the surface phonological representation of a sentence is the output of an interaction between markedness constraints on prosodic structure and correspondence constraints which govern the relation between prosodic structure and the syntactic constituent structure that is the output of the syntactic component of the grammar.

1. Accent and \(\varphi\)-formation in Tokyo Japanese & Northern Bizkaian Basque:

Tokyo Japanese and Northern Bizkaian Basque share many prosodic properties:

- Both have a distinction between lexically accented and unaccented words.
- In both, lexically accented words show a single culminative pitch accent in the surface representation: \(\omega(\ldots H*L \ldots )\omega\)
- In both, the distribution of a word-initial LH rise diagnoses the presence of the left edge of a phonological phrase (\(\varphi\)): \(\varphi(LH- \ldots )\varphi\)
- In both, within the same \(\varphi\), there is significant downstepping of pitch after a lexically accented word.
- In both, the \(\varphi\)-organization of a syntactic phrase is a function, in part, of phonological factors like accent status, leading to cases of nonisomorphism between syntactic and phonological constituency, see e.g. Selkirk & Tateishi 1988, Kubozono 1993, Jun & Elordieta 1997, Elordieta 1998, Gussenhoven 2004
- Yet there are differences in \(\varphi\)-organization in identical syntactic environments in the two languages, showing a role for language-particular ranking of prosodic markedness constraints with respect to constraints on the correspondence between syntactic and prosodic constituency.
2. \(\phi\)-structure within DPs in Tokyo Japanese & Northern Bizkaian Basque

- Tokyo Japanese DPs: Genitive XP + head noun

(1) Syntactic constituency

a. i. \(XP[XP[ A ]XP-no \ A ] XP\)

ii. \(\phi(A)\phi!\phi(U)\phi\)

\(DP[DP[Yamáguchi-no]DP aníyome-ga]DP\)

Yamaguchi-gen sister-in-law-nom
‘Yamaguchi’s sister-in-law’

b. i. \(XP[XP[ U ]XP-no \ U ] XP\)

ii. \(\phi(U)\phi\)

\(DP[DP[Inayama-no]DP yuujin-ga]DP\)

Inamaya-gen friend-nom
‘Inamaya’s friend’

c. i. \(XP[XP[ U ]XP-no \ A ] XP\)

ii. \(\phi(U)\phi\)

\(DP[DP[yamai-no]DP yamádera-ga]DP\)

mountain village-gen mountain temple-nom
‘mountain village of the mountain temple’

d. i. \(XP[XP[ A ]XP-no \ U ] XP\)

ii. \(\phi(A)\phi!\phi(U)\phi\)

\(DP[DP[Yamámori-no]DP yamagoya-ga]DP\)

Yamamori-gen mountain hut-nom
‘Yamamori’s mountain hut’

[There is some variability in the case of UU, UA and AU, which in slower or more carefull speech may show separate phrasing for unaccented words as well. Facts from Kubozono 1993, Selkirk & Tateishi 1988.]


Def. \(\phi_{\text{min}}\) (minimal \(\phi\)) = \(\phi\) not dominating any other \(\phi\).

[\(\phi_{\text{min}}\) supplants the notion of minor phrase/accenntual phrase]

Def. \(\phi_{\text{max}}\) (maximal \(\phi\)) = \(\phi\) not dominated by any other \(\phi\).

[\(\phi_{\text{max}}\) supplants the notion of major phrase/intermediate phrase]
Northern Bizkaian Basque DPs: Genitive XP + head noun

Syntactic constituency

Prosodic constituency

\[\text{DP}[\text{DP}[\text{Amáyen}]\text{DP} \text{liburúa}]\text{DP}\]

\[\text{Amaya-gen book-abs} \]

\[\text{‘Amaya’s book’}\]

\[\text{DP}[\text{DP}[\text{lagunen}]\text{DP} \text{dirua}]\text{DP}\]

\[\text{friend-gen money-abs} \]

\[\text{‘the friend’s money’}\]

\[\text{DP}[\text{DP}[\text{lagunen}]\text{DP} \text{amúma}]\text{DP}\]

\[\text{friend-gen grandmother-abs} \]

\[\text{‘the friend’s grandmother’}\]

\[\text{DP}[\text{DP}[\text{Amáyen}]\text{DP} \text{dirua}]\text{DP}\]

\[\text{Amaya-gen money-abs} \]

\[\text{‘Amaya’s money’}\]


Note: The facts for Northern Bizkaian Basque in (6) represent the “ideal”, sentence-medial case. In NBB, there is never any surface U in final position in the isolation form or before the verb, which is sentence-final (cf. (7-bii) and (7-dii)). This is ascribed to the presence of “sentence accent” on words in that position by Hualde, Elordieta & Elordieta 1993; Elordieta 1997, 2007a; Arregi 2002. This issue isn’t taken up here.

How to account for the instances of nonisomorphism—namely the lack of syntactic-prosodic constituency correspondence—internal to DPs in (1) and (3)?
• **Hypothesis:**

(4) Assume a Match Phrase (Selkirk 2006, 2009, to appear) theory of the correspondence between syntactic and prosodic constituency:

a. Match (XP, ϕ): An XP in syntactic representation corresponds to a prosodic constituent in phonological representation, call it ϕ (‘phonological phrase’).

b. Match (ϕ, XP): A ϕ (‘phonological phrase’) in phonological representation corresponds to an XP in syntactic representation

• Prediction of Match theory: A strong tendency in any language for the prosodic constituency to mirror, i.e. be isomorphic to, syntactic constituency, including its recursivity, e.g.

\[ \text{XP}[\text{XP[ word ]XP word }]_{\text{XP}} \rightarrow \text{ϕ}( \text{word } \text{ϕ word } \text{ϕ}) \]

(5) The high ranking of very familiar types of prosodic markedness constraints impose the Match-violating, nonisomorphic, ϕ-structures seen DP-internally in both Tokyo Japanese and Northern Bizkaian Basque:

a. Fact: \[ \text{XP}[\text{XP[ A ]XP A }]_{\text{XP}} \rightarrow \text{ϕ}( \text{A } \text{ϕ A } \text{ϕ})_{\text{ϕ}} \]


**“If-accented-then-Hd-of-ϕ_{Min}”**

Constraint ranking at the S-P interface:

**“If-accented-then-Hd-of-ϕ_{Min}” >> Match (ϕ, XP)**

[Given this assumption that an accent must be associated with the prosodic head of a ϕ_{Min}, which has the consequence that any accent-bearing word must head a distinct ϕ_{Min}, we provide an account for the generalization that there is at most one A-word in a ϕ_{Min}.

b. Facts: \[ \text{XP}[\text{XP[ U ]XP-no U }]_{\text{XP}} \rightarrow \text{ϕ}( \text{U U } \text{ϕ})_{\text{ϕ}} \]

\[ \text{XP}[\text{XP[ U ]XP-no A }]_{\text{XP}} \rightarrow \text{ϕ}( \text{U A } \text{ϕ})_{\text{ϕ}} \]

 Relevant prosodic markedness constraint (Inkelas and Zec 1995, Selkirk 2000):

**BinMin (ϕ, ω):** A ϕ must contain at least two prosodic words (ω)

Constraint ranking at the S-P interface:

**BinMin (ϕ, ω) >> Match (XP, ϕ)**
c. Facts: In T. Japanese: \[ \text{XP[XP[ A ]\_XP-no U ] XP} \rightarrow \phi(\phi(\phi(A))_\psi(\phi(U))_\psi) \]

In N.B. Basque: \[ \text{XP[XP[ A ]\_XP-(e)n U ] XP} \rightarrow \phi(\phi(\phi(A))_\psi U) \_\psi \]

Relevant markedness constraint (McCarthy & Prince 1993, many others):

**Align R (\(\varphi_{\text{Min-Hd}, \varphi_{\text{Min-Edge}}})**

The head (= main stress) of \(\varphi_{\text{Min}}\) is R-most in \(\varphi_{\text{Min}}\).

[Given our assumption that an accent is associated with the prosodic head of a \(\varphi_{\text{Min}}\), the Head-Edge alignment constraint accounts for the generalization that an A-word is always R-most in a \(\varphi_{\text{Min}}\).]

**Analysis of the difference between TJ and NBB in \(\varphi\)-structure of \([A U]\):**

(6) Northern Bizkaian Basque Tokyo Japanese

<table>
<thead>
<tr>
<th>(\varphi)</th>
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<td>/ \</td>
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<td>(\varphi) \</td>
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<td>(\omega) (\omega)</td>
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<tr>
<td>A U</td>
<td>A U</td>
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<tr>
<td>“adjunction to (\varphi)”</td>
<td>“coordination of (\varphi)”</td>
</tr>
</tbody>
</table>

In both cases, the accented word is R-aligned with a \(\varphi\)-edge. The difference between them lies in the phrasal status of the following unaccented word.

- The coordination structure, where U is a \(\varphi\), incurs a violation of Match (\(\varphi\), XP); the adjunction structure does not.

- The adjunction structure violates a prosodic markedness constraint disfavoring adjunction—*Adjunction (Myrberg 2010); the coordination structure does not.

  *ADJUNCTION (Myrberg 2010)

  Sister nodes in prosodic structure are instantiations of the same prosodic category.

- As we can see, the S-P correspondence constraint Match (\(\varphi\), XP) conflicts with the prosodic markedness constraint *Adjunction, setting up a tension which a language must resolve by one or the other ranking of the two constraints.

?How to account for the difference between T. Japanese and NB. Basque in the prosodic parsing of the \([A U]\) sequence in (1d) and (3d) depicted in (6)?
• **Hypothesis:**

(7) NB. Basque: Match (q, XP) >> *Adjunction

T. Japanese: *Adjunction >> Match (q, XP)

○ **Interim summary:** The high ranking of familiar types of prosodic markedness constraints can be given responsibility for Match-violating nonisomorphisms observed inside DP structures in Tokyo Japanese and Northern Bizkaian Basque

(8) Examples from the different types of constraint families

i. “If-accented-then-Hd-of-\( q_{\text{min}} \)” = A type of constraint on the tone/prosodic Head (stress) relation (see e.g. Yip 2002, Hellmuth 2007)

ii. BinMin (\( q, \omega \)) (Inkelas and Zec 1995, Selkirk 2000) = A type of constraint on the binarity of prosodic structure (many well-known references)

iii. *Adjunction (Myrberg 2010) = A type of constraint on domination relations in prosodic structure (Selkirk 1996)

3. **Sequences of DPs in the sentence in NB. Basque**

Elordieta 2006, 2007b observes that Northern Bizkaian Basque prosodic structure may show a further sort of nonisomorphic grouping in which a sentence-initial XP and the XP that follows are grouped into a single maximal phonological phrase (\( q_{\text{max}} \)).

(9) \[ \text{clause[XP[...]]XP[...]} \text{clause} \rightarrow \text{IP} | q_{\text{max}}(q(\cdots)q_q q(\cdots)q_q) q_{\text{max}} \cdots | \text{IP} \]

Note: IP stands for ‘intonational phrase’, produced by Match Clause (Selkirk 2009)

(10) **Evidence for nonisomorphic q-structure: pitch realization of sequences of XPs containing A-words in Northern Bizkaian Basque sentences (Elordieta op.cit.)**

a. [A]XP [A]XP verb = IP | \( q_{\text{max}}(A)_q !(A)_q ) q_{\text{max}} \text{ verb } | \text{IP}

b. [[A] A]XP verb = IP | \( q_{\text{max}}(A)_q !(A)_q ) q_{\text{max}} \text{ verb } | \text{IP}

c. [A]XP [A]XP [A]XP verb = IP | ((A) !!(A)) q_{\text{max}} \text{ (A) q_{\text{max}} verb } | \text{IP}

d. [[A] A]XP [A]XP verb = IP | ((A) !!(A)) q_{\text{max}} \text{ (A) q_{\text{max}} verb } | \text{IP}

e. [[[A] A] A]XP verb = IP | (((A) !!(A)) !!(A)) q_{\text{max}} \text{ verb } | \text{IP}
(i) The pattern of downstep in (10a), with its sequence of two single-A-word XPs is the same as that seen internal to a single \(\psi_{\text{max}}\) containing two A-words as in (10b) [and (6a)].

a. \([A]_{\text{XP}} [A]_{\text{XP}} \text{verb} = \quad \text{IP}\mid \psi_{\text{max}} (A)_q \psi(A)_q \psi_{\text{max}} \text{verb} \mid \text{IP}\]

\[
\text{DP}[\text{Amayári}]_{\text{DP}} \quad \text{DP}[\text{liburúa}]_{\text{DP}} \quad \psi_{\text{max}} (\psi(\text{Amayári}) \psi(\text{liburúa}))_{\psi_{\text{max}}} \quad \psi_{\text{max}} \text{emon dotzo}
\]

\[\text{Amaya-dat book-abs give aux dotzo 'she has given the book to Amaya'}\]

b. \([A]_{\text{XP}} [A]_{\text{XP}} \text{verb} = \quad \text{IP}\mid \psi_{\text{max}} (A)_q \psi(A)_q \psi_{\text{max}} \text{verb} \mid \text{IP}\]

\[
\text{DP}[\text{DP}[\text{Amáyen}]_{\text{DP}} \quad \text{liburúa}]_{\text{DP}} \quad \psi_{\text{max}} (\psi(\text{Amáyen}) \psi(\text{liburúa}))_{\psi_{\text{max}}} \quad \psi_{\text{max}} \text{emon dotzo}
\]

\[\text{Amaya-gen book-abs give aux dotzo 'she has given him/her Amaya’s book'}\]

(ii) The pattern of downstep in (10c), with its sequence of three XPs each consisting of a single A-word is the same as that seen in (10d), where a clause-initial XP containing two A-words precedes a single A-word XP. In both, the first two words are grouped together into a maximal \(\psi_{\text{q}}\), and the third A-word is located in a separate \(\psi_{\text{max}}\). In both (10c) and (10d), downstep is found between the first two A-words of the sentence, but downstep between the second and the third A-words is blocked, as predicted by the status of the third A-word as a separate \(\psi_{\text{max}}\).

c. \([A]_{\text{XP}} [A]_{\text{XP}} [A]_{\text{XP}} \text{verb} = \quad \text{IP}\mid ((A)_q \psi(A)_q \psi_{\text{max}} \text{verb} \mid \text{IP}\]

\[
\text{DP}[\text{Amayári}]_{\text{DP}} \quad \text{PP}[\text{ewenían}]_{\text{PP}} \quad \text{DP}[\text{liburúa}]_{\text{DP}} \quad \psi_{\text{max}} (\psi(\text{Amayári}) \psi(\text{ewenían}) \psi(\text{liburúa}))_{\psi_{\text{max}}} \quad \psi_{\text{max}} \text{emon eutzan}
\]

\[\text{Amaya-dat Thursday-on book-abs give aux eutzan ‘he gave the book to Amaya on Thursday’}\]

d. \([A]_{\text{XP}} [A]_{\text{XP}} \text{verb} = \quad \text{IP}\mid ((A)_q \psi(A)_q \psi_{\text{max}} \text{verb} \mid \text{IP}\]

\[
\text{DP}[\text{DP}[\text{Amáyen}]_{\text{DP}} \quad \text{amumári}]_{\text{DP}} \quad \text{DP}[\text{liburúa}]_{\text{DP}} \quad \psi_{\text{max}} (\psi(\text{Amáyen}) \psi(\text{amumári}) \psi(\text{liburúa}))_{\psi_{\text{max}}} \quad \psi_{\text{max}} \text{emon dotzo}
\]

\[\text{Amaya-gen grandmother-dat book-abs give aux dotzo ‘he has given the book to Amaya’s grandmother’}\]
(iii) By contrast to (10cd), in (10e), which consists of a single sentence-initial XP containing three A-words in a nested genitive construction within DP, there is downstep between the first and the second and between the second and the third words.

e. \[
\begin{align*}
\text{DF[DP[DP[Amáyen]DP amúmen]DP liburúa]DP emon dotzo} \\
\text{'(S)he has given him/her Amaya's grandmother's book'}
\end{align*}
\]

The facts above from Northern Bizkaian Basque give evidence for the existence of a ϕ\text{max} which groups the contents of a clause-initial XP consisting of a single A-word together with the contents of the following XP in the sentence. This nonisomorphic ϕ\text{max} structure incurs a violation of the correspondence constraint Match (ϕ, XP), since there is no syntactic XP which corresponds to this ϕ\text{max}.

(11) Analysis

a. IP-Initial ϕ-Binarity

A ϕ\text{max} at the left edge of IP must be at least binary at the ϕ\text{min} level.

b. In Northern Bizkaian Basque:

IP-Initial ϕ-Binarity >> Match (ϕ, XP)

(12) Evidence for ϕ\text{min}-level-binarity of IP-initial ϕ\text{max}: pitch realization of XP sequences beginning with clause-initial XP[[U] A]\text{XP in Northern Bizkaian Basque (Elordieta op.cit.)}

\[
\begin{align*}
a. \text{[[[U] A] A]XP verb} & = \text{IP|q}\text{max}(U A)q\text{min} !(A)q\text{min }q\text{max verb |IP} \\
b. \text{[[[U] A] A]XP verb} & = \text{IP|q}\text{max}(U A)q\text{min} !(A)q\text{min }q\text{max verb |IP}
\end{align*}
\]

1 As Elordieta op. cit. points out, IP-Initial ϕ-Binarity is a positional markedness constraint in the sense of Smith 2002, one calling for prosodic augmentation at an initial edge. ϕ\text{min}-level binarity is required only for a ϕ\text{max} that is not positioned at the left edge of IP. (This is seen in (10c,d) above).
(i) Reminder from (1c/3c): \[ [U] A \Rightarrow_\varphi (U A)_\varphi \]

[Evidence: Absence of \( \varphi \)-initial LH rise at left edge of the A following U ]

(ii) IP-Initial \( \varphi \)-Binarity, formulated as in (11), therefore predicts that a sentence-initial two-word XP \([U A]\) will be grouped within the same \( \varphi \) as the following XP, and this is true, as shown by the downstepping of the A-word from the second XP in sequence.

\[
\begin{align*}
\text{a. } [ [U] A ] X P [A] X P \text{ verb } & = \quad \text{IP} | \varphi_{\text{max}}( (U A)_\varphi ! (A)_\varphi )_{\varphi_{\text{max}}} \text{ verb } | \text{IP} \\
& \text{DP} [\text{DP}[\text{lagunen}]_{\text{DP}} \text{ amumári}]_{\text{DP}} \quad \text{DP}[\text{liburúa}]_{\text{DP}} \text{ emon dotzat} \\
& \text{friend-gen grandmother-dat book-abs give aux} \\
& \text{‘I have given the book to the friend’s grandmother’} \\
& \text{LH- } H^* \text{L! LH- } H^* \text{L} \\
& _{\varphi_{\text{max}}(\varphi(\text{lagunen amumári})!_{\varphi}(\text{liburúa}))_{\varphi_{\text{max}}} \text{ emon dotzat}}
\end{align*}
\]

(iii) Patterns of post-accent downstep in (12a) are the same as those seen internal to a single XP, as in (12b), where the sentence-initial XP contains the entire sequence \([UA]\), as reported in Elordieta op cit.

\[
\begin{align*}
\text{b. } [[[U] A] A] X P \text{ verb } & = \quad \text{IP} | \varphi_{\text{max}}( (U A)_\varphi ! (A)_\varphi )_{\varphi_{\text{max}}} \text{ verb } | \text{IP} \\
& \text{DP} [\text{DP}[\text{lagunen}]_{\text{DP}} \text{ amúmen}]_{\text{DP}} \quad \text{liburúa}]_{\text{DP}} \text{ emon dotzat} \\
& \text{friend-gen grandmother-dat book-abs give aux} \\
& \text{‘I have given him/her the friend’s grandmother’s book’} \\
& \text{LH- } H^* \text{L! LH- } H^* \text{L} \\
& _{\varphi_{\text{max}}(\varphi(\text{lagunen amúmen})!_{\varphi}(\text{liburúa}))_{\varphi_{\text{max}}} \text{ emon dotzat}}
\end{align*}
\]

(13) Interim Summary:

- The significant nonisomorphism between syntactic XP structure and prosodic \( \varphi \) structure observed with clause-initial sequences of XP in Northern Bizkaian Basque sentences can be understood as the consequence of a language-particular constraint ranking:
  \[ \text{IP-Initial \( \varphi \)-Binarity} >> \text{Match}(\varphi, \text{XP}) \]
- The absence of comparable nonisomorphism in clause-initial sequences of XP in Tokyo Japanese (see Selkirk and Tateishi 1991) must be explained as a consequence of the opposite constraint ranking:
  \[ \text{Match}(\varphi, \text{XP}) >> \text{IP-Initial \( \varphi \)-Binarity} \]
4. Conclusions

(i) The role for phonological markedness constraints on prosodic structure

- We have seen evidence from two lexical pitch accent languages for a role for familiar types of prosodic markedness constraints in defining the surface prosodic constituent structure of a sentence.

- The hypothesis entertained here is that attested instances of nonisomorphism between syntactic (S) and prosodic (P) constituency, such as seen here in Northern Bizkaian Basque and Tokyo Japanese, are due to prosodic markedness constraints, rather than to correspondence constraints on the relation between S and P constituency as suggested earlier by Selkirk 1986, Nespor & Vogel 1986.

(ii) The nature of constraints on the relation between S and P constituency

- A new correspondence theory of the relation between S and P constituency was assumed in this paper, one in which Match constraints call for the output prosodic constituent structure to be faithful to—i.e. match up with—syntactic constituency in the syntactic structure input. All data are consistent with Match theory, modulo the effects of prosodic markedness constraints.

- Adopting an OT perspective (see e.g. McCarthy and Prince 1995), we have modeled nonisomorphisms—namely departures from the perfect correspondence between S and P constituency that Match theory predicts—as the consequence of language-particular constraint rankings in which some prosodic markedness constraint(s) are ranked higher than some Match correspondence constraint(s).

REFERENCES


