Cyclic Prosodification in Japanese

1. Introduction to Puzzle This paper argues that prosodic prominence relation is calculated phase-by-phase in Japanese and phasehood is is contextually determined by a requirement at PF. It has been observed that when certain maximal projections, XP and YP, and their licensers, α and β, are in a sentence, some ordering restrictions appear between XP and YP as in (1).

(1) a. Nesting Dependency
[XP ... YP ... α ... β]

b. *Crossing Dependency
[XP ... YP ... α ... β]

In (1a), two relations between a licensee and a licenser are nesting, indicated by a line. This is called *nesting dependency* in this paper. On the contrary to (1a), (1b) shows a crossing relation between a licensee and a licenser, called *crossing dependency*. Interestingly, the crossing dependency leads to unacceptability. The asymmetry in question has been observed in LF-intervention effect, distinctive scope-taking of *wh*-phrase, and focus in-situ construction. An example of LF-intervention effect and its schema are illustrated below:

(2) a. dare-ga LGB-shika yoma-nai no?
who-NOM LGB-NCI read-NEG Q
'Who read nothing but LGB?'

b. [wh- ... NCI ... NEG ... Q]

(3) a. *Taro-shika nani-o yoma-nai no?
Taro-NCI what-ACC read-NEG Q
'What did nobody but Taro read?

b. *[NCI ... wh- ... NEG ... Q]

Why is the crossing dependency ungrammatical? This is the puzzle that I address in this paper.

2. Proposal Following Ishihara's analysis of focus prosody of *wh*-questions and NCI in Japanese, I argue that the crossing dependency in (1b) is ruled out because a prosodic prominence relation established in an earlier cycle is not preserved in a later cycle.

(4) Naoya-ga nani-o nomiya-de non-da no?
Naoya-NOM what-ACC bar-LOC drink-PAST Q
'What did Naoya drink at the bar?

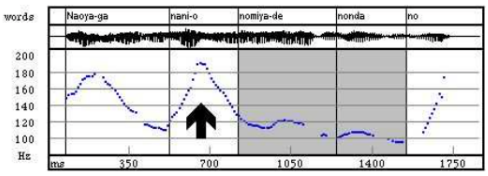


Figure 1: A pitch contour of (4)

As observed in Ishihara (2003, 2007), an F_0 of *wh*-phrases or NCIs is boosted and a pitch of its following elements is strongly reduced until their licenser, Q-morpheme or negation. The prosody of a *wh*-question in (4) is illustrated in Figure 1. Hiraiwa&Ishihara (2012) note that a focused phrase in the focus in-situ construction also shows Focus Prosody. In order to capture this, Ishihara (2003) proposes two phonological operations named *Focus Intonation Prosody rules* (hereafter FIP rules) as in (5).

(5) a. *P-focalization Rule*
If α_{FOC} bears FOC, add ×'s to α_{FOC} until a new line is formed.

b. *Post Focus Reduction Rule*
If α_{FOC} bears FOC and precedes β, and α_{FOC}'s peak (after P-focalization) is at Line n, then delete an × of β on Line n-1.

These FIP rules assume the Metrical Grid representation (Liberman 1975, Liberman&Prince 1975). Ishihara (2003) assumes that (i) these rules apply to a Spell-Out domain if it contains FOC that is a phonological feature that NCIs, wh-phrases, and a focused phrase in the focus in-situ construction have, (ii) FOC will not be visible at the later Spell-Out cycle once these rules apples to it, (iii) these phrases and their licensers are introduced into a derivation with [iFOC] and [uFoc] respectively, and (iv) Agree{[iFOC], [uFOC]} assigns FOC to them once the licensers are introduced into the derivation.

Adopting (5) and his assumptions (i-iii), I propose a new definition of phase:

(6) a. A syntactic phrase, XP, is a phase iff a head X contains a [uFOC] probe.

b. Agree{[iFOC], [uFOC]} triggers Spell-Out of XP that maps XP onto prosody as the smallest prosodic phrase, χ, containing both a goal and its probe.

In addition, I formalize the core idea of Ishihara (2003) that prosodic prominence relations must be preserved through a derivation. I define a relative prosodic prominence relation that is established in each Spell-Out as the following in order to formalize how to verify that the established prosodic prominence relations are preserved through a derivation.

(7) **Relative Prosodic Prominence Relation *RRP***:

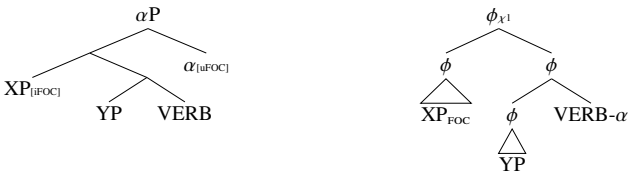
a. $RRP_n = \{\langle x, y\rangle$: $\forall y \neq x \in D_n$, where x is an element with the highest prosodic prominence in $D_n\}$

b. $D_n = \{z \mid z$ is a phonological word in $\chi_n\}$

(8) **Formalization of Prominence Preservation**: a union of all RRPs must be asymmetric. Asymmetric: Let R be a binary relation over a set S. Then R is asymmetric if there is no x, y ∈ S such that both $\langle x, y\rangle \in$ R and $\langle y, x\rangle \in$ R.

Let us see how these rule out the crossing dependency.

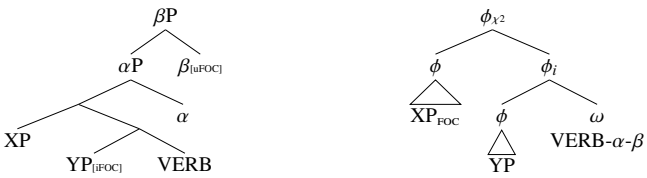
(9) a. *The first cycle, αP*



Line 3	×		
Line 2	×	[×]	[×]
Line 1	×	×	×
	XP$_{FOC}$	YP	VERB-α

D_1 = {XP, YP, VERB}
RRP_1 = {⟨XP, YP⟩, ⟨XP, VERB⟩}

b. *The second cycle, βP*



Line 4		×	
Line 3	×	×	
Line 2	×	×	
Line 1	×	×	×
	XP	**YP**$_{FOC}$	VERB-α-β

D_2 = {XP, YP, VERB}
RRP_2 = {⟨YP, XP⟩, ⟨YP, VERB⟩}

c. $RRP_1 \cup RRP_2$= {⟨XP, YP⟩, ⟨YP, XP⟩, ⟨XP, VERB⟩, ⟨YP, VERB⟩}

Spell-Out applies to αP and maps it as χ_1. I assume that affixes, α and β, are prosodified with their host head at Spell-Out. Based on χ_1, (5a) assigns an × on XP to create Line 3 (indicated by **BOLD**) and (5b) deletes ×'s on YP and VERB (indicated by [BRACKET]). In this cycle, we have D_1 = {XP, YP, VERB} and then RRP_1 = {<XP, YP>, <X, VERB>} according to (7). When β merges, Spell-Out applies to βP. Assuming that χ_n must contain χ_{n-1} due to an economical reason, ϕ_i in (9b) is not χ in the second cycle. As indicated by UNDERLINE, the union of *RRP*s is not asymmetric. Therefore, the crossing dependency is ungrammatical. Note that such a problem does not arise in the nesting dependency. An ordered pair between XP and YP is not established until the second cycle because XP is out of the first Spell-Out domain.

3. Against Focus Alternative Analysis Erlewine&Kotek (2017) propose that Predicate Abstraction over alternatives causes the intervention effect. The proposal in Kotek (2017) is supported by the following generalization of the effect in Japanese that they propose:

(10) Generalization: Intervention correlates with scope-taking:
Scope-rigid quantifiers above an in-situ *wh*- cause intervention. Quantifiers that allow scope ambiguities - i.e., those that allow reconstruction below *wh* - do not.

In order to capture this, Erlewine&Kotek (2017) argue that reconstruction avoids the intervention effect. If this is on the right track, non-scope rigid quantifiers like *subete* 'all' should be interpreted below negation when the intervention effect disappears; contrary to (11).

(11) subete-no gakusei-ga nani-o tabe-nakat-ta no?
all-GEN student-NOM what-ACC eat-NEG-PAST Q

a. which x is it every student that did not eat x?' ∀>NEG

b. * which x is it not the case that every student ate x.' *NEG>∀

(12) LF of (a): $[_{CP}$ C ... $DP_{\forall}$ λ**x** ... *wh*- ... $[_{NEGP}[_{vP}$ ... x ... V]NEG]]

It is an ∀>NEG reading, not an NEG>∀ reading, that is available in the intervention configuration in (12). Their analysis, therefore, cannot be maintained. Importantly note that the proposed analysis rules in (11) because the quantifiers do not show focus prosody.

Selected Reference Ishihara, S. 2003. *Intonation and Interface Conditions*. MIT Dissertation.