

Phonological and Phonetic Effects of Minor Phrase Length on F0 in Japanese

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Question 1

- What sorts of **phonological factors** contribute to the organization of the words in a sentence into a prosodic structure organization? Specifically, is there an effect of **word length**?

→ **Yes, there is an effect of word length (syllable/mora count) on minor phrase organization in Japanese.**

Question 2

- Do purely **phonological factors**, such as word length, ever take **precedence over syntactic factors** in determining the organization of a prosodic structure?

→ **Yes, a constraint on the minimum length of minor phrase is responsible for the absence of a prosodic major phrase that is called for by the syntax.** (In one out of three speakers)

Question 3

- Are there effects of **word length** on the **phonetic realization of F0** contours?

→ **Yes, there is an anticipatory length-based F0 raising effect, based on the length of the upcoming minor phrase.**

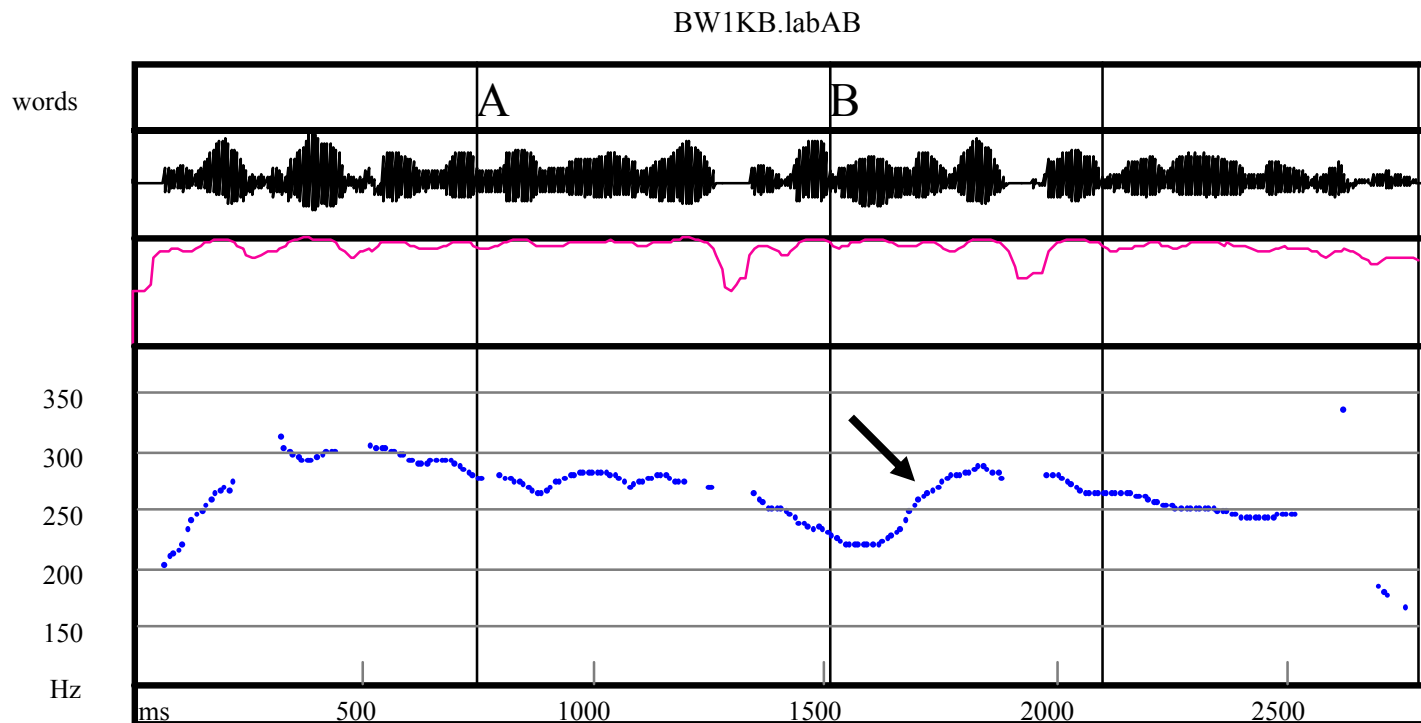
Syntactic Constraints on Prosodic Phrase Structure

In Japanese there is a tendency for the left edge of a syntactic maximal phrase (XP) in the syntactic representation to align with the edge of a major phrase in phonological representation, whose phonetic reflex is a **pitch range reset**:

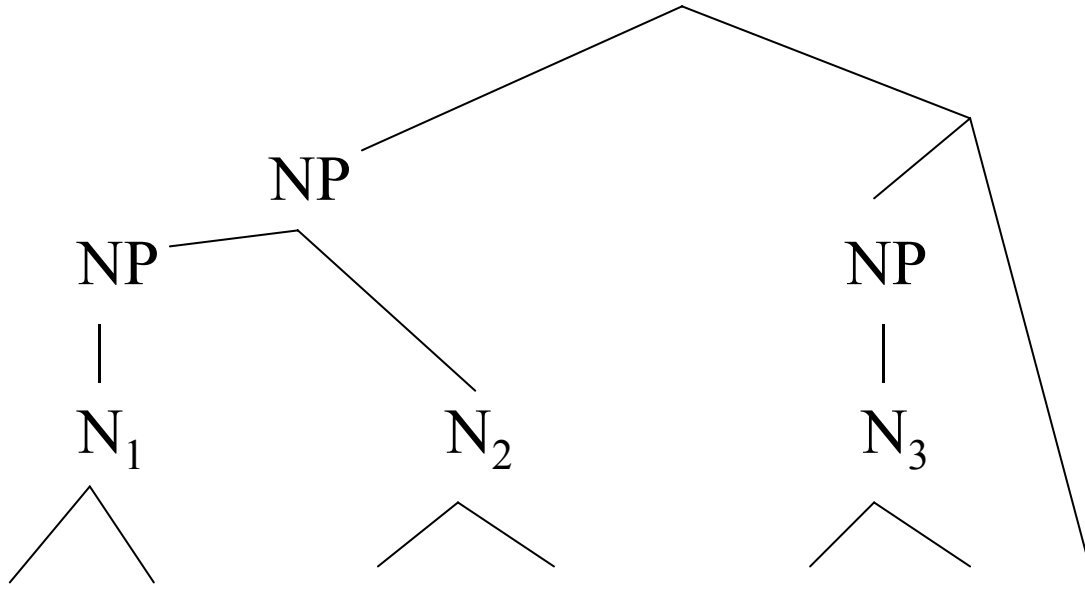
Align-L (XP, MaP)

Wa-gashi-ya-san-no ^A mame-uri-yaku-ga ^B memo-
gaki-o morai-ma'shita.

The Japanese candy-store's bean-seller received some notes.



Branching Subject



Noun-Noun-no Noun-Noun-ga Noun-Noun-o Verb

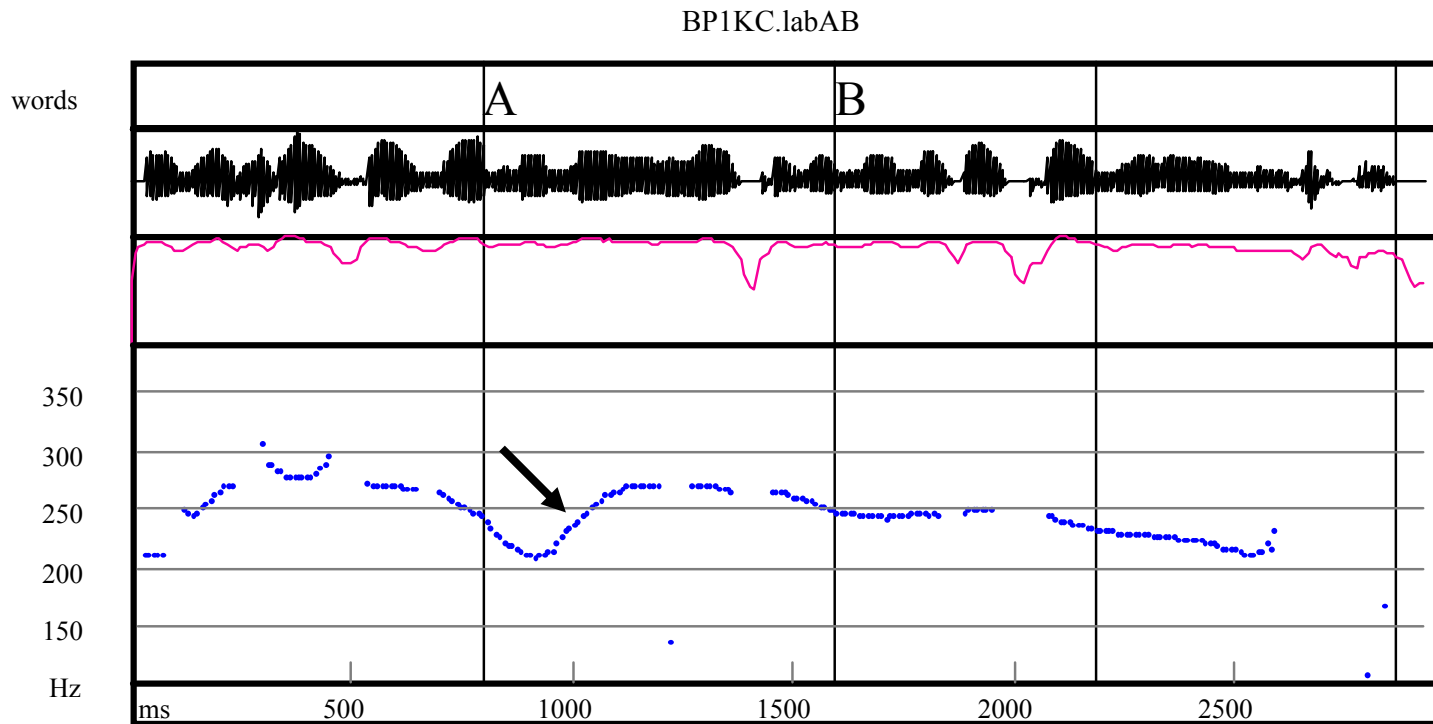
A

B

MaP { (LH) (LH) } { (LH) (LH) } MaP

Wa-gashi-ya-san-ga ^A mame-uri-yaku-no ^B memo-
gaki-o morai-ma'shita.

The Japanese confectioner received the bean-seller's notes.



Experimental materials

- **Subject-final N3**

[[[[N1-no] N2-no] **N3-ga**] [[N4-o] Verb]]
{ } } }
MaP

- **Dative N3**

[[[N1-no] N2-ga] [[**N3-ni**] [[N4-o] Verb]]]
{ } } }
MaP

Other conditions

- **Length**

- The N3 were 3, 5 or 7 moras long (including a particle).
- The surrounding nouns in the sentence consisted of 5 moras.

- **Accentedness**

- N2 and N3 were either accented or unaccented.
- Other items were unaccented except verbs.

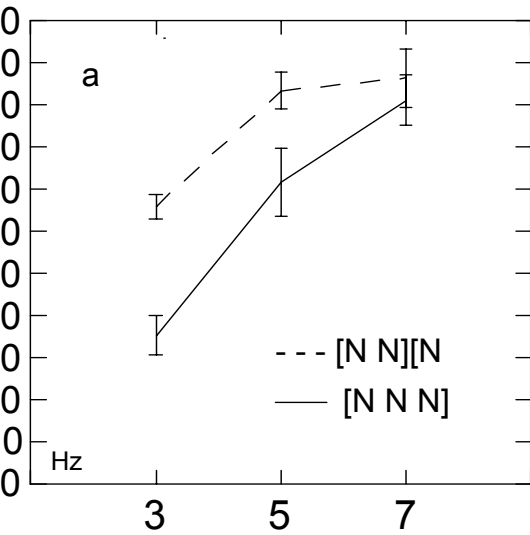
Results on the syntactic factor

N3 = accented, 3-7 moras

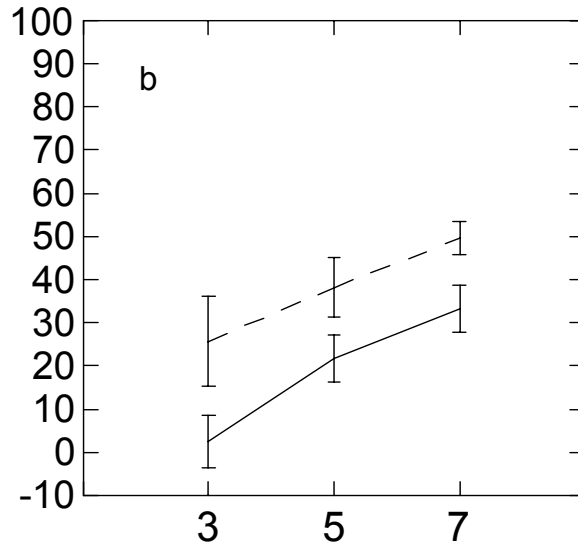
Initial rise in **dative N3** case is **significantly higher** than initial rise in **subject-final N3** case, for almost all three mora lengths, for all three subjects.

Initial rise = value of F0 peak of N3 in Hz minus the value of preceding F0 valley in Hz (= $H_3 - L_3$)

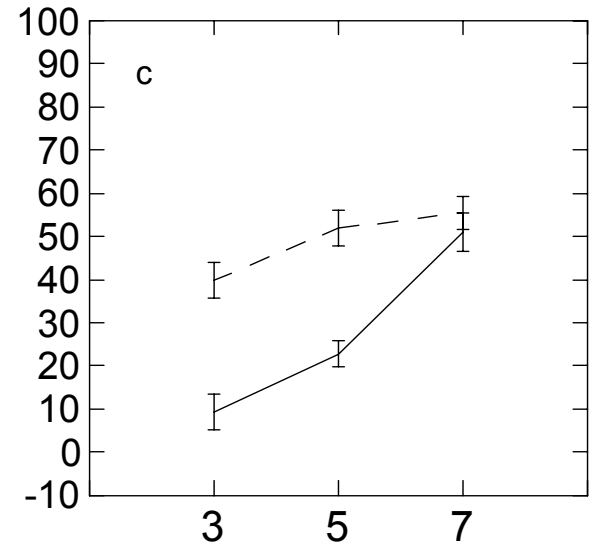
Initial rise of accented N3



Speaker K



Speaker R

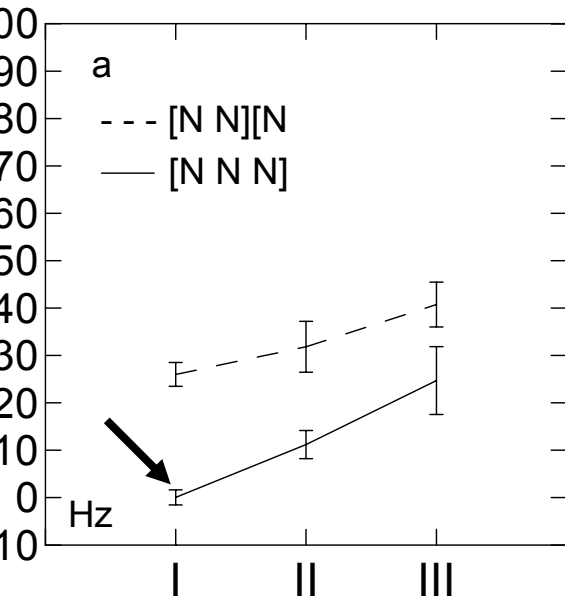


Speaker S

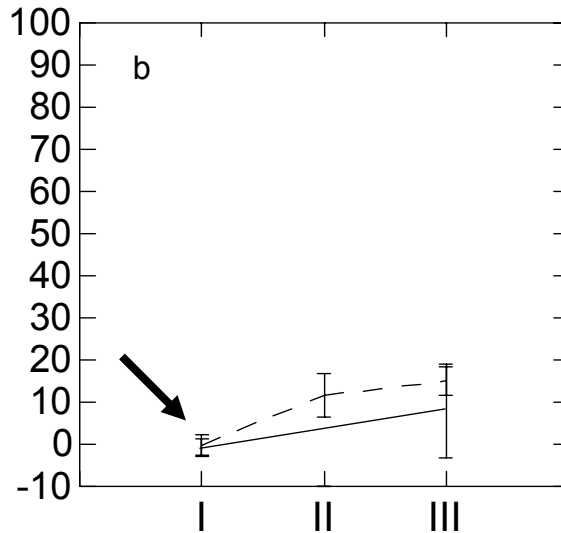
Observation: Accented cases

- **N3 is always analyzed as a MiP on its own**, because of the requirement that a (lexical) pitch accent coincide with the head of MiP.
- N3 is coincided with a MaP boundary at its left edge regardless of its mora count for all three speakers, which indicates that in their grammars the constraint **Align-L(XP, MaP)** is always respected in the accented condition.

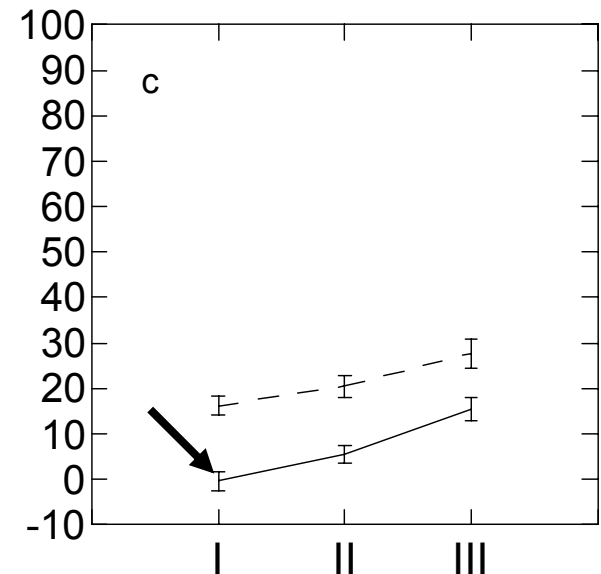
Initial Rise of Unaccented N3



Speaker K



Speaker R



Speaker S

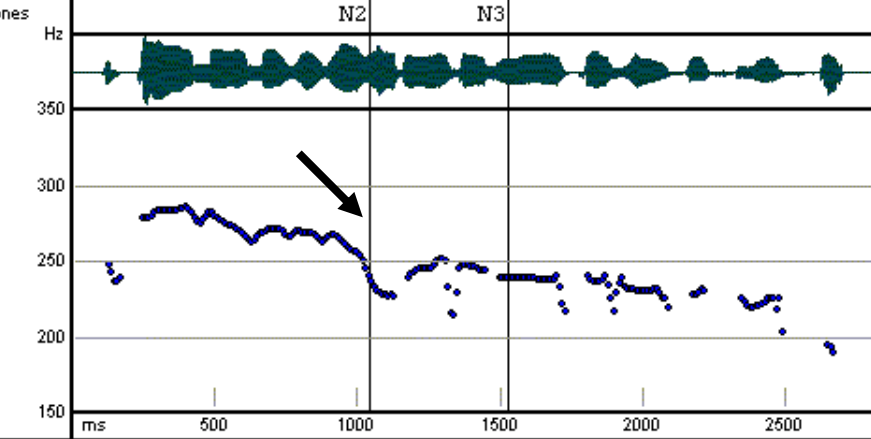
Observation: Unaccented Cases

- When N3 is 3 moras long, unaccented and subject-final, **it never forms a MiP on its own** (i.e., initial rise at N3 is not observed).
- When N3 is longer, however, even unaccented nouns form a MiP.

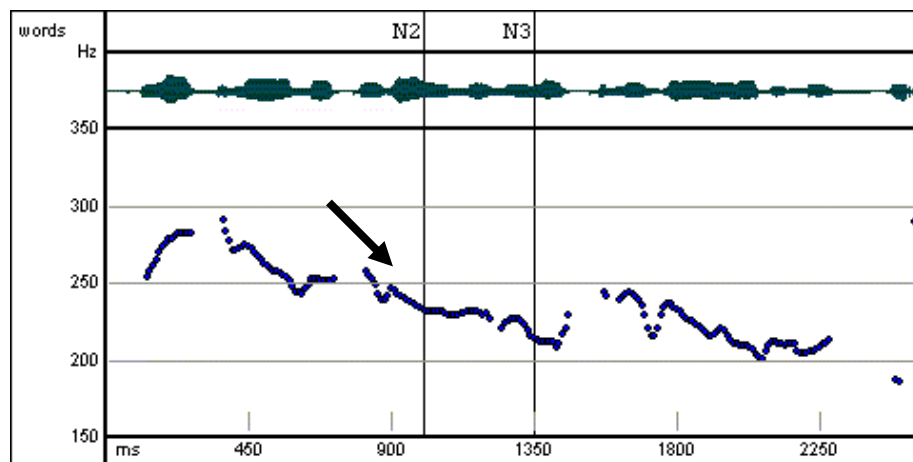
Dative vs. Subject-final NP

(Speaker R)

- When dative N3 is 3 moras long and unaccented, it forms neither a MiP nor a MaP on its own.
- Instead, N3 joins in the same MiP and MaP as the preceding subject-final N2.
- When N3 is longer, it forms its own MiP regardless of its syntactic position.

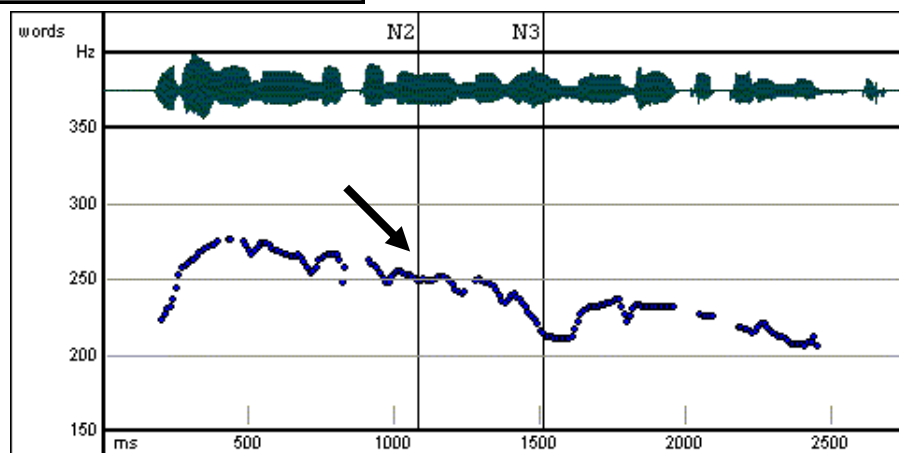


5-mora Dative



3-mora Dative

3-mora Subject



Question 1:

- “What sorts of phonological factors contribute to the organization of the words of a sentence into a prosodic structure organization?”

→ Short unaccented words fail to project their own MiP.

→ This is the effect of $*(3\mu)_{\text{MiP}}$:

A minor phrase cannot consist of three moras (or less).

Question 2:

- “Do purely phonological factors (such as $*(3\mu)_{\text{MiP}}$) ever take precedence over syntactic factors in determining the organization of the words of a sentence into a prosodic phrasing structure?”
- Dative short unaccented NPs form neither a MiP nor a MaP on their own, in violation $\text{Align}(\text{XP}, \text{MaP})$ in speaker R.
- Speaker R: $*(3\mu)_{\text{MiP}} \gg \text{Align}(\text{XP}, \text{MaP})$
 - Speaker K and S: $\text{Align}(\text{XP}, \text{MaP}) \gg *(3\mu)_{\text{MiP}}$

Question 3:

- “Are there effects of word length on the phonetic realization of F0 contours?”

→ The initial rise at the left edge of a MaP consisting of a 7-mora N3 MiP is significantly larger than the initial rise of a MaP consisting of a 3-mora N3+ni MiP, for both accent conditions, for all speakers.

[However, differences between 7 and 5 mora were not significant for two speakers.]

Anticipatory Length-based F0 Raising

- There is indeed a phonetic effect of word length at the MiP level, manifested in a greater initial rise for a longer MiP.
- This anticipatory length effect is present, but not as marked, when the MiP is itself a MaP, as in the dative case.

Phonological effects of word length on MiP formation

- There is evidence of the effect of word length on phonological organization of words into minor phrases (MiP) in Japanese.
- More specifically, short unaccented nouns fail to project their own MiP

Phonetic effects of word length on MiP initial rise

- There is evidence that, once MiP structure is assigned, the phonetic realization of F0 depends on the mora count of the MiPs that are present in the representation.