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The Intonation of Gapping in Japanese

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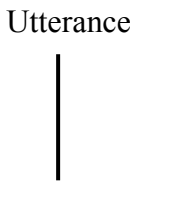
1. Introduction

☞ Prosodic structures define a domain for phonological processes (Hayes and Lahiri 1991; Nespor and Vogel 1986; Selkirk 1986 etc).

(1) Selkirk (1986 et seq.)

Utterance
|
Intonational Phrase
|
Major Phrase (Intermediate Phrase)
|
Minor Phrase (Accentual Phrase)

(2) Pierrehumbert & Beckman (1988)
J-ToBI (Venditti 1995, to appear)



☞ Does Japanese lack an Intonational Phrase (IP) altogether?
☞ IP is motivated by a variety of processes in a variety of languages.

Chichewa (Kanerva 1990: 146-147)
English (Beckman & Pierrehumbert 1986; Nespor & Vogel 1986; Selkirk to appear)
German (Baumann et al. 2001; Féry and Hartmann 2004; Truckenbrodt in press)
Greek (Arvatini & Baltazani in press)
Hungarian (Vogel & Kenesei 1987)
Italian (Tuscan dialect) (Nespor & Vogel 1986)
Kinande (Hyman 1990: 112-121)
Kinyambo (Bickmore 1990: 8)
Luganda (Hyman 1990: 111-112)
Spanish (Nespor & Vogel 1986)

☞ We investigate multiple-clause constructions in Japanese, namely gapping and coordination, to see whether an IP is motivated in Japanese phonology. The answer is yes.

2. Method

Target sentences

(3) **Gapping** (Subj Obj ~~Verb~~, Subj Obj ~~Verb~~, and Subj Obj Verb)

Murasugi-wa *namauni-o* ~~*moritsuke,*~~ *Munakata-wa*
Murasugi-Top sea urchin-Acc Munakata-Top
mamemochi-o ~~*moritsuke,*~~ *Morimura-wa* *aemono-o* *moritsuketa.*
bean rice cake-Acc Morimura-Top aemono-o dished up
"Murasugi dished up sea urchin, Munakara bean rice cake, and Murimura aemono."

(4) **Coordination** (Subj Obj Verb, Subj Obj Verb, and Subj Obj Verb)

Murasugi-wa *namauni-o* *moritsuke,* *Munakata-wa*
Murasugi-Top sea urchin-Acc dished up Munakata-Top
mamemochi-o *moritsuke,* *Morimura-wa* *aemono-o* *moritsuketa.*
bean rice cake-Acc dished up Morimura-Top aemono-o dished up
"Murasugi dished up sea urchin, Munakara dished up bean rice cake, and Murimura dished up aemono."

Speakers

- Four native Tokyo Japanese speakers (R, N, J, Y).

Material

- All words were accented on the second mora and were 4 moras long (plus a case particle).
- Constituent structures of subjects and objects were varied: S(hort) tokens consist of single words, L(ong) tokens consist of two words.
- Four conditions: SS, SL, LS, Dative (double object structure, i.e., N-*ni* N-*o*).
- Two different lexical sets for each condition.

Procedure

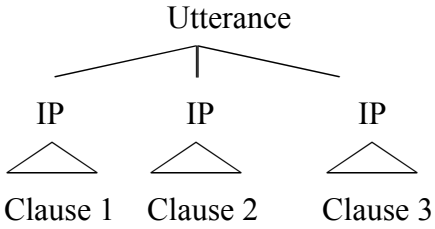
- Recorded in a sound attenuated booth at UMass, Amherst.
- Six repetitions for each sentence.
- Gapping-coordination minimal pair sentences were recorded on different days.

- Digitized with 11,025 Hz sampling rate and 16 bit quantization level.
- Submitted to *PitchWorks* (Scicon R&D) for F0 measurement.

3. Proposal

☞ Multiple-clause constructions like gapping and coordination have structures in which each clause corresponds to an IP and the whole sentence corresponds to an Utterance, as in (5a).

(5a)

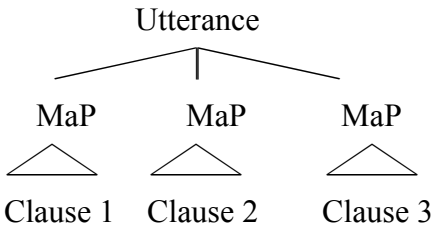


In (5a), IPs are phonetically characterized by:

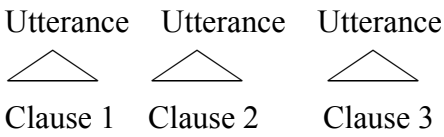
- Final lowering
- Final pause
- Final creakiness
- Large initial rises
- Robust pitch range reset

☞ We will reject two alternatives which do not make use of an intermediate level between a MaP and an Utterance (following Pierrehumbert and Beckman 1998; Venditti 1995, in press):

(5b)



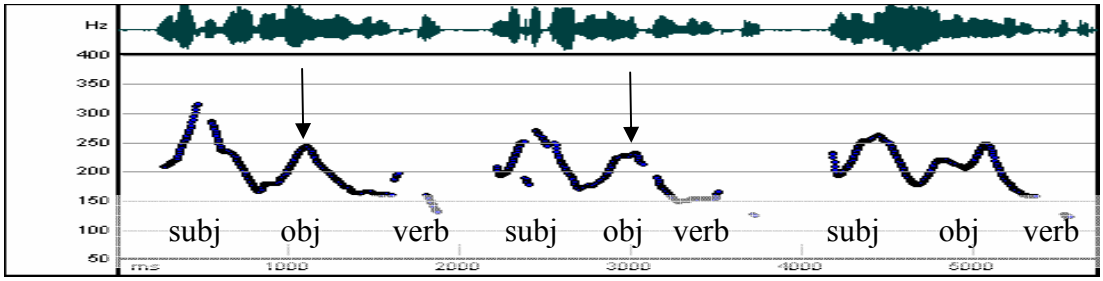
(5c)



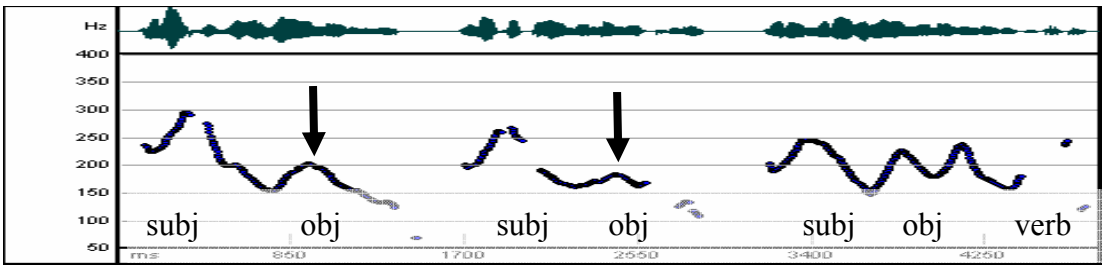
4. Comparison between gapping and coordination

4.1. Observation

(6) a. Coordination



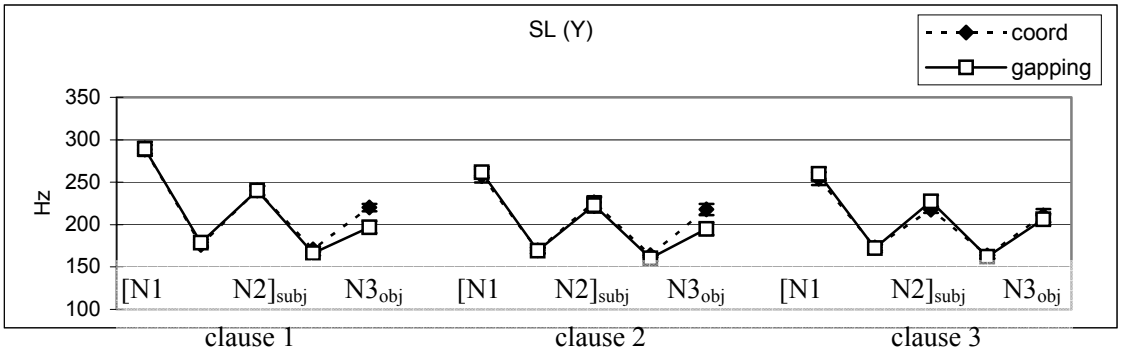
b. Gapping



☞ The object peaks in non-final clauses are lowered in gapping compared to those in coordination, despite that they are hosted by the same lexical items.

☞ This pattern is observed for all the speakers in all the conditions: *all clause-final peaks* in the first and second clauses of gapping constructions are lowered compared to the corresponding peaks in coordination. One example:

(7)



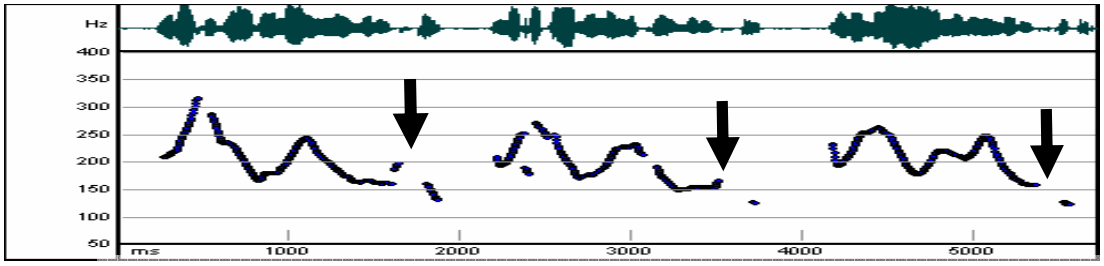
☞ The degree of final peak lowering with respect to the preceding H was calculated. The result of an ANOVA suggests that there is a categorical difference between gapping and coordination: $F(1, 352) = 289.693$, $p<.0001$.

4.2. IP-final final lowering

☞ Why do clause-final peaks appear lowered in gapping?

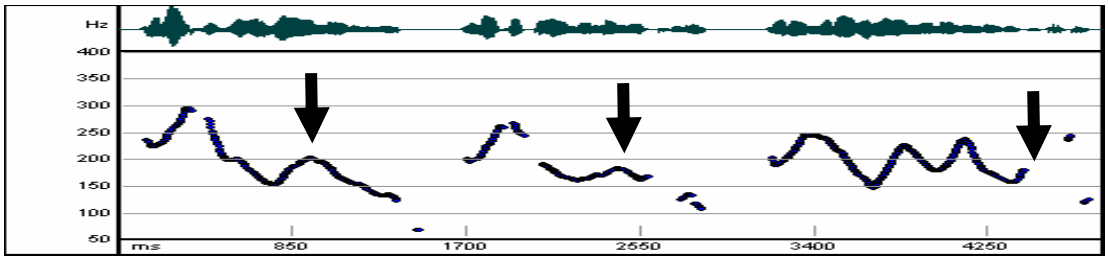
> Our proposal: All clause-final H* peaks are lowered. In coordination, what's lowered is H peaks of the verbs; but in gapping, what's lowered is object peaks.

(8) a. Coordination



[subj obj verb]$_{IP}$ [subj obj verb]$_{IP}$ [subj obj verb]$_{IP}$

b. Gapping



[subj obj]$_{IP}$ [subj obj]$_{IP}$ [subj obj verb]$_{IP}$

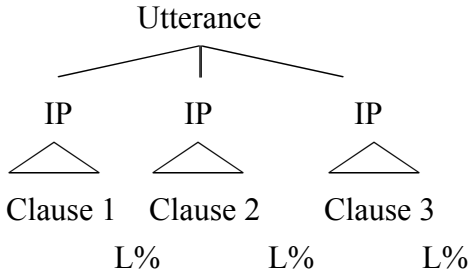
☞ How can we define this domain-final lowering? I.e., at what prosodic level is this domain-final lowering defined?

- This cannot be an Utterance, as lowering is observed clause-finally, but not just utterance-finally.

- This cannot be a MaP either, as such lowering is not motivated MaP-finally.

The structure for multiple-clause constructions:

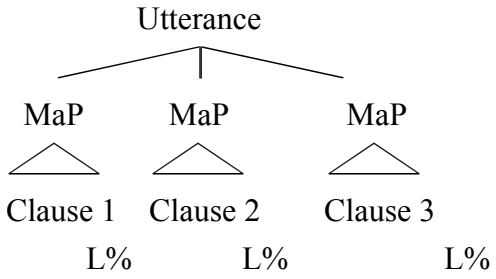
(9)



☞ Each clause is parsed into an *Intonational Phrase*, and an IP is associated with a L%, which causes lowering of final H* by a phonetic implementation rule.

An alternative predicted by Pierrehumbert & Beckman (1988) and J-ToBI (Venditti 1995):

(10)

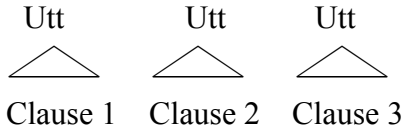


- A creaky-voiced vowel and pause are observed clause-finally where lowering is observed, but neither of these is usually observed MaP-finally.
- Clause-initial rises are much bigger than MaP-initial rises (cf. Ladd 1988, 1990).
- Pitch range reset is more robust clause-initially than MaP-initially.

5. Further evidence and the properties of Utterance

☞ We compared the intonation of gapping to that of coordination to motivate the existence of IP-final lowering. Now, we will demonstrate that multiple-clause constructions must be composed of IPs rather than separate Utterances:

(11)

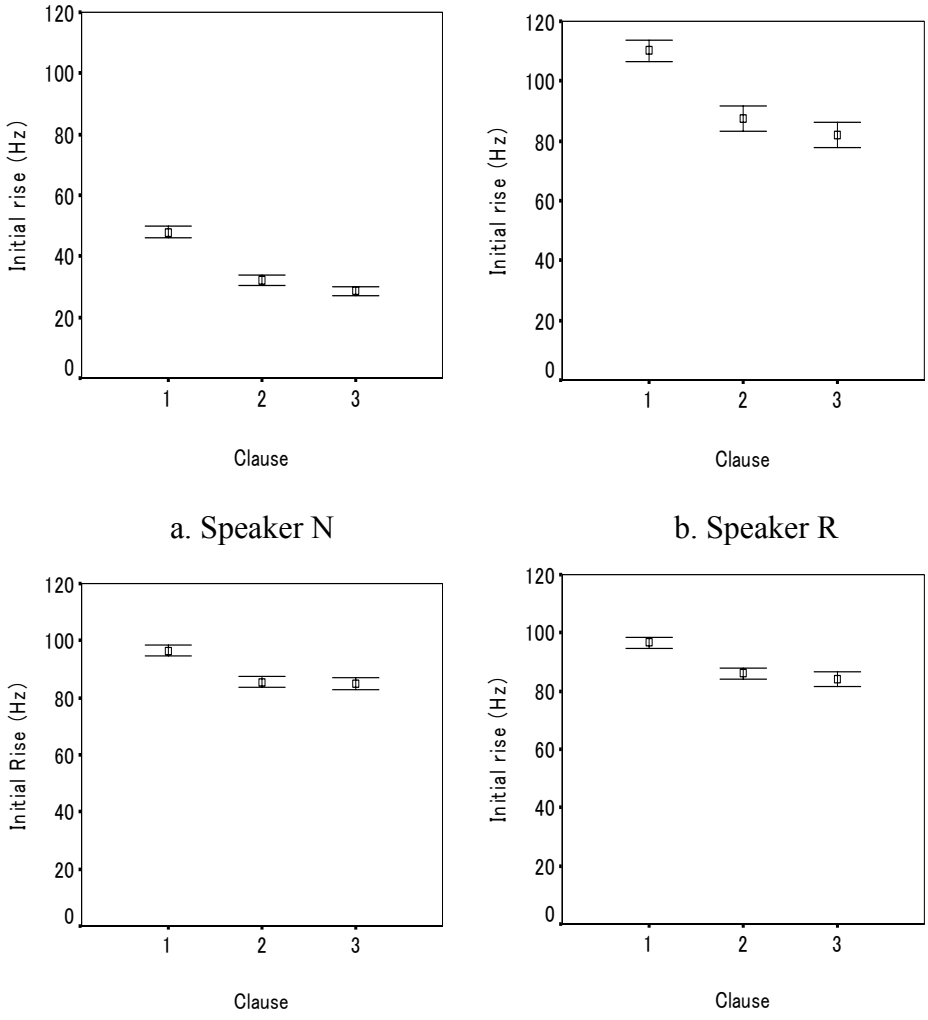


In (11) each clause constitutes a separate Utterance. This structure predicts that the clauses behave alike in terms of intonation - this prediction is NOT borne out.

5.1. Clause-initial rises

☞ The clause-initial rise is biggest in the first clause:

(12)



a. Speaker N

b. Speaker R

c. Speaker J

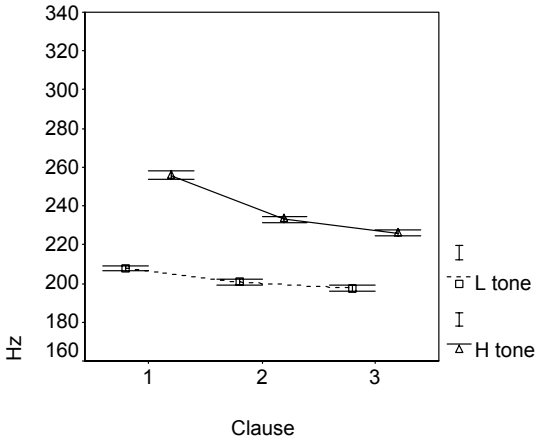
d. Speaker Y

☞ This is a domain-initial strengthening effect (Cho & Keating 2001; Fougeron & Keating 1997; Keating et al. 2003; Onaka 2003): Utterance-initial rises are boosted.

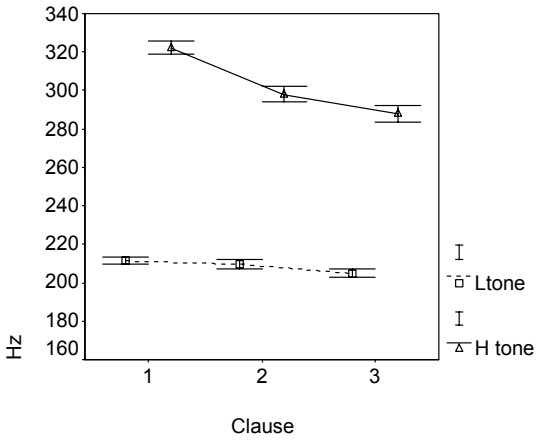
5.2. Declination

☞ Declination, a steady descent in F0, takes place throughout the whole sentence, not just over each clause. The following graphs plot the mean values of clause-initial Ls and Hs:

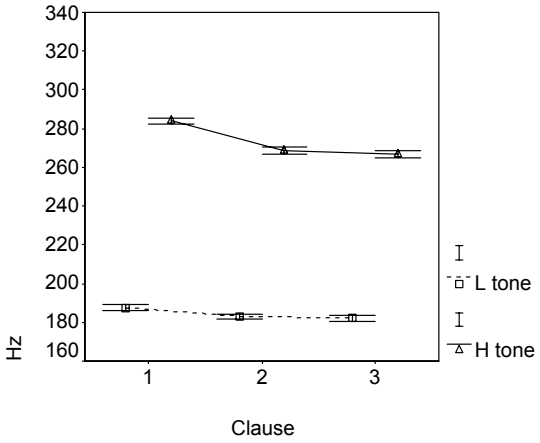
(13)



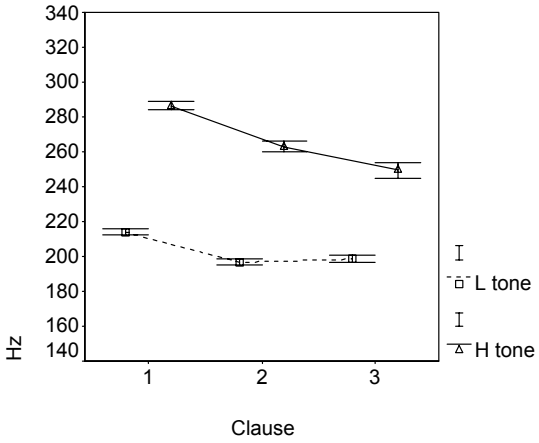
a. Speaker N



b. Speaker R



c. Speaker J



d. Speaker Y

Observations:

(i) The values of initial Hs generally decline from the first clause to the third clause, but

(ii) The drop in H frequency between the first clause and the second clause is steeper than the drop in H frequency between the second and the third clause.

Explanations:

(i) is due to declination that takes place in the Utterance domain, and

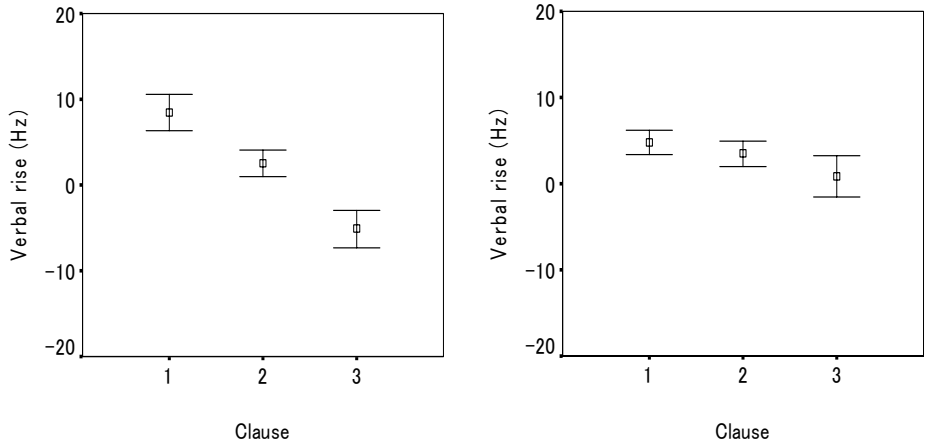
(ii) is due to Utterance-initial boosting effects for H.

→ A prosodic level that incorporates all the clauses is necessary to define these processes, contra (11).

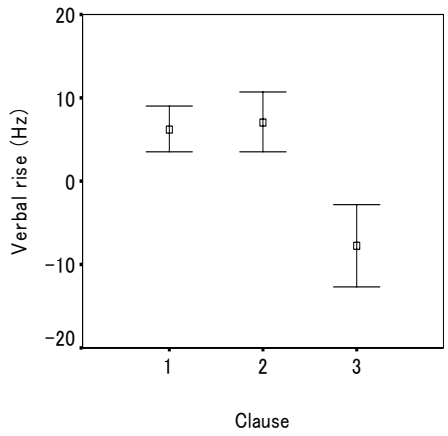
5.3. Verbal rises in coordination

☞ We argued in §4 that in coordination, verbal peaks are subject to an IP-final lowering.
☞ The extent of lowering is strongest Utterance-finally:

(14)



a. Speaker N　　b. Speaker R



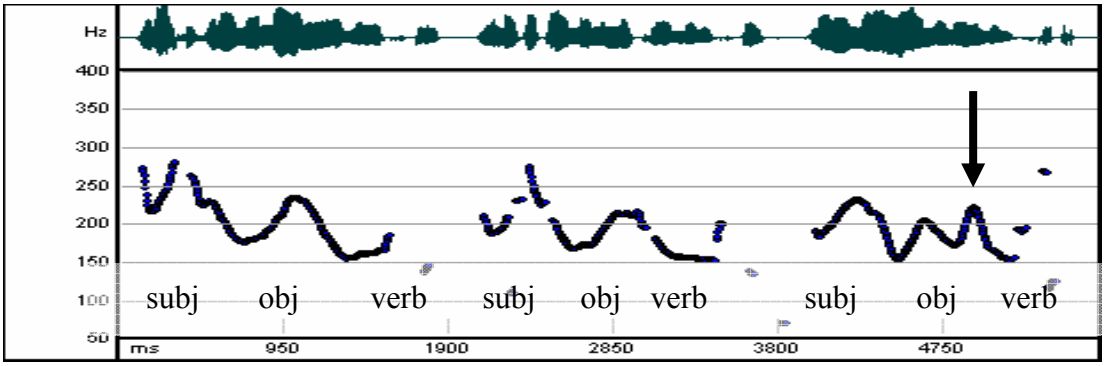
c. Speaker Y

☞ Again, this is a domain-edge strengthening effect, where lowering has a stronger effect in domain(Utterance)-final positions (cf. Ladd 1988).

5.4. Utterance-final H

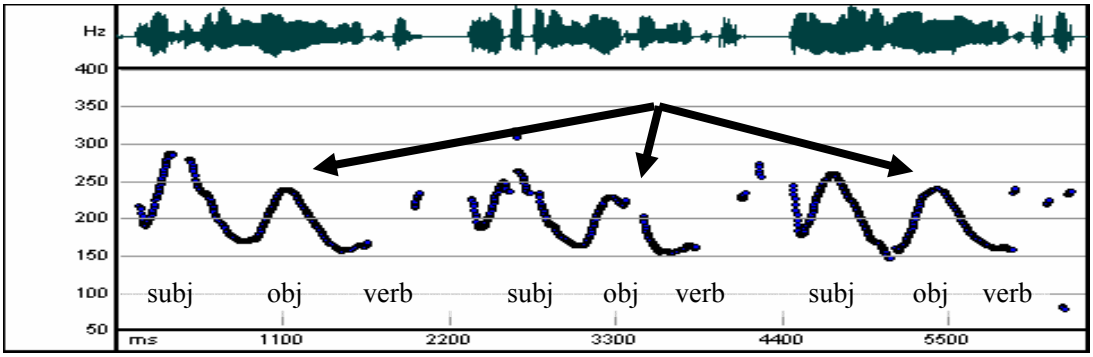
☞ There is a H tone that appears sentence-finally, not clause-finally.
☞ For Speakers N and Y, this appears as an extra H peak realized on the case particle of a final object:

(15) Speaker Y

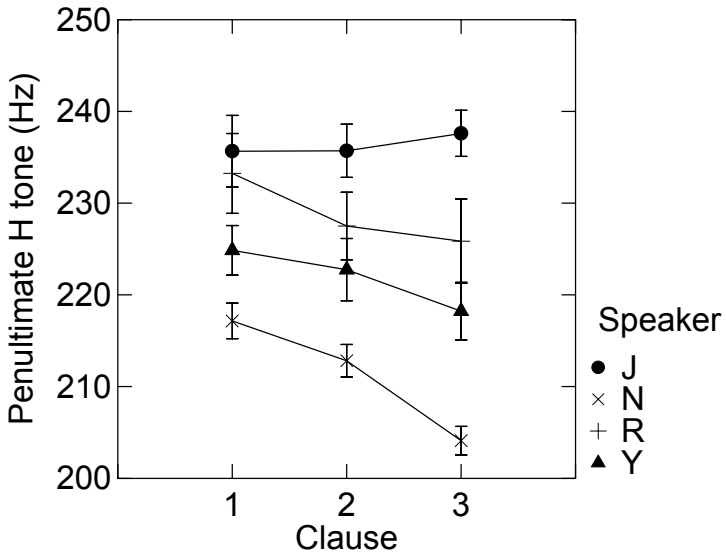


☞ For Speakers J and R, the H tone manifests itself by boosting H* of a final object:

(16) Speaker J



(17)



☞ For Speaker J and R, the H* peaks in the third (final clause) is not lower than the H* peaks in the second clauses, although given declination we expect the contrary (as seen in Speakers

Y and N).

☞ This suggests that the third-clause H* peaks of Speaker J and R are boosted.

☞ Our impression is that this inter-speaker variation is a generational difference; the first pattern is used by speakers in their early twenties; the second pattern by older speakers) (cf. Grice et al. 2001, who argue for mobility of a phrasal accent).

☞ The presence of an H that appears only utterance-finally, but not every clause-finally, provides evidence that these IPs are grouped into a higher prosodic level.

6. Discussion

6.1. Summary

(18) Phonetic correlates of an IP:
- Final creakiness
- Final pause
- Final lowering (due to L%)
- Larger initial rises compared to a MaP
- More robust pitch reset than in a MaP

Phonetic correlates of an Utterance:
- Boosting of an initial rise
- Domain of declination
- Stronger final lowering (due to L% and domain-edge strengthening effects)
- H associated with some mora in the penultimate word

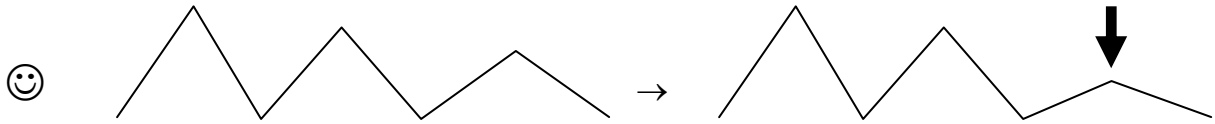
6.2. Some implications

☞ In our case, an IP-final L% affects only the IP-final H*L. The effect is much more local than hitherto assumed for the effect of lowering by %L (Pierrehumbert and Beckman 1988; Pierrehumbert and Hirschberg 1990; Hayes and Lahiri 1991).

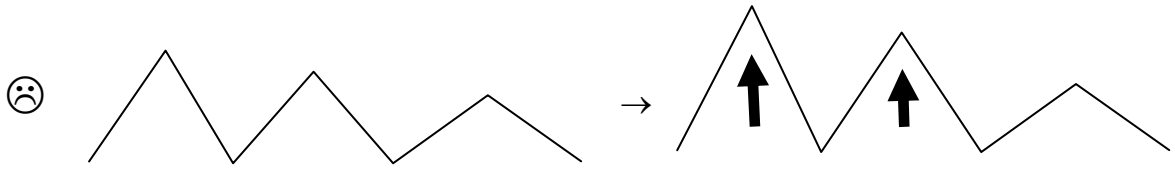
☞ We have been assuming that it is *lowering* rather than *raising* (Truckenbrodt in press):

(19)

a. lowering analysis



b. raising analysis (Truckenbrodt to appear)



A raising analysis is untenable in light of lowering of verbal rises in coordination (§5.3). If what stays constant is final peaks (and the others are raised), then it is not clear why verbal rises are most lowered in Utterance-final positions.

☞ Universality of prosodic layers? An IP does play a role in Japanese, despite the previous claims to the contrary. Our research was informed and driven by a cross-linguistic observation that an IP corresponds to a syntactic clause and expectation that prosodic organization is universal (Selkirk to appear). We have shown that this line of research is fruitful to the extent that we found evidence for a new prosodic level in Japanese.

Acknowledgement

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