

Relative clause and downstep in Japanese

Manami Hirayama (Seikei U) & Hyun Kyung Hwang (RIKEN)

Downstep in Japanese

Pitch register after an accented phrase is noticeably lower than after an unaccented phrase (e.g., [1], [2], [3])

Domain

- Intonational Phrase (IP)/Major Phrase (MP) (e.g., [4], [5])

Blocking/pitch reset

- Maximal projections of syntactic categories (XPs) [6]
→ Proposal: Left edges of XPs are mapped onto left edges of MP boundaries that block downstep. (cf. Variation [7])

- Parts of speech [8]
Downstep ✓ [N-no [N-no N]] but ✗ [Adj [Adj N]]

→ Proposal: Relative clauses, mapped onto MPs, block downstep, as adjectives project RCs [9] but nouns don't do so in Japanese.

Our study: Hypothesis

Relative clause boundaries block downstep.

Predictions

If **RC boundaries** block downstep, targets would **not** be downstepped in (1a, b) but would be downstepped in (2a, b).

	Trigger	Target
(1a) [+RC], Adj. cond:	[[Verb-past] _{RC} [Adj-past] _{RC} Noun]] _{NP}	
(1b) [+RC], Verb cond:	[[Verb-past] _{RC} [Verb-past] _{RC} Noun]] _{NP}	
(2a) [-RC], Adj. cond:	[Noun-ga _(NOM) Adj]	
(2b) [-RC], Verb cond:	[Noun-ga _(NOM) Verb]	

Presence of downstep:

Peak f0 in **targets** in **accented** phrases (e.g., 1a)
> Peak f0 in **targets** in **unaccented** phrases (3a)

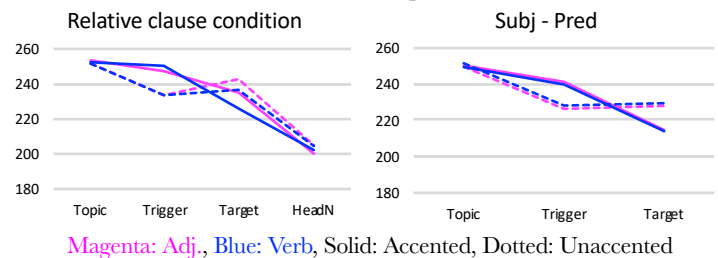
(1)	Topic	Trigger	Target	head N	
a.	áni-wa	[[niránda] _{RC}	[[darúkatta] _{RC}	magó]] _{NP}	to itta
	brother-TOP	stare(V).PAST	tired(ADJ).PAST	grandchild COMP	say.PAST
		'(My) brother said a grandchild who stared disfavorably and was tired.'			
b.	áni-wa	[[najínda] _{RC}	[[niránda] _{RC}	magó]] _{NP}	to itta
	brother-TOP	adjust(V).PAST	stare(V).PAST	grandchild COMP	say.PAST
		'(My) brother said a grandchild who got adjusted themselves and stared disfavorably.'			
(2)	Topic	Trigger	Target		
a.	áni-wa	[magó-ga	nemú]]	to itta	
	brother-TOP	grandchild-NOM	sleepy(ADJ).NONPAST	COMP	say.PAST
		'(My) brother said the grandchild is sleepy.'			
b.	áni-wa	[magó-ga	nirámu]]	to itta	
	brother-TOP	grandchild-NOM	stare(V).NONPAST	COMP	say.PAST
		'(My) brother said the grandchild stares (at him) disfavorably.'			
(3)	Topic	Trigger	Target	head N	
a.	áni-wa	[[mananda] _{RC}	[[nemúkatta] _{RC}	magó]] _{NP}	to itta
	brother-TOP	study(V).PAST	sleepy(ADJ).PAST	grandchild COMP	say.PAST
		'(My) brother said a grandchild who studied and was sleepy.'			

Results

Downstep is found in all conditions.
RC boundaries per se do not block downstep.

Type		β (Hz)	t	p
(1a) V-A-N	(intercept)	235.296	15.12	< 0.001 ***
	TriggerUnacc	7.976	3.51	< 0.001 ***
(1b) V-V-N	(intercept)	226.066	16.285	< 0.001 ***
	TriggerUnacc	11.336	6.061	< 0.001 ***
(2a) Subj-A	(intercept)	214.751	16.587	< 0.001 ***
	TriggerUnacc	13.717	3.615	< 0.05 *
(2b) Subj-V	(intercept)	214.108	17.535	< 0.001 ***
	TriggerUnacc	15.738	6.192	< 0.001 ***

- Means for 10 speakers -



Discussion I

Why do attributive adjectives block downstep [8] while adj. in RC, verbs, and nouns [8] don't?

- Attributive modifiers occur in a certain order in Japanese (as well) [10].
- The order was respected in [N-no [N-no N]] but not in [Adj [Adj N]] in [8]. The unnaturalness in meaning in the sequence A-A raised the pitch at the second A, blocking downstep.
- A/V in relative clauses don't participate in this natural ordering constraint, as they are not attributive modifiers; they are in fact in the predicate position in RCs.

Discussion II Definition of downstep

Is the pattern in A really the same as in V?

- In syntagmatic diagnostic of downstep [6], where the target is analyzed as downstepped if the f0 peak is lower than the peak in the trigger, downstep patterns don't appear to be the same between A and V conditions.
- In fact, the presence of downstep in RC-Adj (1a) seems to be due to the high f0 in target in unaccented sentences.

Recording & Analysis

- 16 sentences in total
- 10 speakers (M: 1, F: 9), 8 repetitions
- Measurements: Max f0 of each phrase
- Linear mixed-effects analyses with R and lmerTest package; speaker and item as random effects

References [1] Kubozono, H. 1989. Syntactic and rhythmic effects on downstep in Japanese. *Phonology* 6(1): 39–67. [2] Poser, W. 1984. *The Phonetics and Phonology of Tone and Intonation in Japanese*. Ph.D. dissertation, MIT. [3] Pierrehumbert, J. & Beckman, M. 1988. *Japanese Tone Structure*. Cambridge: MIT Press. [4] Igarashi, Y. 2015. Intonation. In Kubozono, H. (Ed.), *Handbook of Japanese Phonetics and Phonology*. Berlin: de Gruyter Mouton, 525–568. [5] Ishihara, S. 2015. Syntax-phonology interface. In Kubozono, H. (Ed.), *Handbook of Japanese Phonetics and Phonology*. Berlin: de Gruyter Mouton, 569–618. [6] Selkirk, E. & Tateishi, K. 1991. Syntax and downstep in Japanese. In Georgopoulos, C. & Ishihara, R. (Eds.), *Interdisciplinary Approaches to Language*. Dordrecht: Kluwer, 519–543. [7] Ishihara, S. 2016. Japanese downstep revisited. *NLLT*, 34, 1389–1443. [8] Hirayama, M. & Hwang, H. K. 2015. Downstep in Japanese revisited: Lexical category matters. Poster at the *14th Conference on Laboratory Phonology*. [9] Kuno, S. 1973. *The Structure of the Japanese Language*. Cambridge: MIT Press. [10] Watanabe, A. 2017. Attributive modification. In Shibatani, M., Miyagawa, S., Noda, H. (Eds.), *Handbook of Japanese Syntax*. Berlin: de Gruyter Mouton, 783–806.