ABSTRACT

1. Sentence level F0 downtrend in 3 types of shiki systems in Japanese dialects were investigated.
2. Kishiwada system can be analyzed as the contrast of word-initial tones (H vs. L).
3. Ibuki systems reveal a F0 downtrend that is distinct from downstep, suggesting the need of positing three-way tonal contrast.
4. Mitoyo system has two high-pitched shiki types, while lacking in low-pitched one, suggesting that shiki systems with falling type may better be captured in terms of pitch direction, rather than level.

F0 realization of pitch registers (shiki) in three dialects of Japanese

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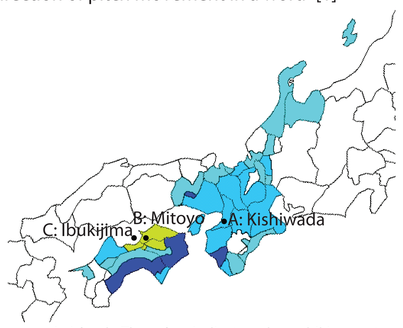
1. BACKGROUND & ISSUES

1.1. Dialects with *Shiki* system (Map.1)

- Shiki = Lexical contrast on F0 coexistent with pitch accent
- Definition in Japanese dialectological literature
  "Direction of pitch movement in a word" [1]



Part of Japanese main islands. The colors indicates where shiki-accent systems have been reported (Simplified version of the map in [2] by [3]). Location of the three dialects studied (A: Kishiwada, B: Mitoyo and C: Ibukijima) are indicated.

1.2. Variation in shiki systems studied

A : Central Kinki-system: Osaka, Kyoto, Kishiwada etc.
2-shiki types : H-beginning vs. L-beginning [4]
B : Sanuki-system : Mitoyo, Kanonji etc.
2-shiki types : Falling vs. Non-falling [5]
C : Ibuki-system : Ibukijima (only)
3-shiki types : Falling vs. Level vs. Rising [6]

1.3. Word level shiki F0 patterns of Ibukijima dialect [7]

- Peak F0 value : Accented ≈ Falling > Level
- Rate of F0 change : Level > Falling > Accented
- Both Rate of F0 change & Final F0 value depend on duration
- Weight on attributes discriminating shiki-accent categories
  : Rate of F0 change > Magnitude of F0 rise
  > Initial F0 value

--> More consistent with dynamic definition of shiki in [1]

1.4. Research Questions : Sentence level F0 downtrend

(1) Do shiki types have different F0 downtrend when produced in ***sequence in an utterance***?
(2) If yes, does it reveal ***differences between dialects***?
What does it suggest about ***phonological representation***?

2. METHODS

2.1. Speakers (Age: 67-80)

A : Kishiwada	2 female	
B : Mitoyo	1 female	2 male
C : Ibukijima	3 female	

2.2. Speech corpus

- Accented words / Unaccented words with all shiki types
  --> Sequence of 1~3 words
  --> Spoken 4~6 times in a fixed frame sentence

Examples

1-sequence	*konogorowa*	***mame-ga***	*ooi*
2-sequence	*konogorowa*	***nori-no mame-ga***	*ooi*
3-sequence	*konogorowa*	***nori-no nioi-no mame-ga***	*ooi*

(Nowadays we have many **beans with flavor of laver**)

For Ibukijima *nori*, *nioi*, *mame* are Falling-shiki-Unaccented, while for Kishiwada, they are Accented words.

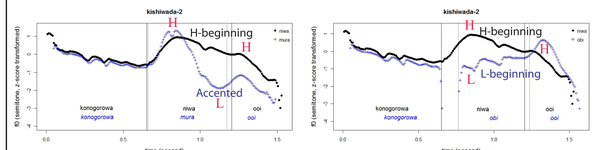
2.3. Data analysis

- Time normalized to the mean of each word in each position
- F0 sampled as semitone (re 100Hz) and z-score transformed
  --> Obtain time normalized mean contours of 3 - 6 renditions

3. BASIC PATTERNS (1-word sequence)

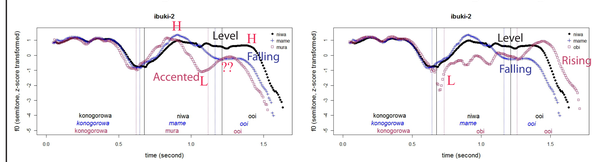
■ **A : Kishiwada** (speaker 1) 2-shiki + Accent (HL)

H-beginning & Accented | H-beginning & L-beginning (Level & Rising [1])



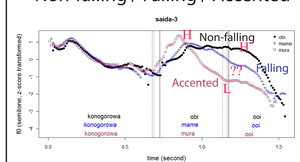
■ **C : Ibukijima** (speaker 1) 3-shiki + Accent (HL)

Level / Falling / Accented | Level / Falling / Rising



■ **B : Mitoyo** (speaker 3) 2-shiki + Accent (HL)

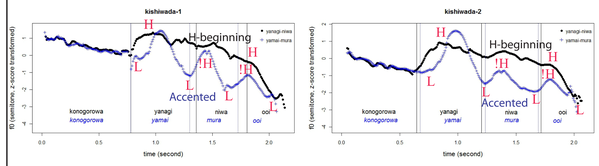
Non-falling / Falling / Accented (***no Rising***)



4. DOWNTRENDS (2-word sequences)

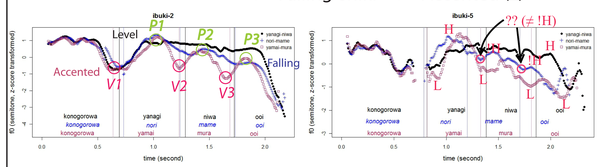
■ **A : Kishiwada**

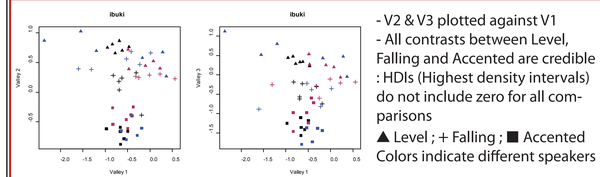
H-beginning : Declination [4]
Accented : Downstep (+ declination)



■ **C : Ibukijima**

Level-shiki : Very small declination
Falling & Accented : Similar downtrend in peak --> Downstep
Word-final F0 values
H with declination > Downstepped H
> Falling-shiki > Accented (L)



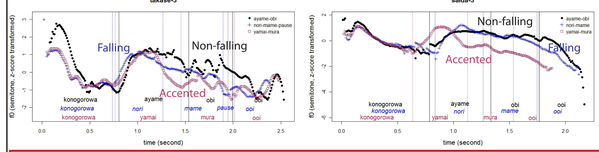


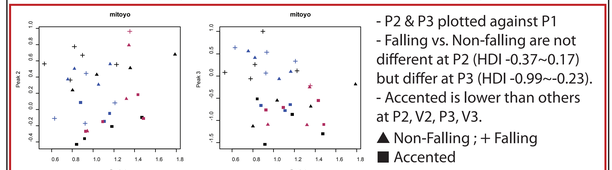
- V2 & V3 plotted against V1
- All contrasts between Level, Falling and Accented are credible : HDIs (Highest density intervals) do not include zero for all comparisons
  ▲ Level ; + Falling ; ■ Accented
  Colors indicate different speakers

Difference between shiki-accent categories were tested with Bayesian ANCOVA [4, 7]
Model : P2 or P3 (V2 or V3) = Baseline + Slope × P1 + Accent + Subject

■ **B : Mitoyo**

Non-falling : small declination like that of Ibuki
Falling: Downstep (≈ Accented)
Word-final F0 values
H with declination > Downstepped H
> Falling-shiki > Accented (L)



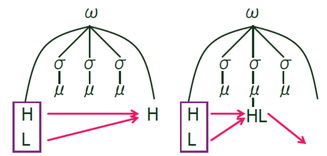


- P2 & P3 plotted against P1
- Falling vs. Non-falling are not different at P2 (HDI -0.37~0.17) but differ at P3 (HDI -0.99~-0.23).
- Accented is lower than others at P2, V2, P3, V3.
  ▲ Non-Falling ; + Falling
  ■ Accented

5. MODELS OF F0 DOWNTRENDS

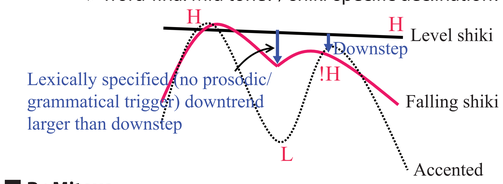
■ **A : Kishiwada (≈ Osaka Japanese** [4])

Shiki = Word-initial (H vs. L) & final tones (H)
+ Declination (in H-beginning-shiki)
+ Downstep for Accented & L-beginning-shiki
(triggered by HL tone sequence)



■ **C : Ibukijima**

H for Level-shiki / HL for accent / (L for Rising-shiki)
+ Declination (in Level-shiki)
+ Downstep in Accented and Rising-shiki
(triggered by HL tone sequence)
Downstep in Falling-shiki
(triggered by latent-L? <-- no independent evidence)
+ Factor responsible for word-internal downtrend of Falling-shiki
≠ (>) Downstep [8]
--> word-final Mid tone? / shiki-specific declination? [9]



■ **B : Mitoyo**

- H & L for HL accent is necessary
- 2 types of high-pitched shiki with no low-pitched shiki
- Falling & Non-falling seems to be distinguished by global F0 downtrend rather than levels in the pitch range

--> Shiki in Mitoyo (and possibly Ibukijima) may be captured better as lexically specified difference in downtrend (as argued in [1], [5] and [6]).

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