

Assignment of English Lexical Stress by Japanese and Seoul-Korean Learners of English

Mariko Sugahara
Doshisha University

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Doshisha University



大学共同利用機関法人 人間文化研究機構
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The question asked

in my recent studies on English Stress Assignment and Perception by Japanese and Seoul Korean speakers (Sugahara 2016a,b, 2019, 2020) is:

- whether Japanese learners of English (JLE) and Seoul Korean Learners of English (SKLE) behave differently when perceiving and assigning English lexical stress,
- given differences in their lexical prosody systems.

Implications of my studies

- The presence/absence of lexical stress/accent in L1 affects perception and assignment of lexical stress in English as L2, which is in line with previous studies such as Dupoux et al. (1997) and Peperkamp & Dupoux (2002),
- Japanese speakers' perception/assignment of English lexical stress is influenced by the distribution of lexical accent in Japanese, and/or the accent patterns of morphologically complex words.

Lexical Prosody System: English

Lexical Prosody System: English

- English is a **stress language** in which the lexical prominence of a word is acoustically expressed with
 - not only **pitch** (only in an accented condition)
 - but also **duration, vowel quality** and **amplitude**
- English is also a ‘**free stress**’ language where stress locations are determined for word by word,
 - e.g., *díffer* vs. *defér*,
 - fórearm* (noun) vs. *foreárm* (verb)
- The distribution of stress is **not completely random**, however, as shown later.

Lexical Prosody System: English

- Even in an accented condition, it is not clear to what extent pitch plays a distinctive role because the shape of pitch accent varies depending on the speakers' attitudes and sentence types,

Díffer?

L*+H H-H%

Defér?

L+H* H-H%

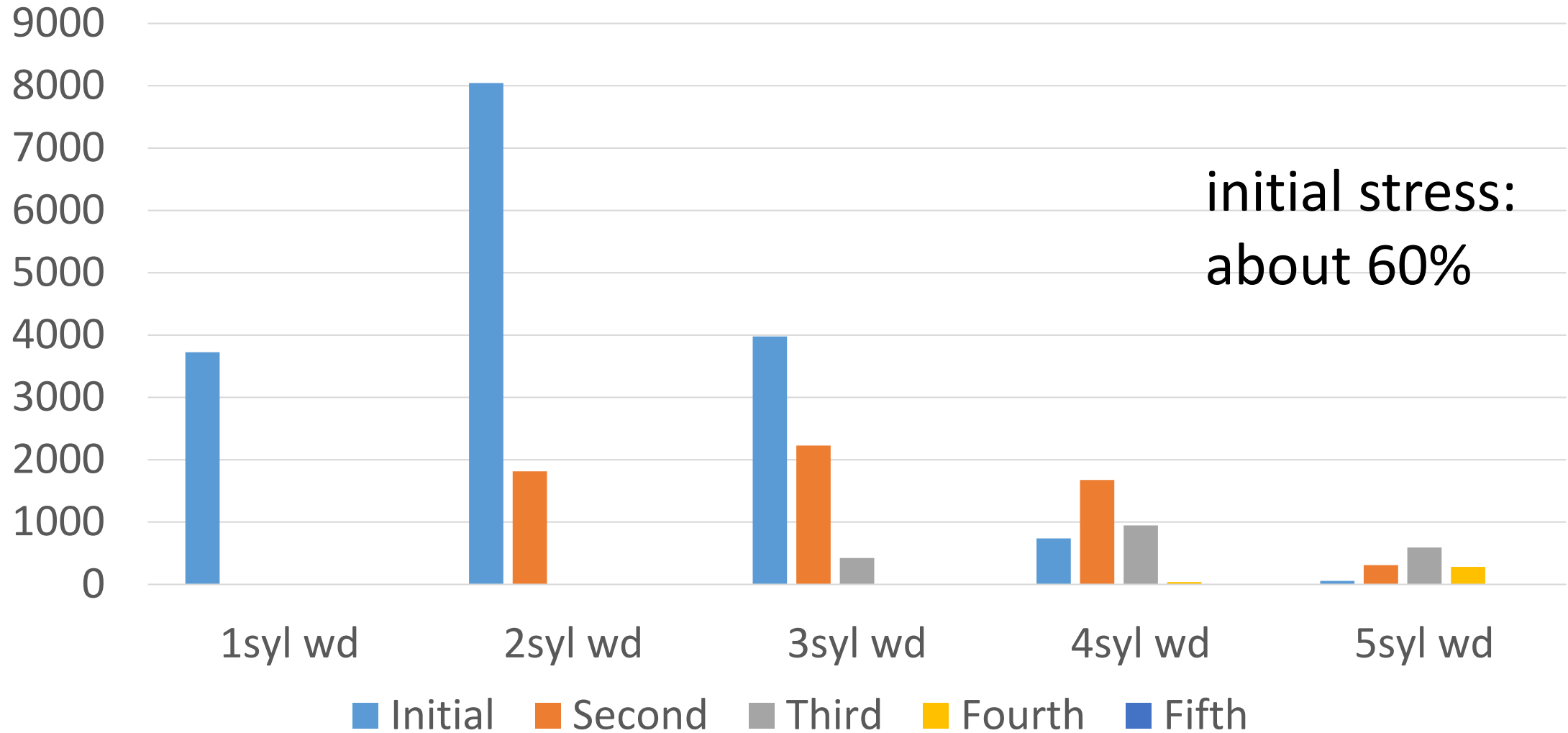
- and the number of those minimal pairs are small. Furthermore, only **0.5% of homophones are distinguished by stress patterns** (Sibata & Sibata, 1990).

Lexical Prosody System: English

- English **primary stress positions** are mostly confined to one of the **last three syllables** of a word,
- but **initial primary stress** is the most frequent because the majority of words are **mono-, di-, and tri-syllabic**.
- **60%** of the English words have **initial primary stress**. (Based on the English Lemma data from the CELEX database.)
- About **90 %** of the whole **lexical tokens in a spontaneous speech** are those with **word-initial primary stress**. (Cutler & Carter, 1987)

The dominance of **initial primary stress** is out of question.

Lexical Prosody System: English



Based on the data provided by Teschner & Stanley Whitley (2004)

Lexical Prosody System: English

- Another aspect of English is that **suffixes** are factors affecting stress patterns.
- It is well known that English suffixes are divided into two groups depending on whether or not their attachment to a stem alters the original stress pattern of the stem.
- **Stress-neutral suffixes:**
 - e.g. *-ness, -less*, all inflectional suffixes
- **Stress-shifting suffixes:**
 - e.g. *-al, -ion, -ese, -eer, -ate, -oid*.

Lexical Prosody System: English

More detailed classifications of **stress-shifting suffixes** (Zamma, 2007) :

- (i) **extrametrical**: the final syllable containing the suffix (f.s.s) is extrametrical: *par(rén)<ral>*, *mo.ti.(vá)<tion>*
- (ii) **non-extrametrical**: the f.s.s. is parsed in a bisyllabic main stress foot: *a.(tó.mi)<c>*
- (iii) **non-retracting**: the f.s.s. by itself forms a main stress foot: *Jà.pa.(nése)*
- (iv) **strongly-retracting**: the f.s.s. receives secondary stress and a weight insensitive main stress foot is created: *(dé.sig)(nàte)*,
- (v) **weakly-retracting**: the f.s.s. receives secondary stress and a weight sensitive main stress foot is created: *e(líp)(sòid)*.

Summary of the English lexical prosody system

		English
1	Lexically specified stress/accent present?	Yes
2	Does lexical stress/accent play a distinctive role?	Not clear
3	Does pitch play a distinctive role?	Not clear
4	Are acoustic cues other than pitch used for lexical prominence?	Yes (duration, amplitude, vowel quality)
5	Which is more dominant: initial or medial stress/acc?	Initial

Lexical Prosody System: Japanese

Lexical Prosody System: Japanese

- The major dialects of Japanese, i.e., Tokyo Japanese and Kansai Japanese, have lexical accent, and accented syllables/morae are marked with a **pitch fall (pitch accent) only**.
- Japanese is similar to English in that the lexical accent is specified in the lexicon.

e.g. *kokóro* in Tokyo, *kókoró* in Kansai ‘mind’

kámakiri in Tokyo, *kamakíri* in Kansai ‘mantis’

- Japanese pitch accent plays a distinctive role, and **13.6% of homophones are distinguished** by pitch accent (Sibata & Sibata 1990):

hási-ga ‘chopsticks-Nom’

hasí-ga ‘bridge-Nom’

hasi-ga ‘edge-Nom’

H*+L

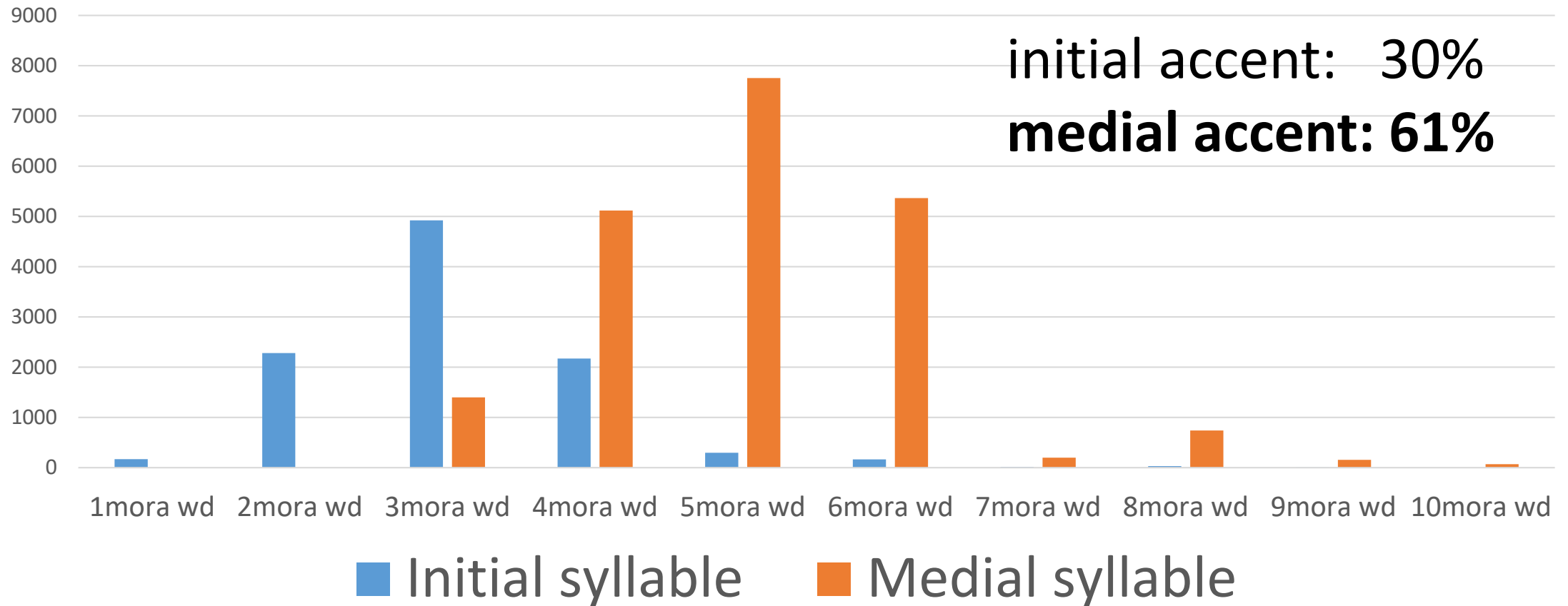
H*+L

Lexical Prosody System: Japanese

- Like English, **antepenultimate and penultimate syllables** are the popular accent locations in Japanese (Kubozono 2006).
 - **Antepenultimate Mora Accent Rule** in loanwords (McCawley 1968, Kubozono 2006): The syllable that contains the **antepenultimate mora** is accented, and
 - **Latine Accent Rule** is also operating in loanwords (Kubozono 2006): If the **penultimate syllable** is heavy, it is accented. Otherwise, **antepenultimate syllable** is accented.
 - A similar picture is true of Kansai Japanese (Tanaka 2009, Sugahara 2016a).
- Japanese, however, is **not as initial-accent oriented as English does.**

Lexical Prosody System: Japanese

Accent locations of accented words
Data from Osaka-Tokyo Accent Dictionary



Lexical Prosody System: Japanese

- It is partly because Japanese has more words with more than three syllables, and they tend to be morphologically complex (compounds, inflected verbs/adjectives, etc), and
- accent tends to occur near morpheme boundaries (word-medial position).

e.g. *kyóoto*

kyootó-si 'Kyoto city',

Kyoto-dáigaku 'Kyoto University'

tábe 'to eat (infinitive)' *tabé-nai* (negation)

tabé-reba (conditional)

tabe-másu (polite)

Summary of the Japanese lexical prosody system

		Japanese
1	Lexically specified stress/accent present?	Yes
2	Does lexical stress/accent play a distinctive role?	Yes
3	Does pitch play a distinctive role?	Yes
4	Are acoustic cues other than pitch used for lexical prominence?	No
5	Which is more dominant: initial or medial stress/acc?	Medial

Lexical Prosody System: Seoul Korean

Lexical Prosody System: Seoul Korean

- Seoul Korean has been claimed to lack lexical stress/accent (Jun, 1996).
- **Tonal melodies are the properties of phrase-level constituents, i.e., AP and the IP.**
- According to Jun (1996), long APs are associated with a sequence of **LHLH or HHLH** tones unless they are IP-final.
- Whether or not an AP starts with **LH or HH** depends on the **nature of their initial segment.**

Lexical Prosody System: Seoul Korean

- If the initial segment is a **lenis obstruent or a sonorant**, the accentual phrase begins with an **LH tone**.
- If it is an **aspirated or fortis (tense) obstruent**, an **HH tone** appears.
- Recent studies on VOT and F0 of aspirated and lenis consonants have revealed that VOT distinction is diminishing and F0 distinction is getting more enhanced (Lee & Jongman 2012, Kang 2014, Cho 2017) especially in younger female speech (Kang 2014, Cho 2017).
- The morphological organization of words does not affect the tonal melodies.

Summary of the Seoul Korean lexical prosody system

		Seoul Korean
1	Lexically specified stress/accents present?	No
2	Does lexical stress/accents play a distinctive role?	No
3	Does pitch play a distinctive role?	Yes/No
4	Are acoustic cues other than pitch used for lexical prominence?	N.A.
5	Which is more dominant: initial or medial stress/accents?	N.A.

Summary of the lexical prosody systems

	English	Japanese	Seoul Korean
Lexically specified stress/accent present?	Yes	Yes	No
Does lexical stress/accent play a distinctive role?	Not so much as it does in Japanese.	Yes	No
Does pitch play a distinctive role?	Not so much as it does in Japanese.	Yes	Yes/No
Are acoustic cues other than pitch used for lexical prominence?	Yes (duration, amplitude, vowel quality)	No	N.A.
Which is more dominant: initial or medial stress/acc?	Initial	Medial	N.A.
Does morphology affect lexical stress/acc patterns?	Yes	Yes	No

- Given the differences in the prosodic systems between Japanese and Seoul Korean, the question is whether or not JLE and SKLE behave differently when perceiving and assigning lexical stress to English words.

Sugahara (2016b)

**Perception Study with Truncated
word stimuli**

Sugahara (2016b)

21 pairs of words were produced by a male native speaker of English.

...at(e)/...ut(e)-ing

ACTivating,

AGitating,

ALlocating,

CALculating,

CAPTivating,

CElebrating,

COMplicating,

CONcentrating,

CONjugating,

DEdicating,

DOminating,

PROsecuting,

...at(e)/...ut(e)-ion

actiVAtion

agiTAtion

alloCAtion

calcuLAtion

captiVAtion

celebRAtion

complIAtion

concentRAtion

conjuGAtion

dediCAtion

domiNAtion

proseCUtion

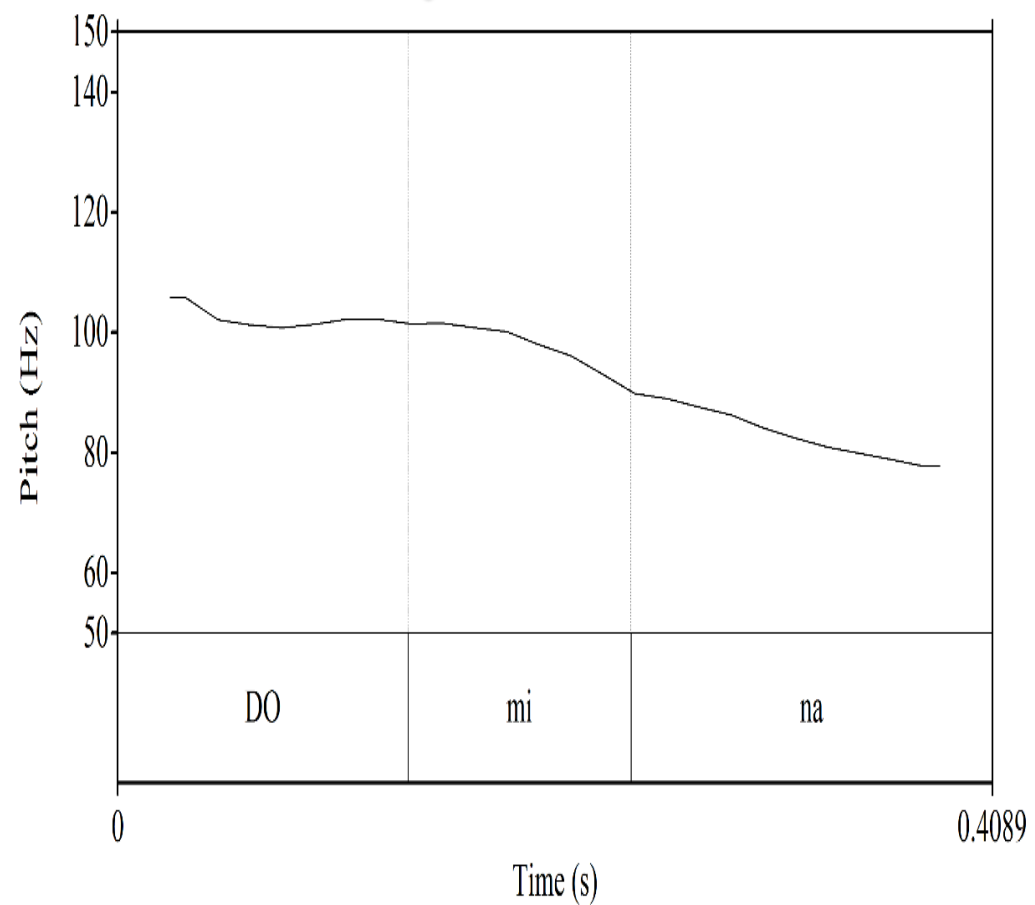
Sugahara (2016b)

2-syllable	<i>DOmi-</i>	from “ DO minating”	[dá . mə. nəɪ. rɪŋ]
	<i>domi-</i>	from “domi NA tion”	[dà. mə. néi . ʃən]
3-syllable	<i>DOmina-</i>	from “ DO minating”	[dá . mə. nəɪ. rɪŋ]
	<i>domiNA-</i>	from “domi NA tion”	[dà. mə. néi . ʃən]

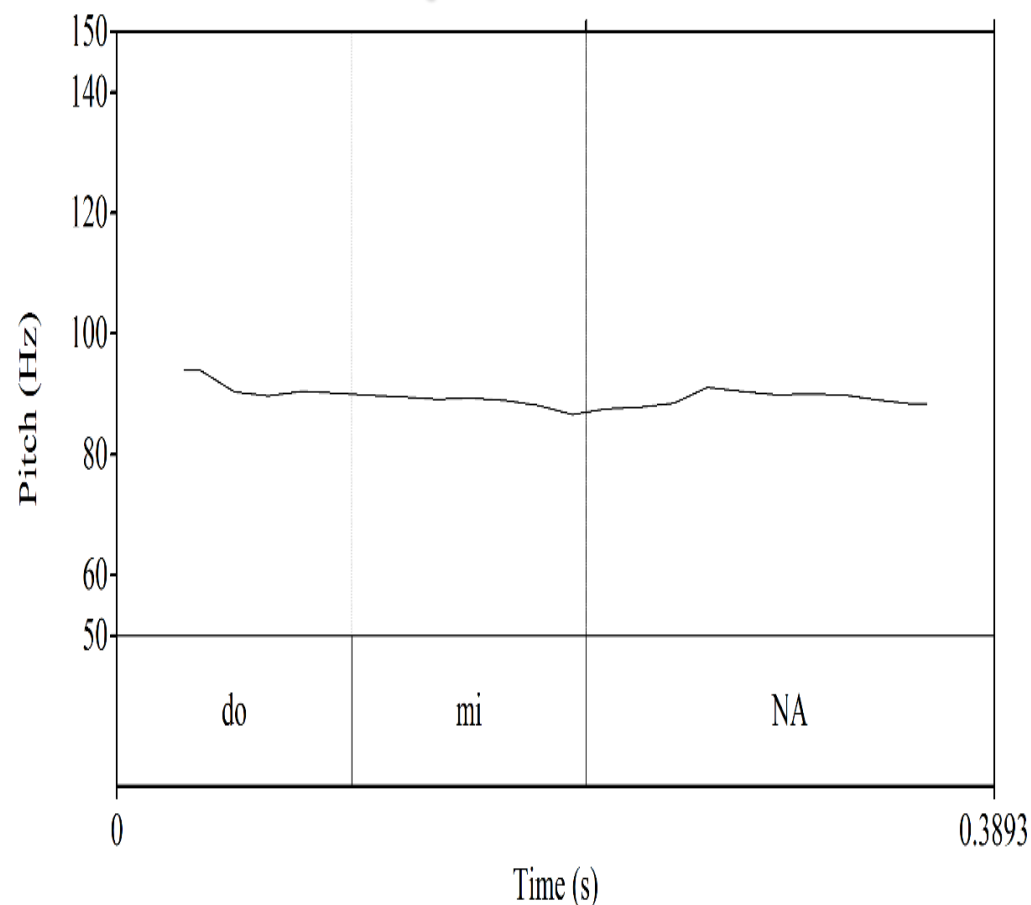
- [Natural F0] for the **2-syl stimuli**,
- [Natural F0] and [Flat F0] for the **3-syl stimuli**.
- 21 native speakers of English (NSE, 8 m, 13 f), 30 JLE (12 m, 13 f) and 27 SKLE (4 m, 23 f) listened to the stimuli.
- They were asked to identify the original word from which the stimuli were truncated.

[Natural] stimuli

***DO*mina-**



***domi*NA-**

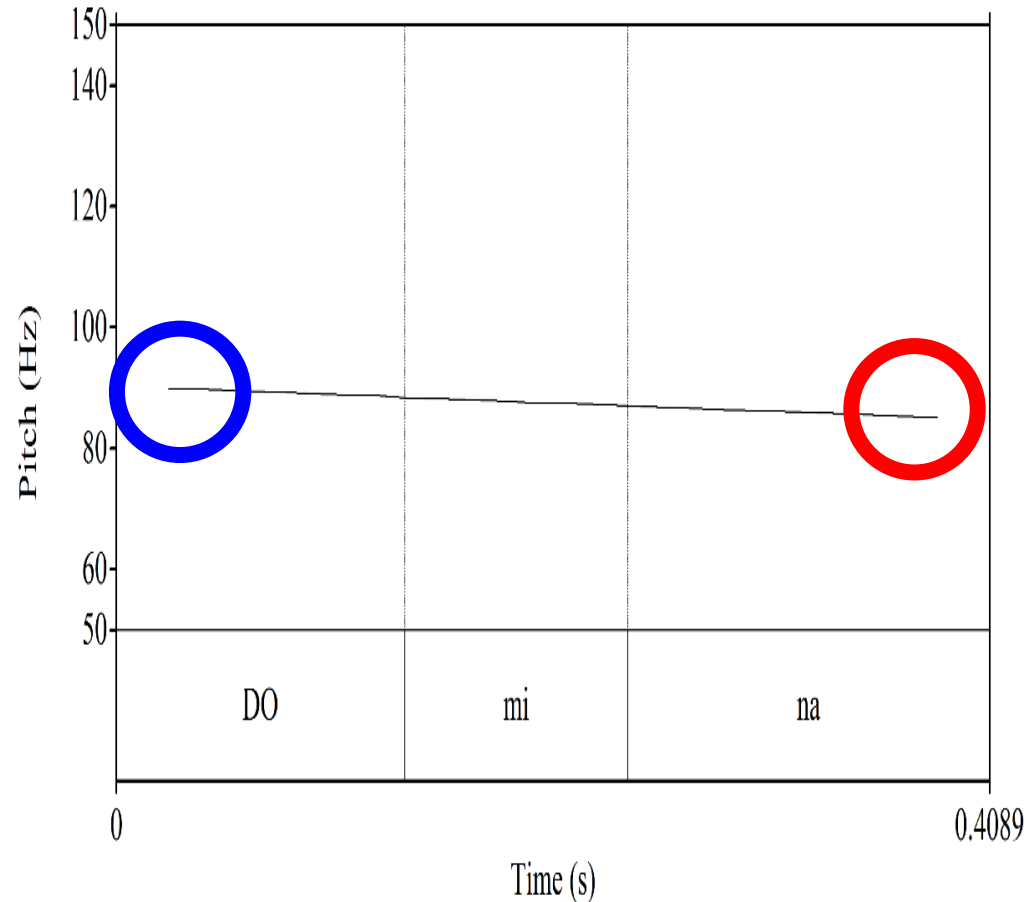


[Flat] stimuli

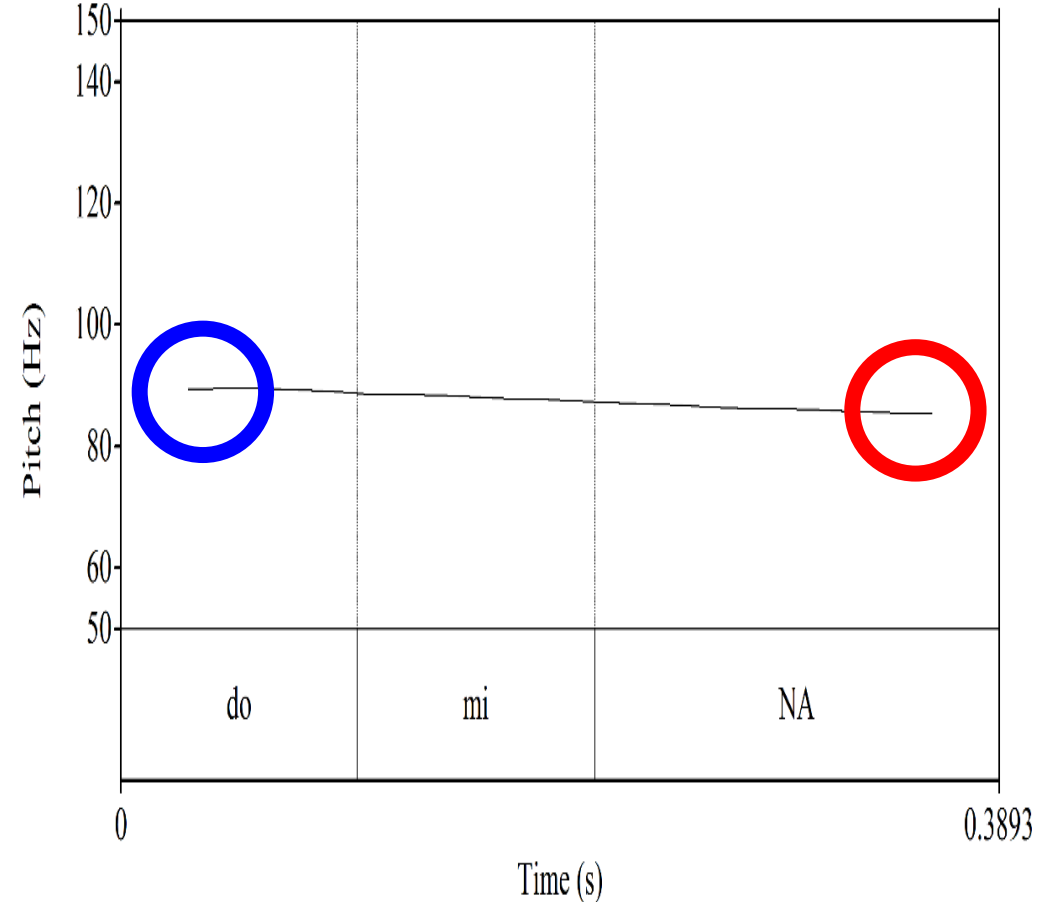
90 Hz: The average of the F0 of the initial syllables of the *DOminating*-type words and tat of the *domiNAtion*-type words.

85 Hz: The average of the F0 of the stem-final syllables of the *DOminating*-type words and tat of the *domiNAtion*-type words.

DOmina-



domiNA-





dóminating

dominátion

Stimuli presentation

- There were 3 blocks ([Natural 2 Syl], [Natural 3 Syl], [Flat 3 Syl]).
- Each stimulus was presented three times in the same block, and the presentation order of the stimuli was randomized in each block.

Presentation order of the blocks

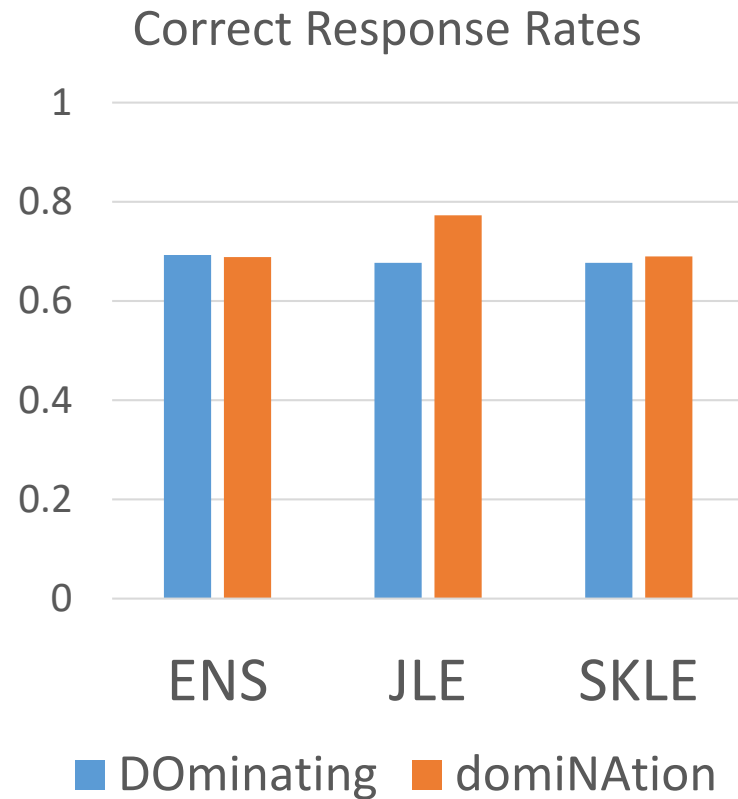
(F) → **<three-syllable: Natural>** → **<two-syllable: Natural>** → (O) → (F)
→ **<three-syllable: Slightly Slanting>** → (O) → (O) → (F)

F = blocks with full word stimuli (noun-verb minimal pairs) used in Sugahara (2016a)

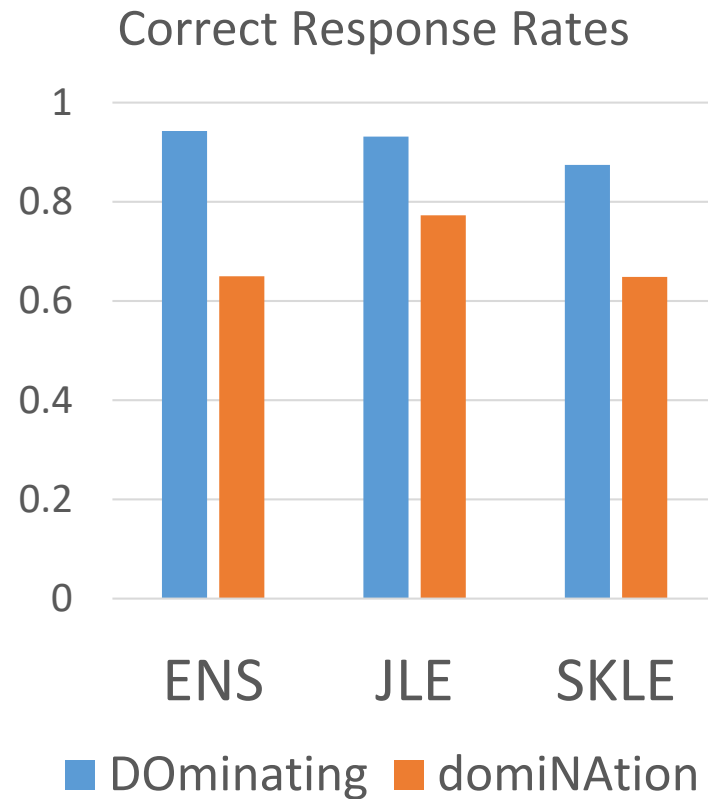
O = blocks of other truncated words

- Throughout the three conditions, the correct resp rates of **JLE's *domiNAtion*** were always higher than ENS's and SKLE's.
- The **3-syl conditions** have some factor to induce **bias towards *DOminating* (initial stress)**.

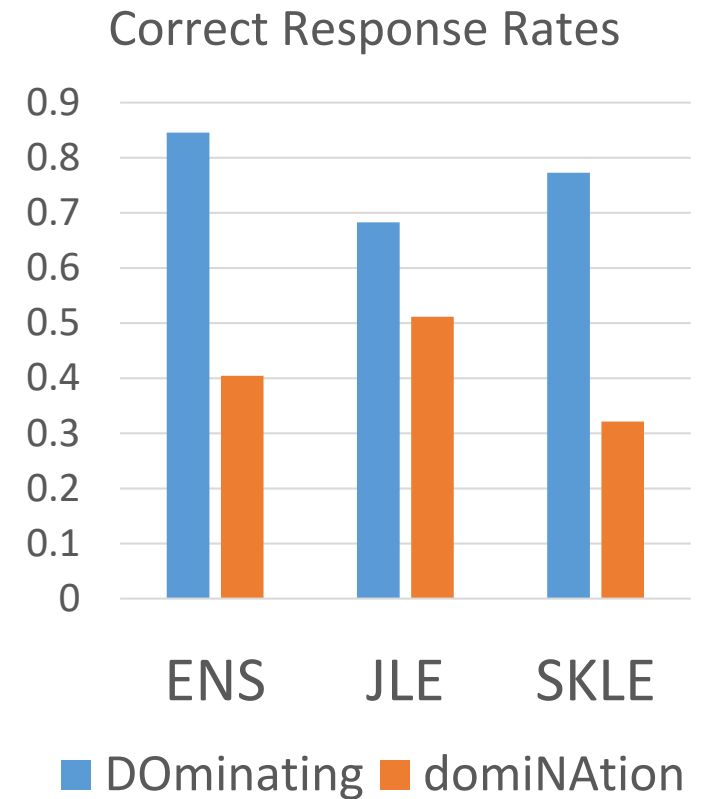
2-Syl Natural



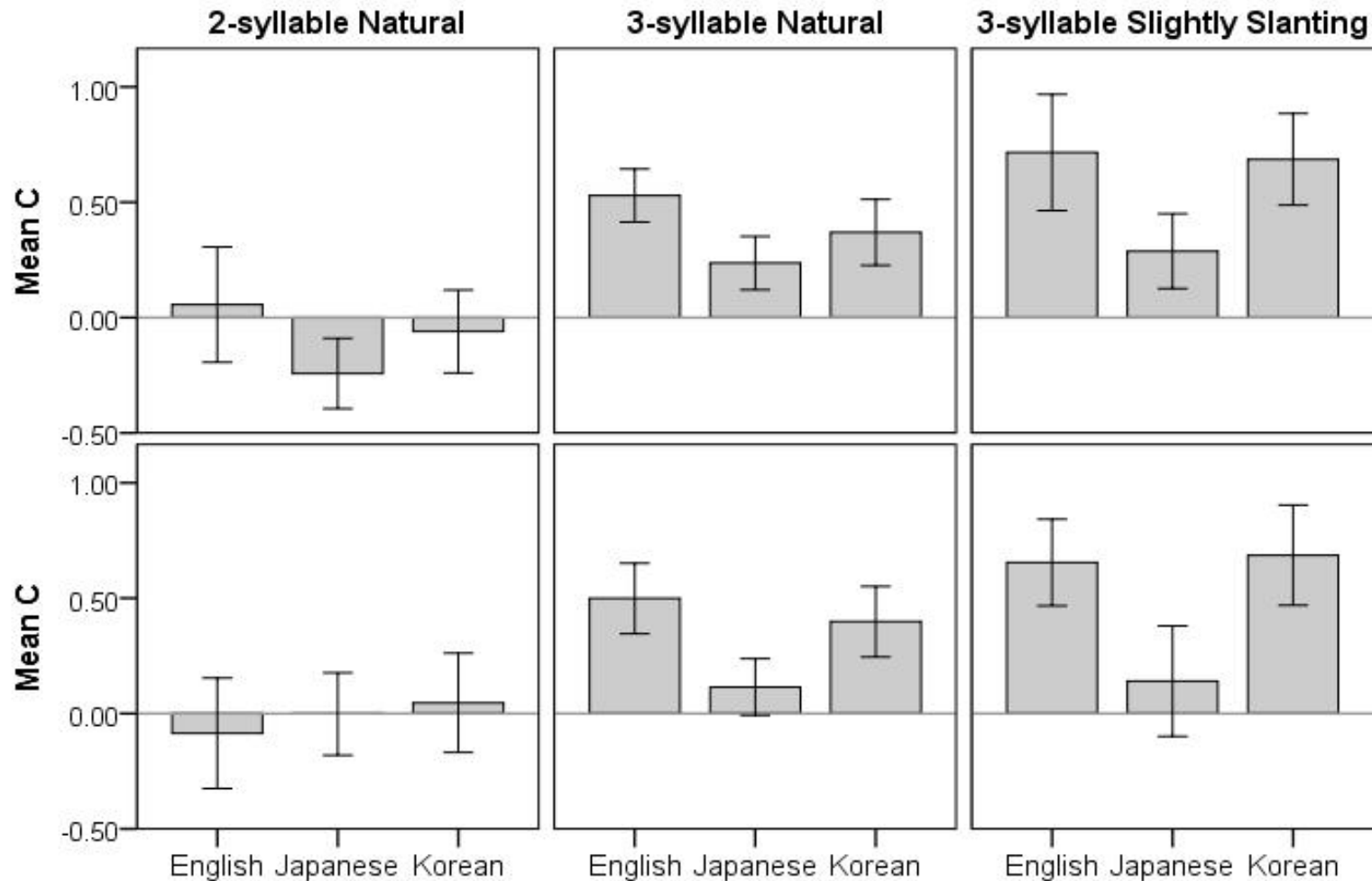
3-Syl Natural



3-Syl Flat



- To see if the JLE's **less bias towards initial stress (*DOminating*)** is statistically significant, a **bias measure 'c'** (Macmillan & Creelman, 1990, 2005) was obtained for each listener in each stress and each F0 condition.



The *-ing* form more frequently occurs than the *-ion* form. e.g., *agita-*, *alloca-*, *calcula-*, *celebra-*, *complica-*, *concentra-*, *dedica-*, *domina-*, etc.

The frequency of the *-ing* form and that of the *-ion* form are equal. e.g., *activa-*, *captiva-*, *conjuga-*, *estima-*, *mitiga-*, etc.

- A two-way ANOVA on the *c* values was conducted separately for each of the three blocks.
- Dependent variable: *c*
- Fixed factors: '**language groups**' (English, Japanese, Seoul Korean)
 '**frequency**' (*[-ing < -ion]* vs. *[-ing = -ion]*)
 - [Natural 2 syl]: n.s.
 - [Natural 3 syl]: **only the main effect of language groups was significant** ($F(2, 150) = 13.42, p < .001$), and no significant interaction between the two factors was present.
 - [Flat 3 syl]: **only the main effect of language groups was significant** ($F(2, 150) = 14.88, p < .001$).

Even in the **3-syl cond**, **JLE** were **significantly less biased towards initial stress** than ENS and SKLE.

➔ **What induced JLE's less bias to *DOminating* (initial stress) and their preference for more *domiNAtion* (stem-final stress) than ENS and SKLE?**

- One possible way to think about this is that JLE are affected by their statistical knowledge about Japanese accent locations or their knowledge about the accent patterns of Japanese morphologically complex forms.

A New Question

- Do **JLE** prefer **more non-initial stress** than **SKLE** even when they **assign stress to written words (base forms vs. derived/inflected forms)**?

Sugahara (2020):

**Stress Assignment Study with a
Questionnaire-based Task**

Sugahara (2020)

- Participants were presented with English words written on questionnaire sheets and
- asked to write down a stress mark above the vowel of the syllable they considered primarily stressed. (If they thought that there was no stress in the word, they were requested to write down “no stress”.)

Sugahara (2020)

- Data obtained from **22 JLE** and **10 SKLE** were analyzed.
- Their CEFR levels are the following:

CEFR level	B1	B2
JLE	17	5
SKLE	6	4

Sugahara (2020)

- Words used in the study:

- **Group 1:** 23 triplets

e.g.

Base		Stress-Neutral		Stress-Shifting
<i>dominate</i>	–	<i>dominating</i>	–	<i>domination</i>
<i>prosecute</i>	–	<i>prosecuting</i>	–	<i>prosecution</i>

- **Group 2:** base forms and suffixed words with stress-shifting *-al* or *-ic* (6 pairs)

	Base		Stress-Shifting
e.g.	<i>parent</i>	–	<i>parental</i>
	<i>alcohol</i>	–	<i>alcoholic</i>

- **Group 3:** base words with non-initial stress (5 words: control)

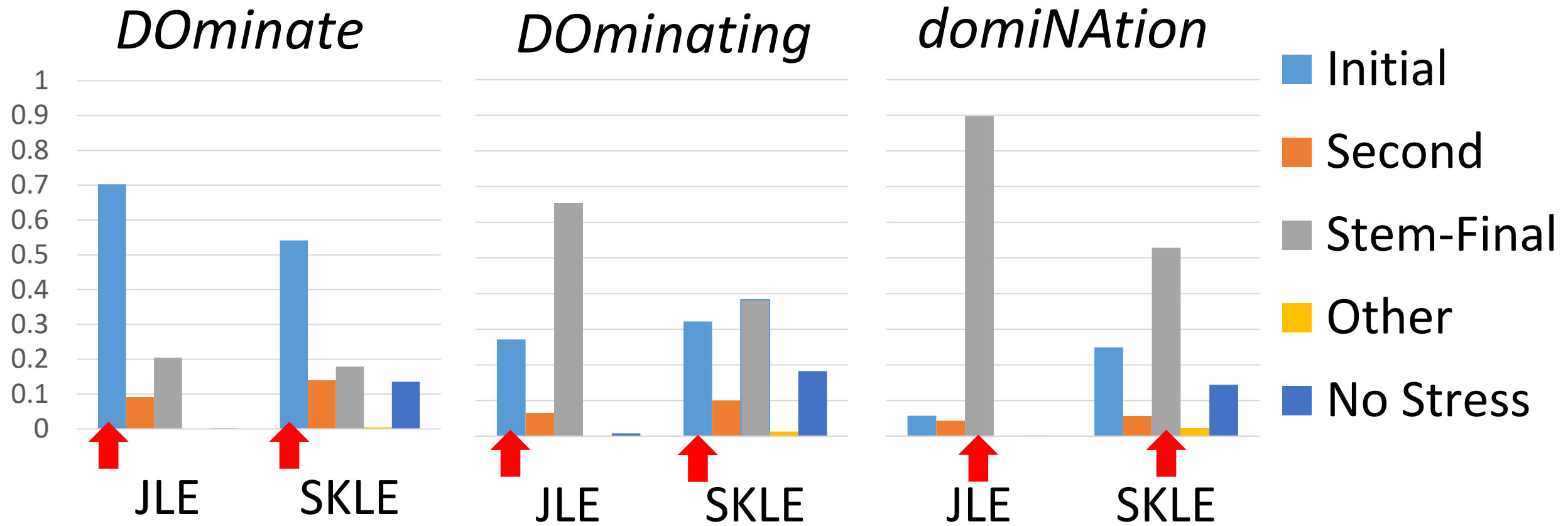
e.g. *agenda*, *veranda*, *obey*

- In Sugahara's (2020) paper, analyses were **separately conducted** for the words which the participants answered that **they knew** and those which they answered that **they did not know**.
- However, the two analyses gave exactly **the same results**. Therefore in this presentation, they are **converted into one**.



Results: Group1

Correct stress positions = red arrows



Initial S: JLE > SKLE *

No S: SKLE > JLE *

St-Fin S: JLE > SKLE *

No S: SKLE > JLE *

Initial S: SKLE > JLE *

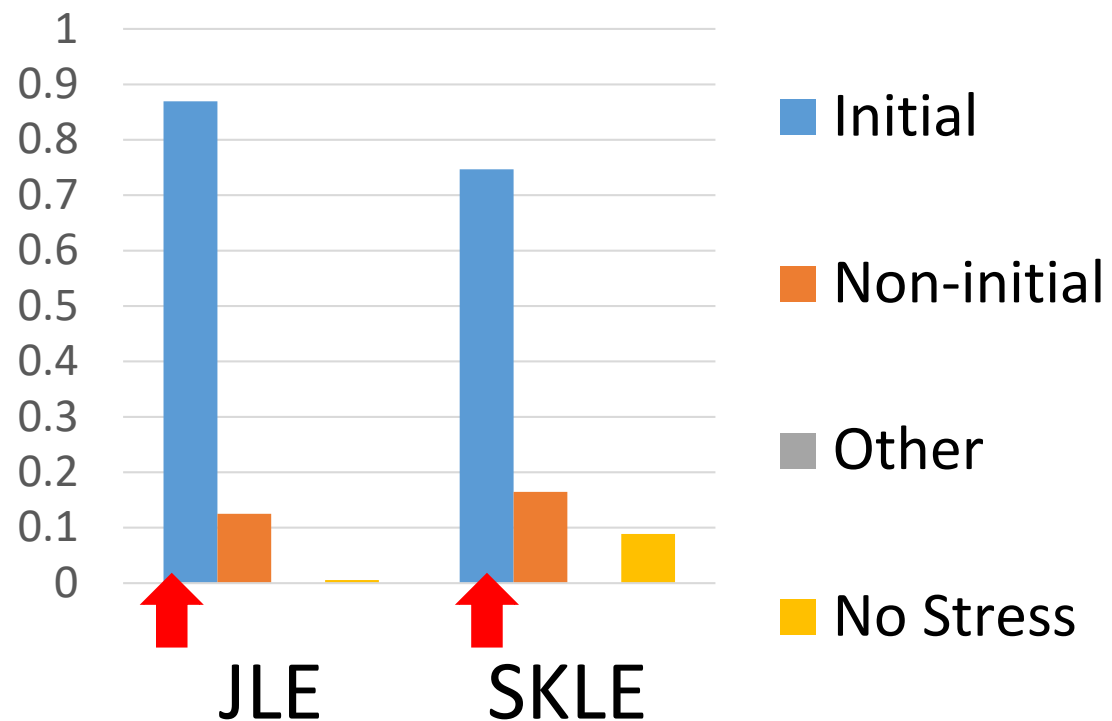
St-Fin S: JLE > SKLE *

No S: SKLE > JLE *

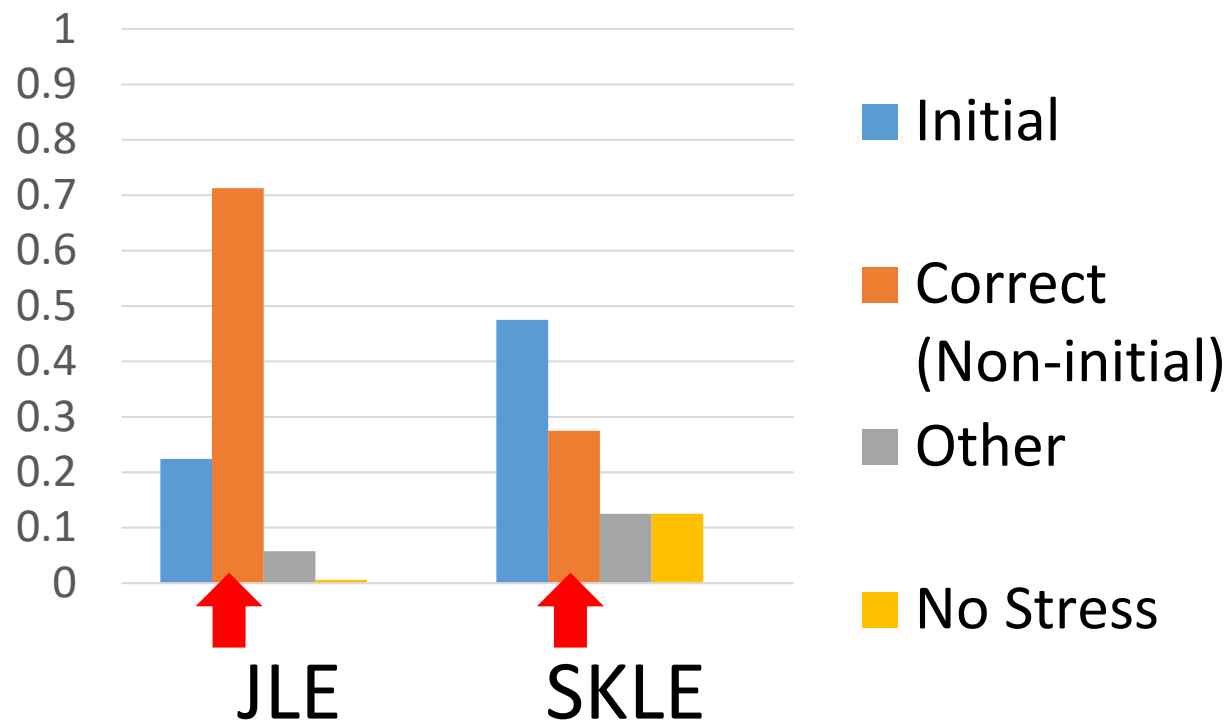
Results: Group2

Correct stress positions = red arrows

PArent, ALcohol



paREntal, alcoHolic



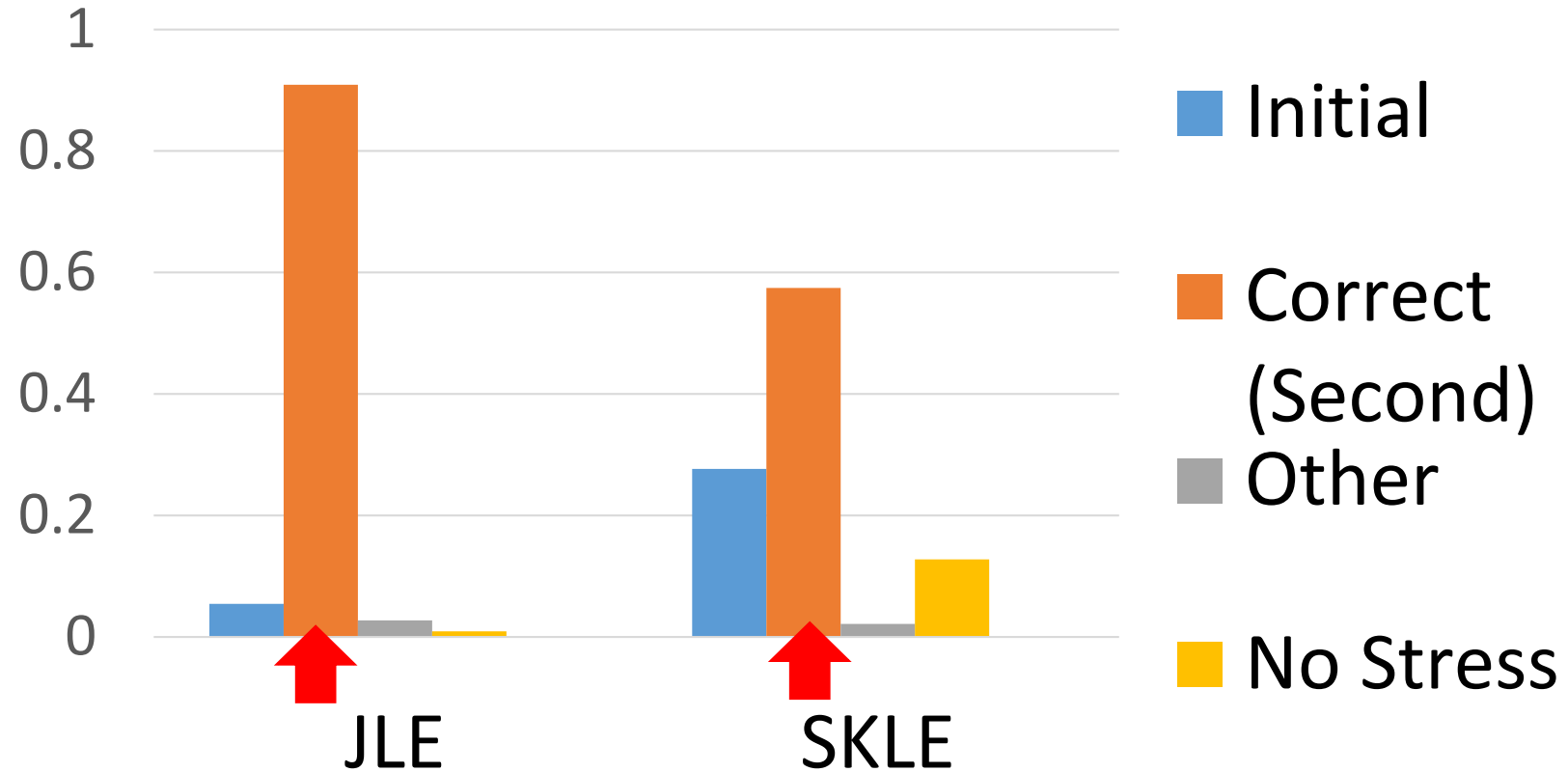
Initial S: SKLE > JLE *

Correct: JLE > SKLE *

Results: Group3

Correct stress positions = red arrows

veRANda



Initial S: SKLE > JLE *

Correct: JLE > SKLE *

Discussion

<Base words>

- Throughout Groups 1 to 3, both JLE and SKLE preferred the **correct stress patterns most frequently** regardless of whether or not the correct stress was word-initial.
- Nonetheless, **JLE were significantly better than SKLE** in identifying the correct stress locations in Group 1 and Group 3.
- This result indicates that **JLE are more sensitive to lexical stress locations in English** than SKLE when they learn the stress patterns of English base words.
- It is because **Japanese is a lexical accent language**. That the native speakers of languages with lexical stress/accent is more sensitive to lexical stress in L2 has been reported by Dupoux et al. (1997) and Peperkamp & Dupoux (2002), and our results are in line with their findings.

Discussion

Dupoux, Pallier, Sebastian & Mehler (1997)

- They investigated how the presence/absence of lexical stress contrast in L1 affects listeners' perception of L2 stress.
- They have shown that
 - **Spanish listeners** who **have lexical stress contrast in their L1** were good at discriminating non-native words that formed a minimal pair in terms of stress locations in ABX perception tasks which required relatively heavy memory,
 - **French listeners** who **lack lexical stress contrast in their L1** had difficulty in doing so.

Discussion

“**Stress Parameter**” proposed by Peperkamp & Dupoux (2002):

- **Speakers of L1 with lexical stress/accent:** The stress parameter is set such that lexical stress/accent information is **encoded in their phonological representation** because it is useful in their languages.
- **Speakers of L1 without lexical stress/accent:** the parameter is set such that the information is **not encoded in the representation** because it is not useful in their languages.
- **The stress parameter of speakers’ L1 affects their learning of L2 lexical prosody systems.**

Discussion

<Derived/Inflected words>

- **JLE preferred more “stress-shift” (=non-initial stress)** than SKLE regardless of whether the suffix was stress-neutral or stress-shifting.
- Japanese is a language in which the **lexical accent tends to move near to morpheme boundaries in complex words.**
- Given this, it may be easier for JLE to learn the stress-shifting rules of English suffixes, and they even **overapply such stress-shifting rules to stress-neutral suffixes in English.**

Discussion

An additional finding:

- Some SKLE preferred **no stress** across all word sets.
- Probably it is due to their stress parameter setting preventing some of them from learning English lexical stress system.

Conclusions

- **JLE and SKLE behave differently** in their perception and assignment of **English lexical stress**.
- **JLE prefer more non-initial stress in derived/inflected words than SKLE**, being influenced by the **lexical prosody system in their L1** that lexical accent tends to move near to morpheme boundaries.
- The **L1 stress parameter setting of SKLE** may make it difficult for some of them to learn the stress patterns in L2 (English).
- A future study: JLE's and SKLE's production of the words used in Sugahara (2016b) will be analyzed, and see whether there is consistency between their performance in the questionnaire study and that in production.

Acknowledgments

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Thank you for listening

ご清聴ありがとうございました

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