

# The role of memory on the individual differences in acquiring L2 pronunciation skills

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PronSIG at IATEFL

# Outline

1. Individual differences in L2 pronunciation
2. Aptitude factors
3. My research: the role of phonological memory capacity
4. Pedagogical suggestions

## Individual differences in L2 pronunciation

- Different learners show different levels of mastery of the target language
- Proficiency level of other language skills (vocabulary, grammar, reading, writing) can predict pronunciation skills? → **Not always...**
- Pronunciation skills involve some other ability than IQ? → **Probably yes...**

# Individual differences in L2 pronunciation

Age of onset

Linguistic differences

Personality

Gender

Motivation

Aptitude

# Aptitude factors

## **Language aptitude** (Carroll, 1981)

- ✓ Phonetic coding ability (PCA) : a capacity to code unfamiliar sound so that it can be retained over more than a few seconds and subsequently retrieved or recognized
- ✓ Grammatical sensitivity
- ✓ Rote learning ability
- ✓ Inductive language learning ability
- PCA → Germans' L2 pronunciation skills (Hu et al., 2013)

# Aptitude factors

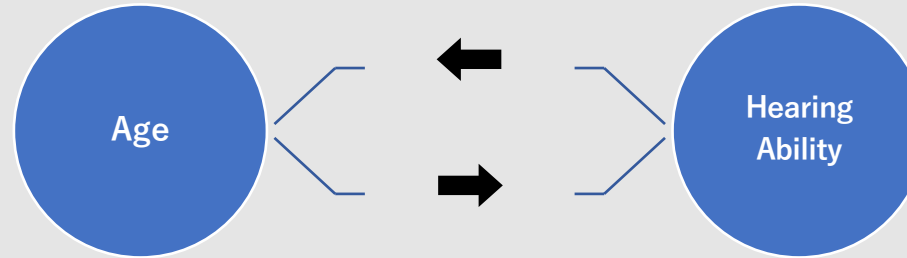
## **Perception ability**

- Perception skills: prerequisite for the production of targeted language sounds (Flege, 2003; Hosomura, 2005).
- Perception skills → Production skills (Derwing, Munro, and Wiebe, 1997) .

# Aptitude factors

## Perception ability: Age

- As people get older, their hearing ability becomes weaker (Okamoto, Shitara, Momiyama, Hirayama, & Ishii, 1989; Staiano, 2007; Tsuiki et al., 2002).
- Hearing loss starts during adolescence (Takahashi et al., 1996)



- Critical period hypothesis (Lenneberg, 1967; Scovel, 1988)

# Aptitude factors

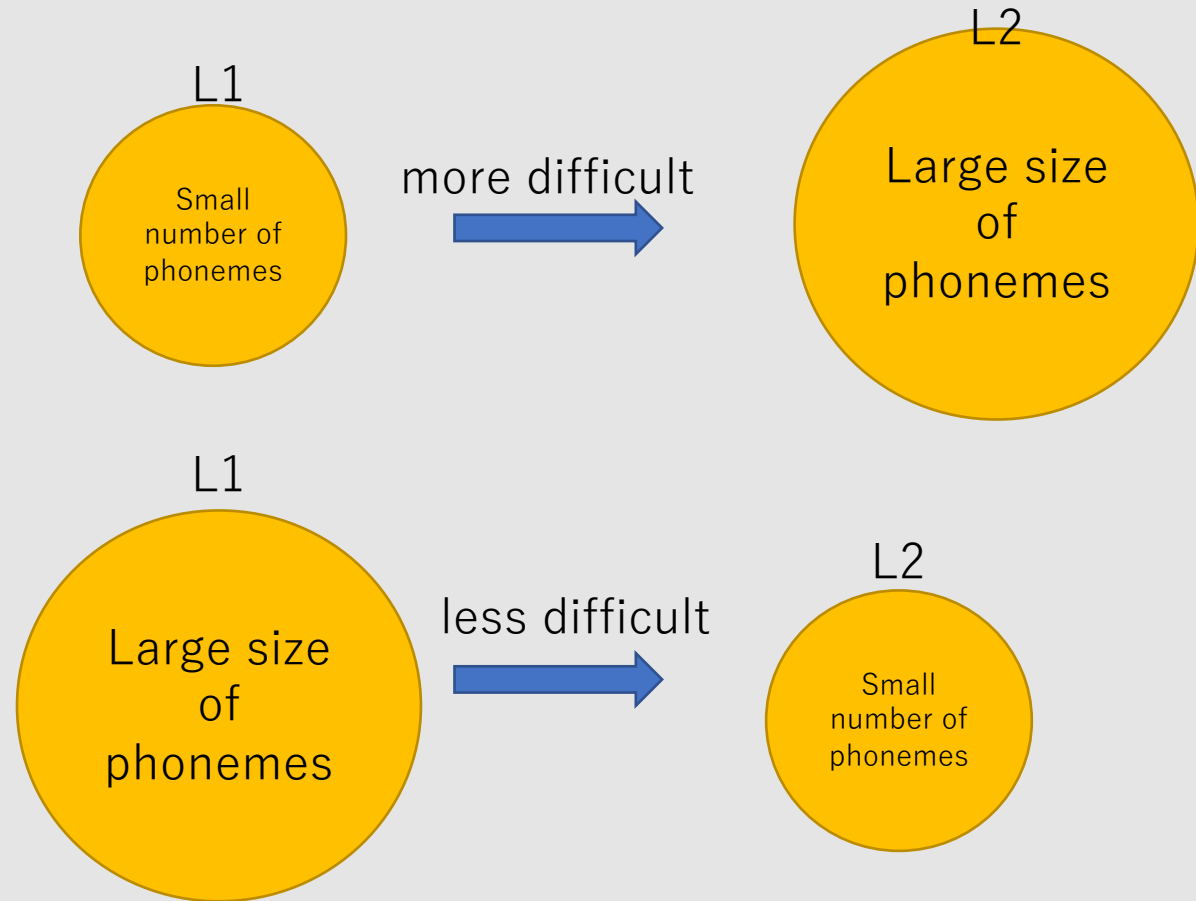
## **Perception ability: Passband**

- Passband : the range of frequencies that a language predominantly uses.
- Different languages have different unique “passbands” (Murase, 1998).
  - ✓ English: 2,000 hertz ~ 12,000 hertz
  - ✓ Japanese: 125 hertz ~ 1,500 hertz



# Aptitude factors

## Perception and articulation ability: segmentals



# Aptitude factors

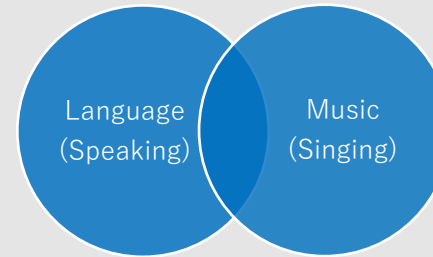
## **Articulation ability**

- Speech motor-control ability (Hu et al., 2013)

# Aptitude factors

## Musical ability

- Structural similarity between language and music, (Tanaka and Nakamura, 2004; Mora, 2000)



- Brain studies (Griffiths, Johnsrude, Dean, & Green, 1999; Schön et al., 2010)
- Musical ability and L2 pronunciation (Milovanov, Pietilä, Tervaniemi, and Esquef (2010) Slevc and Miyake (2006)



# My Research

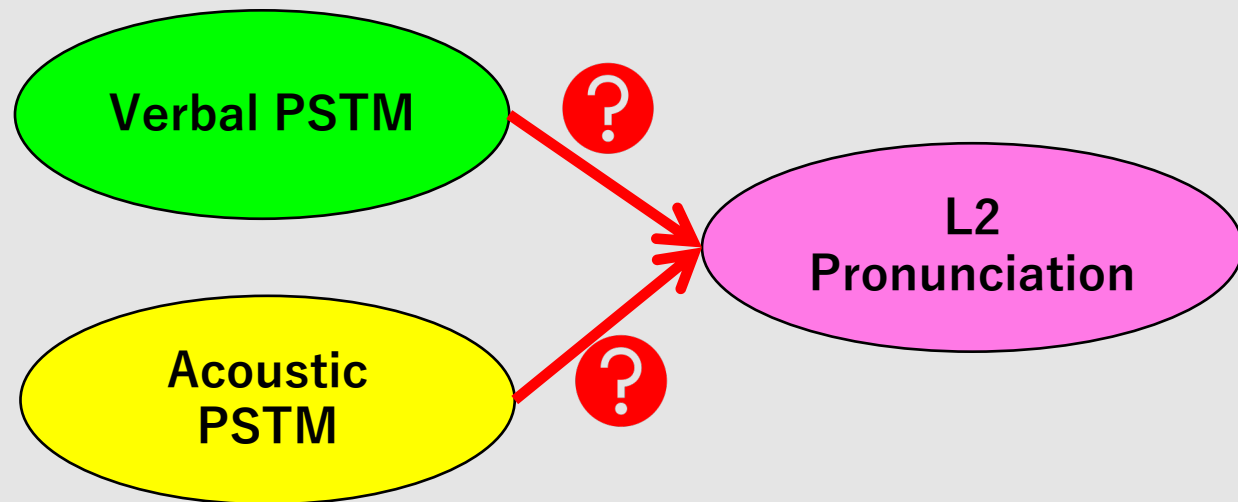
1. Effects of Verbal and Acoustic PSTM
2. Working memory vs. Motivation

# Research 1

**PSTM (Verbal and  
Acoustic) and L2  
Pronunciation**

# The purpose of this study

To investigate the influence of phonological short-term memory capacity on Japanese EFL learners' L2(English) pronunciation skills.



# Methods

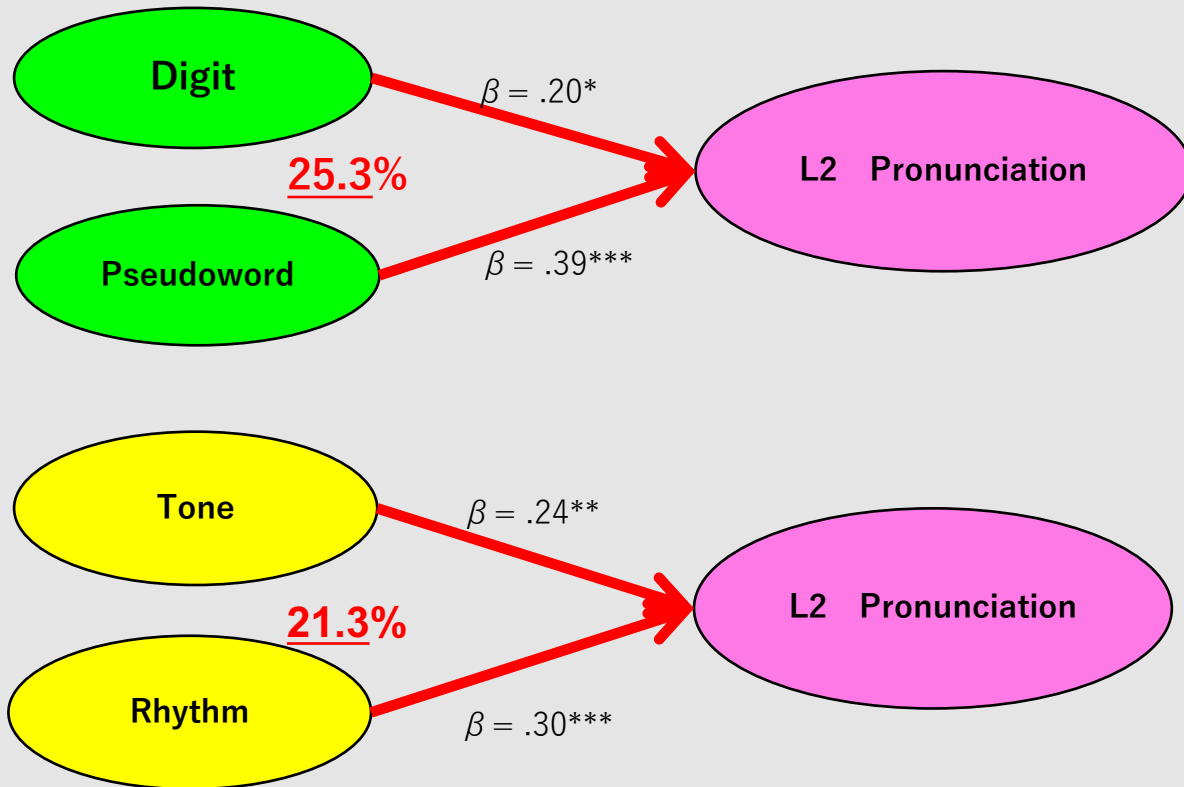
## Participants

- 156 Japanese EFL learners (18 – 23)
- Intermediate L2 proficiency

## Instruments

- **Verbal PSTM**: L1-based digit memory span test, pseudoword memory span test
- **Acoustic PSTM**: Tonal memory span test, Rhythm memory span test
- **L2 pronunciation**: Word and sentence reproduction test

# Summary of the results



RQ1

How much does **verbal** PSTM memory affect L2 pronunciation skills?

--> 25.3%

RQ2

How much does **acoustic** PSTM affect L2 pronunciation skills?

--> 21.3%

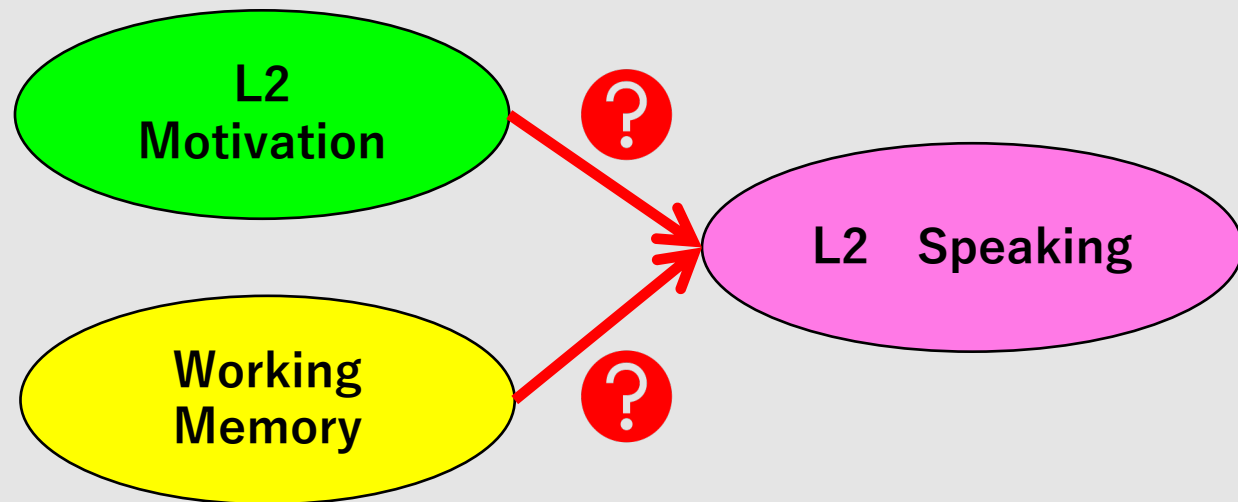


# Research 2

**Aptitude  
vs.  
Motivation**

# The purpose of this study

The purpose : to investigate the extent to which two different variables (L2 motivation and working memory capacity) explain the variance in L2 speaking skills by Japanese EFL learners (Kondo, 2021a).



# Methods

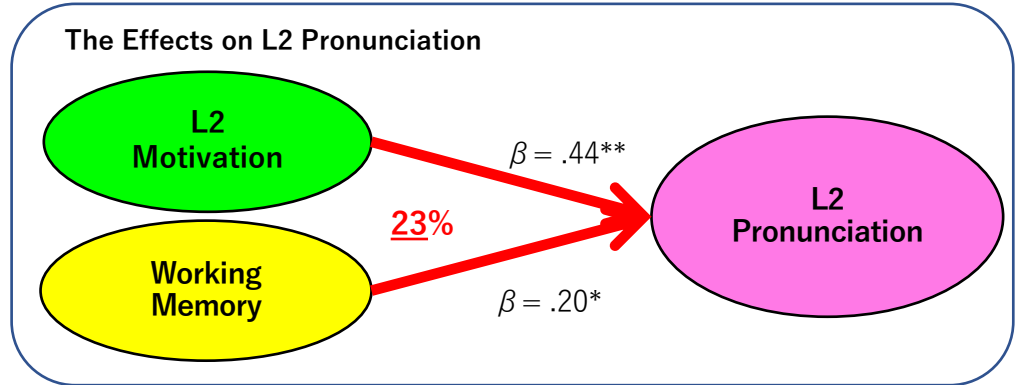
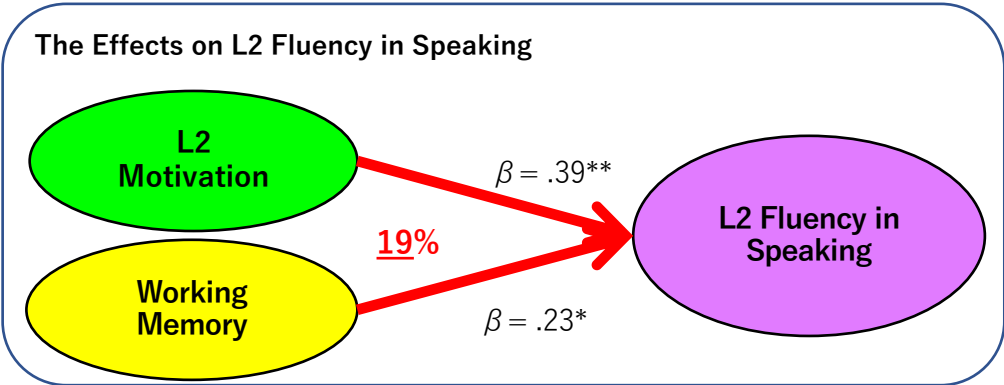
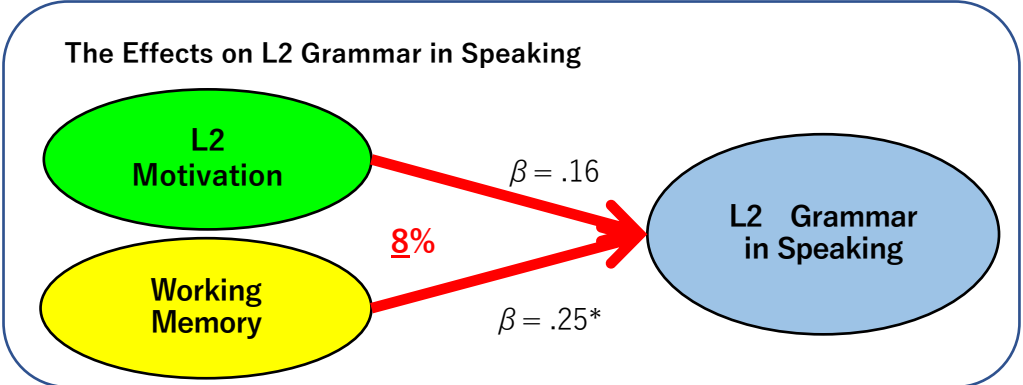
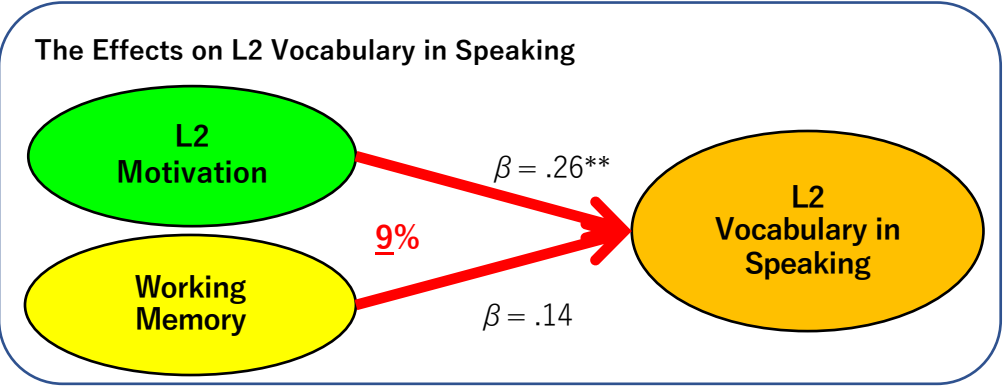
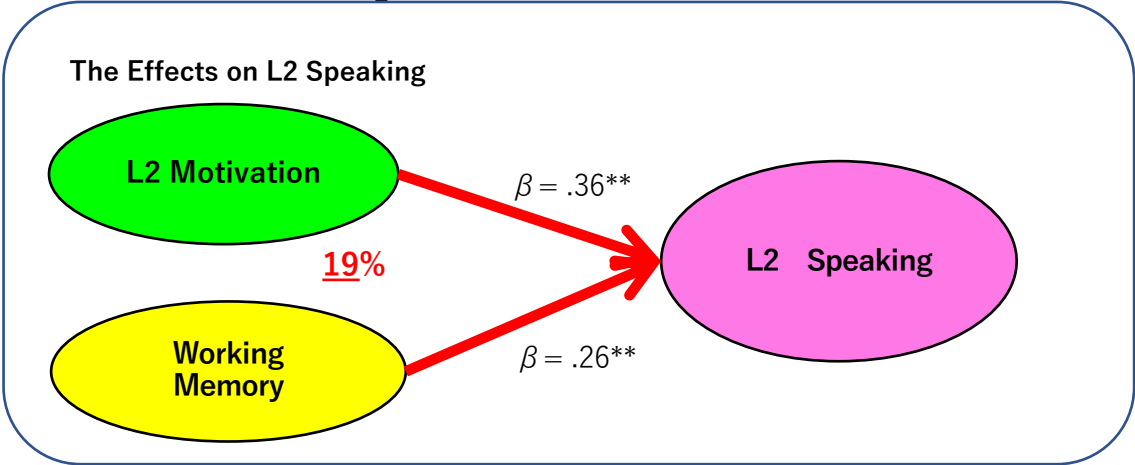
## Participants

- 111 Japanese EFL learners
- 18 - 26 years old

## Instruments

- **L2 Speaking Skills**: Versant® Speaking Test
- **L2 Motivation**: Survey of English Learning Motivation
- **Working Memory Capacity**: L1-based Listening Span Test

# Summary of the Results





# Pedagogical Suggestions

- Focus of instruction: segmentals and suprasegmentals
- Teachers' native language
- Using authentic media
- Using computer software
- Teaching framework

# Pedagogical Suggestions

## Focus of instruction



### Suprasegmentals

- Anderson-Hsieh, Johnson & Koehler (1992)
- Hahn (2004)
- Field, (2005)
- Van den Doel, (2006)



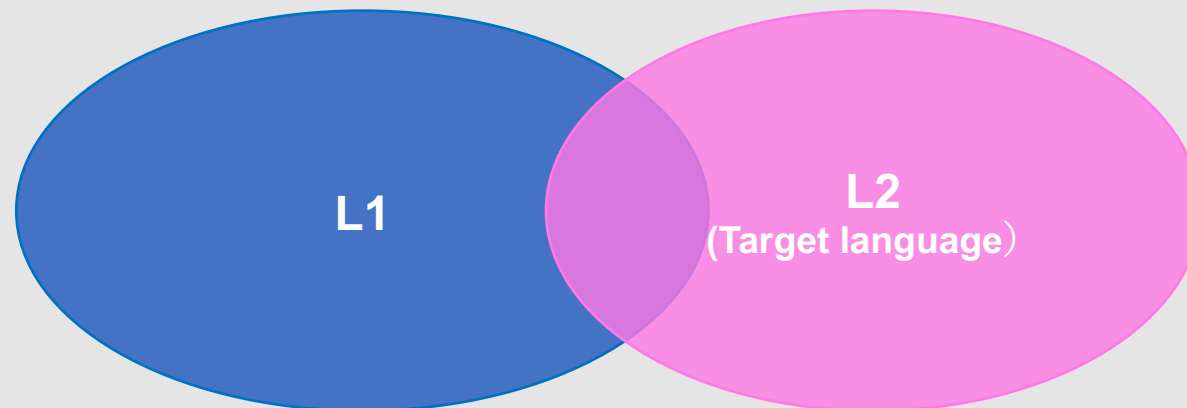
### Segmentals

- Kashiwagi & Snyder (2008, 2014)

# Pedagogical Suggestions

## Focus of instruction —language combination

- L1 and the target language combination (Szpyra-Kozłowska & Radomski, 2012; Radomski & Szpyra-Kozłowska, 2014)



# Pedagogical Suggestions



**Focus of instruction**—Type of speakers with whom learners communicate

- Speech process pattern (Jenkins, 2000).
  - ✓ native speakers → top-down
  - ✓ non-native speakers → bottom-up
- Instructional priority (Rogerson-Revell, 2011)
  - ✓ Segmental instruction: students who expect to have more opportunities to communication with non-native English speakers
  - ✓ Suprasegmental instruction : learners who are planning to study in English-speaking countries (e.g., the US or UK).



# Pedagogical Suggestions



## Focus of instruction—Instructional effectiveness

- The type of speech task (Saito, 2012)
  - ✓ Focus-on-form type of instruction
  - ✓ Focus-on-meaning type of instruction
- Cognitive resources (working memory)



# Pedagogical Suggestions

## Teachers' native language

- ✓ Native speaking teachers: providing native speech sounds, evaluating intelligibility and comprehensibility of students' pronunciation
- ✓ more intuitive → young learners 
- ✓ Non-native speaking teachers: understanding or anticipating or detecting their students' problems, knowing how to address problems
- ✓ procedural explanations → adult learners 

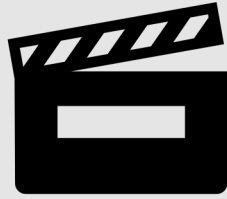
→ Team-teaching

# Pedagogical Suggestions

## **Cognitive link between visual and audio**

- Importance of presenting visual information in teaching pronunciation (Hayashi & Sekiyama, 1998)
- Audio-visual training is more effective than audio training (Hazan, Sennema, Iba, & Faulkner, 2005)
- McGurk effect : multisensory illusion occurring with audio-visual speech (McGurk and MacDonald, 1976)

# Pedagogical Suggestions



## Using films

- Large amount of exposure of authentic audio-visual information
- Speaker's mouth movement → segmental features
- Language with context → suprasegmental features
- More interesting and motivating materials (Kondo, 2009, 2021b)

# Pedagogical Suggestions



## **Using songs**

- Cognitive link between language and music
- Activity for Japanese EFL learners: 'Twinkle Twinkle Little Star' (Takahashi, et. al, 2020)

# Activity for Japanese EFL learners: 'Twinkle Twinkle Little Star'

(Takahashi, et. al, 2020)

Japanese version

ki ra ki ra hi ka ru

The musical notation for the Japanese version is written on a single staff in 4/4 time. It consists of seven notes: a quarter note on G4, a quarter note on F4, a quarter note on E4, a quarter note on D4, a quarter note on C4, a quarter note on B3, and a half note on A3. The lyrics 'ki ra ki ra hi ka ru' are aligned under the notes.

English version

twin- kle twin-kle lit- tle star

The musical notation for the English version is written on a single staff in 4/4 time. It consists of seven notes: a quarter note on G4, a quarter note on F4, a quarter note on E4, a quarter note on D4, a quarter note on C4, a quarter note on B3, and a half note on A3. The lyrics 'twin- kle twin-kle lit- tle star' are aligned under the notes.

Edited English version

twin- kle twin- kle lit- tle star

The musical notation for the Edited English version is written on a single staff in 4/4 time. It consists of seven notes: a quarter note on G4, a quarter note on F4, a quarter note on E4, a quarter note on D4, a quarter note on C4, a quarter note on B3, and a half note on A3. The lyrics 'twin- kle twin- kle lit- tle star' are aligned under the notes.

# Pedagogical Suggestions



## Using computer software

- Ami Voice Call: diagnosis, visual feedback

# Pedagogical Suggestions

## AmiVoice CALL -pronunciation-

← メインメニューに戻る

発音 評定

Standard Edition

LOAD

中学文法

06. I found a river in the forest.

I found a river in the forest.

森の中で川を見つけた。

和訳

総合評価



「ə:r」の発音が、日本語の「あ～」の発音になっています。



語尾の「t」の後に、日本語の母音の「お」の音が入っています。



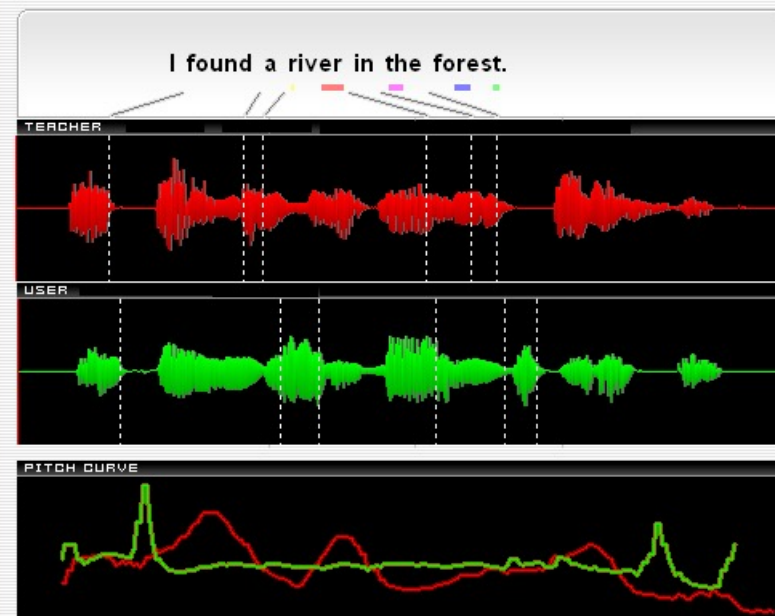
「r」の発音が、日本語の「ラ行」の発音になっています。



「r」の発音が、日本語の「ラ行」の発音になっています。



「ə」の発音が、日本語の「ザ行」の発音になっています。



発話開始

戻る

次へ

再生

同時に再生

再生

表示切替

まだまだです。 録音音声を聞いて練習しましょう。

過去の練習履歴





# Pedagogical Suggestions



## Using computer software

- Ami Voice Call: diagnosis, visual feedback
- Learners' motivation, autonomy and self-regulation

Set a target pronunciation features



Help them recognize their progress (log, meeting)



Enhance their intrinsic motivation

# Pedagogical Suggestions



## **Teaching framework** (Celce-Murcia et al., 2010)

- Discourse-level instruction:
  - ✓ meaning-focused communication tasks in near-real communicative contexts
- Working memory to pay attention to their pronunciation

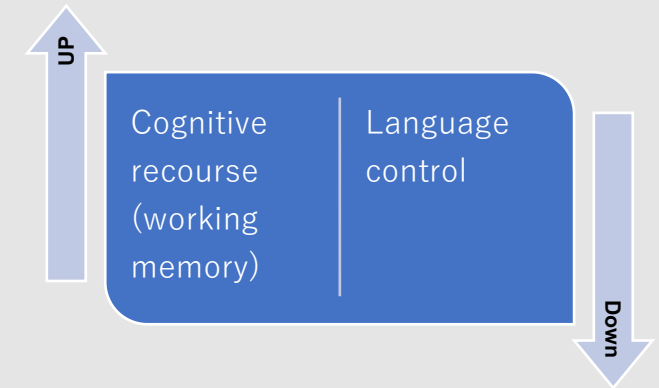
# Pedagogical Suggestions



## Teaching framework (Celce-Murcia et al., 2010)

### Five stages

- (1) Description and analysis
- (2) Listening discrimination
- (3) Controlled practice**
- (4) Guided practice**
- (5) Communicative practice**



The lesson  
plan for  
teaching  
sentence  
prominence

Target feature: **Sentence prominence**

Material: Legally Blonde (2001)

1. Description and analysis
2. Listening discrimination
3. Controlled practice
4. Guided practice
5. Communicative practice

# Legally Blonde (2001)

**WARNER: Elle, one of the reasons I wanted to come here tonight was to discuss our future.**

ELLE: And I'm fully amenable to that discussion.

**WARNER: Good. You know we're having all kinds of fun lately. Well, Harvard is going to be different. Law school is a completely different world...and I need to be serious.**

ELLE: Of course.

**WARNER: I mean my family expects a lot from me. And I expect a lot from me. I plan on running for office some day.**

ELLE: And I fully support that, Warner. You know that, right?

**WARNER: Absolutely. But the thing is, if I'm going to be a senator by the time I'm thirty — I need to stop dicking around.**

ELLE: Oh, Warner, I completely agree.

**WARNER: That's why I think it's time for us to—Elle, pooh bear.**

(ELLE: I do. / WARNER: I think we should break up.)

ELLE: What?

# The lesson plan for teaching sentence prominence

## 1. Description and analysis

- Explain the rules or patterns of the target feature, sentence prominence
- Have them guess the sentence prominence without sound.

## 2. Listening discrimination

- Have them check the sentence prominence with sound.

## 3. Controlled practice

- Repeating/ shadowing practice
- Role play

# The lesson plan for teaching sentence prominence

## 4. Guided practice

- Q and A about the dialogue
  - ① Q. Why did Warner want to meet her?  
A. He wanted to **(discuss)** his future, and **(break)** up with her.
  - ② Q. Who expects a lot from Warner?  
A. His **(family)** expects a lot from him, and **(he)** expects a lot from himself.
  - ③ Q. If he is going to be a senator, who does Warner need to marry?  
A. He needs to marry a person like **(Jackie)**, not a **(Marilyn)**.
  - ④ Q. What did Elle expect Warner to do that night?  
A. She thought he was **(proposing)** her.

## 5. Communicative practice

- Situation role play 1: Breaking up with your boy/girl friend.
- Situation role play 2: Proposing your boy/girl friend

# Conclusion

Language teachers should ...

- understand that students' low performance is not always because of the lack of effort
- understand individual factors affecting their students' speech
- design their instructional methods accordingly.



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