Learners' Proficiency and Lexical Encoding of the Geminate / Non-geminate Contrast in Japanese

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Introduction

- Japanese has a length contrast both in consonants and vowels and that is phonemic
  - *kata* “shoulder” vs. *katta* “won”
  - *koto* “Japanese harp” vs. *kooto* “coat”
- Geminate is represented as っ in hiragana (e.g. きって = *kitte* “postal stamp”)
- Geminate is moraic

Research Question

- **Can learners lexically represent this L2 distinction (geminate vs. non-geminate) as native speakers do?**

- **Goal of this study:**

Investigate the acquisition patterns for **length contrasts** from both **categorization** and **lexical encoding** perspectives.

Research background

- The length contrast has been shown to be difficult to learn when it is not in learners' L1 (Han 1992).
- The contrast of geminate and non-geminate has been widely studied in various perspectives;
  - Production: Han (1992)
  - Perception: Hardison and Motohashi-Saigo (2010)
  - Training: Tajima et al., (2008)

Research background

- Focus of previous studies:
  discrimination and categorization

- **Less extensively explored**:
  The degree to which this contrast is encoded in learners' lexical representations (e.g. Hayes-Harb & Masuda, 2008)

- **Focus of this study: explore** categorization and lexical encoding abilities of L2 learners at different levels of proficiency: Does successful lexical encoding follow from accurate perception of the contrast?

Lexical encoding

- Representing phonological form of a word into the mental lexicon.
- Storing the information into long-term memory.

Participants

	Number of Participants	First language
Beginners	9	English
Advanced Learners 3rd or 4th year level or associate instructors	14	English
Native Speakers	11	Japanese
Total	34	

Tasks

(1) ABX-using length

→ Using geminate / non-geminate contrast

(2) ABX-ignoring length

→ Ignoring distinction in geminate / non geminate contrast

(3) Lexical decision

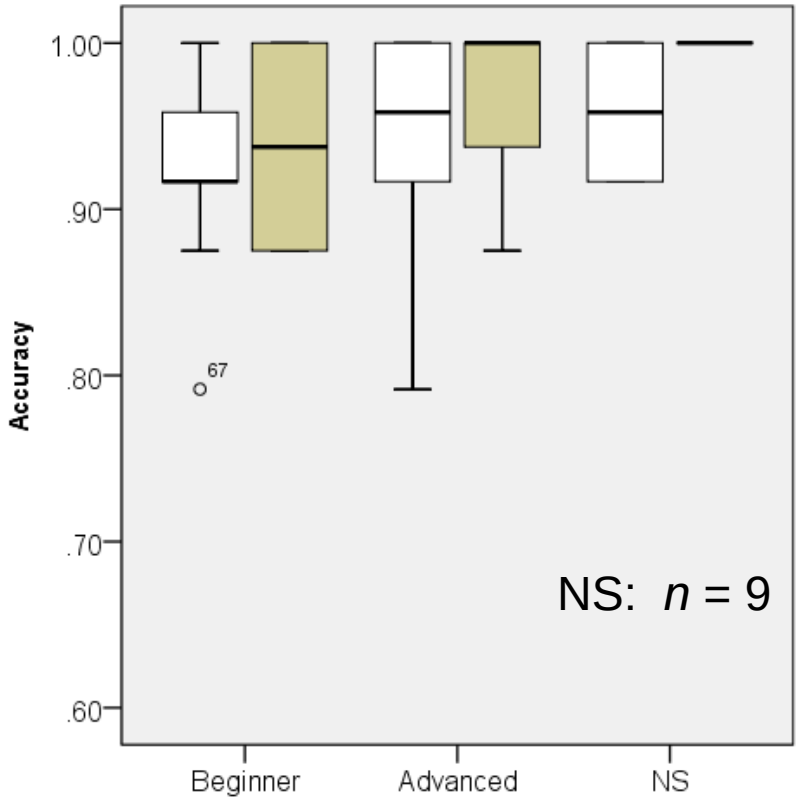
※ All tasks use the same voice (but different tokens) to verify that subjects perceive length in that speaker.

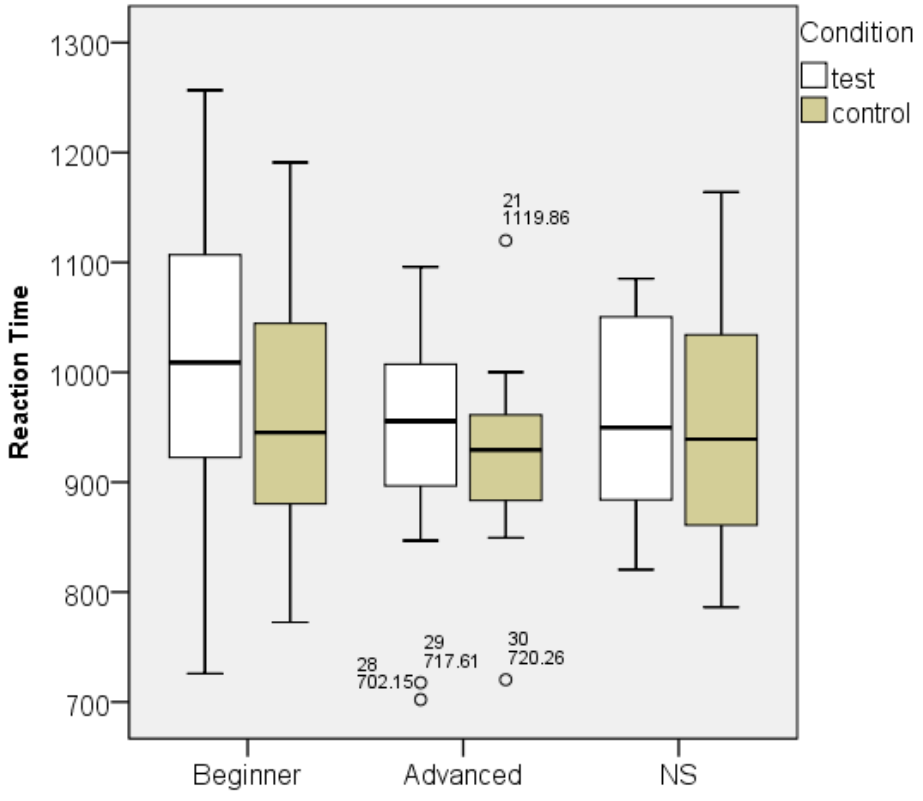
ABX-using length

- Participants were asked to listen to triplets of stimuli consisting of invented words and to judge whether the third stimulus was similar to the first or the second one.

				Expected response
Test:	*mete*	*mette*	*mette*	X = B
	A	B	X	
Control:	*moke*	*moki*	*moke*	X = A
	A	B	X	

Results ABX "using length"

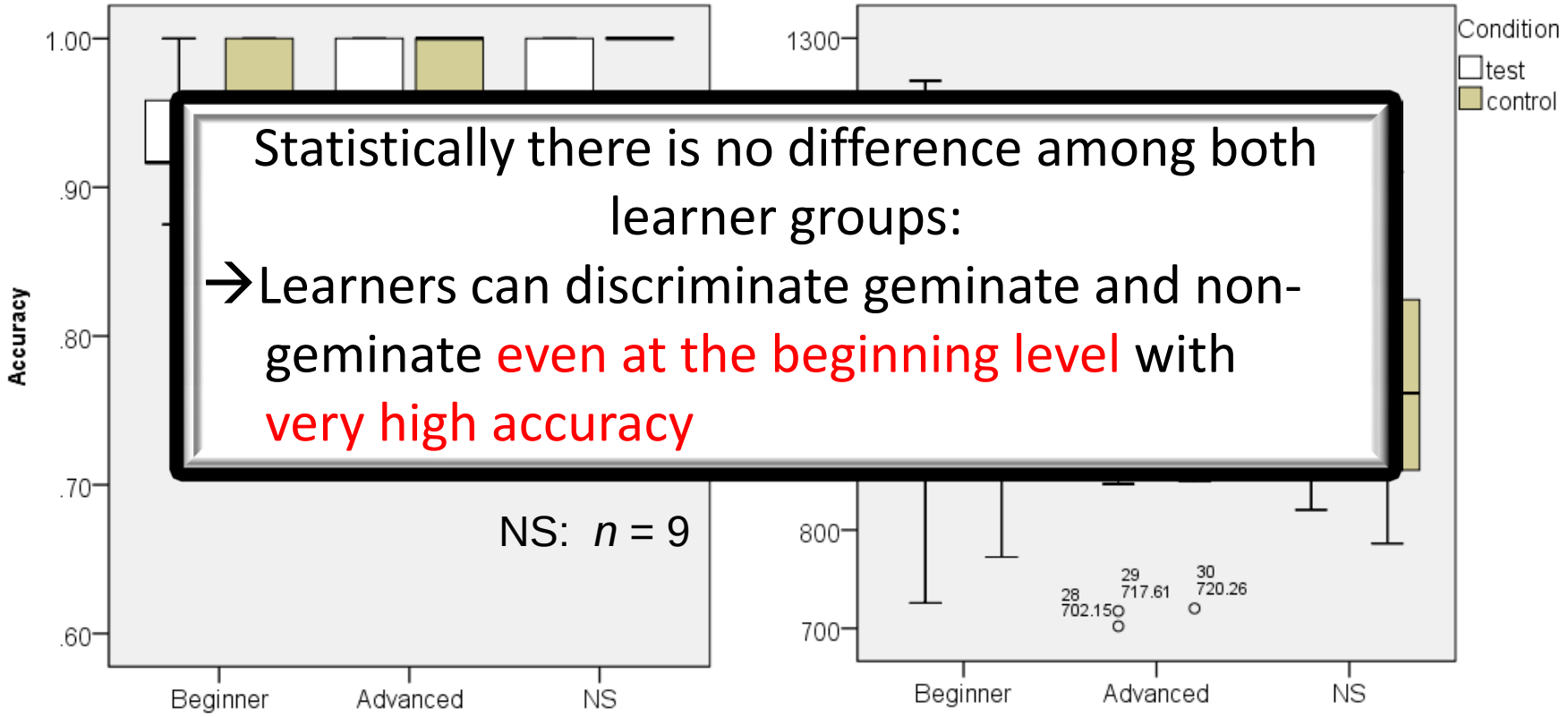




-Effect of group (F (2, 90) = 5.6, p < .01).
-Effect of condition (F (1, 90) = 5.2, p < .05)
-**But no interaction p > .1**

- No effect of group (F (2, 90) = 1.7, p > .1).
-No effect of condition (F (1, 90) = .9, p > .3)
- No interaction p > .1

Results ABX “using length”



Statistically there is no difference among both learner groups:

→Learners can discriminate geminate and non-geminate even at the beginning level with very high accuracy

NS: $n = 9$

-Effect of group (F (2, 90) = 5.6, $p < .01$).
-Effect of condition (F (1, 90) = 5.2, $p < .05$)
-**But no interaction p > .1**

- No effect of group (F (2, 90) = 1.7, $p > .1$).
-No effect of condition (F (1, 90) = .9, $p > .3$)
- No interaction p > .1

ABX-ignoring length

- Listeners were asked to ignore length differences between stimuli while judging similarity (see Dupoux et al., 1997).

				Expected response
Test:	*kepa*	*keppo*	*keppa*	X = A *
	A	B	X	
Control:	*moke*	*moki*	*moke*	X = A
	A	B	X	

**kepa* and *keppa* are similar only if the subject successfully ignore length

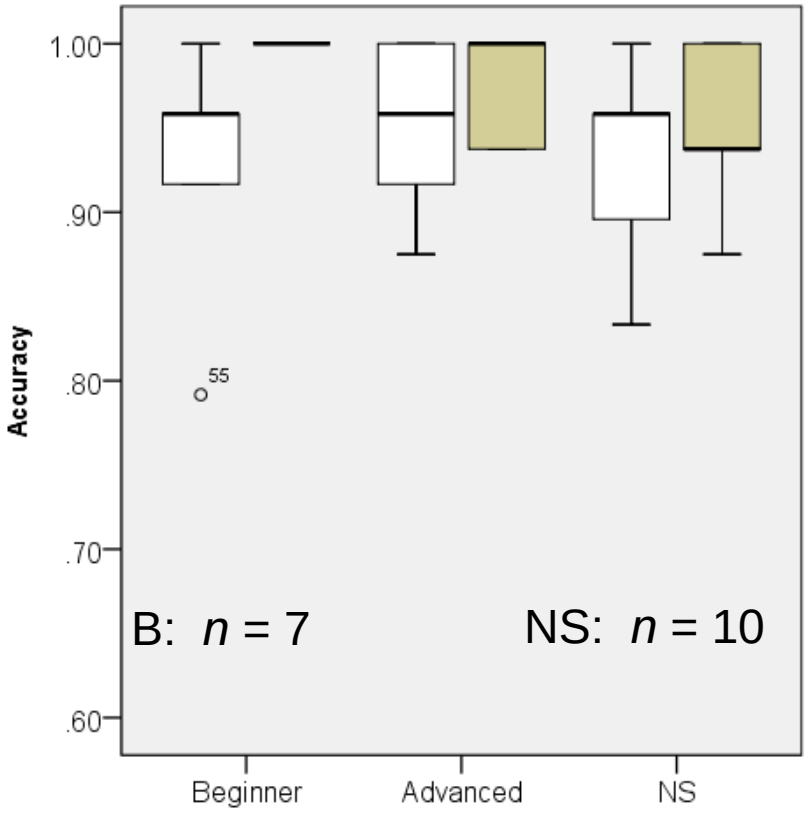
ABX-ignoring length

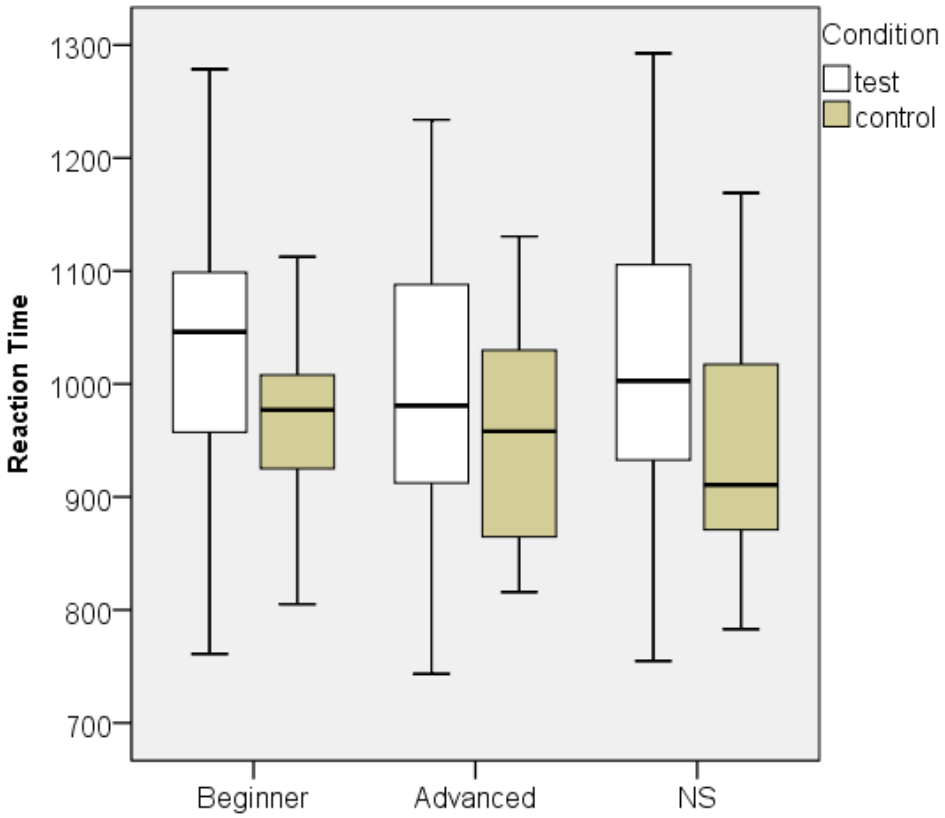
- Native speakers will have difficulty ignoring length because they automatically pay attention to it.

  → Less accurate, longer response time

Results ABX “ignoring length”

Crucial difference is between **advanced learners** and **native speakers**:



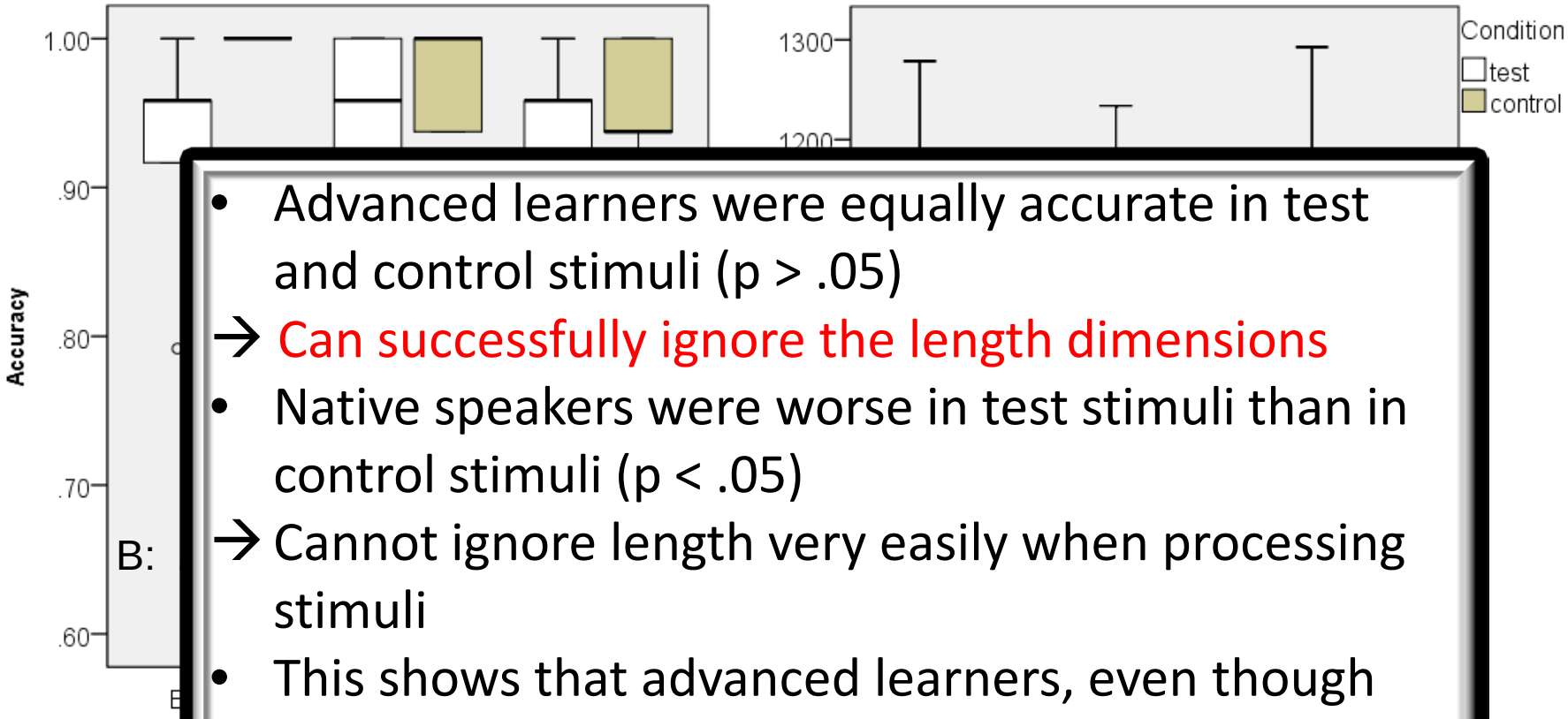


- No effect of group ($F(2, 87)$, = 2.1 $p > .1$)
-Effect of condition ($F(1, 87)$, = 15.3 $p < .01$)
-**No interaction**

- No effect of group ($F(2, 87)$, = .29 $p > .7$)
-Effect of condition ($F(1, 87)$, = 5.3 $p < .03$)
-**No interaction**

Results ABX “ignoring length”

Crucial difference is between **advanced learners** and **native speakers**:



- Advanced learners were equally accurate in test and control stimuli ($p > .05$)

→ Can successfully ignore the length dimensions

- Native speakers were worse in test stimuli than in control stimuli ($p < .05$)

→ Cannot ignore length very easily when processing stimuli

- This shows that advanced learners, even though they can discriminate and categorize geminates/non-geminates easily, still process it differently from native speakers.

- No effect (
-Effect of co
-**No interac**

.7)
03)

Lexical Decision

- Listeners had to decide whether the stimulus they hear is a real Japanese word.
- All the real words were taken from the text books for the first year and second year students (*Genki* I and II).

	Test	Test	Test	Test	Control	Control
	Singleton	Geminate	Non-wd Singleton	Non-wd Geminate	Wd	Non-wd
Example	*akeru*	*kippu*	*kipu*	*akkeru*	*tenki*	*tengi*
Gloss	"to open"	"ticket"	N/A	N/A	"weather"	N/A

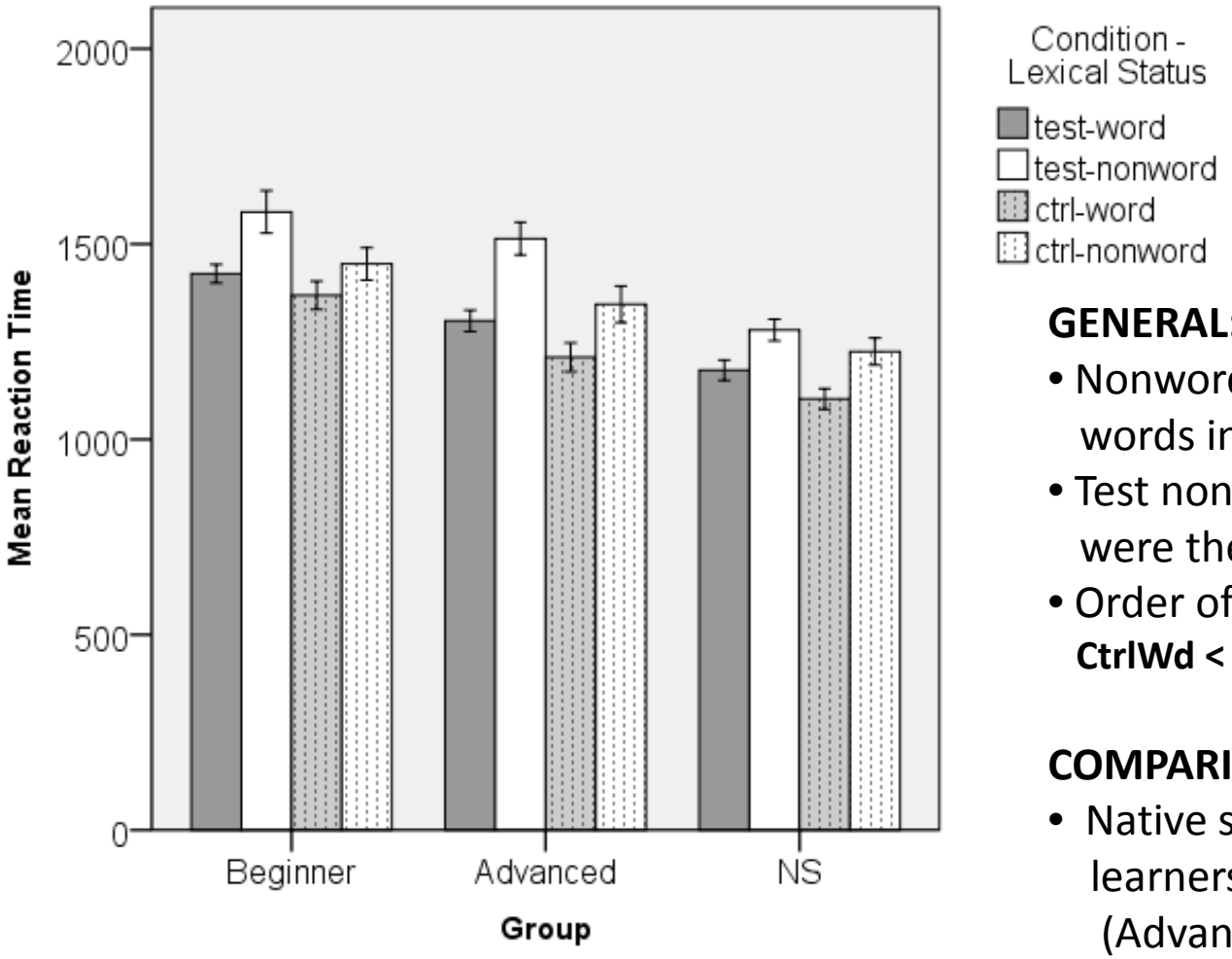
Lexical Decision

- Basis for lexical decision :

  compare the incoming input (stimulus) to stored phonological representations for words.

  - The only way to **correctly reject a non-word** (which is a potential word: *akeru* ~ **akkeru*) is to have a clear phonological representation of words.

Overall results: Reaction Time



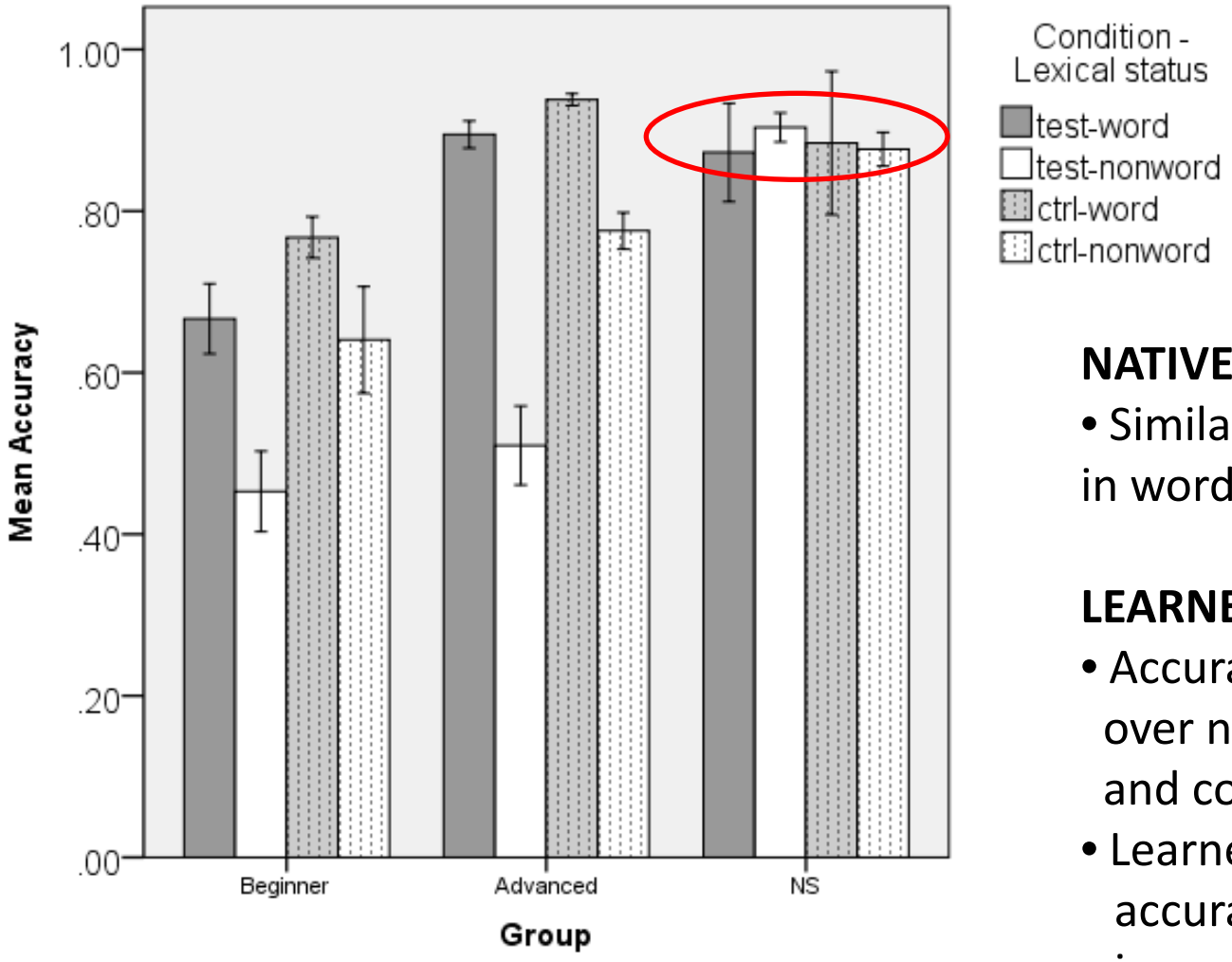
GENERAL:

- Nonwords were slower than words in all groups.
- Test nonwords including geminates were the slowest.
- Order of latency
  CtrlWd < TestWd < CtrlNW < Test NW

COMPARISON: Learners vs Native

- Native speakers 'RT faster than learners' latency
  (Advanced vs. Native: ($p < .02$))
  (Beginner vs. Native ($p < .0001$))

Overall results: Accuracy



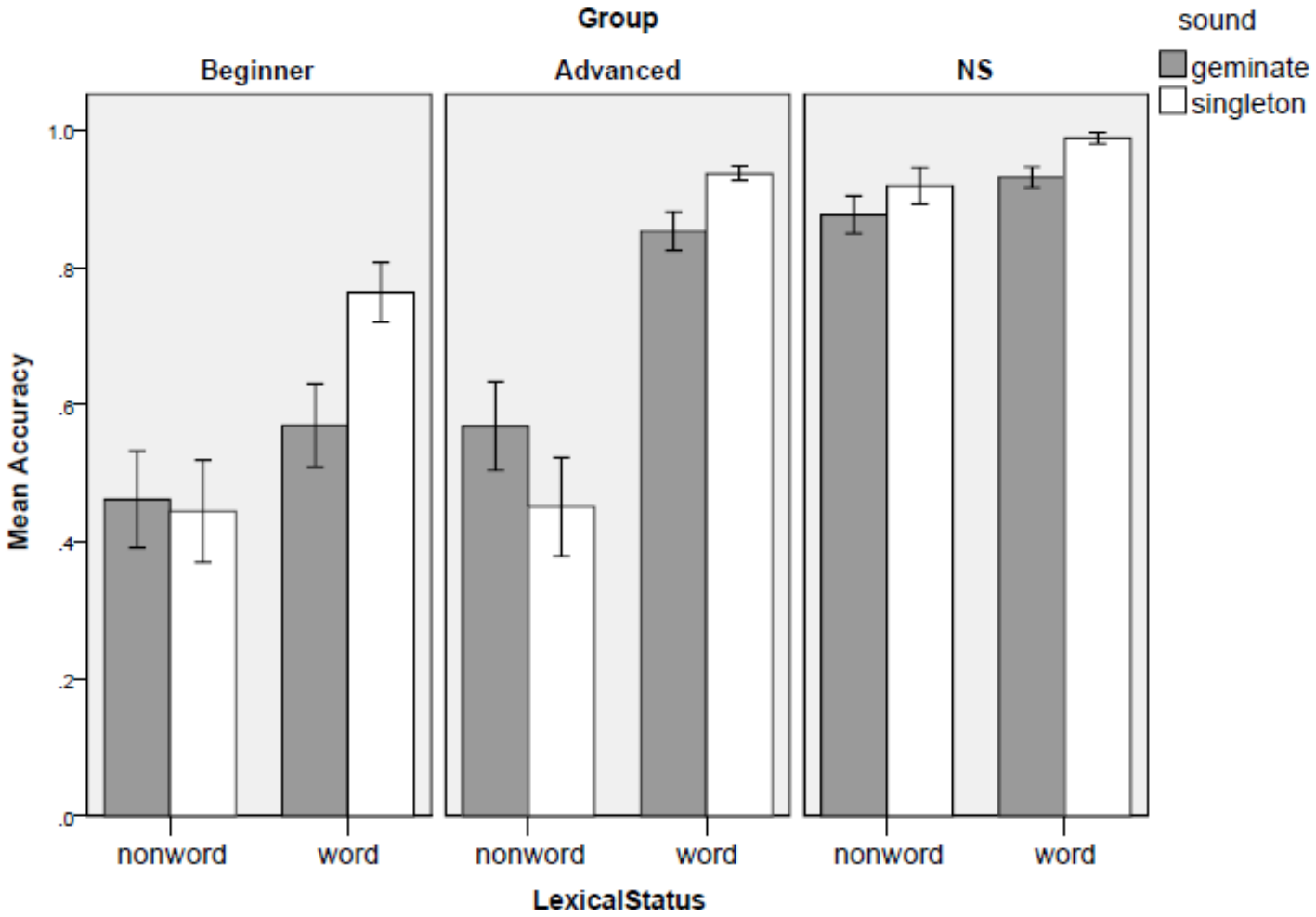
NATIVE SPEAKERS:

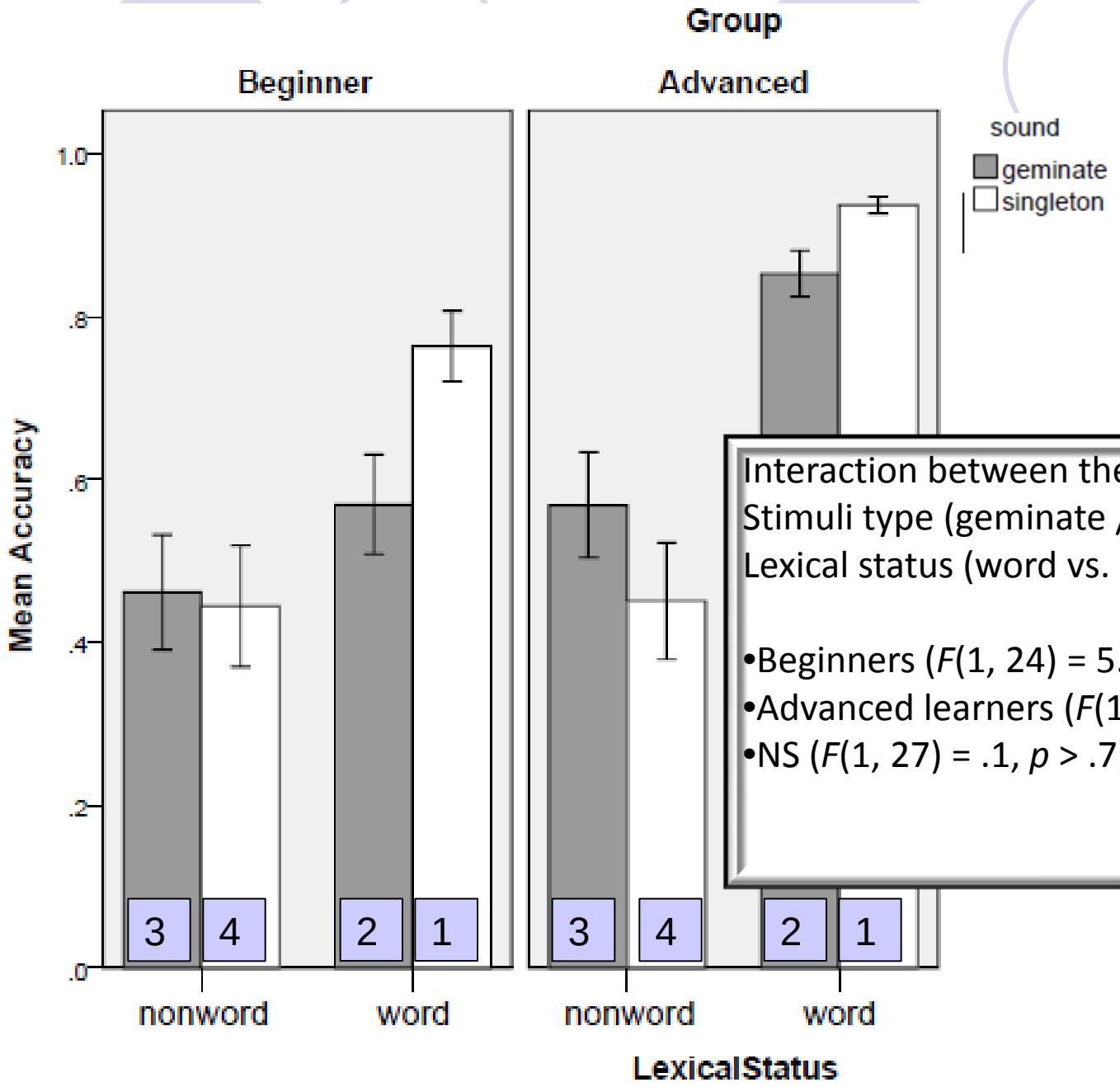
- Similar in test and control, in words and nonwords

LEARNERS:

- Accuracy higher for words over nonwords (in both test and control condition)
- Learners have a low accuracy for test nonwords in particular

Interaction of lexical status and stimuli type for both learner groups



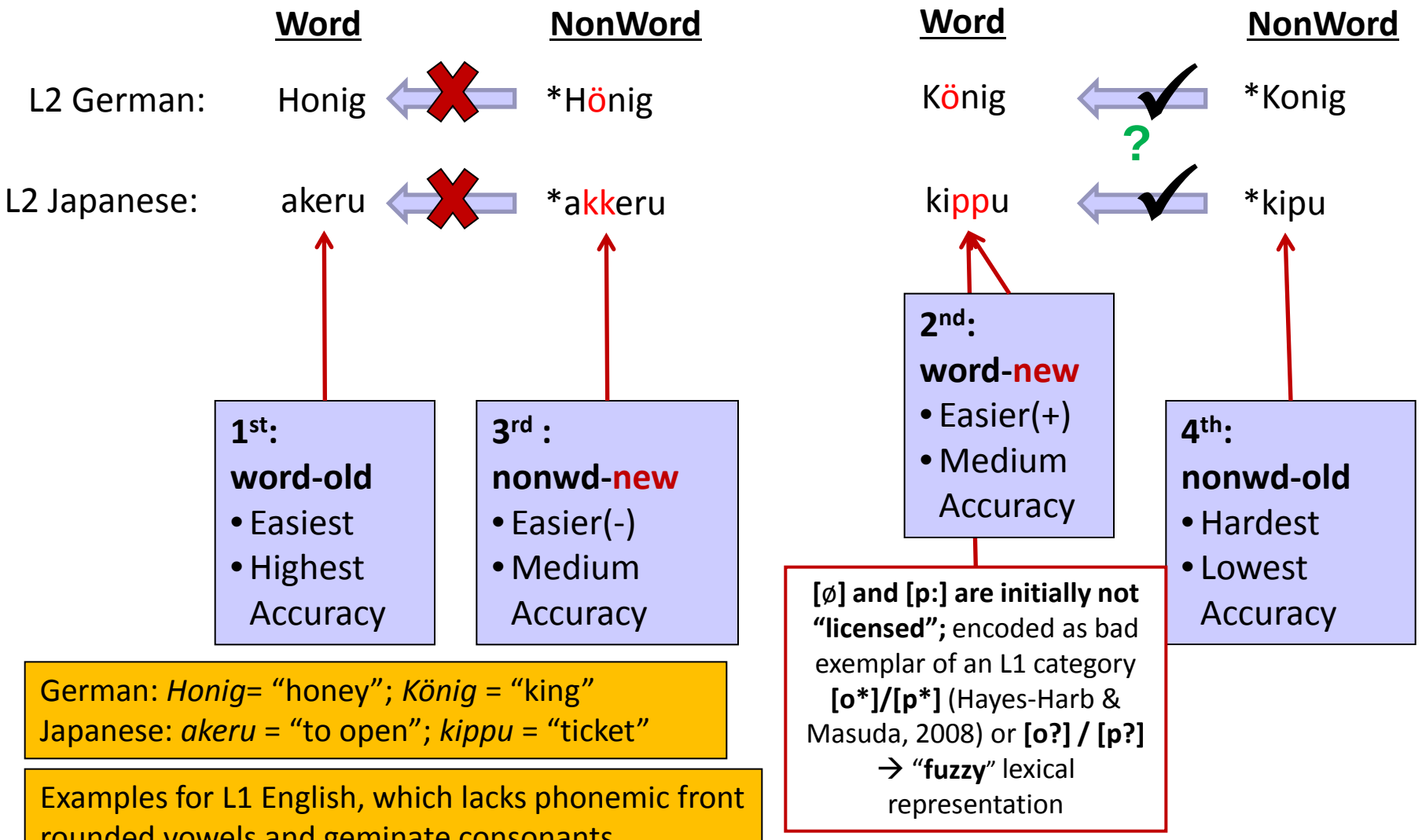


Interaction between the variables:
Stimuli type (geminate / non-geminate) and
Lexical status (word vs. nonword)

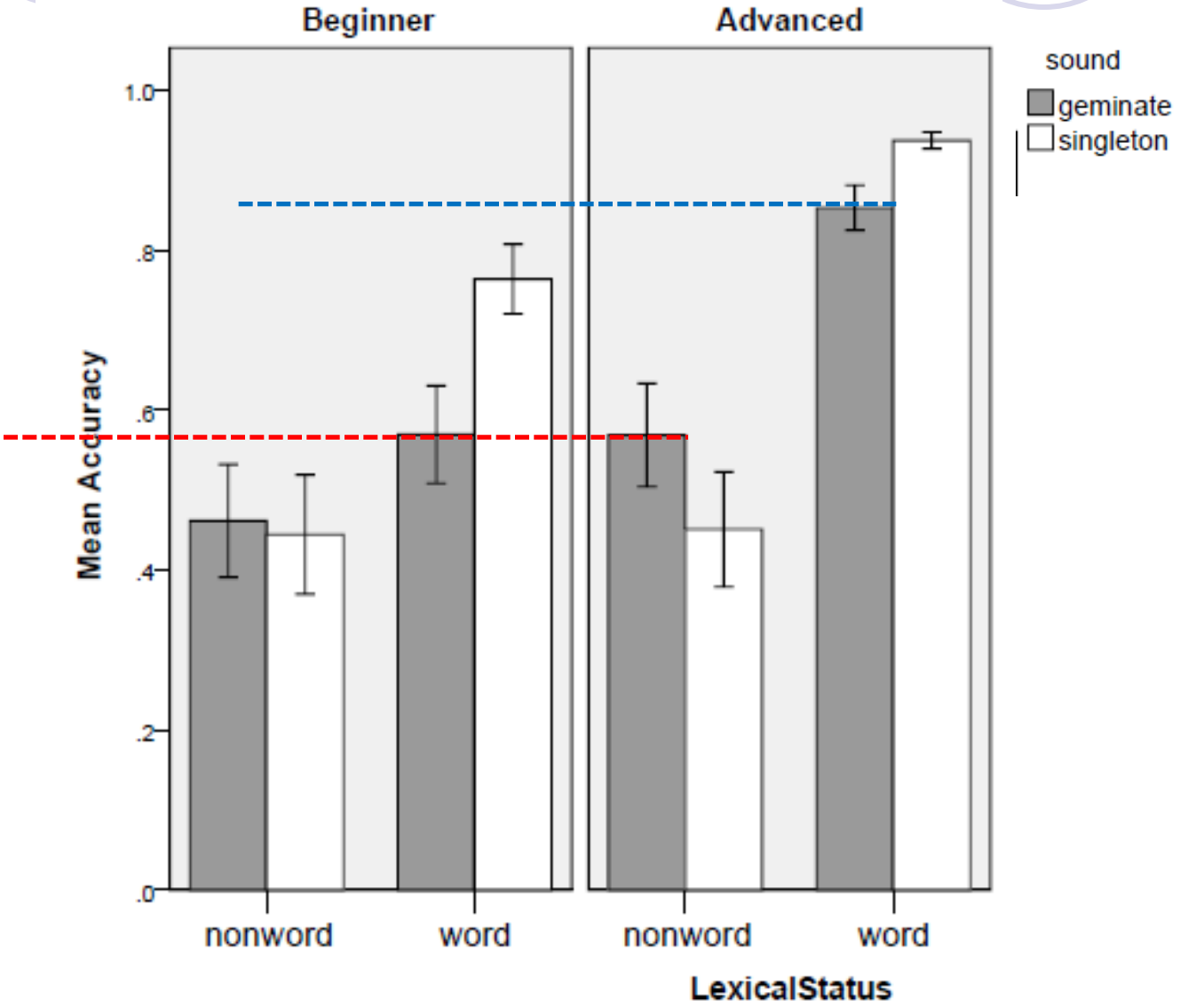
- Beginners ($F(1, 24) = 5.9$, $p < .02$)
- Advanced learners ($F(1, 39) = 5.6$, $p < .02$)
- NS ($F(1, 27) = .1$, $p > .7$)

Predicted Difficulty of L2 Lexical encoding

(Darcy et al., in progress)



Overall improvement



Discussion

- Overall reduction of error rates indicates development for advanced learners
  - Improvement most visible on words that contain geminates while beginners still struggle to accept words with geminate

Lexical Decision

- When L1 doesn‘t use a certain dimension, L2 lexical encoding of it will be fragmentary or deficient compared to native speakers (at first)
  - Darcy et al., *in progress*; Ota et al., 2009; Pallier et al., 2001
  - Case 1: non-native dimension encoded using the best equivalent in your L1 (a geminate [t:] will be encoded as [t]) → merger of the distinction in lexical representations
  - Case 2: non-native dimension „marked“ as different or new, but still not fully target like (e.g. a geminate [t:] as [t*] (Hayes-Harb and Masuda, 2008)or [?])

→ distinction is lexically possible, but not stable

Implications

- Dissociation between categorization and lexical encoding.
  - Categorization does not predict lexical encoding straightforwardly
- Learning the form of words in a second language does not end with discrimination abilities
- Updates in phonological grammar are needed to license certain representations at the lexical level
- Question for further research;

  How do learners learn to update their phonological grammar and their lexical representations?

Conclusion

- Learners can discriminate geminate and non-geminate contrasts even in earlier stages of exposure to L2.

- However the way non-native speakers lexically encode the distinction is not the same as native speakers.

Acknowledgements

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