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Does training make French speakers more able to identify lexical stress?

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Does training make French speakers more able to identify lexical stress?

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Plan

- Introduction

- Goals and method

- Results and discussion
  - Training
  - Pre- and post-tests

- Conclusion and perspectives

Introduction

- French speakers show difficulties in the production of stress in L2

- Perceptual explanations
  - *Crible phonologique*
    - Phonological system of L1 as a "filter" through which all the sounds of L2 are perceived and classified
  - *Stress deafness*

Polivanov,1931; Troubetzkoy, 1939; Dupoux et al., 1997, 2001, 2008

# The hypothesis of *stress deafness*

- The presence of *stress deafness* depends on
  - Cognitive load required by the task
  - Phonetic variability in the stimuli

- French speakers are unable to encode distintive stress in their phonological representations

Dupoux et al., 1997, 2001, 2008

The hypothesis of *stress deafness*

"Stress has such large acoustic correlates that French participants can resort to acoustic strategies in certain tasks. However, this intact psychoacoustic ability does not translate into good performances in other, more demanding, tasks."

(Dupoux et al., 2008, p. 700)

Starting point
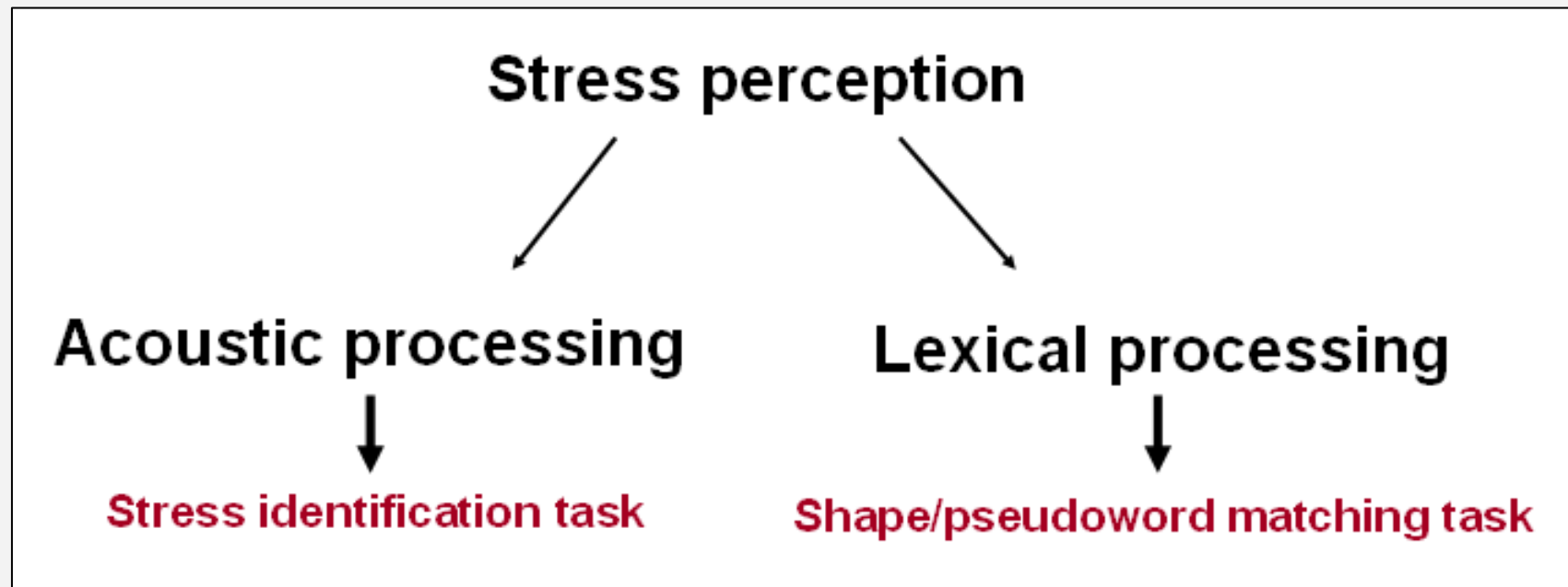
Goals

- To determine whether French-speaking listeners are able to learn to perceive Spanish lexical stress contrasts

- To determine whether training improves French-speaking listeners' performance in identifying lexical stress in Spanish

Experimental design

3 phases

1. Pre-test

2a. Training

2b. No Training

3. Post-test

Participants

- 29 native speakers of French with no knowledge or contact with Spanish or Italian (*non-natives*)
  - ⇨ **Training**

- 22 bilingual Spanish - Catalan speakers with no knowledge or contact with French (*natives*)
  - ⇨ **Training**

- 20 native speakers of French with no knowledge or contact with Spanish or Italian (*non-native controls)*
  - ⇨ **No Training**

Material
Pre- and post-tests

- Four triplets of trisyllabic Spanish words
  - Proparoxytones (PP)

    ***nú**mero* – ***vá**lido* – ***lí**mite* – ***mé**dico*

  - Paroxytones (P)

    *nu**me**ro* – *va**li**do* – *li**mi**te* – *me**di**co*

  - Oxytones (O)

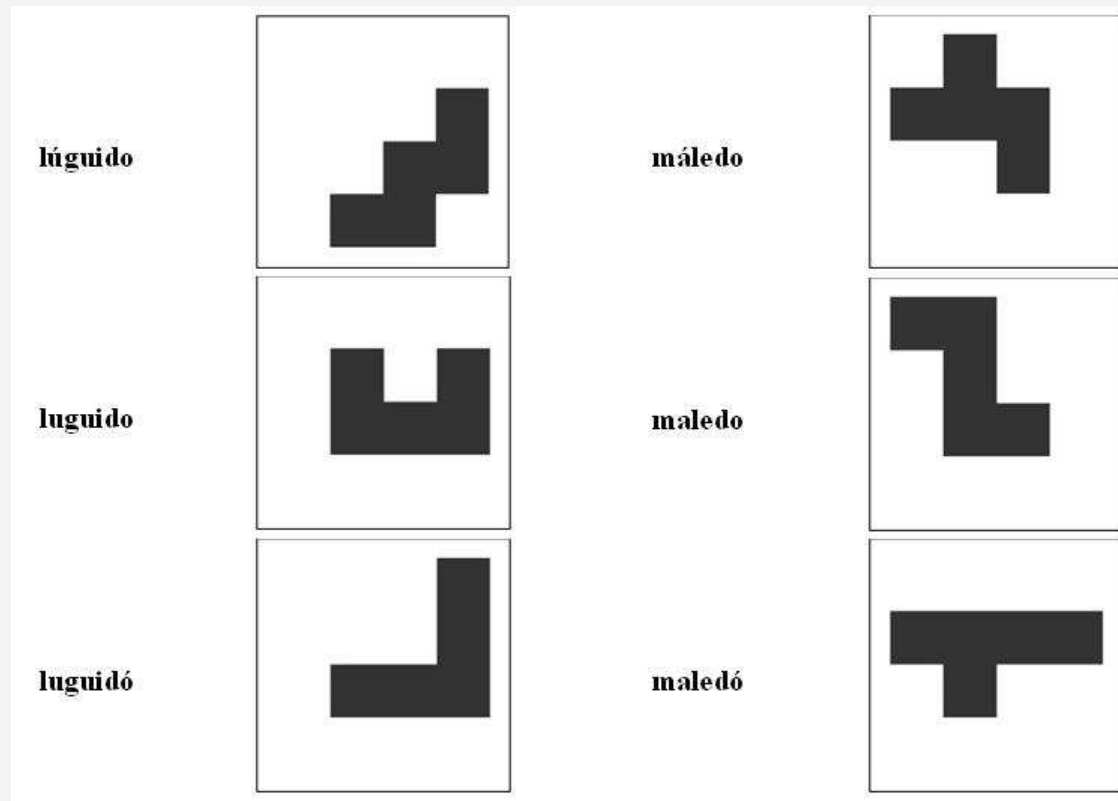   *nume**ró*** – *vali**dó*** – *limi**té*** – *medi**có***

  - ⇨ **12 words**

Llisterri et al., 2005

Material
Training

- Two triplets of trisyllabic Spanish pseudowords
  - Proparoxytones (PP)

    lúguido - **má**ledo
  - Paroxytones (P)

    lu**gui**do - ma**le**do
  - Oxytones (O)

    lugui**dó** - male**dó**

    ⇨ **6 pseudowords**

Llisterri et al., 2005
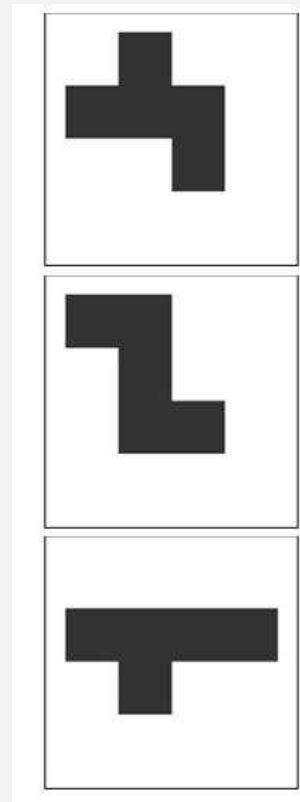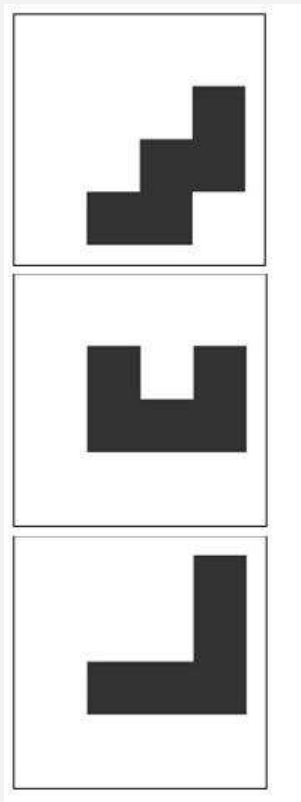
Material
Training

- 6 visual shapes

Dufour et al., 2010

Material
No Training

- 6 visual shapes (no oral stimuli)

Procedure

1. Pre-test: Stress identification task

2. a) Training: Shape/pseudoword matching task
   b) No training: Click task

3. Post-test: Stress identification task
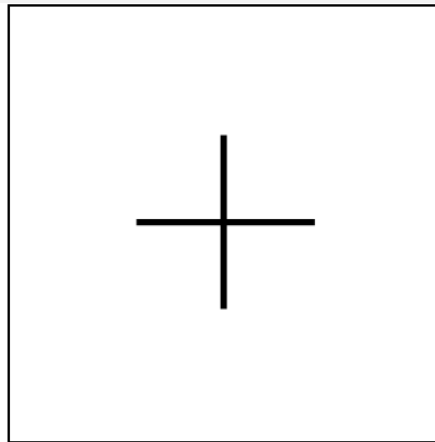
Procedure
Pre- and post-tests

- Stress identification task
  - Participants heard the stimulus and had to indicate as fast as possible the stressed syllable by pressing a button in a response box

Procedure
Pre- and post-tests

1. Première syllabe   2. Deuxième syllabe   3. Troisième syllabe

Procedure
Pre- and post-tests

- Stress identification task
  - Participants heard the stimulus and had to indicate as fast as possible the stressed syllable by pressing a button in a response box

- 3 repetitions of each word (36 stimuli)

- Different randomization of the stimuli for each participant and test
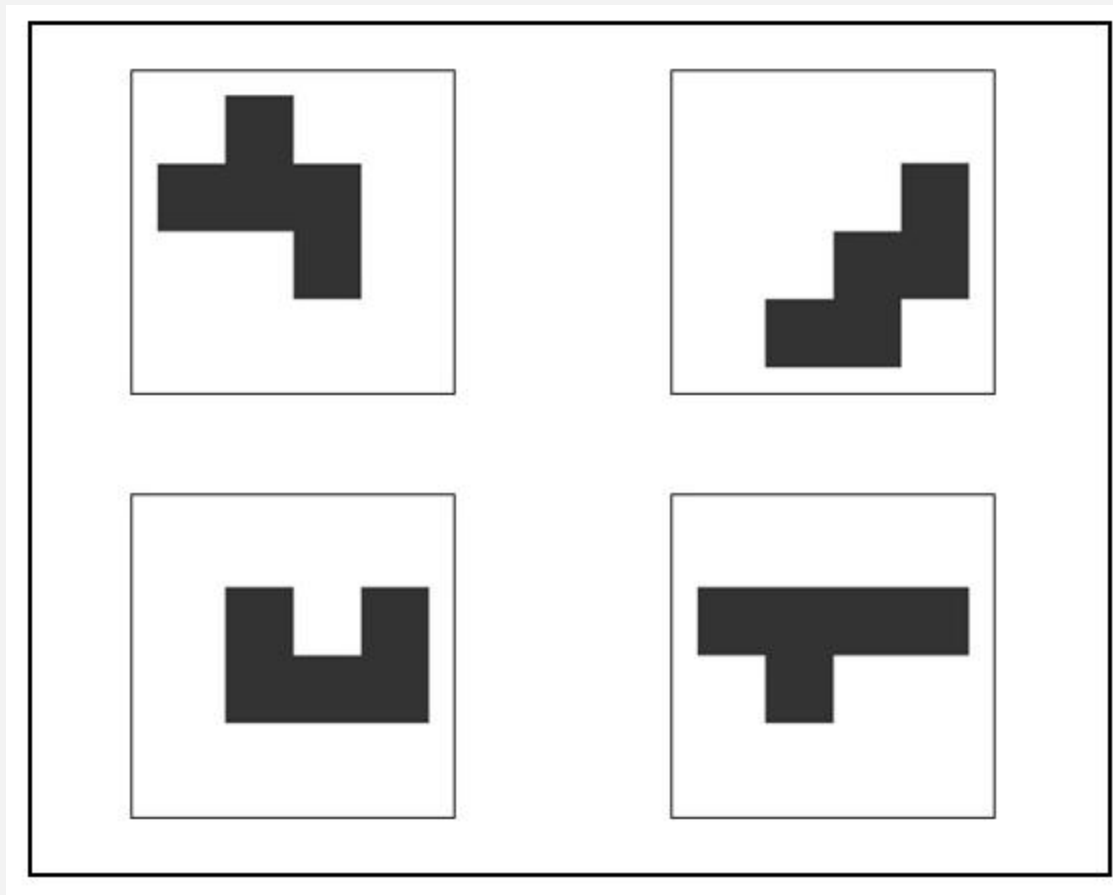
Procedure
Training

- Shape/pseudoword matching task
  - Four shapes were presented on the screen
  - Participants heard one of the six pseudowords
  - They clicked on the shape they thought corresponded to the pseudoword
  - Feedback:
    - After each response, the three distractor shapes disappeared, leaving only the correct shape
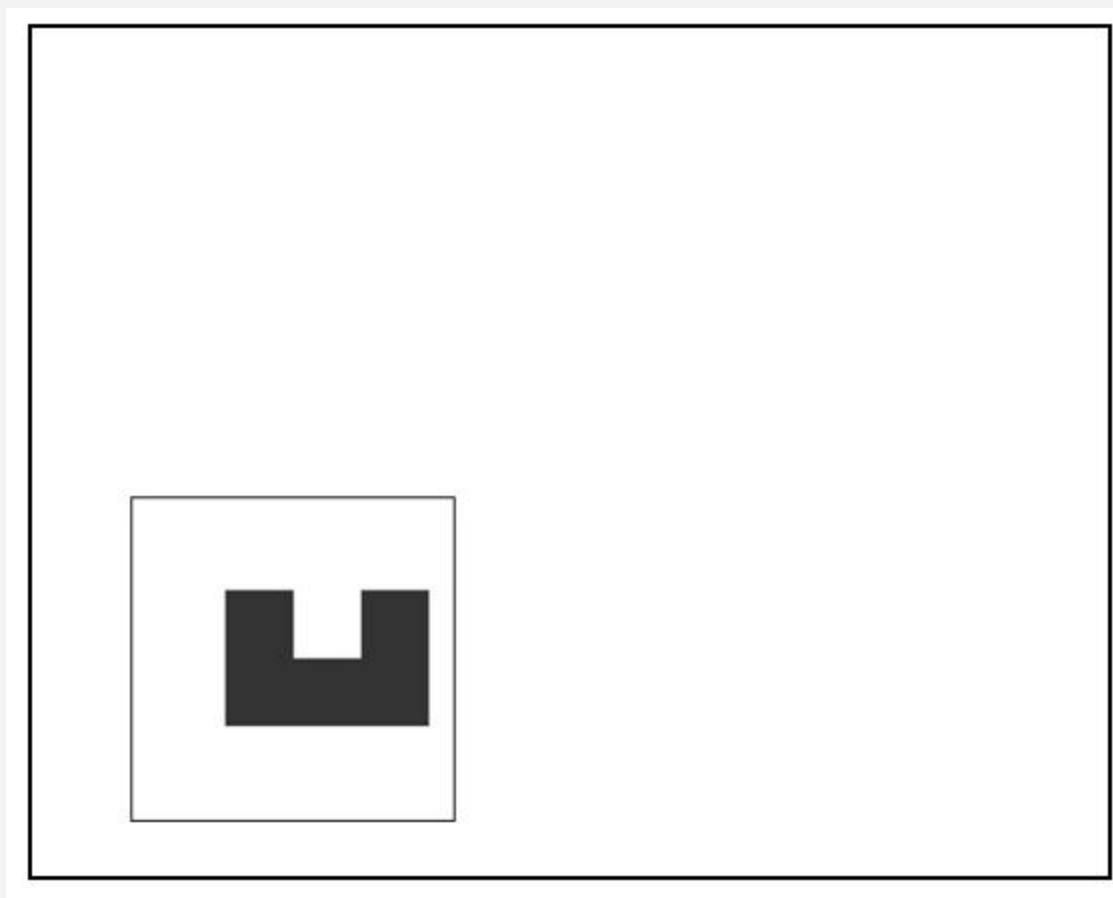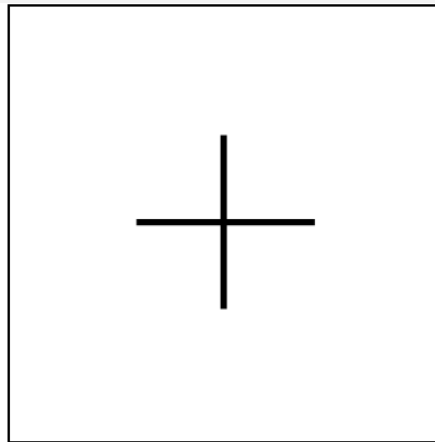   - The pseudoword was heard again

Procedure
Training

Procedure
Training

Procedure
Training
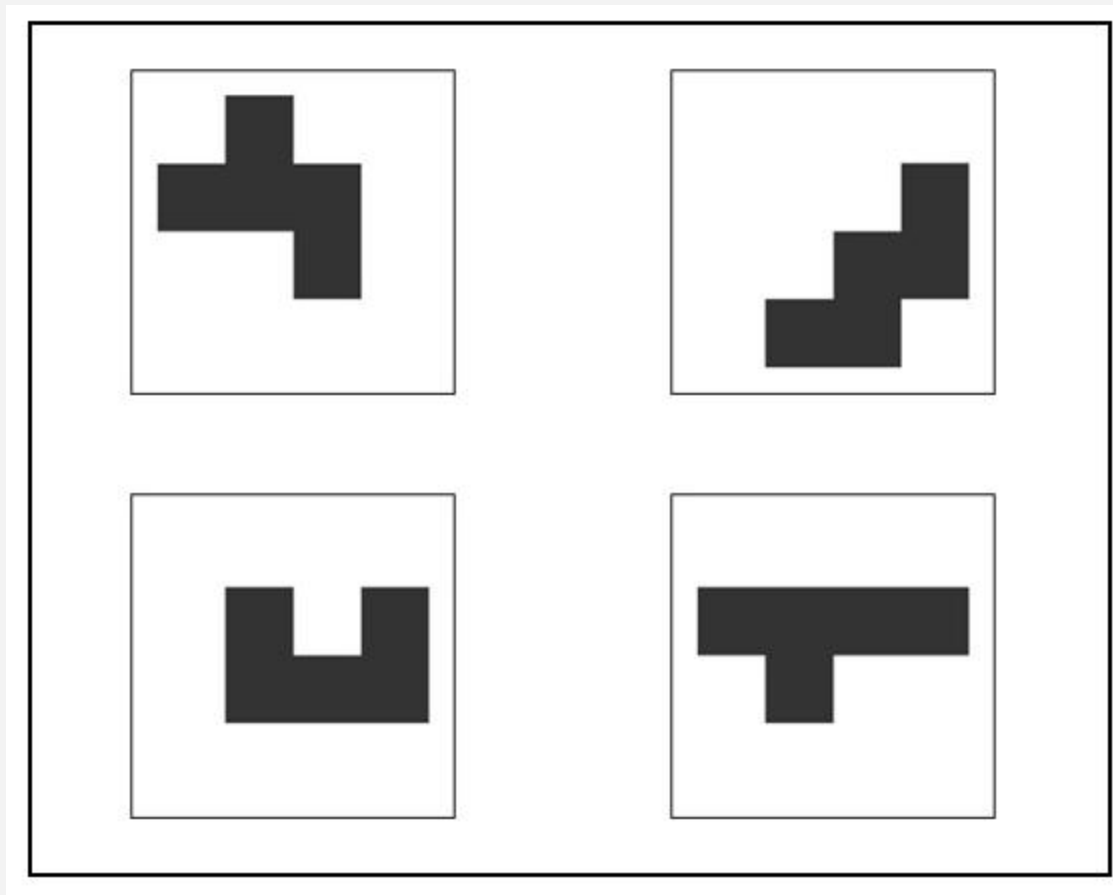
Procedure
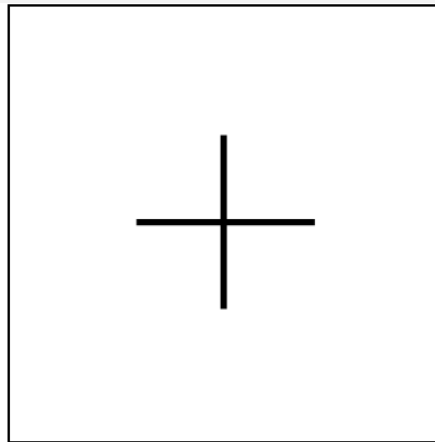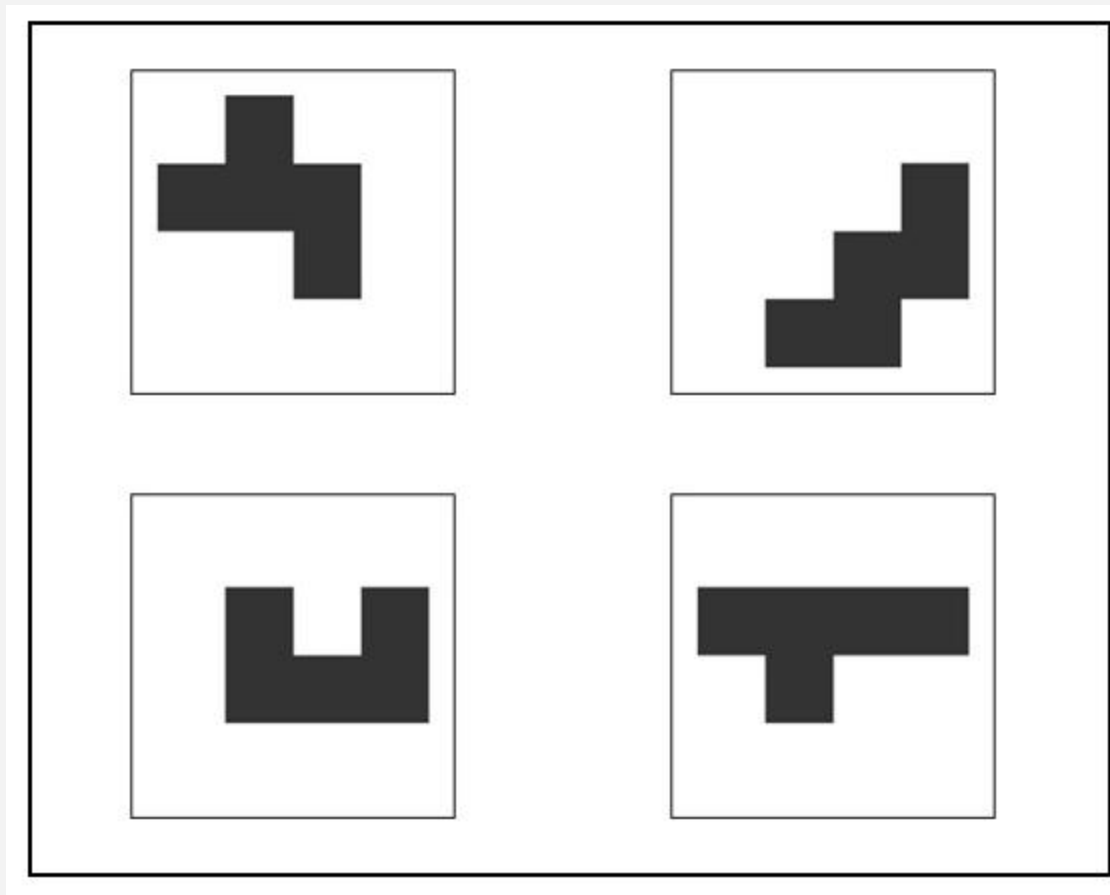## Training

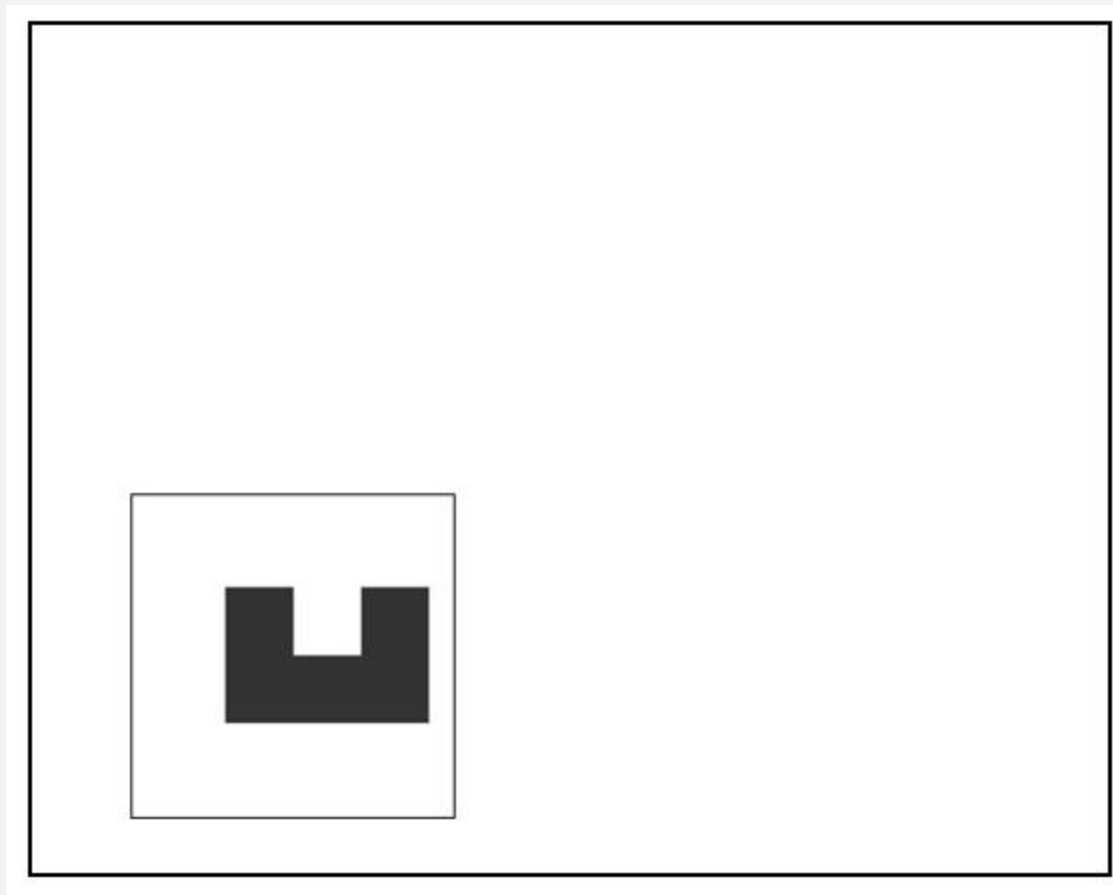# Procedure
Training

Procedure
Training

Procedure
Training

Procedure
Training

Procedure
Training

Procedure
Training

- 5 blocks
    - 4 blocks with feedback
    - 1 block with no feedback

- In each block, 6 repetitions of each pseudoword (36 stimuli per block, 180 stimuli in total)

- Different randomization of the stimuli for each participant

Procedure
No Training

- Click task with no oral stimuli
  - The participants had to click as fast as possible on the shape that appeared on the screen

Procedure
No Training

Procedure
No Training

Procedure
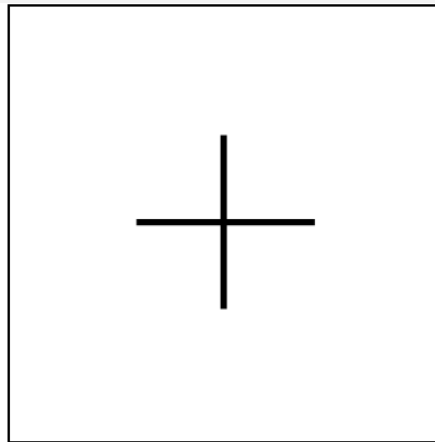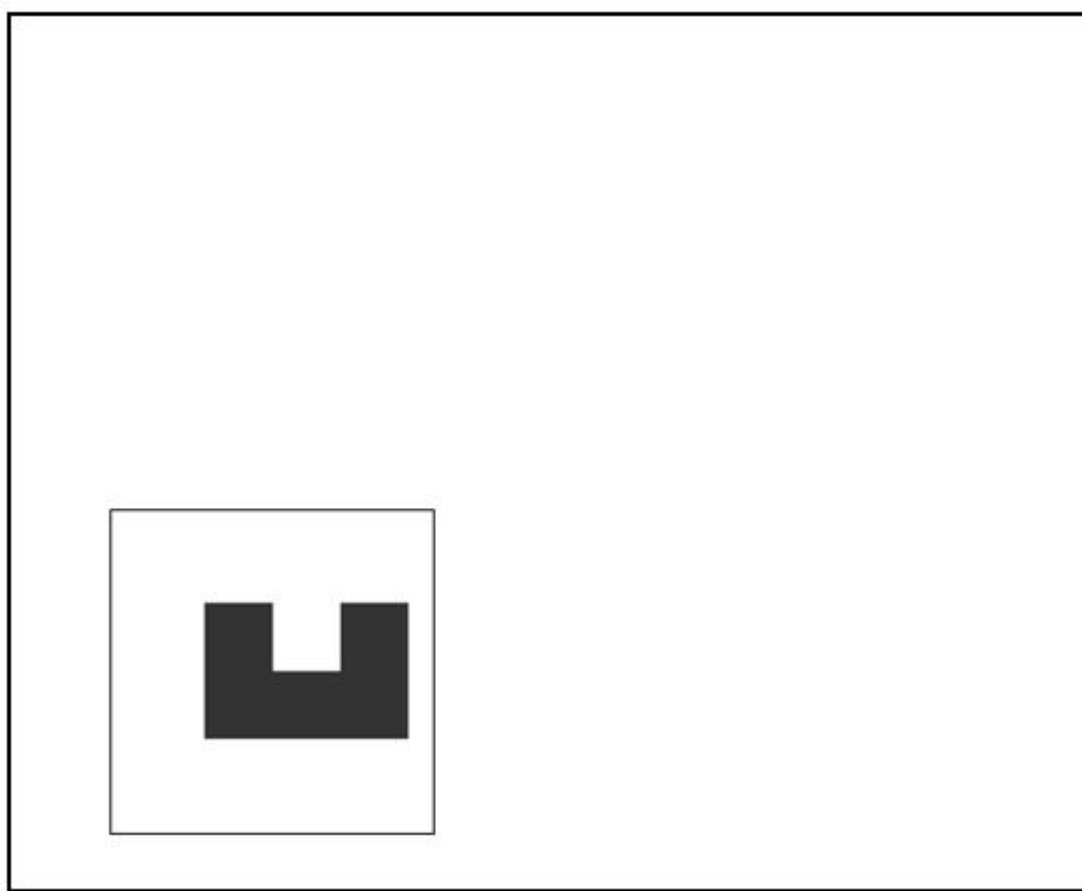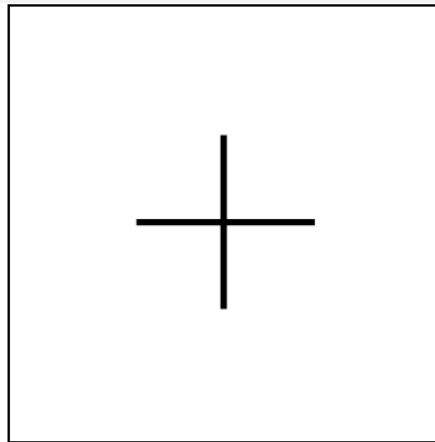## No Training

Procedure
No Training

Procedure
No Training

- Click task with no oral stimuli
  - The participants had to click as fast as possible on the shape that appeared on the screen

- 5 blocks

- Different randomization of the stimuli for each participant

Data analysis

- Exclusion of participants who showed memorization problems or a large number of missing data
  - 22 non-natives
  - 16 natives
  - 14 non-native controls
- Pre- and post-tests: correct/incorrect participants' responses and reaction times
- Training: Correct/incorrect participants' responses
- Mixed-effect models (logistic and linear models)

Baayen, Davidson & Bates, 2008; Bates & Sarkar, 2007

Results and discussion
Training

- Dependent variable:
  - Correct/Incorrect response

- Independent variables:
  - Group (Natives, Non-natives)
  - Pattern (PP, P, O)
  - Block (1, 2, 3, 4, 5)

Results and discussion
Training

- No effect of Pattern (PP, P, O)

- Effect of Group (Natives, Non-natives)

- Effect of Block (1, 2, 3, 4, 5)

- Interaction Group x Block

Results and discussion
Training

Figure 1. Percent correct in the training session as a function of block and group. Error bars are standard error of the mean

Results and discussion
Training

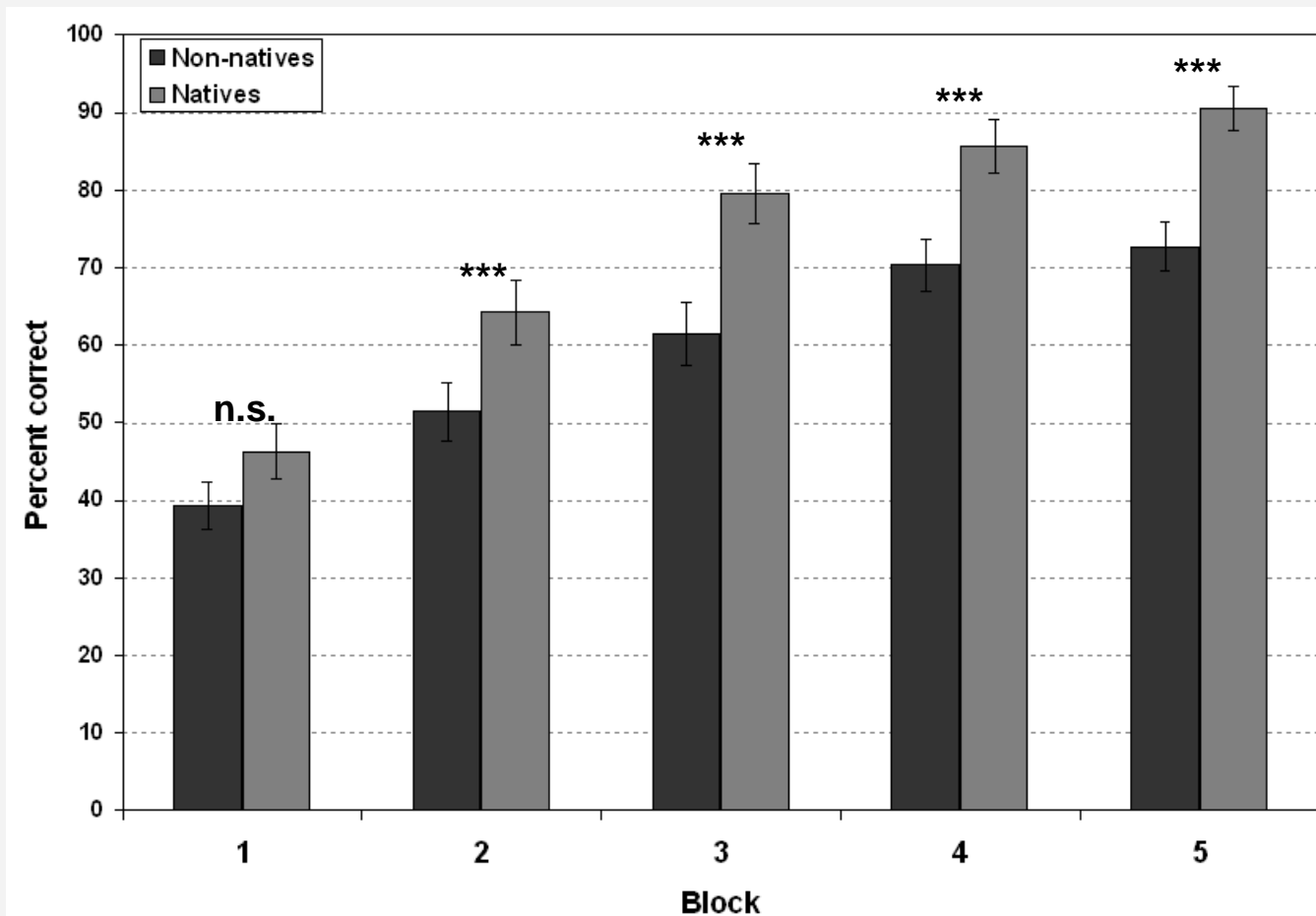

Figure 1. Percent correct in the training session as a function of block and group. Error bars are standard error of the mean

Results and discussion
Training

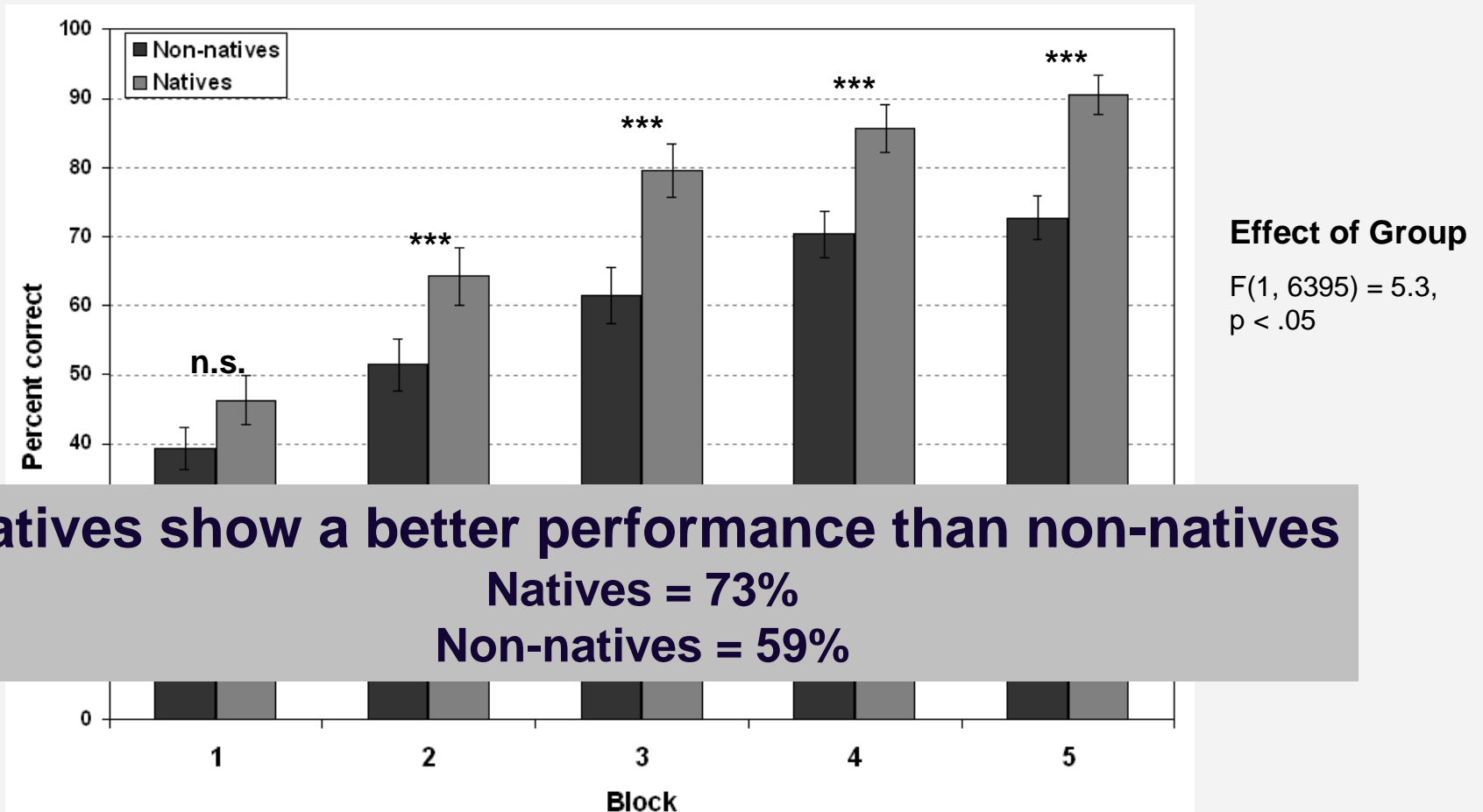

Figure 1. Percent correct in the training session as a function of block and group. Error bars are standard error of the mean

Results and discussion
Training

Summary
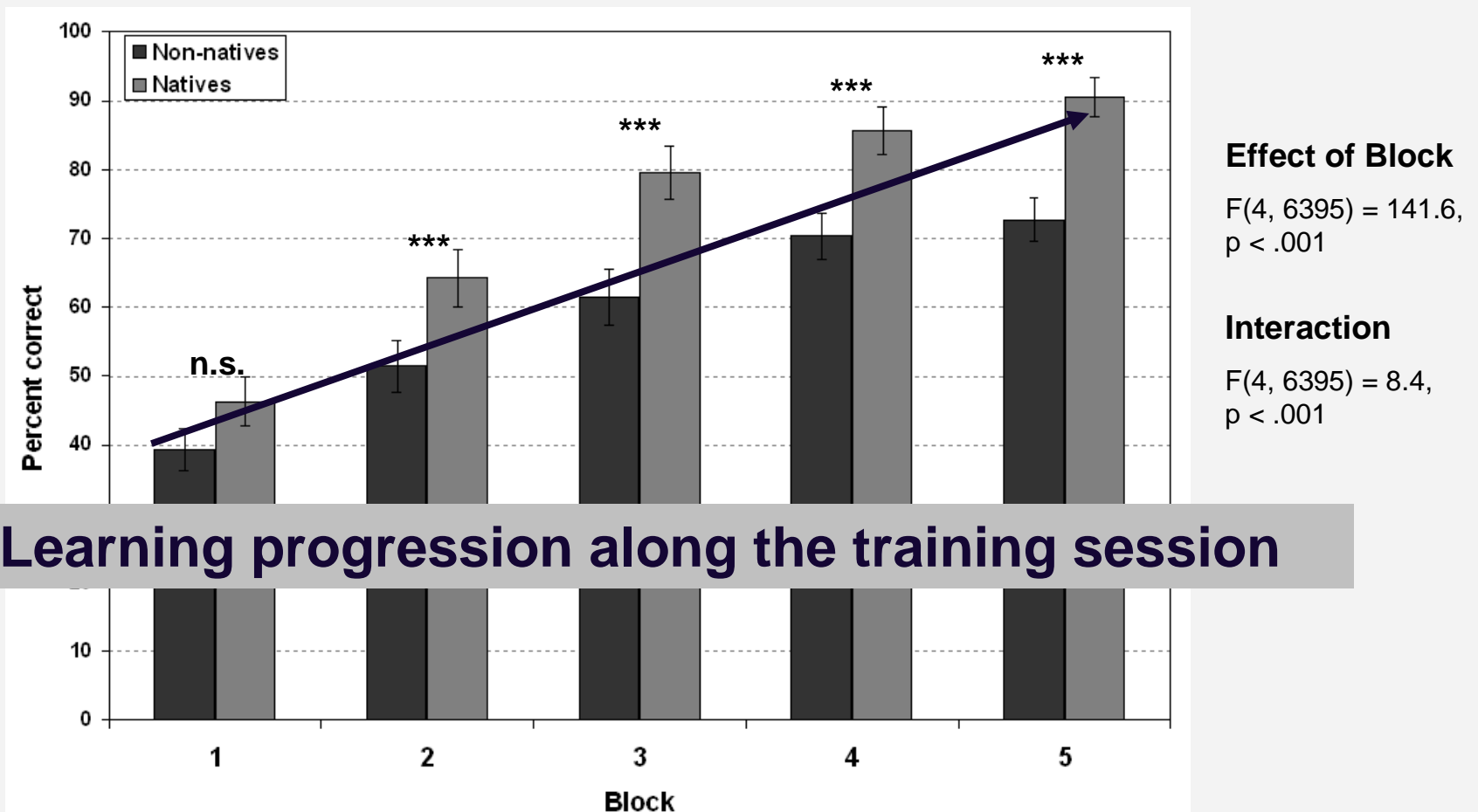
- French-speaking listeners are able to learn lexical stress contrasts

- They have the capacity to integrate (at least, temporarily) and retrieve the accentual information, although their performance is not as good as the native Spanish one

Results and discussion
Pre- and post-tests

- Do the French-speaking listeners improve their identification of Spanish lexical stress?

- Do they behave in a different way than the participants with no training?

- Interaction Group x Experiment?

Results and discussion
Pre- and post-tests

- Dependent variable:
  - Correct/Incorrect response

- Independent variables:
  - Group (Natives, NN Control, Non-natives)
  - Experiment (pre-, post-test)
  - Pattern (PP, P, O)

Results and discussion
Pre- and post-tests

- Effect of Group (Natives, NN Control, Non-natives)
- Effect of Experiment (pre-, post-test)
- Effect of Pattern (PP, P, O)
- Interaction Group x Experiment
- Interaction Group x Pattern
- No triple interaction

Results and discussion
Pre- and post-tests

- Effect of Group (Natives, NN Control, Non-natives)
- Effect of Experiment (pre-, post-test)
- Effect of Pattern (PP, P, O)
- **Interaction Group x Experiment**
- Interaction Group x Pattern
- No triple interaction

Results and discussion
Pre- and post-tests

Figure 2. Percent correct responses as a function of group (natives, NN Control and non-natives) and experiment. Error bars are standard error of the mean.

Results and discussion
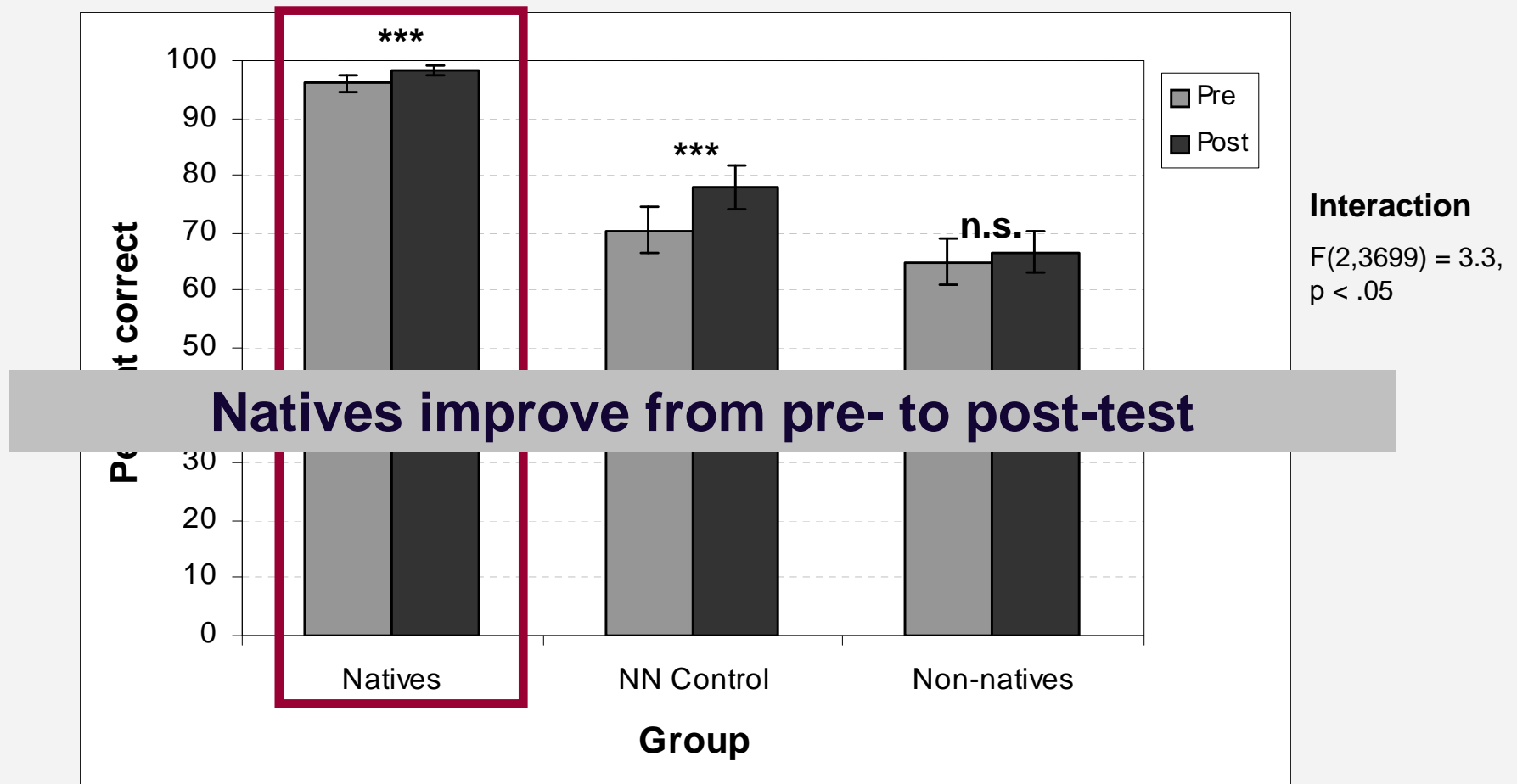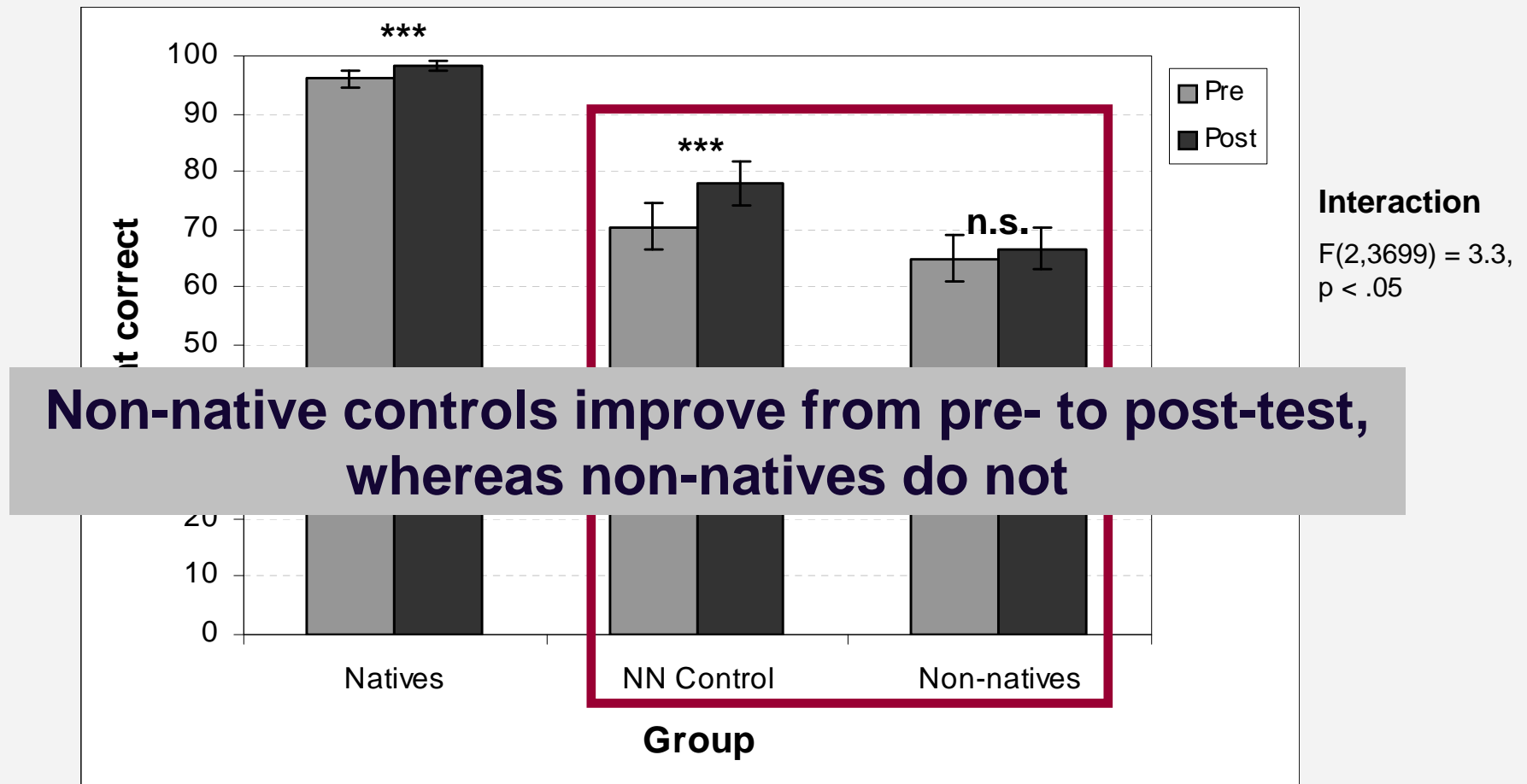## Pre- and post-tests

Figure 2. Percent correct responses as a function of group (natives, NN Control and non-natives) and experiment. Error bars are standard error of the mean.

Results and discussion
Pre- and post-tests

Figure 3. Percent correct responses as a function of experiment and group (natives, NN Control and non-natives). Error bars are standard error of the mean.

Results and discussion
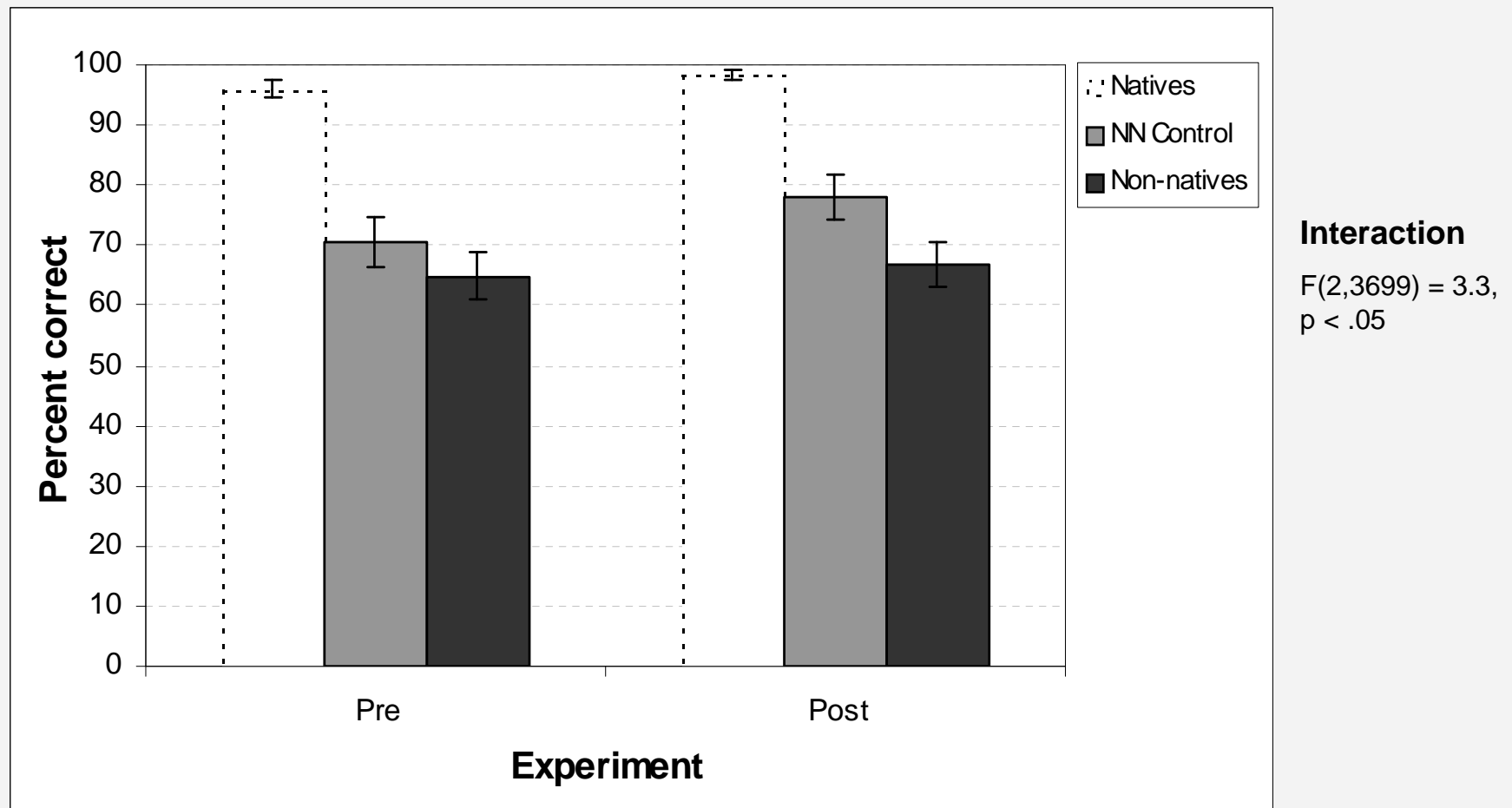## Pre- and post-tests

Figure 3. Percent correct responses as a function of experiment and group (natives, NN Control and non-natives). Error bars are standard error of the mean.

Results and discussion
Pre- and post-tests

Summary

- The non-native controls are better than the non-natives in post-test

- Contrary to the non-native controls, the non-natives do not improve from pre- to post-test

Results and discussion
Pre- and post-tests

How to explain these unexpected results?

Results and discussion
Pre- and post-tests

- Some hints

  - Are the non-native controls slower than the non-natives in post-test?

Results and discussion
Pre- and post-tests

Post-test

No effect of Group

F(1,909) = 0.03, n.s.

The non-native controls are NOT slower than the non-natives
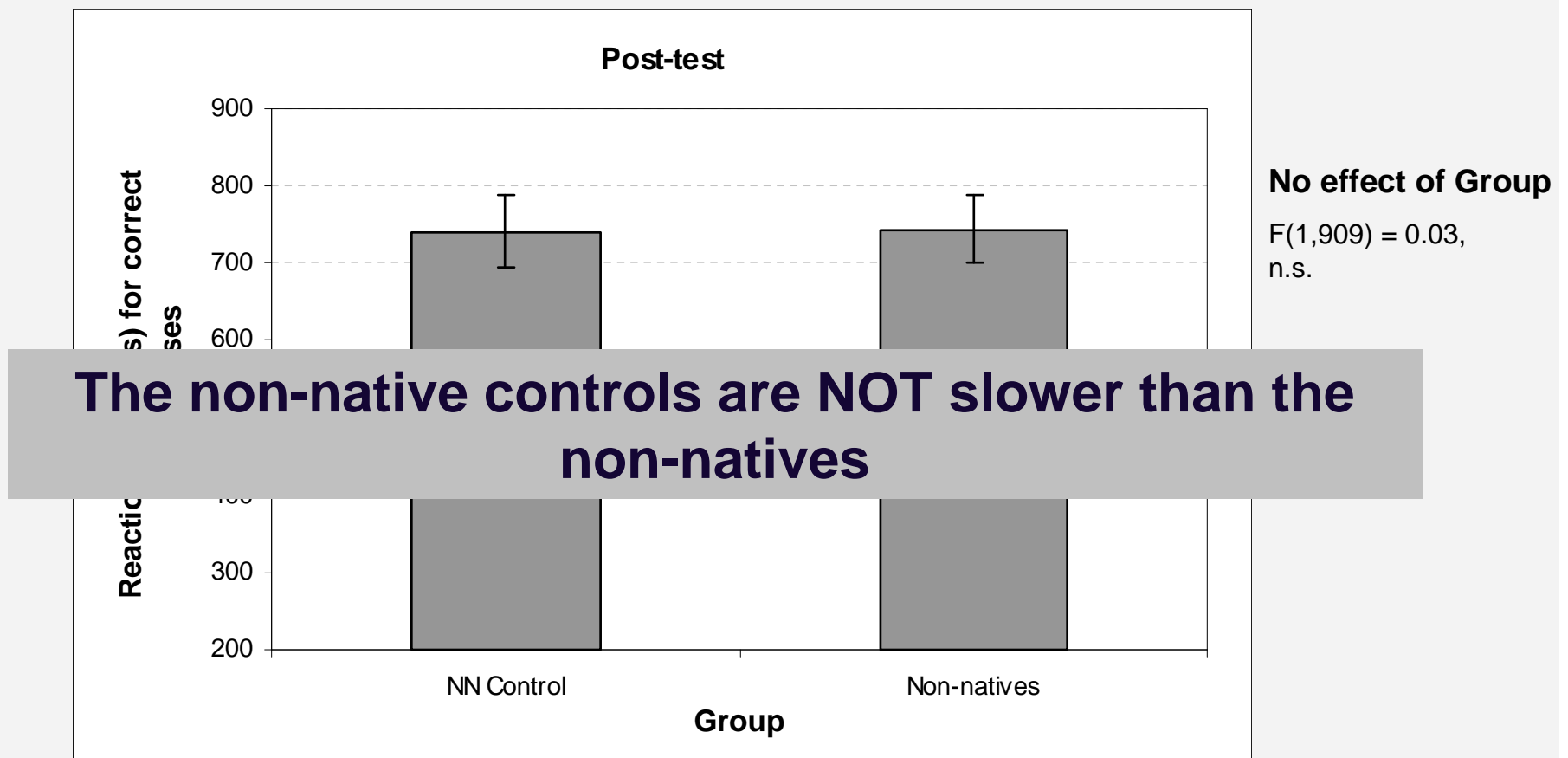
Figure 4. Reaction time (in ms) for correct responses in post-test as a function of group (NN Control and non-natives) . Error bars are standard error of the mean.

Results and discussion
Pre- and post-tests

- Some hints
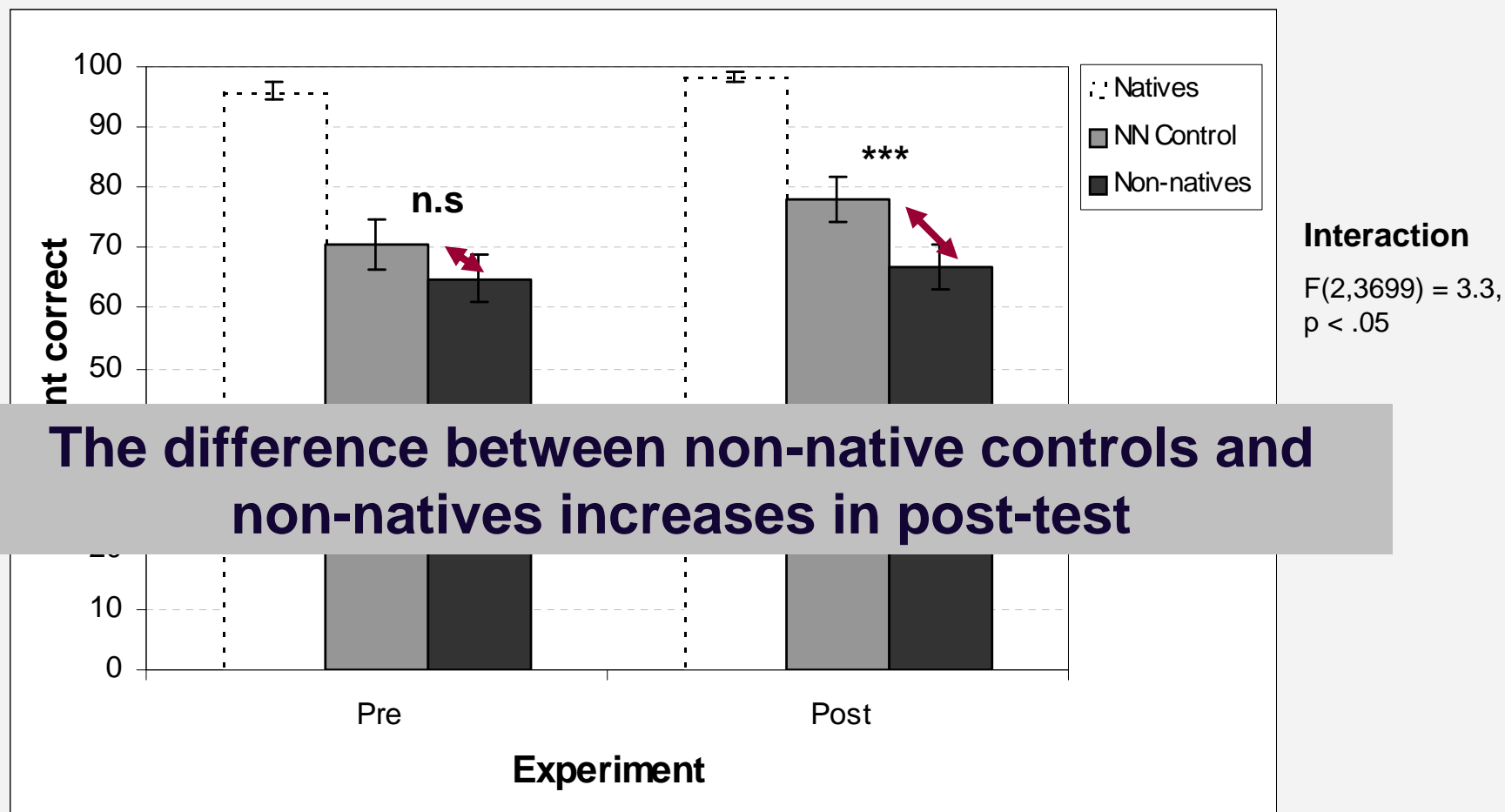
    - Is the musical expertise different in both groups?
        - Ear for music (1-7 scale)
        - Sense of rhythm (1-7 scale)
        - Musical instrument
        - Singing in tune

Schön, Magne, & Besson, 2004; Marques et al., 2007

Results and discussion
Pre- and post-tests

- Some hints

    - Is the musical expertise different in both groups?

	NN controls N = 14	Non-natives N = 20	
Ear for music	3.57	4.05	$t(31) = 0.8$, n.s.
Sense of rhythm	5	4.95	$t(32) = 0.9$, n.s.
Musical instrument	8	10	$X2(1, N= 34) = 0.17$, n.s.
Singing in tune	7	8	$X2(1, N= 34) = 0.33$, n.s.

Results and discussion
Pre- and post-tests

- Some hints

    - Does training really have an effect on stress identification in non-natives?

        - Influence of the performance at the end of the training on the responses in the post-test (in non-natives only)
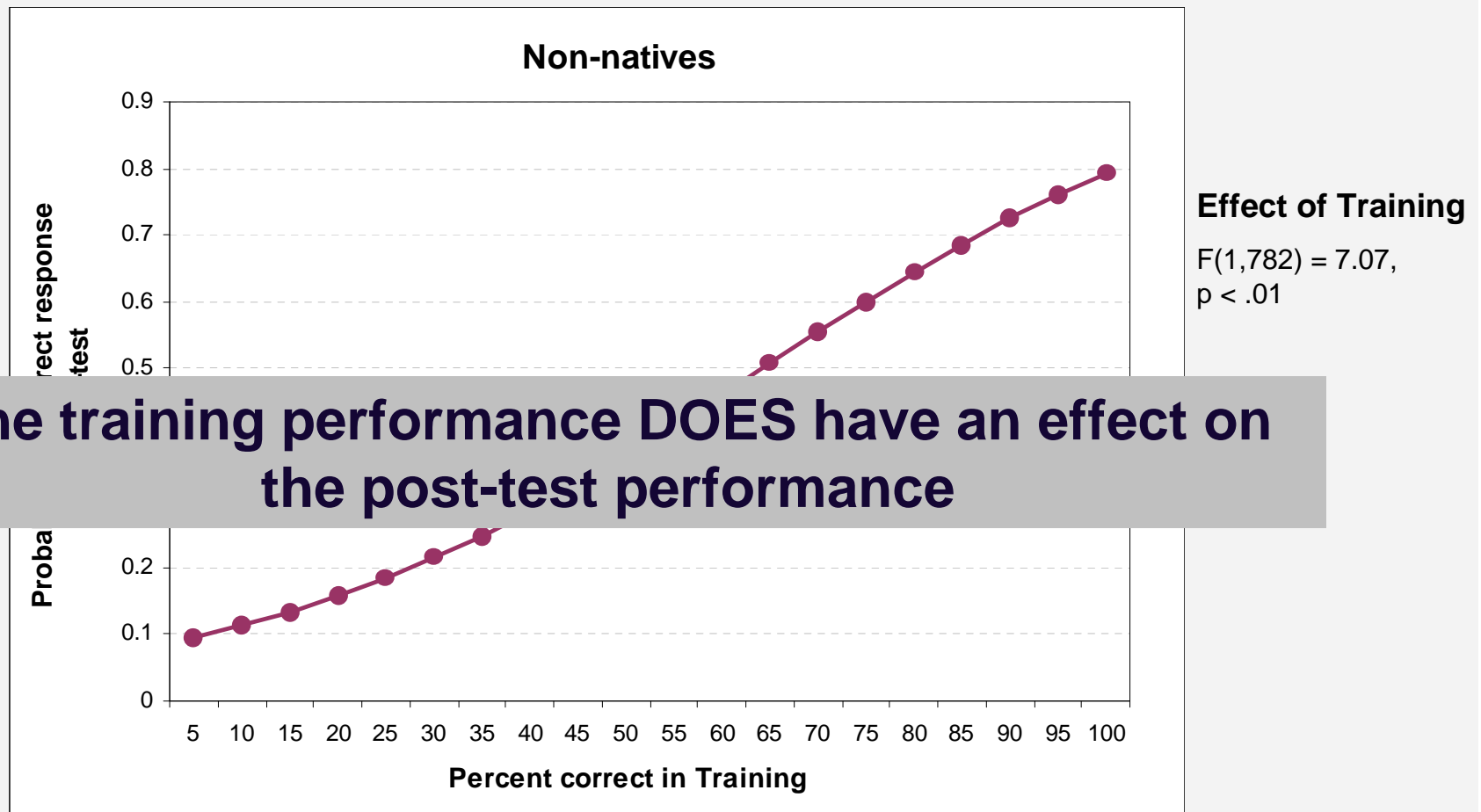
Results and discussion
Pre- and post-tests

Non-natives

Effect of Training

$F(1,782) = 7.07$, $p < .01$

The training performance DOES have an effect on the post-test performance

Percent correct in Training

Figure 5. Estimated probability of correct response in post-test as a function of percent correct in Training.

Conclusion and perspectives

- Unexpected and unexplainable differences between non-native controls and non-natives

- Although there is no global improvement, training does have an effect on the identification of lexical stress in non-natives

Conclusion and perspectives

- Phonetic variability in the stimuli

- Task with acoustic and lexical processing in pre- and post-test

- Words and pseudowords

Conclusion and perspectives

Does training make French speakers more able to identify lexical stress?

Yes, but only if they are good at the end of the training…