

# **Visual Chinese character recognition :**

**Is a stroke neighbor priming effect facilitatory or inhibitory?**

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# Content

- Background
- Previous studies
- The Present Study
- Discussions

Background

# Background

- In visual word recognition, the encounter of a word influences the processing of the subsequent words. The mental representations of the visually similar words (neighbors) are also activated.

e.g. word

**lord**

**ward**

**wood**

**work**

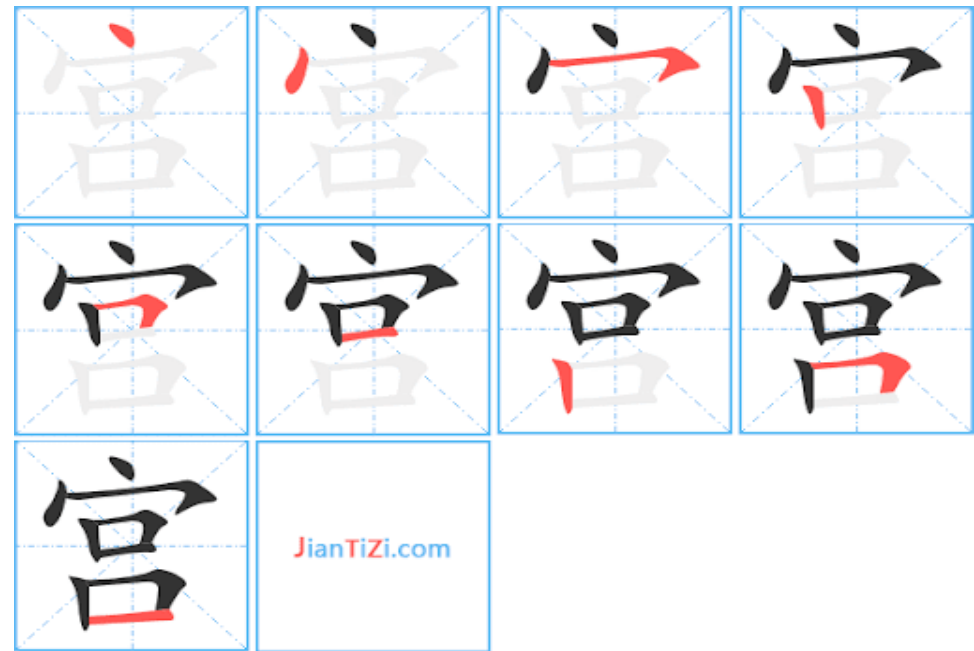
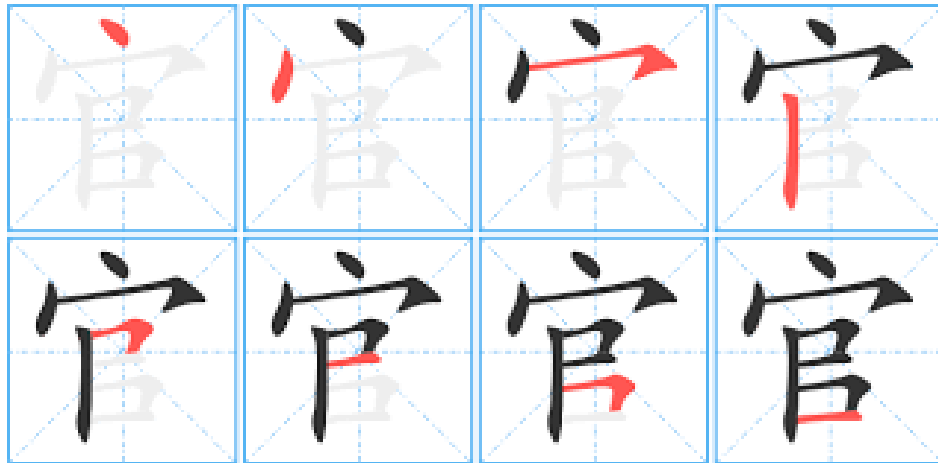
Evidence from: French (Grainger & Segui, 1990), English (Davis & Lupker, 2006), Japanese Katakana (Nakayama, Sears, & Lupker, 2011)

# Background

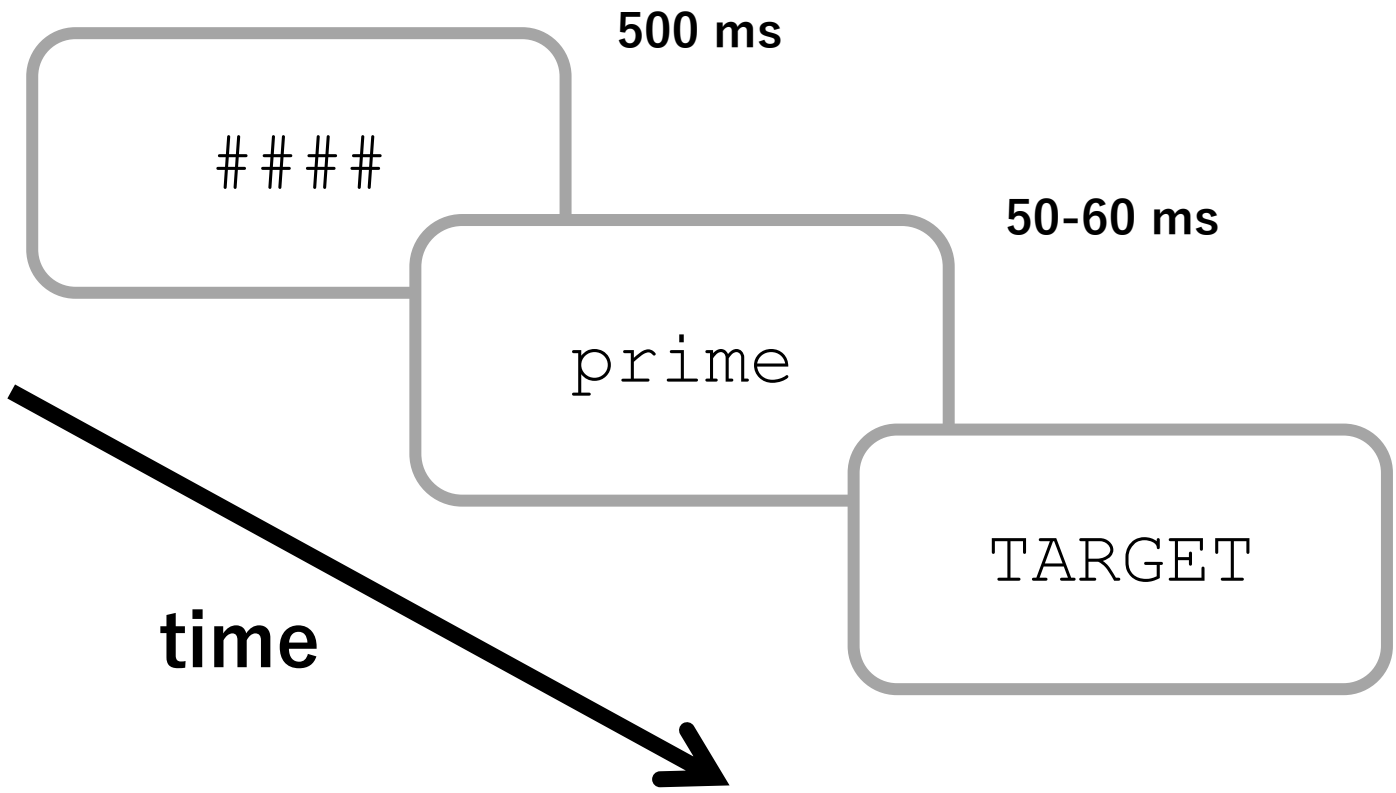
- The Chinese script is structurally different.
- Strokes are analogous to letters. **Letter neighbors-stroke neighbors.**

p a l a **c** e-palac**e**

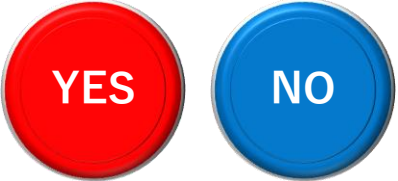
p a l a **t** e-palac**e**



# Masked Priming Paradigm

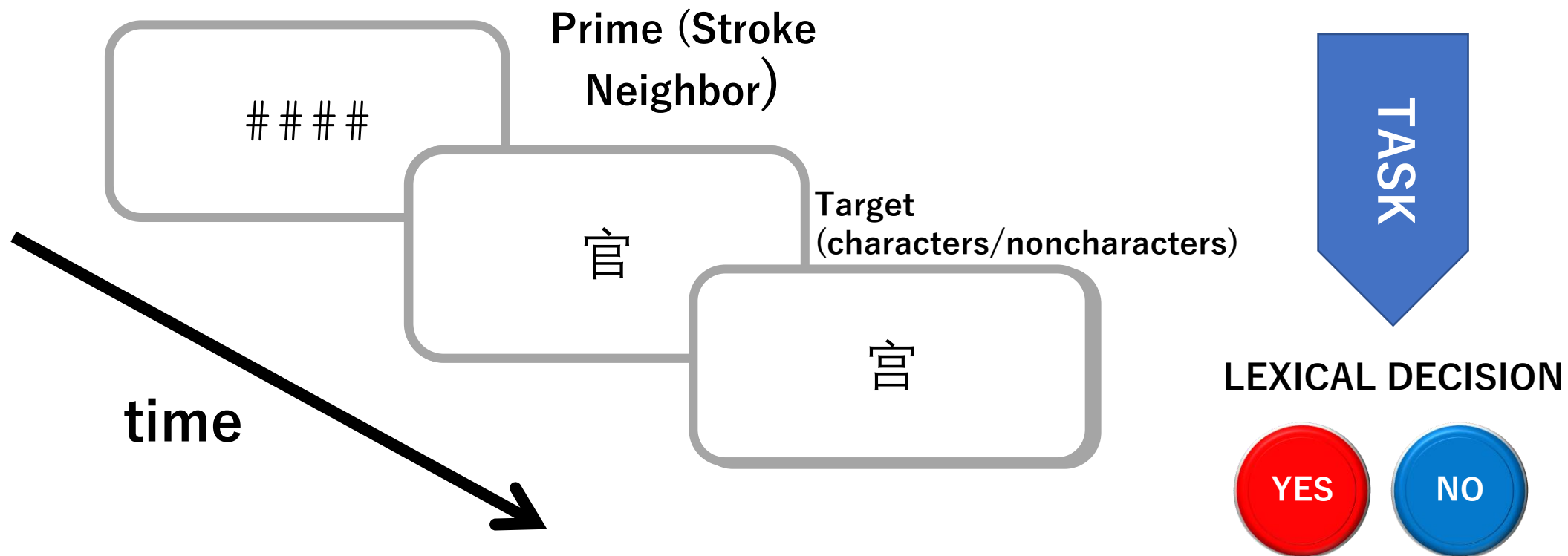


LEXICAL DECISION  
(word or not a word?)



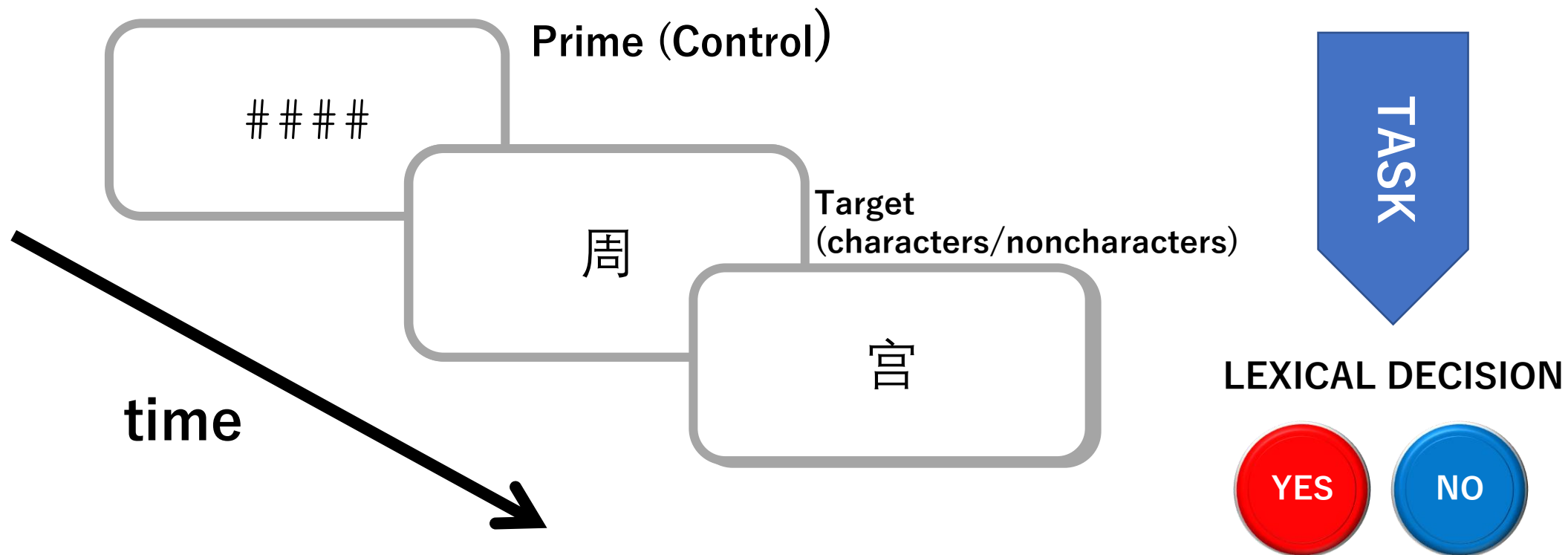
# Stroke Neighbor Priming

e.g., 官 /guan1/, official—宫 /gong1/, palace; 周/zhou1/, week—宫 /gong1/, palace



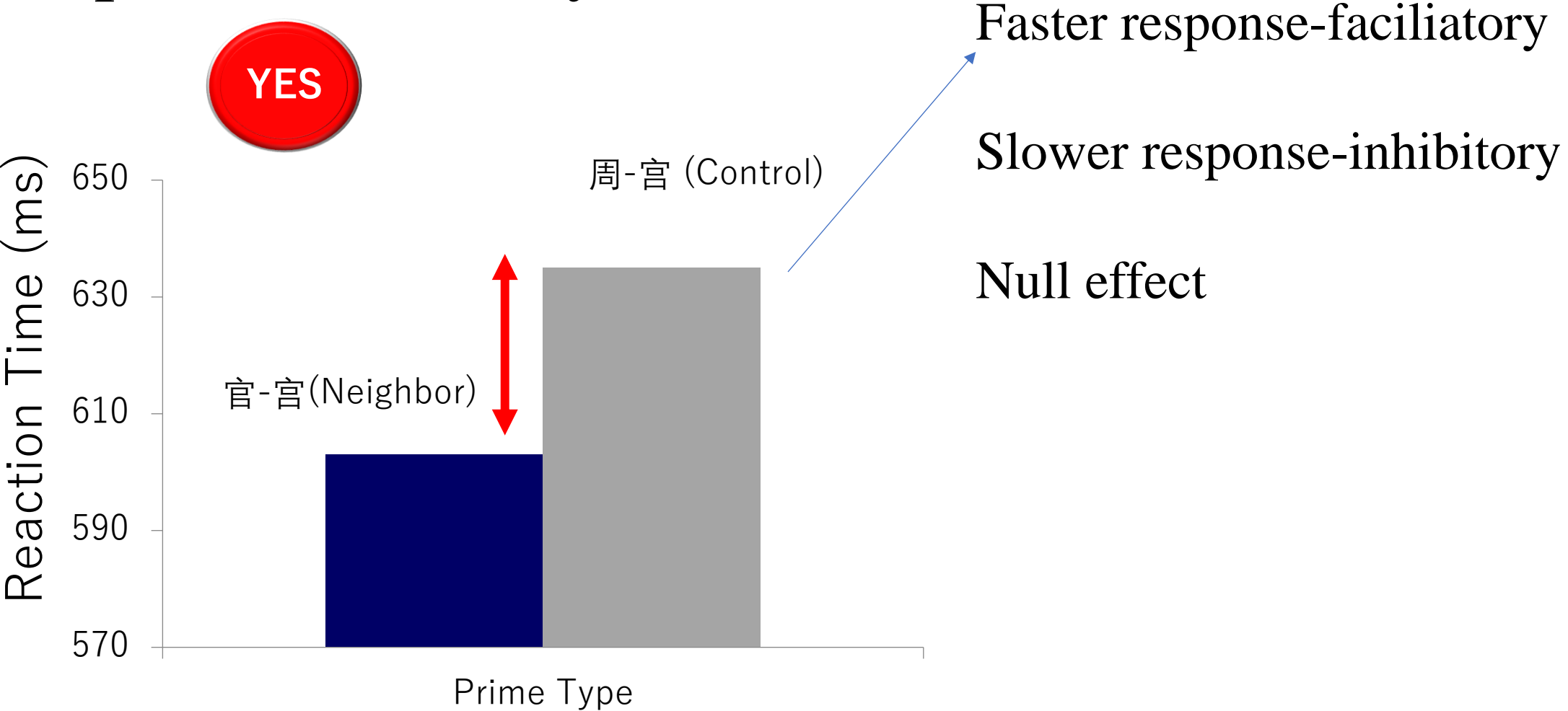
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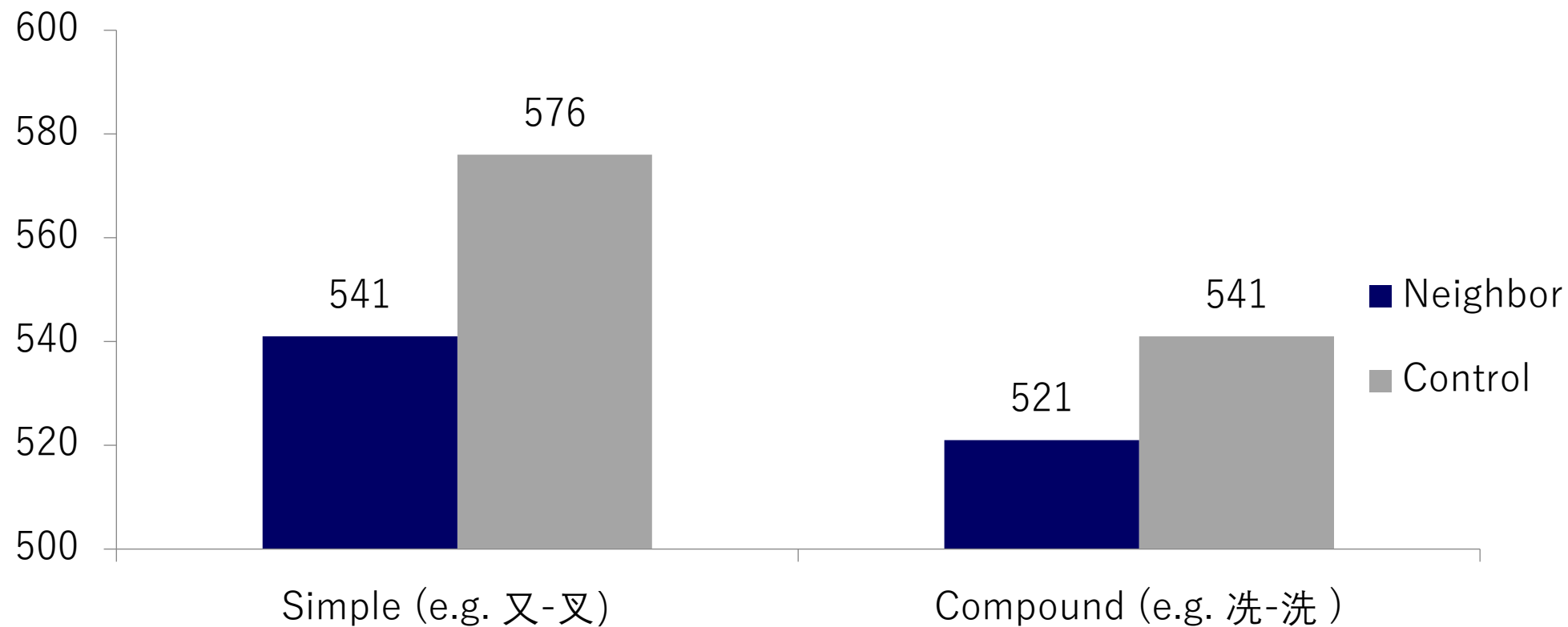
# Stroke Neighbor Priming Effects (often only “yes” responses are analyzed)




# Previous Study

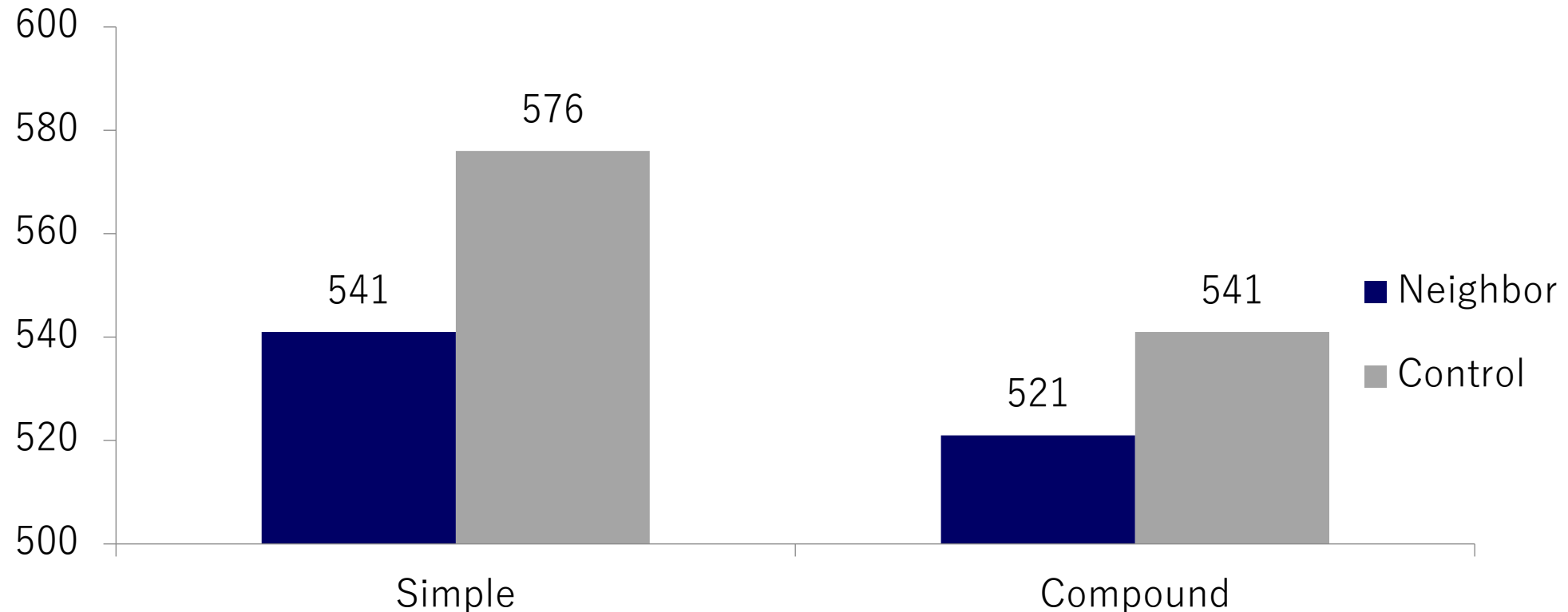
## Shen & Foster (1999)

- Two blocks (simple & compound), two conditions (neighbor & control).



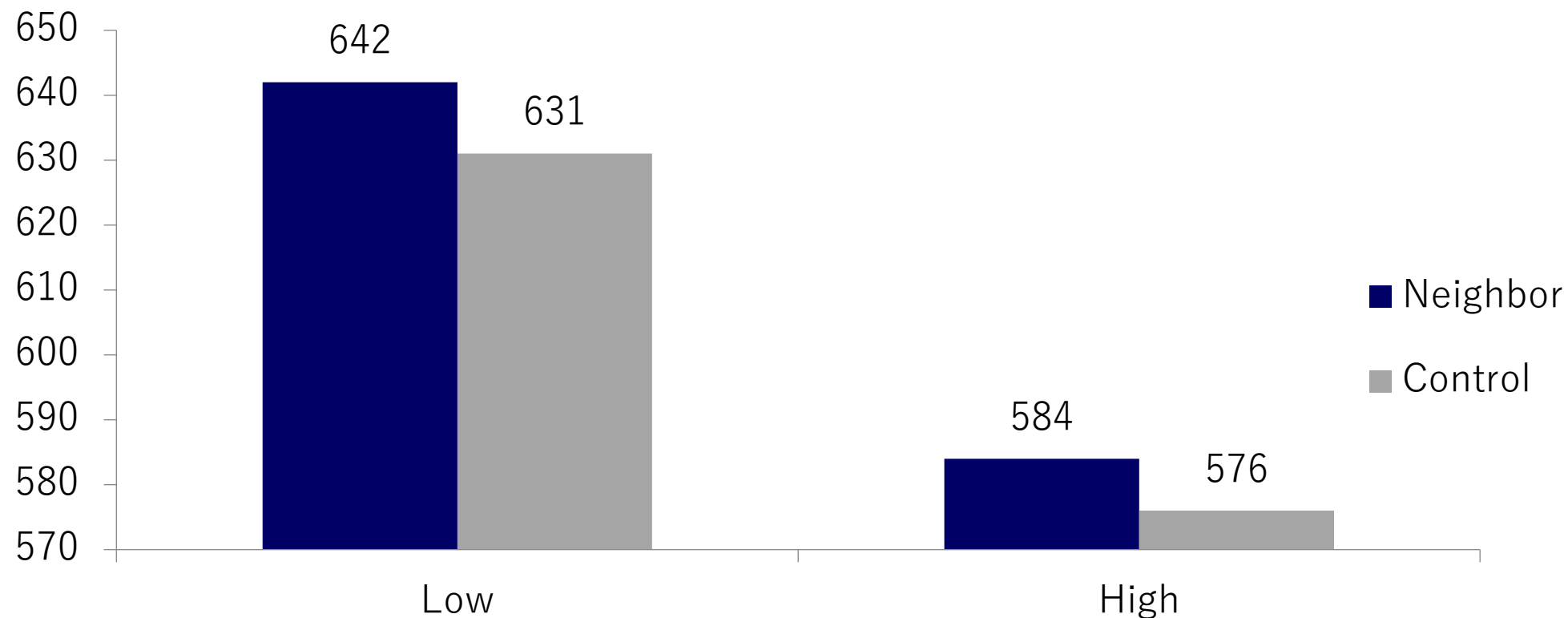
# Shen & Foster (1999)

- Facilitatory for both simple and compound characters.  There was visual overlapping, so the representation of the target was pre-activated.



## Wang et al. (2014)

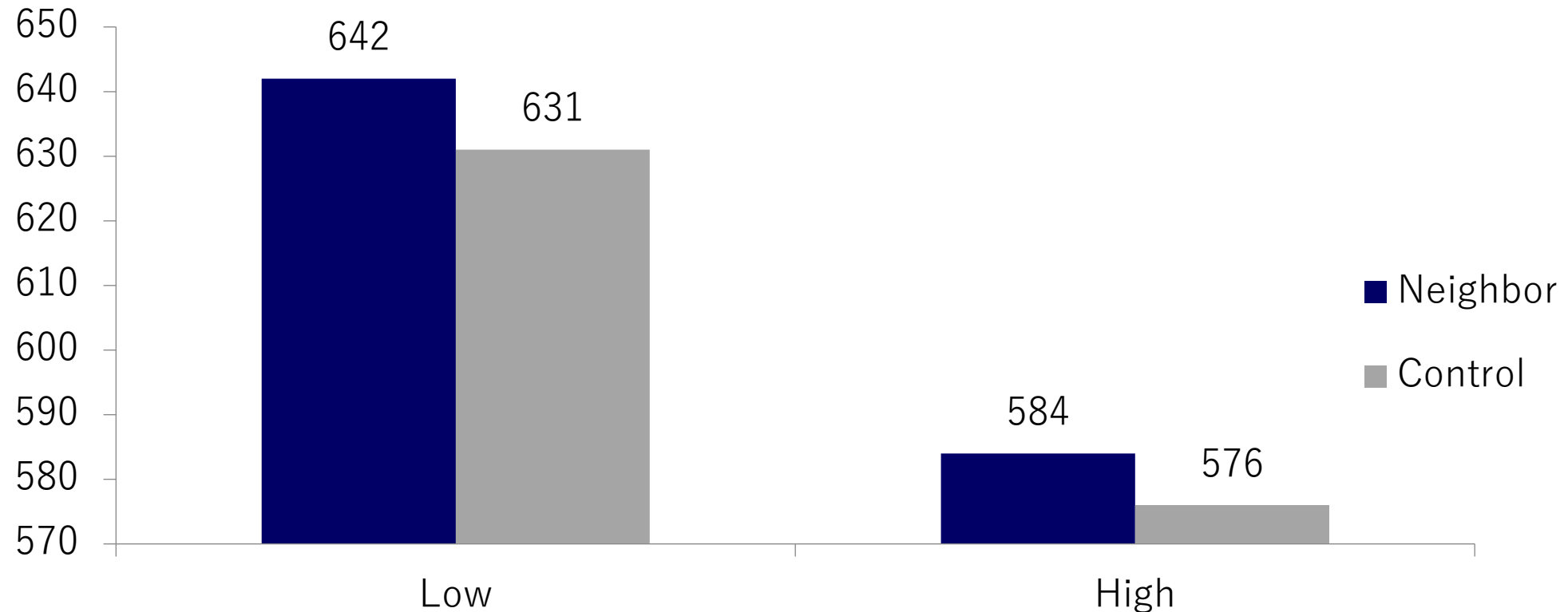
- 2 (high frequency targets vs low frequency targets)  
× 2 (neighbor vs control)



# Wang et al. (2014)

- Inhibitory for both high-frequency and low-frequency characters.

➡ The activation of neighbors compete with each other.



Why different?

# The Present Study



# Method

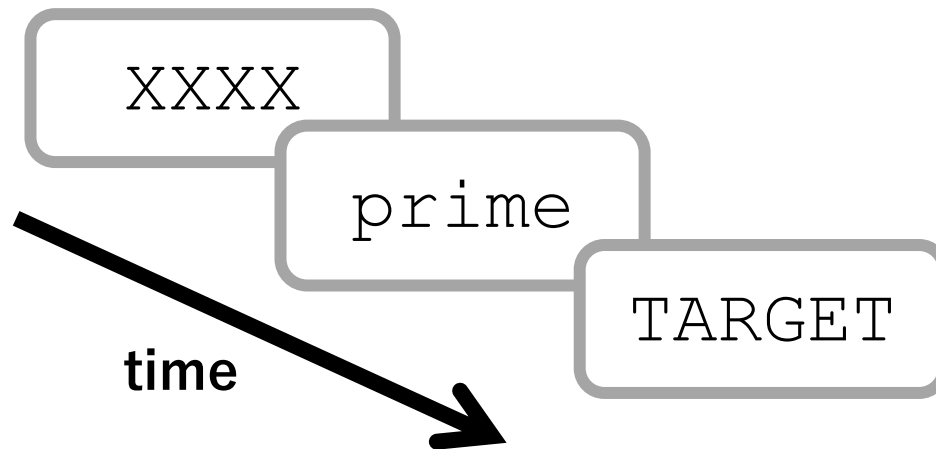
# Method

Participants:

- 40 native speakers from Mainland China  
(right handed)

Task:

- Masked Priming (Lexical decision)

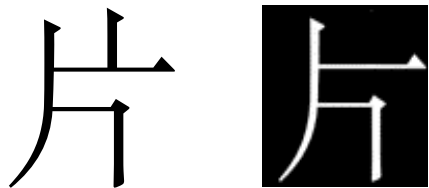


# Method

Stimuli (Same as in Shen & Forster, 1999)

- **Simple Characters**
- 30 stroke neighbor pairs
- 30 control characters as primes
- 30 noncharacters (created by deleting strokes from existing characters)-paired with another 30 control characters.
- Primes in Kaiti, targets in Songti. Primes smaller in size.

Prime	Strokes	Frequency/million	Target	Strokes	Frequency/million	Control	Strokes	Frequency/million
令	5	263.17	今	4	960.18	圣	5	259.88



# Method

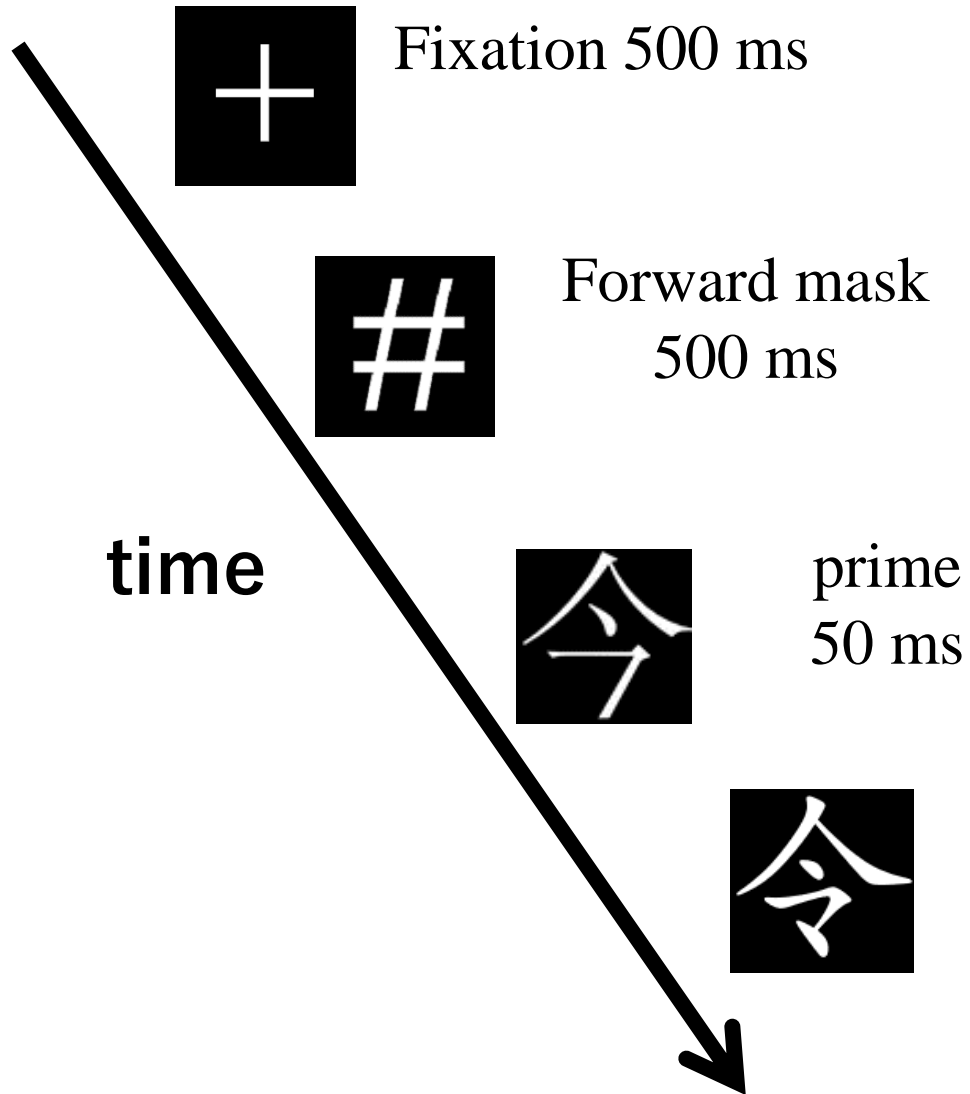
Stimuli (Same as in Shen & Forster, 1999)

- **Compound Characters**
- 32 stroke neighbor pairs
- 32 control characters as primes
- 32 noncharacters (created by deleting strokes from or adding strokes to existing characters)-paired with another 32 control characters.
- Primes in Kaiti, targets in Songti. Primes smaller in size.

Prime	Strokes	Frequency/million	Target	Strokes	Frequency/million	Control	Strokes	Frequency/million
埋	10	47.8	理	11	877.41	浴	10	47.46



# Procedure



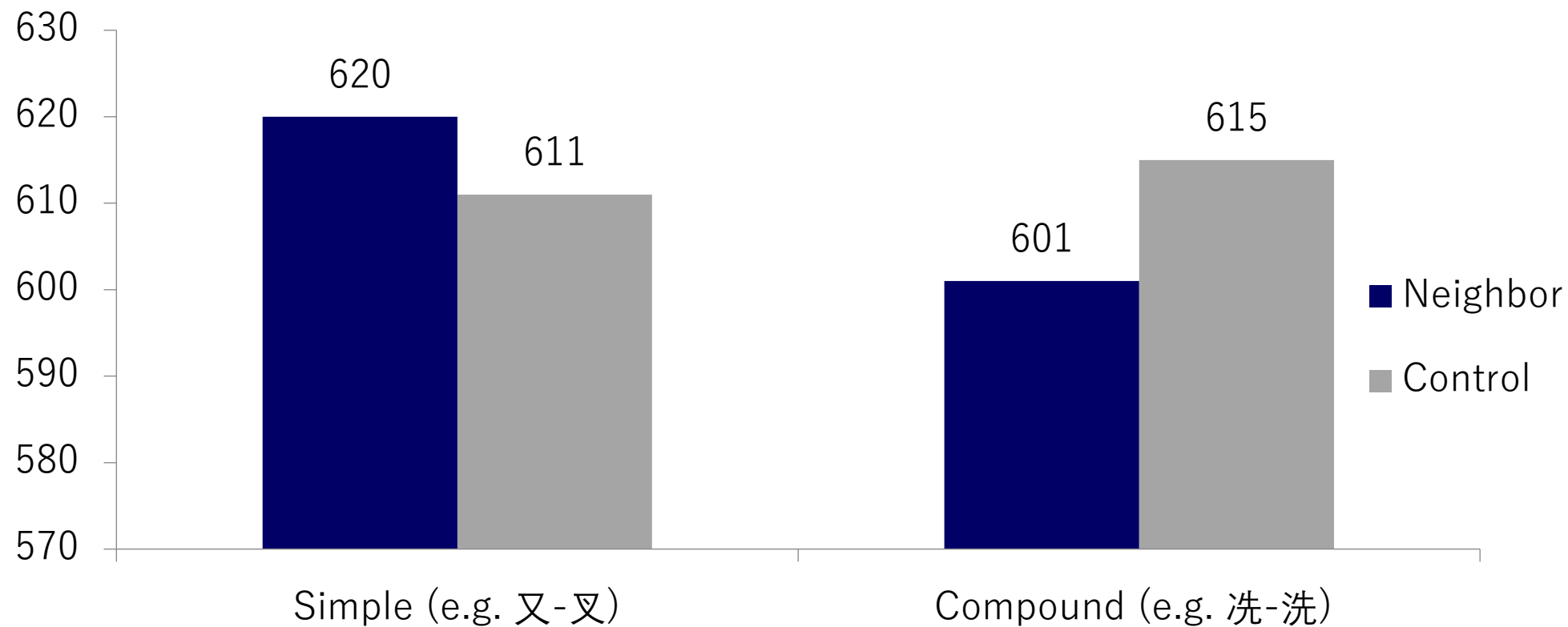
Lexical decision



# Results

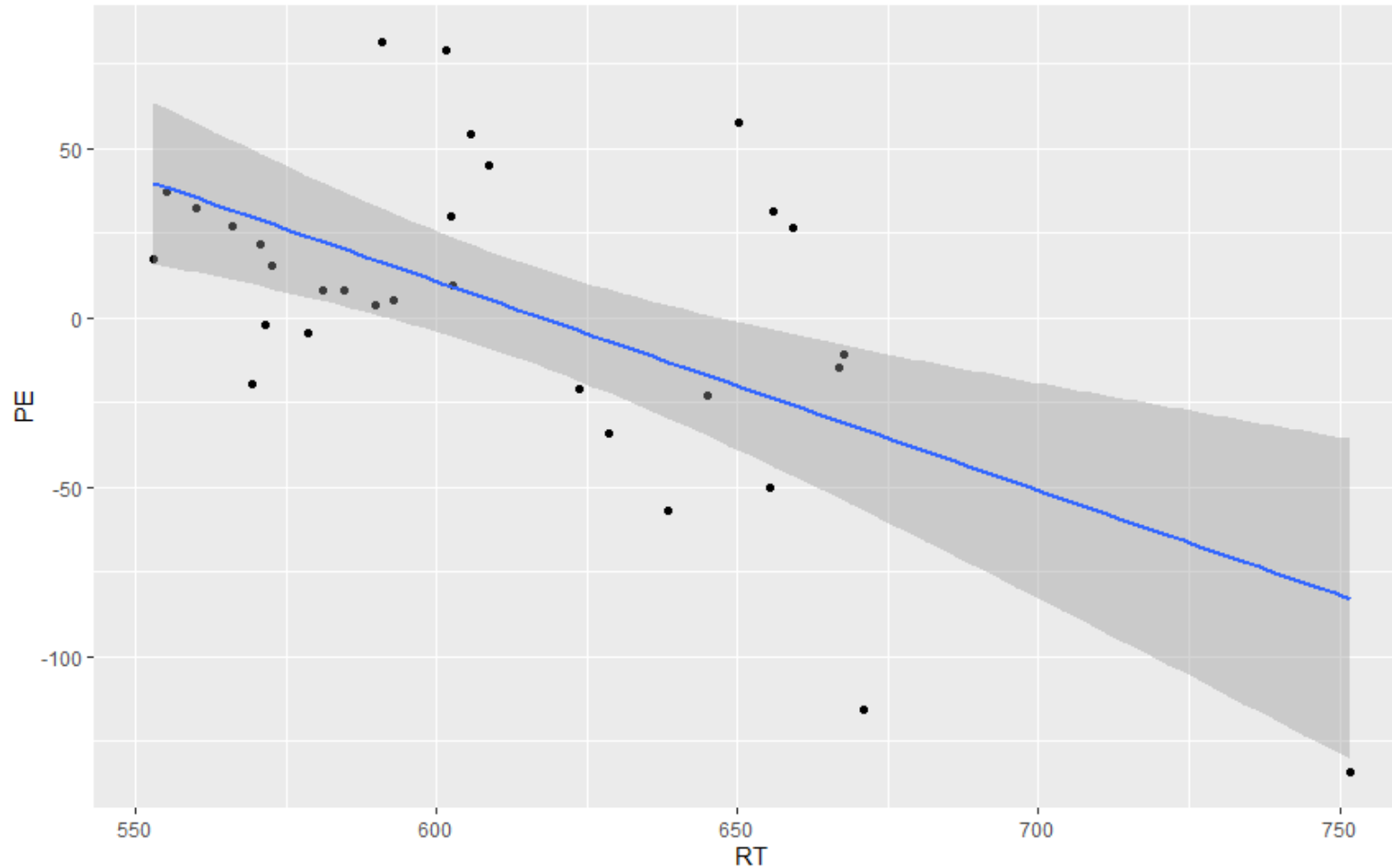
# The present study

- Replicated Shen & Forster's result but only partially. For compound characters-facilitatory, simple characters-inhibitory trend.



# The present study

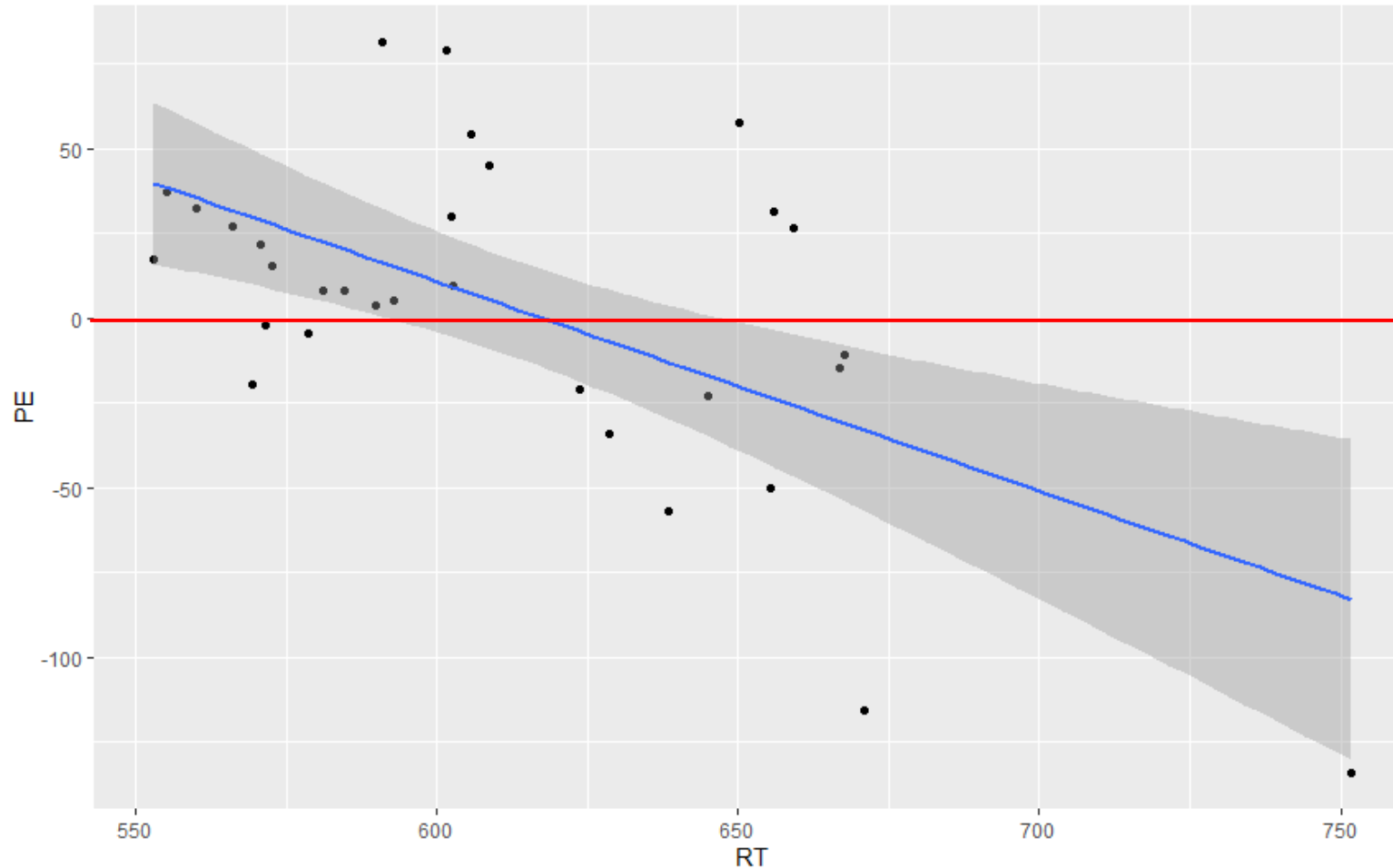
- The response time and the priming effect (RT in “control” condition – RT in “neighbor” condition) are negatively correlated.





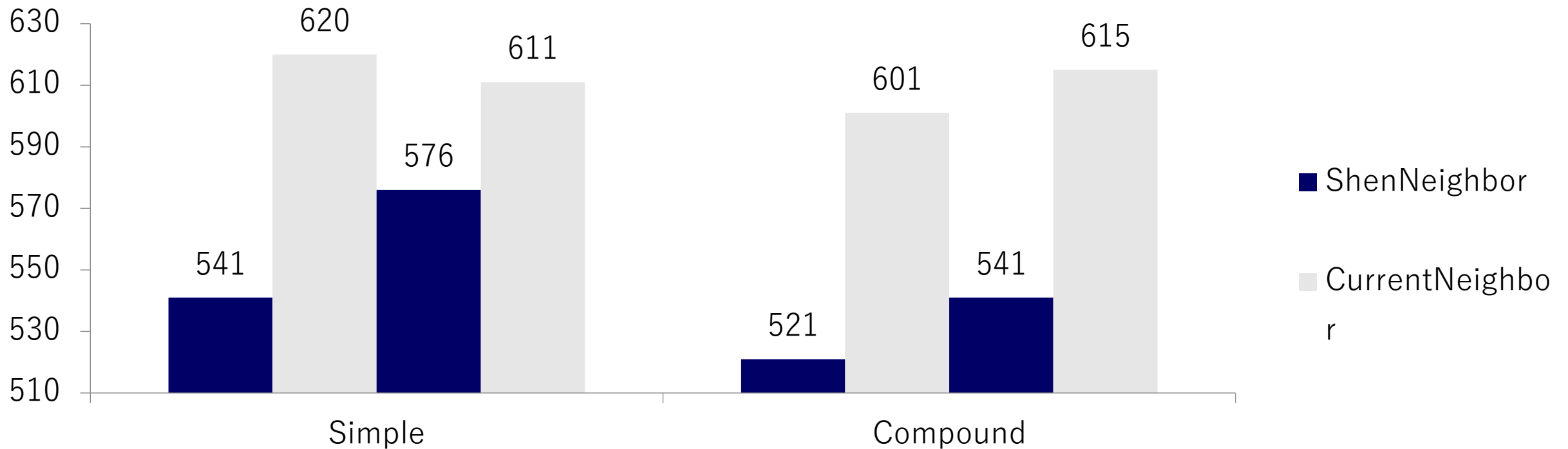
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# RT differences in two studies

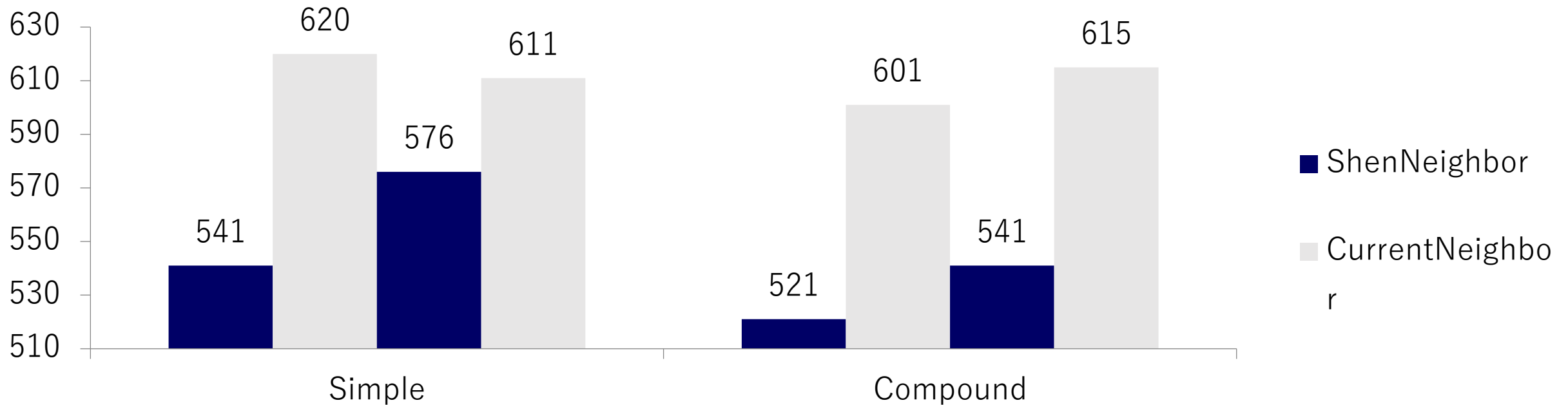
- Same stimuli, same procedures, but apparently different response time.



# Similarities in two studies

Simple, Strokes	Compound, Strokes	Simple, Frequency/Million	Compound, Frequency/Million
4.43	8.34	678.20	79.05

- Simple characters are responded slower despite higher frequency<sup>[1]</sup> and fewer strokes <sup>[2]</sup>.



[1] See Ding, Peng & Taft (2004)

[2] See Peng & Wang (1997)

# Discussion

## De Moor, Vergus, & Brysbaert (2005)-English

- M criterion (individual),  $\Sigma$  criterion (summed).

1. Word-likeness of nonwords;

2. Instruction.

3. Feedback.

# Difficulty in discriminating (non)characters.

- The difficulty in the discrimination of characters and noncharacters could be different across blocks and studies.

“Simple” condition

片 直

“Compound” condition

扱 诟

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- The difficulty in the discrimination of characters and noncharacters could be different across blocks and studies.

“Simple” condition

片 直

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扱 诟



When it is difficult to discriminate, RT goes up.

# Instruction

- In De Moor, Vergus & Brysbaert (2005), participants performed differently when the requirement of the task is different (accuracy vs speed).
- Although both accuracy and speed were required in Shen & Forster (1999), it is possible the wording in the instruction led the participants to give quicker response, thus shorter RT.



# Feedback

- Both studies gave the feedback of accuracy and RT.

Correct 494.40

... Wrong ...

# Familiarity effect?

- Twenty-four native speakers of Mandarin Chinese from the **same** population as in Experiment 1...
- **Exactly the same** set of test materials, the pattern mask, target and prime characters, from the preceding experiment were used.

# Conclusion

- The presentation of a Chinese character also activates the “neighbor” of this character. But whether the effect is facilitatory or inhibitory is subject to the experimental setting, inhibitory effect usually comes together with longer response time.
- We should pay particular attention to the following aspects when studying the neighbor priming effect using LDT: word-likeness of nonwords, instruction, feedback, the familiarity of the material for participants...

谢谢!

Thanks a lot!