# The Stroop-like Effect During Sound Perception Task in Bilingual Minds

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## 1. Introduction

It is widely accepted that concepts can be represented in two linguistic forms in the bilingual lexicon: first language (L1) and second language (L2). Recently, whether the phonology in the L1 interferes with the word recognition in the L2 for bilingual people is a subject of lively debate.

There is an assumption that there may be a kind of Stroop-like Effect, which was first proposed in psychology, in bilinguals' brain. When bilinguals read or listen L2 word pairs(WP) with a sound-similarity judgment task and if L1 sound is also activated, there will be 4 conditions as shown in Table 1.

Based on this assumption, the paper will examine this issue in sound similarity judgment tasks by assessing effects of phonological interface on the recognition of Chinese disyllabic word pairs by English-Chinese bilingual speakers. What the paper hypothesis is there is a kind of Stroop-like effect in bilingual brains when the result of explicit processing of L2 word pairs is not the same as the implicit processing of L1 word pairs.

## 2. Background

Different with the cross-language tasks, which encourages a bilingual activation pattern, in one-language tasks cross-language effects of L2 on L1 were found in a purely L1 context (Kroll and Stewart, 1994；Hell and Dijkstra, 2002). Thierry and Wu (2007) found bilinguals' knowledge of their L1 was activated in the context of their L2. Participants exhibited a reduced N400 amplitude for English word pairs whose Chinese translations shared a common character relative to English word pairs whose Chinese translations did not share a common character, the temporal parameters and necessary characteristics of the task may determine whether bilinguals access the L1. (Van Heuven et al. 2008). Obviously, the research is a good support to unconscious activation of L1 during L2 semantic comprehension task. What will be the sound-perceptive task? When bilinguals just read or listen to words in their L2 with perceptive task, will the L1 be activated?

## 3. Experiment Methodology

The electrophysiological experiment was carried out as below. 20 English-Chinese (Mandarin) bilinguals whose L1/L2 is in different levels and 20 monolingual Chinese (Mandarin) speakers were selected as participants in our researches to control any potential priming effects. Then the 200 word pairs as shown in Table 1 used were matched across experimental conditions for lexical frequency and word concreteness.

| WP L1-L1<br>WP L2-L2 | Common first syllable | Different first syllable |
|---|---|---|
| Common first syllable | **工作-工人**<br>(gongzuo-gongren)<br>*Work-Worker* | **老虎-时间**<br>(laohu-shijian)<br>*Tiger-Time* |
| Different first syllable | **名字-明天**<br>(mingzi-mingtian)<br>*Name-Tomorrow* | **厨房-熊猫**<br>(chufang-xiongmao)<br>*Kitchen-Panda* |

**Table 1. Example of Materials**

Participants viewed two blocks of 100 word pairs presented in a randomized order. After a prestimulus interval of 200 ms, the first word was flashed for 500 ms at fixation followed by the second word after a variable interstimulus interval of 500, 600, or 700 ms. Participants were instructed to indicate whether the second word's sound was similar to the first one by pressing keys.

## 4. Conclusion

From the classic electrophysiological component N400, this experiment found that the English-Chinese bilinguals could not judge these Chinese word pairs easily when the result of explicit processing is not the same as the result of implicit processing. This finding provides that L1 can be activated and Stroop-like effects do exist in bilingual minds.

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