

出國報告（出國類別：其他－參訪、國際會議）

- 1. 雙語閱讀與跨語言研究研討會暨耶魯大學 Haskins Laboratories 訪問**
- 2. 第 21 屆國際認知神經科學年會 (The 21st Annual Cognitive Neuroscience Society Meeting)**

服務機關：國立陽明大學

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派赴國家：美國

出國期間：103 年 4 月 1 日至 10 日

報告日期：103 年 4 月 21 日

一、目的

本次出國有兩個行程，(A)第一個行程 (4/2 ~ 4/4) 目的是去參加耶魯大學 Haskins Laboratories 主辦的雙語閱讀與跨語言研究研討會以及跨國合作研究的資料討論。(B)第二個行程 (4/5 ~ 4/8) 目的是去參加認知神經科學年會 (CNS 2014 meeting)，並於會中報告研究成果 (海報展示)，交換研究心得。

A. 雙語閱讀與跨語言研究研討會及跨國合作研究討論

在原有的跨國合作框架下舉辦研討會，安排包含來自美國、西班牙、以色列以及台灣的團隊研究者做專題報告，報告各團隊在其語言系統或跨語言的閱讀研究進展；進行跨國/語言研究資料討論，討論最近剛完成資料收集的跨語言 (中文-英文-西班牙文-希伯來文) 閱讀神經造影實驗。透過這一次的與會與討論，期待能更新 (update) 與合作團隊的研究進展，互相了解最新的研究狀況；在研究資料導討論方面，具體目標是希望能加速資料分析與彙整，早日完成研究論文/文章的撰寫與發表。

B. 參加在波士頓舉行的認知神經科學 2014 年會，認知神經科學年會是認知神經科學領域的專業國際會議，每年都會聚集數千位來全世界的認知神經科學學者做研究成果報告，大會也安排各項認知主題的專題報告，提供一個交換意見、互相學習、建立合作的國際平台。

二、過程

A. 雙語閱讀與跨語言研究研討會及跨國合作研究討論

研討會議程如附件一，4/3 及 4/4 則是在耶魯大學 Haskins Laboratories 做資料的討論。

B. 參加在波士頓舉行的認知神經科學 2014 年會 (4/5 ~ 4/8)

CNS 2014 annual meeting 的議程附件二，發表論文海報如附件三。

三、心得及建議事項

A. 雙語閱讀與跨語言研究研討會及跨國合作討論

各國研究代表在這次研討與討論會中，除了呈現了各自的研究成果，更具體地在跨國合作的資料討論上提出其見解與批判，說明語言與閱讀歷程的關係，在

大腦的神經網路的運作與型槩上，有共通性，也有獨特性。這些研究結果具有好幾個層次的意義與影響，將會領導我們下一階段研究的發展方向。

B. 參加在波士頓舉行的認知神經科學 2014 年會 (4/5 ~ 4/8)

今年有若干symposium 很有趣，例如 THE BROADER APPLICABILITY OF INSIGHTS FROM DEVELOPMENTAL COGNITIVE NEUROSCIENCE, MECHANISMS OF RESPONSE INHIBITION，對於個人的研究很有啟發性。另外，在海報的展示過程，也有一些共同研究興趣的研究人員前來參觀海報展示的研究結果，互相交換意見，對於研究結果的解釋具有許多正面的幫助與效果。



THE SCIENCE OF THE SPOKEN
AND WRITTEN WORD

First and Second Language Literacy:
New Directions in Cross-Language Research

Wednesday April 2nd, 2014
300 George Street, New Haven, CT
Room 157 IFE Auditorium

10am-10:30am: Ram Frost; Hebrew University & Haskins Laboratories

10:30am-11am: Manuel Carreiras & Kepa Paz-Alonso;
Basque Center on Cognition, Brain, and Language (BCBL), Spain:
"Orthographic coding: Processing letters and digits"

11am-12pm: Ovid Tzeng and colleagues; Taiwan

12pm-1pm: Lunch Break

1pm-1:30pm: Fumiko Hoefft & Roeland Hancock PhD; University of San
Francisco & Haskins Laboratories:
"Convergence and divergence of implicit learning & reading networks in the
human brain"

1:30pm-2pm: Karen Emmorey; San Diego State University

2pm-2:30pm: Nandini Chatterjee Singh; National Brain Research Centre, India:
"The influence of orthographic depth on reading networks in simultaneous
biliterate children"

2:30pm-3pm: Haskins Laboratories Staff

3pm-3:30pm: Katarzyna Jednoróg;
Nencki Institute of Experimental Biology, Poland:
"Three-dimensional Grammar in the Brain: Dissociating the Neural Correlates of
Natural Sign Language and Manually Coded Spoken Language"

3:30pm-4pm: Haskins Laboratories Staff

4pm-4:30pm: Closing Remarks

Cognitive Neuroscience Society

21st Annual Meeting, April 5-8, 2014
Marriott Copley Place Hotel, Boston, Massachusetts

2014 Annual Meeting Program

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show severe deficits in both. Disruptions in white matter (WM) tracts may be associated with these impairments. Current research has not shown consistent findings. The study aims to investigate WM damage in aphasic patients with or without movement disorders using diffusion tensor imaging (DTI). Six stroke patients with Broca's Aphasia (4 males, 2 females, mean age = 48.3, SD = 10.4) underwent DTI and T1 scans and the Concise Chinese Aphasia Test (CCAT). The tractography revealed that longitudinal tracts are mostly intact in patients, suggesting that motor or speech deficits are less associated with these tracts. Interestingly, corpus callosum (CC) was severely damaged in patients with severe aphasia but moderately damaged in patients with serious movement deficits. This suggests that CC's connection between two hemispheres is crucial for speech, but less so for movement. Besides, patients with poor speech while retaining good movements usually show great damage in cortico-spinal tracts in the frontal branch (CSf). This suggests that CSf affects speech production but not motor movement coordination. In sum, the hemispheric disconnection due to damaged CC have moderate to large impacts on speech and movement, whereas CSf only affects the speech ability. Continuous analysis of more aphasic stroke patients' WM will reveal more insights into the functions of specific pathways, affected or rewired, in this population.

F72

PRE-EXISTING AUDITORY PERCEPTUAL ABILITIES, NOT BILINGUALISM, PREDICT NOVEL SPEECH LEARNING Pilar Archila-Suerte¹, Arturo Hernandez¹; ¹University of Houston — The goal of this study was to investigate how phonetic experience in two languages influences the perception of novel speech sounds and to reveal the underlying neural mechanisms involved in novel speech learning. Adult English monolinguals (n = 20) and early Spanish-English bilinguals (n = 24) participated in four consecutive sessions of phonetic discrimination training (same vs. different) while listening to Hungarian pseudowords that contained novel phonemes. Participants completed two fMRI sessions, one before training and another one after training. The in-scanner task consisted of passively listening to the novel speech stimuli with which participants trained outside the scanner. The behavioral results showed that even though monolinguals and bilinguals learned after training, the groups did not significantly differ from each other in the discrimination of novel speech. Nonetheless, the neural processes engaged by monolinguals and bilinguals differed after training (left anterior cingulate gyrus in monolinguals and bilateral parietal regions in bilinguals). An additional post-hoc regression analysis examined how participants' overall discrimination performance predicted brain activity before and after training. Here it was found that, regardless of language group membership, better perceivers were more likely to recruit sensory-perceptual areas (bilateral superior temporal gyrus), whereas worse perceivers were more likely to recruit higher-order cognitive areas after training (right postcentral gyrus, superior parietal lobule, and left supramarginal gyrus). These findings suggest that growing up in bilingual phonetic environments does not facilitate novel speech learning. Instead, the ability to discriminate novel speech appears to originate from individual enhanced perceptual abilities present prior to training.

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BUILDING PHRASES VS. WORDS: AN MEG INVESTIGATION Meera AlKaabi¹, Liina Pykkänen²; ¹New York University, NNYC, ²NYUAD Institute, NYUAD — A central part of knowing a language is the ability to combine basic linguistic units into more complex representations. Whether complex phrases and complex words are built by the same combinatorial mechanisms has been a matter of significant theoretical debate (e.g., Aronoff, 1994; Marantz, 1997). Within cognitive neuroscience, composition has so far been studied at the phrasal level, but not at the word level. Within the phrasal research, several recent studies have implicated the left anterior temporal lobe (LATL) as the strongest candidate for combinatorial effects across words (Bemis & Pykkänen, 2011; 2013ab). This study is an MEG investigation of the neural correlates of within-word vs. across-words composition. The main goal was to test whether within-word composition deploys the same brain mechanisms as across-words composition, with a primary focus on the LATL. Our design used three noun types, varying in internal structure: compound, suffixed and monomorphemic nouns. Each condition appeared in a modified (preceded by an adjective) and non-modified (preceded by an unpronounceable string of consonants) context. ROI and full brain analyses showed significantly larger activity in the LATL for

compounds and suffixed nouns than for monomorphemic nouns, in the non-modified context. However, within-word and across-word composition interacted interestingly: across word composition effects were only observed when the target noun was itself structurally simple, i.e., across words and within-word composition effects did not linearly add up. In sum, our results provide the first neurophysiological demonstration that composition mechanisms within-words and as across-words may in fact be qualitatively the same.

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NEURAL BASIS OF THE LEFT VISUAL FIELD SUPERIORITY FOR PROCESSING CHINESE CHARACTERS Wen-Jui Kuo¹, Chad Chen¹, Ovid Tzeng²; ¹Institute of Neuroscience, National Yang-Ming University, Taipei, Taiwan, ²Institute of Linguistics, Academia Sinica, Taipei, Taiwan — The goal of this study is to examine neural basis of the left visual field (LVF) superiority for processing Chinese characters. Chinese characters were simultaneously, bilaterally presented to the participants, one in the LVF and one in the RVF. On the same (visual) presentation frame, there was a central cue (< or >) accompanying the two characters to indicate which character (the LVF one or the RVF one) to attend and process for lexical decision. For robustness checking, frequency of the characters was included as a variable and varied (low, medium, and high). Behavioral data of reaction time and accuracy, across all three frequency levels, showed robust, stable LVF superiority. That is, characters presented in the LVF were processed with higher efficiency and accuracy. Our findings are consistent with what a previous study reported (Tzeng et al., 1979). By using fMRI, we found that the processing characters presented in the LVF resulted in greater activity in the right parietal region. Therefore, the LVF superiority for processing Chinese characters seems to be supported by the higher efficiency of the dorsal processing stream.

F75

THE NEURONAL LATERALITY OF THE PHONOLOGICAL AND VISUAL SIMILARITY EFFECTS IN PROBED SERIAL RECOGNITION IN CHINESE-ENGLISH BILINGUALS Morica Y.C. Li^{1,2}, Daisy L. Hung^{1,2}, Ovid J.-L. Tzeng^{2,3}, Denise H. Wu^{1,2}; ¹National Central University, Taiwan, ²National Yang-Ming University, Taiwan, ³Academia Sinica, Taiwan — Previous behavioral findings of verbal short-term memory (STM) have suggested that English monolinguals mainly depend on phonological representation to retain English words, whereas unbalanced Chinese-English bilinguals utilize both phonological and orthographic information to retain English (L2) words as they do with Chinese (L1) characters. To determine whether such functional differences between the two groups of participants reflect distinct neural mechanisms underlying verbal STM, the current fMRI study investigates the neural responses associated with the effects of phonological and visual similarity (PSE and VSE) of English words in a probed serial recognition paradigm in English monolinguals and in Chinese-English bilinguals. The neuroimaging results generally showed a left lateralized fronto-temporo-parietal network of verbal STM for both groups of participants. The PSE was associated with a left lateralized and a more bilateralized fronto-parietal networks in native English readers and in Chinese-English bilinguals, respectively. On the other hand, the VSE was only associated with a right lateralized fronto-parietal network in Chinese-English bilinguals, but not with any brain region in native English readers. The present findings indicate that reading experiences modulate the neural mechanisms underlying verbal STM. They also suggest that the behaviorally observable VSE only in Chinese-English bilinguals might be associated with the right lateralized fronto-parietal activations which support the successful retention of visual/orthographic information of verbal materials.

LANGUAGE: Semantic

F76

EFFECTIVENESS OF LOW-FREQUENCY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION ON POST-STROKE CHINESE APHASIA Yu-Chun Liao¹, Wen-Hsu Sung², Po-Yi Tsai³, Tzu-Chen Yeh³; ¹National Taiwan University, ²National Yang-Ming University, ³Taipei Veterans General Hospital — Previous studies have shown that low-frequency repetitive transcranial magnetic stimulation (LF-rTMS) activates aphasic patients' left

Neural Basis of the Left Visual Field Superiority for Processing Chinese Characters

Wen-Jui Kuo,¹ Chad CY Chen, and ² Ovid JL Tzeng

¹ Institute of Neuroscience, National Yang-Ming University, Taipei, Taiwan; ² Institute of Linguistics, Academia Sinica, Taipei, Taiwan

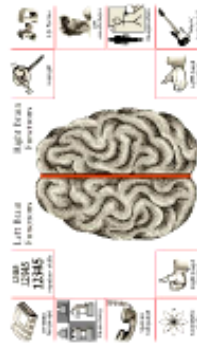


BACKGROUND & AIMS

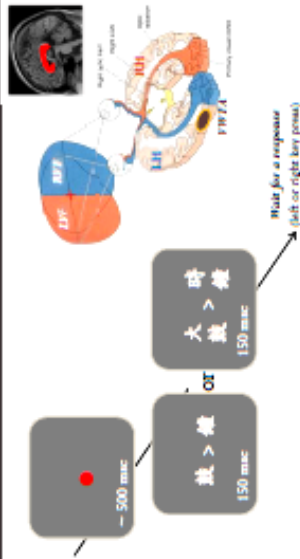
It has been demonstrated that presenting Chinese characters to the left visual field (LVF) and right visual field (RVF) will show different hemispheric asymmetry patterns for processing Chinese single characters and 2-character words. There is a LVF advantage for processing Chinese single character and a RVF advantage for 2-character words (Tzeng et al., 1979).

The goal of this study is using fMRI to examine neural basis of LVF superiority for processing Chinese single characters. In the experiment Chinese characters were simultaneously, bilaterally presented to the participants, one in the LVF and one in the RVF. On the same (visual) presentation frame, there was a central cue (< or >) accompanying the two characters to indicate which character to attend to and process for lexical decision. For robustness checking, frequency of the characters was included as an independent variable.

We expect that ...



METHODS

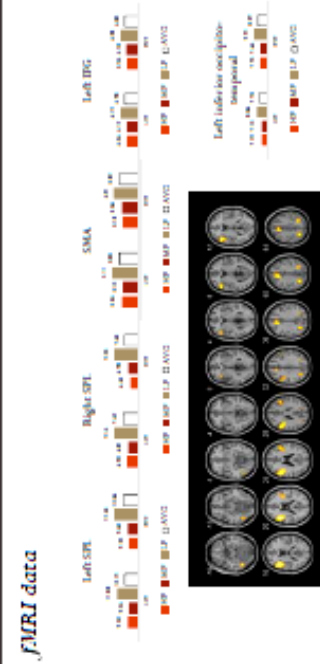


Lexical decision task (LDT)

- 1st IV: visual field (LVF, RVF)
 - 2nd IV: character word frequency (low, medium, high)
- In a trial, two characters or two words were simultaneously bilaterally presented for 150 msec in the LVF and RVF. The target character was indicated by a central cue embedded in the same presentation frame.

RESULTS & DISCUSSIONS (2)

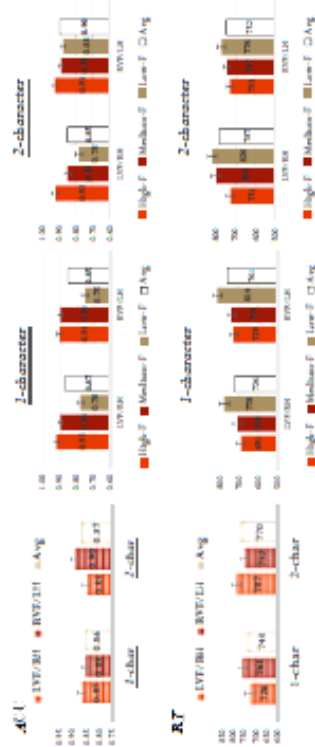
fMRI data



The fMRI data didn't show significant hemispheric difference. Neural correlates of character frequency effects under either LVF or RVF presentation are similar.

RESULTS & DISCUSSIONS (1)

Processing Chinese 1-character and 2-character words in the LVF and RVF



- For 1-character condition, both ACC and RT data show LVF superiority. There is no interaction between character frequency and VF.
- For 2-character word condition, both ACC and RT data show RVF superiority. There is an interaction between VF and word frequency. Word frequency effect was larger when target words were LVF-presented words.
- The results showed a double dissociated response pattern for processing Chinese characters at different linguistic status.
- At single character level, contribution of the RH outweighs contribution of the LH for lexical decision. The processing pattern reverses for processing 2-character words, meaning that linguistic processing per se is the key to this reversed pattern.

行程一之照片

