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研究興趣

• 認知、社會與計算神經科學的高齡化研究

以神經科學方法研究高齡者在生理、心智與大腦等等不同面向的改變，才能完整理解與認識高齡化社會的需求。本實驗室應用認知神經科學（記憶/決策/學習/認知控制與情緒）、社會神經科學（同理心/發展依附/社會互動行為），以及計算神經科學等神經科學不同模式的研究取向，探討生物老化與生活經驗的交互作用如何影響認知心理功能、神經功能與結構、大腦動態與可塑性、行為表現模式、生心理健康和生活品質。結合生物科學、社會科學與電腦科學研究，本實驗室運用認知心理學實驗設計、社會心理與臨床精神量表和非侵入性的神經造影技術（功能性/結構性/擴散性磁共振造影 fMRI/MRI/DTI、腦電波/事件相關電位 EEG/ERPs、腦磁波 MEG）等多項跨領域研究工具，探討的高齡神經科學議題。

• 神經退化疾病與老年精神醫學的診斷與預防

因應高齡化社會的健康醫療與社會照護問題，本實驗室以預防醫學的觀點出發，提出「疾病預防」與「健康促進」兩大方向研究神經退化疾病與老年精神醫學。本實驗室研究輕度認知障礙、失智症、老年憂鬱、自殺與孤獨等老年常見神經退化疾病與精神醫學疾病的生物機制，並以科學方法設計、驗證有效的認知訓練、心智刺激與運動健身的積極性、非藥物介入方法，提高高齡患者的認知神經功能、身心健康與生活品質，達到「成功老化」的目標。

• 人類語言的神經生物與演化生物基礎

語言的理解、表達與創造，是人類不同於其他物種、最複雜的認知系統之一，也是生而為人在生物演化上智慧的來源。為了完整使用語言（包括第二外語或手語）來表達思想和意念，人類感官知覺與神經系統必須快速察覺、分析、回憶與整合視聽資訊、短長期記憶、口語運動協調與控制，以及情緒與社會互動能力。本實驗室以多模式的神經造影工具，多年來探討人類大腦如何處理文字表徵、語音語意和文法的認知神經機制、以及大腦因應語言訊息的側化現象。近年來更結合高齡議題，探討語言在生物老化歷程中的個別差異。

• 生物適應與跨文化神經科學

人類發展與成熟過程中生活環境與後天經驗的多樣性，塑造了大腦處理不同訊息處理的個別差異，人類行為的表達、決策與互動行為也因此深受過去經驗的影響與調控。本實驗室多年來研究人類專業技能學習、認知訓練、文化環境與社會經驗對人類心智、認知行為（包含真實生活環境與虛擬網路世界）與大腦功能與結構的影響。這一系列的研究提供了做為社會社群動物的人類如何感知、互動與理解社會互動模式提供了大腦科學的生物基礎，並有助於我們理解面對不同文化環境時的生物適應行為。



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Research Interests

• Cognitive, Social, and Computational Neuroscience of Aging

Our research is to understand how the mind and brain change and adapt as we age. We are particularly interested in the effects of biological aging (changes in neuroanatomy, neurochemistry, neurocognitive functions, and behavior) and environmental experiences (multilingualism, cognitive training/Stimulation) on neurocognitive processes and social behavior, as well as how these two factors interact with each other at the neural level over the human lifespan. Our research involves the integration of data from different domains, including behavioral responses, neuropsychological assessment, and several advanced neuroimaging techniques such as EEG, ERPs, MRI, fMRI, DTI, & MEG.

• Diagnosis and Prevention of Aging-Associated neurological Diseases and Geriatric Psychiatry

Aging-associated neurodegenerative diseases (e.g., dementia) and patients with geriatric depression have been identified to be associated with cognitive, affective, and somatic abnormalities in individuals age 60 and older. Our research has examined the impacts of dementia, perceived social isolation and late-life depression on neurocognitive function and brain connectivity across human lifespan during affective processing and executive control by using human neuroimaging techniques. We are also interested in isolating neural signatures of

older adults who will age with vitality versus those who are at greater risk of less adaptive cognitive aging (e.g., dementia) and develop effective cognitive/physical training protocol to enhance the quality of life for the achievement of “successful aging”.

• Neurobiological Basis of Language

To successfully comprehend language, perceptual events experienced through different modalities must be rapidly analyzed, retrieved, combined and integrated with long-term memory. The aim of our research is to examine neurocognitive changes of language ability (comprehension, production, and reading) in order to understand what factors characterize and promote effective language processing, including: (1) the semantic organization in the human brain, (2) cerebral lateralization of language processing, and (3) neurocognitive changes of sentence comprehension across the entire adult lifespan.

• Intercultural Relations and Cross-Cultural Neuroscience

Individual undergoes different life experience such as culturally different social environments and cognitive environments that emphasize dissociable ways of processing information. We utilized behavioral and neuroimaging measurement to explore how and whether cultural experience affects individual's cognitive functions, social behaviors and neural function.