2020

臺灣認知神經科學學會年會暨研討會

Taiwan Society of Cognitive Neuroscience Annual Meeting

18 JANUARY (SAT.) 9:00-17:00

地點：國立成功大學社會科學大樓

Venue：Social Sciences Building,
National Cheng Kung University

主辦單位：臺灣認知神經科學學會/國立成功大學心理學系

協辦單位：國立中央大學認知神經科學研究所/中央研究院物理所腦磁波儀實驗室
國立中正大學人文與社會科學研究中心/國立中正大學高齡跨域創新研究中心
國立交通大學生物科技系暨研究所/國立成功大學社會科學院
國立成功大學心智影像(MRI)研究中心/國立成功大學體育健康與休閒研究所

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大會歡迎詞 Welcome Remarks

各位會員及朋友們：

感謝您在新的一年初始，撥冗前來參加臺灣認知神經科學學會年度大會！本年度會議非常感謝國立成功大學心理學系在人力、行政、財務上的全力支持，與本會共同主辦此次會議；同時要感謝國立中正大學人文與社會科學研究中心主任戴浩一教授及國立成功大學心理學系龔俊嘉老師協助邀請國際學者，以及中央研究院腦磁波儀實驗室支援大會業務。

臺灣認知神經科學學會從成立至今已將邁入第八年，每年於年初舉辦會員大會，期能在農曆新春假期前，邀請投身於認知神經科學研究的學者與青年學子們，齊聚一堂、分享目前學術研究工作的成果，並透過會議相互砥礪，尋求合作的機會，讓認知神經科學研究領域能夠有更多角化的研究發展方向。

本（2020）年度會議的主題為「身體活動與認知神經科學」(Physical Activity and Neuroscience)。老齡化社會是當前全世界關注的重大議題，透過近年來科學研究所累積的實徵證據，身體活動力已被視為重要的身心健康指標，運動可帶來的好處也廣為人知；持續進行體育鍛鍊可有效提升體能、認知功能、生活品質，對所有年齡族群的學習、記憶和腦部健康都會產生重大影響。聚焦於此和人類福祉、社會發展息息相關的主軸，本年度年會將透過認知神經科學研究視角，與大家一同關注和身體活動與大腦認知功能相關的研究議題。

今年年會主辦單位有幸邀請到兩位享譽國際的重要學者親臨臺灣，擔任本次年會之專題講座講者，其一是現任職於加拿大卑詩大學並榮獲加拿大首席研究員的 Professor Liu-Ambrose，她將以「Promoting Mobility Outcomes in Older Adults with Exercise: Exploring Cognitive and Neural Correlates」為題，以大腦功能影像分析及神經科學研究說明，年長者透過運動鍛鍊增進活動力之研究進展與成果。另一位擔任專題講座的國際學者是現任職於美國匹茲堡大學(University of Pittsburgh)心理系教授暨老化與認知健康實驗室主任(Brain Aging & Cognitive Health Lab)的 Professor Kirk Erickson，他將以「Exercise and Brain Plasticity」為題，分享當前以體育活動鍛鍊改善大腦活動力及促進健康的科學研究，尚有哪些待開發與釐清的議題與研究方向，並討論有關運動與腦部健康的最新研究。

本次年會規劃了三場主題研討會與一場口頭報告。主題研討會議題包運動鍛鍊與認知功能、以功能性核磁共振腦造影技術（fMRI）探討社會科學研究議題、臺灣認知神經科學研究在急速高齡化社會所面臨的挑戰與轉機，口頭報告的主題則涵括憂鬱情緒對自我認知的影響、以先進腦造影資料分析分法檢驗臉部辨識歷程、老齡族群之視覺短期記憶功能，歡迎各位與會聆聽及交流。

在一年之初，我們很榮幸能夠藉由邀請國內外學界好友參與年會，與各位新知舊識共聚一堂，齊關注目前認知神經科學與各相關領域的研究進展，共分享學術生活的成長點滴。臺灣認知神經科學學會感謝您的參與及支持，也期待在南台灣溫暖的冬陽照耀下，與您溫馨相聚！

祝各位身心健康，闔家平安，新年快樂！

臺灣認知神經科學學會 理事長 吳嫻 敬上

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論文摘要審查委員會 Abstract Review Committee

姓名 Name	服務單位 Affiliation
吳仕煒	國立陽明大學神經科學研究所
吳建德	國立臺灣大學職能治療系
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龔俊嘉	國立成功大學心理學系
本名單依據姓名筆劃排序	

會議議程 Conference Agenda

<table>
<tr><th>Time / 時間</th><th colspan="2">Events / 活動內容</th></tr>
<tr><td colspan="3">Date / 日期 ：2020/1/18
Venue : Social Sciences Building, National Cheng Kung University
地點：國立成功大學社會科學大樓</td></tr>
<tr><td colspan="3">9:00~12:10
Venue: 3F Lecture room / 地點： 3 樓會議廳</td></tr>
<tr><td>9:00~09:20</td><td colspan="2">Registration 報到</td></tr>
<tr><td>09:20~09:30</td><td colspan="2">Opening Remarks 開幕致詞</td></tr>
<tr><td>09:30~10:30</td><td colspan="2">Keynote speech
Promoting Mobility Outcomes in Older Adults with Exercise: Exploring Cognitive and Neural Correlates
Professor Liu-Ambrose
Canada Research Chair (Tier II), Physical Activity, Mobility, and Cognitive Neuroscience
Director, Aging, Mobility, and Cognitive Neuroscience Laboratory, The University of British Columbia</td></tr>
<tr><td>10:30~10:40</td><td colspan="2">Group Photo 團體合照 & Break 中場休息</td></tr>
<tr><td>10:40~11:40</td><td colspan="2">Keynote speech
Exercise and Brain Plasticity
Professor Kirk Erickson
Professor, Department of Psychology
Director, Brain Aging & Cognitive Health Laboratory, University of Pittsburgh</td></tr>
<tr><td>11:40~12:10</td><td colspan="2">Assembly Meeting 會員大會</td></tr>
<tr><td>12:10~13:10</td><td colspan="2">Lunch 午餐
Venue: Room 802201,2nd Floor , South Building, Social Sciences Building
地點：社會科學大樓南棟 2 樓 802201</td></tr>
<tr><td>12:10~13:10</td><td colspan="2">Poster Presentation 壁報論文
Venue: 2F, North Building /地點: 北棟 2F 前空間</td></tr>
<tr><td>13:10~14:30</td><td colspan="2">Student Paper Competition 學生優秀論文比賽
Venue: D801,2F, North Building /地點: 北棟 2F 階梯教室</td></tr>
<tr><td>14:30~15:40</td><td>Symposium A
Exercise and Cognition
Moderator:
Professor Fu-Zen Shaw (蕭富仁教授)
Venue: D401,1F, North Building
地點：北棟 1 樓 D401 階梯教室</td><td>Oral Presentations
Moderator:
Professor Juan, Chi-Hung (阮啟弘教授)
Venue: D801,2F, North Building
地點：北棟 2F D801 階梯教室</td></tr>
</table>

<table>
<tr><td>15:40~15:50</td><td colspan="2">Coffee Break 中場休息</td></tr>
<tr><td>15:50~17:30</td><td>Symposium B
The Challenges and Prospects of Social Neuroscience in Taiwan: Selected Topics from fMRI Hyperscanning, Strategic Games, to Social Interactions and Resource Managements.

Moderator:
Dr. Chun-Chia Kung (龔俊嘉教授)

Venue: D401,1F, North Building
地點：北棟 1 樓 D401 階梯教室</td><td>Symposium C
Challenges and Opportunities for Cognitive Neuroscience on the Verge of Super-aged Taiwan

Moderator:
Dr. Erik Chihhung Chang (張智宏教授)

Venue: D801,2F, North Building
地點：北棟 2F D801 階梯教室</td></tr>
<tr><td>17:30-17:40</td><td colspan="2">Closing ceremony 閉幕典禮
Venue: D401,1F, North Building
地點：北棟 1 樓 D401 階梯教室</td></tr>
</table>

主題演講 Keynote Speech

Professor Liu-Ambrose

Canada Research Chair (Tier II),
Physical Activity, Mobility, and Cognitive Neuroscience

Director,
Aging, Mobility, and Cognitive Neuroscience Laboratory,
The University of British Columbia

Promoting Mobility Outcomes in Older Adults with Exercise: Exploring Cognitive and Neural Correlates

Mobility is the "sixth vital sign" of health and falls are the leading cause of mortality due to unintentional injuries among those 65 and older. While exercise promotes mobility and reduces falls risk in older adults, the underlying neural mechanisms are not well understood. In this presentation, the relationship between neuroimaging, cognitive, and mobility outcomes acquired from randomized controlled trials will be discussed.

Professor Kirk Erickson

Professor,
Department of Psychology

Director,
Brain Aging & Cognitive Health Lab
University of Pittsburgh

Exercise and Brain Plasticity

A growing body of evidence suggests that physical activity is effective for improving brain health throughout the lifespan. Despite the emerging recognition of physical activity as a powerful method to enhance brain health, there is continued confusion from both the public and scientific communities about what the research has discovered about the potential for physical activity to improve brain health and which questions remain unanswered. From this perspective, I will discuss the current research on exercise and brain health and will focus on its impact throughout the lifespan. I will conclude that physical activity decreases the risk for brain diseases and disorders, ameliorates symptoms, improves function, and increases brain volume and that we are beginning to have a better understanding of the factors that moderate and mediate these associations. Overall, physical activity is an important modifiable lifestyle that carries significant consequences for learning, memory, and brain health for people of all ages.

專題研討會議程及摘要　Mini-Symposium Agenda and Abstracts

Symposium A:
Exercise and Cognition

Organizer:
Professor Chia-Liang Tsai (蔡佳良)
Institute of Physical Education, Health and Leisure Studies,
National Cheng Kung University, Taiwan

Venue: 1st Floor Ladder Classroom, North Building, Social Sciences Building/社會科學學院北棟1樓階梯教室

NO	Time	Event
A1	**14:30-14:50**	Chia-Liang Tsai, Professor (蔡佳良) Institute of Physical Education, Health and Leisure Studies, National Cheng Kung University, Taiwan **Exercise and Cognition:** **from Electroencephalographic and Biochemical Perspective**
A2	**14:50-15:10**	Tsung-Hao Hsieh, PhD (謝宗澔) Department of Psychology, National Cheng Kung University, Taiwan **Exercise and Sleep:** **Development of Wearable Sleep Recorder with AI-Aided Analysis**
A3	**15:10-15:30**	Fu-Zen Shaw, Professor (蕭富仁) Department of Psychology, National Cheng Kung University, Taiwan **Exercise and Brain: Neuroscience-derived Evidence for Players**

Symposium B:
The Challenges and Prospects of Social Neuroscience in Taiwan: Selected Topics from fMRI Hyperscanning, Strategic Games, to Social Interactions and Resource Managements.

Organizer:
Dr. Chun-Chia Kung (龔俊嘉),
Department of Psychology, National Cheng Kung University

Venue: 1st Floor Ladder Classroom, North Building, Social Sciences Building/社會科學學院北棟1樓階梯教室

NO	Time	Event
B1	**15:50-16:15**	Der-Yow Chen, Associate Professor (陳德祐) Department of Psychology, National Cheng Kung University **Cooperation and Competition in a Two-stage Signaling Game: a Hyperscanning fMRI Study**
B2	**16:15-16:40**	Ming-Hung Weng, Assistant Professor (翁明宏) Department of Economics, National Cheng Kung University **Coopetition, Compromise, and Theory of Mind in Multi-person Interactions and Hyperscanning**
B3	**16:40-17:05**	Chun-Chia Kung, Associate Professor (龔俊嘉) Department of Psychology, National Cheng Kung University **From College Students to College Couples…fMRI Studies on Developing a Happy Social Interaction**
B4	**17:05-17:30**	Yu-Ping Chen, Assistant Professor (陳瑀屏) International Business, National Taiwan University **Neural Basis of Social Interaction: From Strategic Economic Games to Human Resource Management**

Symposium C:

Challenges and Opportunities for Cognitive Neuroscience on the Verge of Super-aged Taiwan

Organizer:
Dr. Erik Chihhung Chang (張智宏),
Institute of Cognitive Neuroscience, National Central University

Venue/地點: 2nd Floor Ladder Classroom, North Building, Social Sciences Building /社會科學學院北棟 2 樓階梯教室

NO	Time	Event
C1	**15:50-16:15**	Li-Hung Chang, Assistant Professor (張立鴻) Education Center for Humanities and Social Sciences, National Yang-Ming University **Effect of Aging and Cortical plasticity in the Human Visual System**
C2	**16:15-16:40**	Pei-Fang Tang, Associate Professor (湯佩芳) School and Graduate Institute of Physical Therapy, National Taiwan University **Neural Mechanisms and Predictors of Effects of Tai Chi Chuan Exercise on Task-switching in Middle-aged and Older Adults**
C3	**16:40-17:05**	Chien-Te Wu, Assistant Professor (吳建德) School of Occupational Therapy, Graduate Institute for Mind and Brain Sciences, College of Medicine, National Taiwan University **How Does Meaningful Activity Participation Influence People's Psychological Wellbeing: A resting-state fMRI Study**
C4	**17:05-17:30**	James H-Y. Tai, Professor (戴浩一) Chair Professor, Institute of Linguistics, Director, Research Center for the Humanities and Social Sciences, Deputy Director, Center for Innovative Research on Aging Society, National Chung-Cheng University **Bilingualism and Cognitive Aging: Research Issues and Methods**

Symposium A

Exercise and Cognition

Organizer: Professor Chia-Liang Tsai (蔡佳良)

Institute of Physical Education, Health &Leisure Studies,
National Cheng Kung University

Synopsis

The symposium starts at exploring mutual interaction between exercise and cognitive functions. The first speaker, Professor Chia-Liang Tsai, will introduce various exercises from a developmental viewpoint based on electrophysiological evidence and molecular correlates. The second speaker, Dr. Tsung-Hao Hsieh, will introduce sleep importance in exercise and development of wearable sleep recorder accompanied by AI-aided analysis. Finally, Professor Fu-Zen Shaw will introduce exercise and brain change in terms of structure and functional alteration as well as neurofeedback training of brain rhythm. We hope to integrate various aspects of knowledge to strengthen player's performance from cognitive neuroscience viewpoint.

Talk #1:
Professor Chia-Liang Tsai (蔡佳良)
Institute of Physical Education, Health and Leisure Studies, National Cheng Kung University, Taiwan
Exercise and Cognition: From Electroencephalographic and Biochemical Perspectives

Talk #2:
Dr. Tsung-Hao Hsieh (謝宗澔)
Department of Psychology, National Cheng Kung University, Tainan, Taiwan
Exercise and Sleep: Development of Wearable Sleep Recorder with AI-aided Analysis

Talk #3:
Professor Fu-Zen Shaw (蕭富仁)
Department of Psychology, National Cheng Kung University, Tainan,
Exercise and Brain: Neuroscience-derived Evidence for Players

Exercise and Cognition: From Electroencephalographic and Biochemical Perspectives

Chia-Liang Tsai, Professor
Institute of Physical Education, Health and Leisure Studies, National Cheng Kung University, Taiwan

Abstract

It has been proposed that motor coordination problems in children are related to visual perceptual dysfunction and executive function deficits. Also, aging causes a progressive degeneration of memory, cognitive, and motor functions. The vast majority of studies have reported that exercising regularly is an important factor that strongly promote healthy brain development/aging. However, whether the different exercise types impact distinct cognitive advantages need to be understood. In this talk, the effects of different exercise interventions (i.e., aerobic vs. resistance exercise, and open- vs. closed-skill exercise) on cognitive functioning in children with developmental coordination disorder and in the elder adults with mild cognitive impairment will be introduced. The divergent exercise-induced molecular mechanisms (e.g., neurotrophic, angiogenic, and inflammatory factors) to potentially facilitate neurocognitive performance will also be discussed.

Exercise and Sleep: Development of Wearable Sleep Recorder with AI-aided analysis

Tsung-Hao Hsieh, PhD
Department of Psychology, National Cheng Kung University, Tainan, Taiwan

Abstract

We spend 1/3 of our life in sleep. Sleep has been proposed to be beneficial on several functions. Sleep has advantages on energy restoration and repair. It also plays an important role in facilitation of learning process and other cognitive functions, including attention and emotion. Athlete always takes a lot of time to learn skills and to increase endurance. Recently, numerous studies have indicated that a good sleep shows benefits on performance of each competition and energy restoration. Thus, the professional institute has payed attention in sleep measure in a daily life and/or during the match for professional athlete. Polysomnography is a most accurate measure for sleep. But it usually takes a long waiting and preparation time for recording, and it needs to stay in a well-designed space with a professional sleep technician. I will introduce a miniature wearable system for sleep recording. An efficient and interactive sleep scoring interface has been developed. Comfortability and reliability from a professional scorer is comparable. We anticipate the wearable device being used in sports to enhance the performance.

Exercise and Brain: Neuroscience-derived Evidence for Players

Fu-Zen Shaw, Professor
Department of Psychology, National Cheng Kung University, Tainan, Taiwan

Abstract

An athlete looks for getting an outstanding performance in every competition at will. The optimal performance is related to various aspects of cognitive functions in combination with intensive practices. Different exercises, such as closed- vs open-skill exercises, express different emphases. For example, the closed-skill exercise emphasizes on self-driving motivation. The open-skill exercise however addresses both self-focus and self-other interactive response. The present talk firstly introduces differences of brain structure and its functional connectivity between players and novices in various exercises. Different brain rhythms affect specific cognitive functions. Furthermore, neurofeedback training of particular brain rhythm, especially for alpha activity, contributes to strengthen cognitive function then to make an optimal performance. According to prior knowledge, an efficient and effective training propose with mental strategies can be made for each individual player in different exercises.

Symposium B

The Challenges and Prospects of Social Neuroscience in Taiwan: Selected Topics from fMRI Hyperscanning, Strategic Games, to Social Interactions and Resource Managements.

Organizer: Chun-Chia Kung (龔俊嘉), Associate Professor
Department of Psychology, National Cheng Kung University

Underscoring the myriad topics of fMRI can help provide insight, numerous research papers with diverse population and topics have been abundant in the literature. Despite so, researchers strive to create more possibilities with more challenging feats, be it topical or technical. In this symposium, 4 researchers will try to provide their recent research highlights, covering one such outstanding challenge: fMRI hyperscanning between Taipei and Tainan. With the gradual realization of such technical feat, issues/questions like “what hyperscanning can offer (and more than the traditional one)?” and “was it worth the resource/effort?” surface. We hope to, while providing some of the research updates, and reflect on this important question from each of us (at some point).

Prof. Der-Yow Chen (NCKU Psych), who will talk about the brief history of hyperscannning, and how we began the collaboration, and one of our most recent collaborated works on social strategy games. The second speaker, Prof. Ming-Hung Weng (NCKU Econ), will talk about the 2nd hyperscanning experiment and perspectives into the 3-MRI hyperscanning highlights. The third speaker, Chun-Chia Kung (NCKU Psych), will talk about more social aspects of two-people interactive fMRI (and some prior intro on how college students experience self- and other-concerned happiness). Lastly, the 4th speaker, Prof. Yu-Ping Chen (of NTU International Business) will also talk about two people fMRI and another study from resource management.

From the collective highlight of their most recent works, this symposium hopes to stimulate more thoughts, discussions, and future possibilities.

Talk #1:
Dr. Der-Yow Chen (陳德祐),
Department of Psychology, National Cheng Kung University
Cooperation and Competition in a Two-Stage Signaling Game: A Hyperscanning fMRI Study

Talk #2:
Dr. Ming-Hung Weng (翁明宏),
Department of Economics, National Cheng Kung University
Coopetition, Compromise, and Theory of Mind in Multi-Person Interactions and Hyperscanning

Talk #3:
Dr. Chun-Chia Kung (龔俊嘉)
Department of Psychology, National Cheng Kung University
From College Students to College Couples…fMRI Studies on Developing a Happy Social Interaction

Talk #4:
Dr. Yu-Ping Chen (陳瑀屏)
International Business, National Taiwan University
Neural Basis of Social Interaction: From Strategic Economic Games to Human Resource Management

Cooperation and Competition in a Two-Stage Signaling Game: A Hyperscanning fMRI Study

Der-Yow Chen, Ming-Hung Weng, Chun-Chia Kung,
Jen-Tang Cheng, I-Reng Hsu, Yi-Chin Chang, Hsiang-Yun Hsiao

Der-Yow Chen, Associate Professor
Department of Psychology, National Cheng Kung University

Abstract

Cooperation and competition are important types of social interaction. It has been suggested that activities of social cognition brain regions become synchronized between two persons during some social interaction tasks. In the present study, we designed a two-stage signaling game (treasure chest game, TCG) to study the neural mechanism underlying cooperation and competition between two participants. Their brain activities were monitored simultaneously by hyperscanning fMRI. In each trial of TCG, the treasure is hidden in one of two chests. The sender knows the probability of each chest and inform the receiver who can make the final decision. There are two conditions of social interaction. In cooperation condition, if the receiver decides to open the correct chest, both of them share the reward together. In competition condition, if the receiver opens the correct chest, he/she takes the reward exclusively. However, if the receiver opens the wrong one, the reward belongs to the sender. Two participants take turns to play the role as sender or receiver. The behavior results were consistent with the prediction of game theory. In cooperation condition, the sender almost always informed the chest with higher probability, and the receiver almost always followed. In contrast, the behaviors of both participants were approximately 50% in competition condition, as predicted by Nash equilibrium. The fMRI results indicated that the anterior insula cortex and caudate nucleus of all participants showed stronger BOLD signal in competition condition than cooperation. According to the choice of participants, the posterior cingulate cortex showed higher activity when the sender informed the chest with higher probability. Hyperscanning fMRI showed that the synchronization of right temporoparietal junction (rTPJ) activity between two participants was significantly higher in cooperation condition than competition. Furthermore, this synchronization was also significantly correlated with the sender's behavior in competition condition. In summary, our results indicated that this two-stage signaling game is an appropriate task to study the neural substrate of cooperation and competition. In addition, the hyperscanning fMRI experiment reveals the activity synchronization among social cognition brain regions under certain conditions.

Coopetition, Compromise, and Theory of Mind in Multi-Person Interactions and Hyperscanning

Ming-Hung Weng, Assistant Professor
Department of Economics, National Cheng Kung University

Abstract

We carry out two series of hyperscan fMRI experiments to further investigate the reasons for rising correlations between time courses in brain areas when participants engage in interactive decision making.

In the first experiment, pairs of participants make sequential choices in cheap talk games under either cooperative or competitive treatment. Behaviorally, their choices are consistent with Bayesian Nash Equilibrium where the correct information is transmitted and suggestions are followed in most cases during the cooperative condition. On the contrary, in the competitive one, approximately 50% of the transmitted information is misleading while participants do not follow the opponent's suggestion in around half of the events. Analyses in brain imaging reveal significantly stronger activations in participants' caudate, anterior insula and many other areas during competitive trials than in cooperative ones, echoing the more complicate mental process and riskier scene in the former condition. Nevertheless, from examination into MR signals time course of these regions, we found higher correlation between pairs of participants in their temporal-parietal junction (TPJ) when they engage in cooperative interactions than in competitive ones. In addition, pairs exhibiting greater tendency of deceiving others are seen with higher correlation in their BOLD signals during competitive trials, further supporting the important role rTPJ plays in social interactions.

With the second experiment, we try to identify whether the similarity of BOLD activities between pairs of brains rises particularly when individuals interact, instead of when they engage in analogous social tasks. By recruiting pairs of participants to play coordination games with real partners or computer algorithms, we find their BOLD activities in TPJ showing greater correlation when they in interact with real partners than with computer algorithm.

As the team has successfully set up the network platform for three-site hyperscan fMRI experiment, we are looking forward to the upcoming four-people experiments to further examine whether pairs of brains exhibit higher similarity of BOLD activities when they interact with each other compared to the case when they interact with other real human beings.

Keywords:
hyperscan fMRI, cheap talk game, competition, cooperation, rTPJ, coordination game, Perfect Bayesian Nash Equilibrium

From College Students to College Couples…fMRI Studies on Developing a Happy Social Interaction

Chun-Chia Kung, Associate Professor
Department of Psychology, National Cheng Kung University

Abstract

Along with the theme of the symposium in lifelong (and) health development, in this talk I will introduce 2 fMRI studies relevant to the concept of Xing-Fu (happiness) and college couples' interactions in online shopping. The first study aims at the self- vs. other-concerned happiness, a developing perspective into the myriad of happiness and well-being. With ~20 undergrad/grad students undertaking a slow er-fMRI task, we compared their brain responses in how happy (with button 1-4 corresponding to increasing strength of subjective well-being, or SWB) each picture, broadly categorized as intra-personal, inter-personal, and neutral, made them feel. Most notably, the central midline self-related regions, such as medial prefrontal cortex (MPFC) /pregenial anterior cingulate (pACC), as well as posterior cingulate (PCC)/Precuneus, are consistently found to be more responsive to degree of Xing-Fu, with higher connectivity with dopaminergic areas in the higher Xing-Fu condition, and formed an outwardly extension with self- to other-concerned wellbeing. The 2nd fMRI study compared college couples' online shopping in an interactive fMRI context, namely while one lied in the scanner, the significant other will sit outside to interact with the same computer program to coordinately respond. Behaviorally, both sexes showed that when the two agreed on the same item, both increased the chance of later buying; but when the two disagreed, they tended to reduce the buying tendency. When comparing the shopping alone (control) vs. together conditions, temporal-parietal junction (TPJ) was constantly identified. Further correlating along the incongruent (boy_likes_girl_disliked to boy_dislike_girl_like) and the disagreement-insisting to yielding indices, left anterior and lateral inferior parietal lobule (IPL) were separately mapped, forming a proximally interacting IPL-TPJ network. Further mediation analysis among these three regions (l-aIPL, l-lIPL, and l-TPJ) helped constrain their interactions in underpinning their roles in youngster's interacting brain in shaping happy social relationships.

Neural Basis of Social Interaction: From Strategic Economic Games to Human Resource Management

Yu-Ping Chen, Assistant Professor
International Business, National Taiwan University

Abstract

In this talk I will introduce two fMRI studies related to social interaction. The first one is related to strategic interactions in economic bubble games, and the second one is related to person-environment interactions in the workplace.

Throughout human history, economic bubbles have formed and burst. Although the cause of bubbles remains disputed, researchers start to have consensus that bubbles form and burst because of human beings' higher-order reasoning, believing in earning pure capital gains due to other people's similar beliefs. However, it remains unclear when and in what circumstances people mutual beliefs change and how that change forms and bursts an economic bubble. In this work, we combined behavioral finance, cognitive psychology, and neuroscience, to examine the neural basis of interactions in economic bubble games. 33 pairs of participants (66 subjects) were scanned simultaneously using functional magnetic resonance imaging (fMRI) while they were interacting in an investment game in pairs. The outcome of the game depended on the two players' decisions, and we were able to observe how the brains worked together or against each other. We first classified subjects into 5 types of different levels of reasoning, and we looked into the correlation and the interaction of their brain activities, to gain insights about the coupling phenomenon of the two minds.

Person-environment fit refers to a match between an employee and his or her environment on such dimensions as job, organization, group and supervisor. It is critical to organizations since person-environment fit strongly correlates with employees' productivity, commitment, and satisfaction. In this study, we conceptualized person-environment fit in the neurobiological level with neuroimaging techniques. 62 subjects underwent the fMRI scanning while passively reading customized stories related to their job, organization, group, and supervisor. We found that the perception of person-environment fit was associated with brain circuits of cognitive theory of mind. Moreover, positive and negative stories of person-environment fit evoked similar brain activation patterns, while the brain activities associated with misfit stories being stronger and more negative. We also found that individuals' cognitive intelligence was negatively correlated with their person-environment fit, and it was mediated by the resting state functional connectivity of the frontoparietal network.

Symposium C

Challenges and Opportunities for Cognitive Neuroscience on the Verge of Super-Aged Taiwan

Organizer: Erik Chihhung Chang (張智宏), Associate Professor,
Institute of Cognitive Neuroscience, National Central University

As the population in Taiwan ages at an unprecedented rate in human history, many challenges and opportunities arise for many research disciplines. Understanding the causes and effects of normal and abnormal aging certainly will facilitate the implementation of measures promoting successful aging. To delineate the necessary and sufficient conditions for different paths of aging, cognitive neuroscience stands at a vantage point which integrates behavioral and brain sciences, and can offer valuable insights into the mechanisms of cognitive aging. In this symposium, the four speakers will dive into different facets of investigating cognitive aging in Taiwan, including psycholinguistic, cognitive training, emotion processing, perceptual learning, as well as physical and social activities. These experts in aging and cognition will not only share their research findings but also how they resolve challenges of conducting aging studies in Taiwan. They will also share their visions on how studies in cognitive neuroscience can be highly relevant in Taiwan's path toward an island of successful aging.

Talk #1:
Dr. Li-Hung Chang (張立鴻)
Assistant Professor, Education Center for Humanities and Social Sciences, National Yang-Ming University
Effect of Aging and Cortical Plasticity in the Human Visual System

Talk #2:
Dr. Pei-Fang Tang (湯佩芳)
Associate Professor, School and Graduate Institute of Physical Therapy, National Taiwan University
Neural Mechanisms and Predictors of Effects of Tai Chi Chuan Exercise on
Task-Switching in Middle-Aged and Older Adults

Talk #3:

Dr. Chien-Te Wu (吳建德)
Assistant Professor, School of Occupational Therapy, National Taiwan University
Graduate Institute for Mind and Brain Sciences, College of Medicine, National Taiwan University

How Does Meaningful Activity Participation Influence People's Psychological Wellbeing: A Resting-State fMRI Study

Talk #4:

Professor James H-Y. Tai (戴浩一)
Chair Professor, Institute of Linguistics, National Chung-Cheng University
Director, Research Center for the Humanities and Social Sciences, National Chung-Cheng University
Deputy Director, Center for Innovative Research on Aging Society, National Chung-Cheng University

Bilingualism and Cognitive Aging: Research Issues and Methods

Effect of Aging and Cortical plasticity in the Human Visual System

Li-Hung Chang, Assistant Professor,
Education Center for Humanities and Social Sciences, National Yang-Ming University

Abstract

Human visual functions decline with normal aging and can result from the failure of the inhibitory control system in the aging brain. Yet recent studies on perceptual learning (PL) and brain plasticity show that repetitive and intensive practice with the senior subjects leads to the enhancement or even recovery of declined visual function and also associates with white matter's structural changes in the visual cortex. This could suggest that senior adults' learning issues might not be due to the dysfunction of plasticity, but rather to their inhibitory control ability to modulate the information process in the visual system. In my presentation, I will focus on whether PL can be acquired by older adults to enhance impaired visual ability while observing the metabolic changes including GABA and glutamate in the early visual system. GABA has been regarded as a critical neurotransmitter related to the inhibitory signals between neurons. GABA's dysfunctional modulation might be associated with individual learning deficit in the aging brain. Our preliminary results suggest that the visual plasticity in the younger adults were significantly related to the dynamic metabolic changes in their visual cortex, which were not significantly observed in the older adults. It might suggest that the learning deficit in the older adults may relate to the dysfunction of the metabolic balance in the visual cortex and relate to the failure of inhibitory control system.

Neural Mechanisms and Predictors of Effects of Tai Chi Chuan Exercise on Task-switching in Middle-aged and Older Adults

Pei-Fang Tang, Associate Professor,
School and Graduate Institute of Physical Therapy, National Taiwan University

Abstract

Tai Chi Chuan (TCC) exercise, a multi-component exercise, is known to improve cognitive task-switching in older adults. However, the neural mechanisms underlying and predicting this effect remain largely unexplored. Using task-related functional magnetic resonance imaging and a numerical Stroop paradigm, we investigated the relationships between changes in brain activation during task-switching and task-switching behavioral performance before and after a 12-week TCC training program in older adults. We also examined whether baseline structural integrity of specific white matter tracts predicted task-switching behavioral improvement using diffusion spectrum MRI. Cognitively normal older adults were randomly assigned to either the TCC or control (CON) group. Only the TCC group showed improved task-switching performance and increased left superior frontal activation for Switch > Non-switch contrast from pre- to post-intervention. Among the TCC participants, those with greater prefrontal activation increases in the switch condition from pre- to post-intervention or those with better baseline integrity of the prefronto-striatal-thalamo-prefrontal (PSTP) loop presented greater reductions in task-switching errors after training. These results revealed the existence of individual variability in TCC training effects on cognitive task-switching. Older adults who had better preservation of the PSTP loop integrity or those who could enhance the functional activation of the prefrontal cortex to a greater degree during task-switching benefited more from TCC training. Our findings suggest that brain structural integrity and effective functional activation underpin the beneficial benefits of TCC exercise on cognitive aging.

How Does Meaningful Activity Participation Influence People's Psychological Wellbeing: A Resting-State fMRI Study

Chien-Te Wu
Assistant Professor, School of Occupational Therapy,
Graduate Institute for Mind and Brain Sciences, College of Medicine,
National Taiwan University

Abstract

Most countries in the world will be facing the challenge of super-aged society (more than 20% of population is 65 or older) in 5~10 years. Research has shown that aging is accompanied by declinations in physical and mental functions as well as structural and functional alterations in the brain. Research of effective approaches to 'successful aging' has therefore become an important issue. In line with the scaffolding theory of aging, few studies have shown that activity participation (e.g., engaging in meaningful interaction with friends, capability of independently performing activity of daily living, etc.) may be a protective factor of cognitive aging. However, the neurophysiological basis underlying this implication is still unclear, and its understanding can be an essential step to establish an effective guideline for successful aging. In the current study, we aimed to investigate the interrelationship across the degrees of meaningful activity participation, psychological wellbeing and intrinsic functional brain connectivity (evaluated by resting-state fMRI) in elderly population. Our preliminary results revealed that 1. higher level of meaningful activity participation was associated with lower level of psychological distress and 2. bilateral hippocampus seemed to be important hubs that reflect meaningful activity participation and psychological states. Our results suggested that participating in personally valued activities could benefit to the psychological state of older adults.

Bilingualism and Cognitive Aging: Research Issues and Methods

James H-Y. Tai
Chair Professor, Institute of Linguistics,
Director, Research Center for the Humanities and Social Sciences,
Deputy Director, Center for Innovative Research on Aging Society,
National Chung-Cheng University

Abstract

There exists a general assumption that bilingualism enhances executive function and cognitive reserve, thus helps cognitive aging, delays dementia. Contrary to this general assumption, numerous studies in the past 30 years have arrived conflicting findings.

In this talk, I will start a summary of the past studies, pointing out the nature of their inconclusive findings with respect to various dimensions of executive function, methods adopted for the study, and the complex nature of bilingualism and multilingualism. In conclusion, I will address a couple of key issues in studying cognitive aging in the context of multilingual environment in Taiwan.

口頭論文摘要 Oral Abstracts

Oral Presentations

Moderator /主持人：
Professor Juan, Chi-Hung (阮啟弘),
Institute of Cognitive Neuroscience, National Central University

Venue: D401,2nd Floor Ladder Classroom, North Building, Social Sciences Building
地點：社會科學學院北棟2樓D401階梯教室

NO	Time	Event
T01	14:30-14:50	徐慈妤 **The Neural Correlates of Depressive Rumination and Self-oriented Processes**
T02	14:50-15:10	李松穆 **Examining Face and Repetition Effects on Connectivity by Dynamic Causal Modelling with Parametric Empirical Bayes**
T03	15:10-15:30	謝淑麗 **Visual Short-Term Memory Binding Performance in Physiological Aging**

T01

The Neural Correlates of Depressive Rumination and Self-Oriented Processes

Tzu-Yu Hsu, Tzu-Ling Liu, Paul Z. Cheng, Hsin-Chien Lee, Timothy J. Lane, Niall W. Duncan

Abstract

Rumination is one of the main symptoms of major depressive disorder (MDD), where individuals focus their thoughts on negative self-reflection. This negative self-focus has a major impact on patient quality of life and also correlates with the severity and duration of depression episodes. Despite self-related rumination being a key symptom in MDD, our understanding of the neural correlates of these processes remains limited. Similarly, it is not clear how self-related thought per se relates to maladaptive rumination. We therefore conducted two related EEG experiments to investigate these issues in MDD patients and matched controls. In the first of these we targeted the dynamic properties of intrinsic brain activity and how that reacts to changes in behavioural state. The reactivity of these properties differed between patients and controls in a manner that was related to ruminative symptoms. In the second experiment we targeted self-related processing, delineating that from negative emotional confounds. Differences were seen between patients and controls, also correlating with depressive rumination symptoms. In both experiments correlations between neural activity properties and rumination were seen particularly at mid-frontal electrodes, potentially corresponding with prior associations between the medial prefrontal cortex and self-related processing. Taken together, these results point to a key role for changes in self-related processing in MDD. They also highlight an overlap between intrinsic activity and self-related processing where these are both associated with ruminative symptoms.

T02

Examining Face and Repetition Effects on Connectivity by Dynamic Causal Modelling with Parametric Empirical Bayes

李松穆、林君昱、Richard Henson

Abstract

Dynamic Causal Modelling (DCM) with Parametric Empirical Bayes (PEB) is conducted to characterise inter-subject variability on effective connectivity (Zeidman, 2019). First, DCMs are specified for each subject and their connection strengths are estimated from neuroimaging data. The strengths are then modelled at the group level as a combination of a group mean and between-subject variability. Finally, Bayesian Model Reduction (BMR) is used to prune the parameters that do not contribute to the model evidence. We used this approach on a publicly available fMRI data (Wakeman, 2015) to examine the effect of face perception, immediate repetition, and delayed repetition on effective connectivity. In our DCM, two face-selective areas, occipital face area (OFA) and fusiform face area (FFA), were included as ROIs. Endogenous connectivity and modulatory inputs (face perception and two types of repetition) included OFA-self, FFA-self, OFA-to-FFA and FFA-to-OFA connections. The results after BMR show that face perception and immediate repetition modulates OFA-self, FFA-self and OFA-to-FFA connections, while delayed repetition only modulates FFA-self connection. The findings suggest the different neural mechanisms in terms of connectivity underlying immediate and delayed repetition.

Keywords: lexical tone processing, fMRI, intracranial EEG

T03

Visual Short-Term Memory Binding Performance in Physiological Aging

謝淑麗、朱國大、詹葆護、阮啟弘

Abstract

Our world has entered an aged society, including Taiwan. The burden of caring for the old and age-related diseases has become a significant public health issue. The medical community and scientists together have put immense efforts to investigate therapeutic methods and interventions to prevent or to halt the progression of Alzheimer's disease. However, the results are limited, and almost 99% of therapeutic clinical trials report failure.

Cognitive decline is the natural course of physiological aging. Previous studies had demonstrated a performance deficit across varied cognitive tasks and relevance of brain wave biomarkers amongst the physiologically aged population. Essential to our routine life is a cognitive construct, the Visual Short-Term Memory (VSTM) binding task in which Alzheimer's patients show a deficit. However, studies that report that cognitive tasks or brainwave signatures to demarcate physiological aging are limited. To elucidate the demarcation between physiological and pathological aging, We utilize a modified version of the Binding task (Parra et al., 2010) in our current study to assess the cognitive performance and electrophysiological correlates (extracted from EEG) of individuals from healthy middle-age adults and healthy old adults.

The preliminary behavior results from our study not surprisingly indicate a cognitive decline amongst healthy individuals with an increase in their age. And we see the gamma power enhance in occipital lobe for middle age adult. More importantly, the electrophysiological correlates give rise to some specific pattern in older adults, which might serve as a target for exogenous entrainment or neuromodulation. In our study we will use the Transcranial Direct Current Stimulation (tDCS) as a neuromodulation tool to entrain the brain wave and hypothetically make a significant improvement in VSTM binding performance.

學生論文獎競賽初選通過名單　Student Paper Competition

Venue: 2nd Floor Ladder Classroom, North Building, Social Sciences Building, National Cheng Kung University.

(5 min for your presentation, 1 min for Q&A)

NO	Paper Title	First Author	Presentation Time
P01	Distinct neurophysiological Correlates of Sensitivity to Temporal and Spatial Regularity in a Statistical Learning Test	Andhika Renaldi	**13:10-13:16**
P27	Reduced Hippocampal CA1 Subfield Volume Associated Age-Related Decline in Retention of the “When” Memory Component	Chia-Hsing Chi	**13:17-13:23**
P36	Using Beamformer Source Analysis to Localize Brain Oscillations Underlying Manual and Speech Motor Sequence Production	Mei-Jing Lin	**13:24-13:30**
P08	Over- and Underreaction in Detecting Regime Shifts and the Neurocomputational Substrates for Estimating Probability of Change	王牧晨	**13:31-13:37**
P37	Disparity Dependent Luminance Contrast Response Functions in Human Dorsal Visual Areas	陳姵吟	**13:38-13:44**
P18	Envelope Modulation Effect on the Incoming Signals As Revealed by Holo-Hilbert Spectral Analysis	陳彥勳	**13:45-13:51**
P11	Response Asymmetry of Red and Green in Macaque Primary Visual Cortex	黃威銘	**13:52-13:58**
P14	High Dream Lucidity Suggests Better Reality Monitoring Ability.	盧慕蓉	**13:59-14:05**
P17	Development and Validation of a Novel 32-Channel Rodent EEG System	謝雨蓁	**14:06-14:12**
P29	Brain Responses Elicited by Recollecting a Break-up Event of Oneself	簡菱瑤	**14:13-14:19**

壁報論文摘要 Poster Abstracts

NO	Paper Title	First Author
P01	Distinct Neurophysiological Correlates of Sensitivity to Temporal and Spatial Regularity in a Statistical Learning test.	Andhika Renaldi
P02	Contexts of Post-Practice Interference Modulate Memory Consolidation of Motor Sequence Learning.	曹嫚容
P03	Motor Imagery and Execution of Force Control Remain Functional Equivalent under the Feedback of Where and What.	田昕平
P04	Upper limb proprioception and motor function in young pianists.	曾鈺婷
P05	A Study of Arrival and Departures of Visual Statistical Learning.	Amit Rawal
P06	Collecting More Information or Shooting for a larger reward? The role of Information Lifespan and Rate of Information Flow on Decision Making.	劉宜儒
P07	Conjoint Measurement of Quality and Quantity of Sensory Data in Evidence-Based Decision-Making.	徐甄憶
P08	Over- and Underreaction in Detecting Regime Shifts and the Neurocomputational Substrates for Estimating Probability of Change.	王牧晨
P09	以腦造影研究探討成人算術功能的性別差異	楊文儀
P10	觀察者對大鼠親社會行為之影響	蕭翔允
P11	Response Asymmetry of Red and Green in Macaque Primary Visual Cortex.	黃威銘
P12	Does Episodic Simulation Help Prospective Memory?	郭銘柔
P13	Does Emotion Change Serve As an Event Boundary?	莊千慧
P14	High Dream Lucidity Suggests Better Reality Monitoring Ability.	盧慕蓉
P15	Ruminating Activity As a Basis for Neuroanatomical Abnormality in Major Depression Disorder: a VBM Study.	Paul Zen Cheng
P16	High Gamma Activity in the Human Prefrontal and Insular Cortices Represent Monetary Gains and Losses During Decision making.	吳孝真
P17	Development and Validation of a Novel 32-Channel Rodent EEG system.	謝雨蓁

NO	Paper Title	First Author
P18	Envelope Modulation Effect on the Incoming Signals As Revealed by Holo-Hilbert Spectral Analysis.	陳彥勳
P19	Lie to Me: Meta-Analysis of Functional Neuroimaging Studies of Deception.	En-Syuan Huang
P20	Musicians and Non-Musicians' Different Reliance of Features in Consonance Perception: an fMRI Study.	HanShin Jo
P21	Exploring Familiar and Unfamiliar face perception in Young and Senior Adults with Morphing Paradigm.	簡惠玲 Sarina Hui-Lin Chien
P22	Alternation Between-and Within-Class Selectivity Across the Ventral Occipital Cortex: Evidence by Region-of-Interest and Whole-Brain Multi Voxel Pattern Analyses.	Meiselina Irmayanti Abdul
P23	習慣與筆記方式對於記憶表現的影響	王妤
P24	Dynamic Modulation of Excitation and Inhibition Equilibrium by High Frequency Repetitive Transcranial Magnetic Stimulation in the Early Visual Cortex.	連芸
P25	The Relationship Between Individual Differences in Measurements of Statistical Learning and Episodic Memory.	方云柔
P26	Persistence in Base-Rate Neglect is Associated with Weighting Subjective Uncertainty on Prior Distributions.	李嘉仁
P27	Reduced Hippocampal CA1 Subfield Volume Associated Age-Related Decline in Retention of the "When" Memory Component.	Chia-Hsing Chi
P28	People with Specific Social Traits Behave a Higher Tendency to Cooperate or Compete with Others During Communication-Decision Task.	張宜晴
P29	Brain Responses Elicited by Recollecting a Break-up Event of Oneself.	簡菱瑤
P30	The Response of Left Temporal Cortex to Modifier-Head Compounds.	Chun-Hsien Hsu
P31	Investigation of Physiological Indicator Using Wireless EEG in Military Scenarios.	何聰穎
P32	利用接觸熱刺激感覺誘發電位來探討神經病變患者的痛覺	潘春君
P33	不同的心理物理測量方式對痛覺主觀強度的影響	丁俊源
P34	The Other Race Effect in Face Recognition and Attractiveness Judgment.	Muniba Khan

NO	Paper Title	First Author
P35	Facial Attractiveness is Identified later than and Modulated by Race of Faces.	吳嫻
P36	Using Beamformer Source Analysis to Localize Brain Oscillations Underlying Manual and Speech Motor Sequence Production.	Mei-Jing Lin
P37	Disparity Dependent Luminance Contrast Response Functions in Human Dorsal Visual Areas.	陳姵吟

P01

Distinct Neurophysiological Correlates of Sensitivity to Temporal and Spatial Regularity in a Statistical Learning Test

Andhika Renaldi, Yu-Huei Lien, Denise Wu

Abstract

Statistical Learning (SL) is the ability to detect regularity in the environment. Although previous research has shown that participants were sensitive to componential visual SL that resembles characteristics of logographic regularity, whether this sensitivity is reflected in neurophysiological signals is unexplored. In the present study, native speakers of Chinese participated in novel temporal and spatial componential visual SL (C-VSL) tests in which two nonverbal shapes were presented in sequential and simultaneous pairs, respectively, while their brain activity was recorded simultaneously by EEG. In the study phase, the standard pairs always include two shapes that appeared in specific positions in the temporal or spatial pair, though the combination of the two shapes was not specific or unique. On the other hand, the deviant pairs always include two shapes in the opposite positions from the standard. In the test phase, each shape encountered in the study phase was paired with a novel shape that was not encountered before, and participants' performance in the temporal and spatial C-VSL tests was measured by familiarity judgment and recognition. The behavioral results showed that Chinese participants as logographic readers exhibited higher accuracy in the spatial than temporal C-VSL test. The ERP results showed that the deviant pairs in the temporal C-VSL elicited a larger N400 component than the standard pairs in the posterior region of the scalp only in those participants whose behavioral performance was above the chance level. In contrast, the same comparison in the spatial C-VSL test resulted in a relatively sparse MMN difference in the anterior region. Although the behavioral results revealed significant correlation between the accuracy of the temporal and spatial C-VSL tests, the neurophysiological results provide evidence for different mechanisms underlying the sensitivity to temporal and spatial regularity in C-VSL tests.

Keywords：
Statistical Learning, ERP, temporal and spatial regularity

P02

Contexts of Post-Practice Interference Modulate Memory Consolidation of Motor Sequence Learning

曹嫚容、江明彰、林千禾

Abstract

Motor sequence learning consists of the procedural component where motor skill is acquired as well as the declarative component where the structure of a motor sequence can be explicitly described. Previous studies showed that disruption of the declarative component of motor sequence learning during memory consolidation enhanced retention over wakefulness. In the current study we investigated whether different contexts of interference immediately after practice imposed different effects on retention. 54 young adults practiced serial reaction time tasks (SRTT) for 3 sessions. Each session consisted of a 12-element sequence where circles appearing at 4 different positions on the display monitor, preceded and followed by a 50-element random sequence respectively. The learning score for each session was defined as the difference in response time between the 12-element and its subsequent random sequence. The participants were divided into three groups by different post-SRTT tasks: participants in the Word-Learning group (n = 20) learned a list of 16 words, the Digit-Learning group (n = 21) learned a 16-element sequence of numbers from 1-4, and the Vowel-Counting group (n = 13) counted the number of vowels appearing in each of 16 nonsense strings of letters. Retention of the 12-element sequence was tested 12 hours later over wakefulness. We found that offline learning, defined as the increase of the learning score from Session-3 practice to the retention session, was significantly higher in the Word-Learning and Digit-Learning groups compared to the Vowel-Counting group. However, the learning scores did not differ between the Word-Learning and Digit-Learning groups. The results suggest that meaningful interference, such as Word- or Digit-Learning, to the declarative component of motor sequence learning, during the early phase of memory consolidation enhances skill learning. Such learning benefit is not affected by the contexts of interference on memory consolidation.

Keywords：
motor sequence learning, memory

P03

Motor Imagery and Execution of Force Control Remain Functional Equivalent under the Feedback of Where and What

田昕平、張智宏

Abstract

The functional equivalence hypothesis assumes identical operating principles underlying motor imagery (MI) and motor execution (ME). The current study examined this hypothesis in a simple force control task which involves minimal spatial kinesthetic inputs. Visual feedback of spatial (where) or non-spatial (what) information to different groups of participants informed them the amount of force they applied on a platform. For both participants' groups of feedback types, the performing duration as a linear function of task loading showed the similar slope for MI and ME conditions, which confirm what the functional equivalence hypothesis would predict. However, subjective kinesthetic vividness correlated with visual vividness of MI for spatial group instead of non-spatial group, suggesting the integration between force control and the processing of "where" and "what" information may not be equivalent. Further study may examine how the subjective and objective results are inconsistent, and how what kind of motor imagery paradigm can detect the integration distinction.

Keywords：
dorsal/ventral stream; motor simulation theory; force control

P04

Upper Limb Proprioception and Motor Function in Young Pianists

Yu-Ting Tseng (曾鈺婷), Chia-Chun Liu (劉家君), Yi-Wen Chen (陳憶玟),Yi-Hsuan Lin (林宜萱)

Abstract

Intensive piano training may be associated with improved motor and somatosensory functions. This study examined limb proprioception, which is known to play an essential role in skill movements, and motor functions in young musicians who regularly and long-termly played the piano. We investigated sixteen children aged 11-12 years (4 males 12 females) who regularly played the piano, and 16 age- and gender-matched control children who had no previous experience on musical instruments. All children performed 1) joint position matching paradigm that required them to match a target position with the same or opposite limb at the wrist and the elbow without vision, and 2) Movement Assessment Battery for Children second edition (MABC-2) assessing their proprioceptive and motor functions. The results showed that children in the musical group exhibited significantly lower position sense bias (systematic error) at both the elbow (p's< 0.01) and wrist (p's < 0.01) compared to their age-matched controls. However, position sense precision (random error) was not different between the two groups. Furthermore, children played the piano had enhanced fine motor functions shown by higher MABC-2 scores on manual dexterity (p < 0.01), but not other domains (aiming and catching or balance) of motor function. This study documents that children regularly trained with the piano had superior upper limb position sense acuity. Specifically, smaller position sense bias, i.e., less systematic error. Higher upper position sense acuity in young pianists is associated with higher fine motor functions.

Keywords：
Motor control, position sense, development, motor coordination, somatosensory, childhood, music

P05

A Study of Arrival and Departures of Visual Statistical Learning

Amit Rawal, Philip Tseng

Abstract

Visual statistical learning (VSL) occurs when participants look at ordered stimuli and in a brief period of exposure, start picking on these regularities and become increasingly sensitive to them, without ever realizing the statistical properties of the stimuli. In the domain of VSL in shapes, there has been a surge of studies investigating the mechanisms and characteristics of this phenomenon. Initial studies employed the use of only familiarity judgments, and were criticized for employing explicit measures for a phenomenon understood to be implicit. Relatively indirect methods have been developed that extract patterns of results resembling the underlying distribution of the learnt sequences. This experiment explores the inherent behavior of one such task that has been used in a major sect of studies, called the rapid serial visual presentation (RSVP) task. Traditional implementation of this task permits only two positions for the target shape, out of six available positions. Being a detection task, these fixed positions may result in confounded response-time findings. We apply a correction for this potential confound in this task by counter-balancing the positions where each of the shapes is presented. Results show how limited and misinforming the RSVP task can be, when not used with properly controlled parameters, therefore putting results from previous studies in question. We also demonstrate that this task does not reliably showcase statistical learning over the passage of trials since there is a biased practice effect towards items based on their predictability. Finally, we provide solutions and suggestions for some of the concerns regarding this task in the context of statistical learning, and recommend that future studies should be cautious in their interpretation of results stemming from methods that may gradually decline in precision and validity.

Keywords：
statistical learning, implicit learning, VSL, RSVP task

P06

Collecting More Information or Shooting for a Larger Reward? The Role of Information Lifespan and Rate of Information Flow on Decision Making

劉宜儒、吳仕煒

Abstract

In many decisions we face, collecting more information is beneficial but comes at a cost of time and energy that can otherwise be spent on alternative actions. Previously, we showed that people tend to collect less information than they should in a task where information accumulates over time while the size of potential reward for making a correct decision decreases over time. It remains unclear, however, why people exhibit such suboptimal behavior. In this study, using the same task, we investigated two potential causes of suboptimality – information lifespan and rate of information flow.

Method. We examined the role of information lifespan by manipulating the amount of time a piece of information, once presented, stayed on the computer screen (0.2 sec, 0.5 sec, 2 sec and “always on”), while controlling for rate of information flow (20 Hz). We examined the rate of information flow by manipulating how fast a new piece of information is presented – 10 Hz, 20 Hz and 30 Hz – while controlling for information lifespan (always on). As a result, there were 6 conditions, with each condition having 20 participants in a between-subject design.

Results. We replicated previous findings by showing that subjects tended to collect less information than they should across different lifespans and rates. We also found that under extremely short information lifespan, subjects made even faster (more suboptimal) decisions. Since cost of integration of information over time increases as information lifespan decreases, this result suggests that people respond faster to further avoid such cost.

Keywords：
decision making, opportunity cost, reaction time

P07

Conjoint Measurement of Quality and Quantity of Sensory Data in Evidence-Based Decision-Making

徐甄憶、吳仕煒

Abstract

Reliability of sensory evidence for decision-making depends on two important attributes – the quality of each single datum and the quantity (sample size) of sensory data. However, it remains unclear how people evaluate and combine the quality and quantity of sensory data. To address these questions, we designed a novel decision task that requires the subjects to take into account both attributes in order to maximize payoffs.

Method. On each trial, subjects chose between a pair of options that differed in both the quality and quantity of sensory data. An option consisted of red and green dots shown on a computer screen, which were randomly drawn from a box consisting of 100 red and green balls. Subjects had to guess whether there are more green or red balls in the box based on the available information from the chosen option and would receive a reward if making a correct guess. We manipulated the gray scale of the colors of dots so as to change the discriminability between these two colors (3 levels of quality). Quantity of data was manipulated by changing the number of dots presented on the screen (3 levels of quantity, from 1 to 60 dots).

Results. In three behavioral experiments (n=70 subjects in total), we fit 5 different conjoint models, compared them using nested hypothesis tests and found that an additive model linearly combining equal weights to quantity and quality best described subjects' choice. Notably, a small but statistically significant bias toward quality of sensory data was consistently observed across the experiments. This bias is captured by the additive conjoint model in which the decision maker ignores the interaction between quantity and quality at the medium to high level on performance in their corresponding subjective scales.

Keywords：
decision making, sensory evidence, conjoint measurement

P08

Over- and Underreaction in Detecting Regime Shifts and the Neurocomputational Substrates for Estimating Probability of Change

王牧晨,George Wu, Shih-Wei Wu

Abstract

In dynamic environments where technology, markets, competitors and even narratives change regularly, many decisions are tightly associated with our ability to estimate and detect changes. Previous studies on judgment and decision making had established that people can over-react and under-react to potential changes in response to system that generates the signals.

In a probability estimation task, subjects had to estimate change from one regime – red -- to the other – blue – based on the signals they receive. The signals were generated from one of the regimes, which always started from the red regime but can shift to the blue regime based on some transition probability. We investigated the impact of transition probability and signal diagnosticity -- the relative ratio of red to blue balls – on change detection.

We replicated the systematic biases shown in previous studies: compared with the ideal Bayesian solution, subjects (n=30) tended to overreact to a new sample by giving larger estimates on the probability of regime-shift in noisy (low signal diagnosticity) but stable environments (small transition probability). By contrast, subjects tended to underreact in environment that is unstable and signal is precise Further, we fit a quasi-Bayesian model that incorporate free parameters to separately estimate sensitivity to transition probability and signal diagnosticity under different environmental conditions. We found that sensitivity to both transition probability and signal diagnosticity are a decreasing function of their respective dimensions, consistent with a "system-neglect" model in which people respond primarily to the signal and secondarily to the system that generates the signal.

Preliminary fMRI results showed that intraparietal sulcus, anterior insula and pre-supplementary motor area positively correlated with probability estimate on shift, while VMPFC negatively correlated with it. We also found that IPS and VMPFC represent both subjective transition probability and signal diagnosticity estimated from the quasi-Bayesian model.

Keywords：
probability estimation, regime shift, judgment and decision making, parietal cortex, ventromedial prefrontal cortex

P09

以腦造影研究探討成人算術功能的性別差異

楊文儀、張葶葶

Abstract

數學認知是否存在性別差異是個重要的議題，文獻中針對大腦功能性別差異的研究卻屈指可數，有少數的研究指出男性在進行算術作業時，比起女性在右腦的頂內溝、後頂葉皮質區及右側的舌回有更多的活化。然而先前研究採用加減法混合的實驗材料，並沒有針對不同心算題型探討。因此本實驗利用磁振造影技術探討成人進行不同類型的心算作業時，大腦活化的區域是否有性別差異。研究招募63 位受試者，年齡分布在 20~30 歲，男性 31 人、女性 32 人。透過操弄兩個變項(1)運算方法(加法/減法)及(2)運算問題複雜度(簡單問題/複雜問題)來設計實驗材料。實驗呈現一組算式(例如：5+7=12)，要求受試者判別這些算式的答案正確與否，同時掃描其功能性腦影像資料。研究結果發現，行為資料的正確率和反應時間並沒有顯著的性別差異，與以往的研究結果相同。此外，性別與運算方法及問題複雜度之間，亦沒有交互作用。在功能性影像的資料中，運算方法和問題複雜度皆出現主要效果，此效果來自進行減法與複雜問題運算時，額頂認知控制網路有更強的活化，包括兩側後頂葉、腦島等；比起減法，進行加法時左側中顳葉、右側角回以及內側前額葉的活化程度更高，這些結果與過去文獻一致。性別出現顯著主要效果，其效果來自女性在進行心算作業時，雙側枕中、下回、梭狀回以及左側額中回比起男性有更顯著的活化，然而男性相較於女性則沒有顯著的活化區。性別與運算問題的交互作用，主要發生在左側上枕葉，且男性沒有顯著活化，而女性在加法和減法皆有顯著活化，但減法作業活化程度大於加法。女性不論是減法或加法測驗中，視覺區的梭狀迴與雙側枕中、下回皆有顯著活化。且減法作業中，女性的右側舌回比起男性也有更顯著的活化。在加法運算時，男性主要活化在右側殼核以及右側腦島，女性則在左側梭狀回有較顯著的活化。從結果中，可以看出男女性在進行不同心算作業時，存在性別差異。有別於過去認為女性主要使用語意提取的功能進行加減法，本研究的結果發現女性不論在進行加法或減法的運算上，都使用了較多的視覺區。如此可以說明男女性在運算加減法時，可能採用不同的策略。

Keywords：
數學認知、性別差異、磁振造影

P10

觀察者對大鼠親社會行為之影響

蕭翔允、鄭志帆、梁庚辰

Abstract

親社會行為(pro-social behavior)指稱有利於其他個體之社會行為，此類行為在群居動物中十分重要且常見。早期研究透過實驗動物試圖展示親社會行為，但常被批評無法排除條件化、致敏化與社會促進作用(social facilitation)的介入。我們過去從主動壓桿作業發展出的一種救助行為作業中觀察到大鼠展現親社會行為，並確認此非前述三種因素介入的結果，更有可能是同理心的展現。

真實世界展現救助行為的情境往往不僅有救助者與被救助者，還可能有其他個體從旁觀察。救助者可能因有無觀察者而改變其行為。此現象可分為兩類，一是社會促進作用，觀察者的出現會提升救助行為；二是社會惰化(social loafing)，觀察者會造成責任分散而減少救助行為。本研究意圖檢驗觀察者的出現對於大鼠救助行為有何種影響。

實驗分為三階段，第一階段動物將學習透過主動壓桿躲避將出現的電擊或逃脫已出現的電擊；第二階段動物將成對作業，只由第一階段學習較佳的動物按壓槓桿。利用共軛情境訓練動物壓桿與幫助同伴的必然關聯性，並加入偶發的遺漏情境來測試動物能否夠利用此知識幫助同伴。遺漏情境中救助者首次壓桿只讓自己躲避或逃脫電擊，再次壓桿才能幫助同伴；第三階段行為作業與第二階段相同，但加入觀察者或移除待救助者，檢驗待救助者存在與否對遺漏情境中再壓桿的影響，以及觀察者是否改變大鼠在此作業中的救助行為。

第二階段結果顯示大鼠在遺漏情境有較共軛情境高的再壓桿率($p < .01$)，確認牠們確實展現出救助行為。第三階段結果顯示情境類別與是否有待救助者間存在交互作用。進一步檢定發現在遺漏情境中，若有待救助者存在會表現出較高的再壓桿率($p < .05$)，但觀察者並無影響；而在共軛情境中，觀察者的出現會稍微降低再壓桿率但未達顯著($p = .09$)，但待救助者存在與否並未影響。

本研究再次確認大鼠在主動壓桿作業中的再壓桿非單純受到條件化、致敏化與社會促進作用影響，而是有同理心介入的親社會行為。結果還顯示，共軛情境中救助者或有受到觀察者影響，出現社會惰化的趨勢。

Keywords：
觀察者效應,救助行為,操作制約,遺漏情境

P11

Response Asymmetry of Red and Green in Macaque Primary Visual Cortex

Wei-Ming Huang, Hsiang-Yu Wu, Yu-Cheng Pei, Chun-I Yeh

Abstract

Contrast between long-wavelength (L-cone) and middle-wavelength (M-cone) signals is one of the channels that processes chromatic information in visual pathway. Recent studies have found that the weights of L-cone and M-cone inputs in the primary visual cortex (V1) are not equal - many V1 neurons prefer red (L-cone) to green (M-cone) stimuli (Conway and Livingstone, 2006; Lafer-Sousa, et al., 2012; Shirhattia and Ray, 2018). However, the red-green imbalance has not been reported in the lateral geniculate nucleus (LGN, Reid and Shapley, 2002). These results raise a question that whether the red-over-green preference is generated within V1. We addressed this question by measuring neuronal activities in different layers of macaques V1. Color sparse noise consisted of equiluminant red and green squares with constant short-wavelength cone weight to measured spatial receptive fields. Cortical layers and electrode depths were identified based on the reconstruction of the lesion sites and the current source density analysis. For single-unit activities, we calculated the signal-to-noise ratio (SNR) as the ratio of the variances of the receptive field at the peak time and 0-40ms before stimulus onset (Yeh et al., 2009). Response preference was quantified as the ratio of the SNRs of red and green maps. We found that a higher number of macaque V1 neurons preferred red to green (n=172 out of 203). The red-over-green preference was stronger for layers 2/3 neurons than for layer 4/6 neurons. Based on LFP signals, the red induced a broader visual spread (the visual spread was calculated as the variance of the fitted Gaussian function, Xing et al., 2009) and a larger gamma-band (30-50 Hz) power than the green. Overall, our results showed that the red/green asymmetry was likely originated within V1. The disparity between red and green signals was amplified in the superficial layers of V1.

Keywords：
Visual cortex, color opponency, local field potential,

P12

Does Episodic Simulation Help Prospective Memory?

郭銘柔、鄭仕坤

Abstract

This study aims to investigate whether episodic simulation could improve event-based prospective memory, under the control of level of processing. To answer this question, we first replicated the behavioral experiment from a previous study that compared prospective memory performance from episodic simulation condition and phonics-related condition. A group of Chinese speakers were recruited and the experiment was comprised of two conditions, episodic simulation condition and tone generation condition. Each condition contained encoding phase and prospective memory test phase. According to the results of a 3-way ANOVA, prospective memory performance was significantly better if the participants encoded the prospective memory cues in episodic simulation condition. Therefore, we successfully replicated the result of the previous study. To control the influences of level of processing, we conducted the 2nd experiment to compare the tone generation condition with another deep processing condition. The results indicated that the performance of prospective memory was not different between the two conditions, which further supports the original argument, under the control of level of processing.

Keywords：
event-based prospective memory, episodic simulation, level of processing

P13

Does Emotion Change Serve As an Event Boundary?

莊千慧、鄭仕坤

Abstract

When experiencing a context of spatial, goal, or perceptual shift (i.e., experiencing an event boundary), the continuous information we perceived is segmented into discrete events in our daily life. However, whether the change of emotional context also has an impact on our event memories is still unclear. To investigate this question, we manipulate the emotional context images and explicit break on our three study-test behavioral experiments. Our result in experiment 1 show that people recognized more negative images than positive ones. Combining the other two ongoing experiment, we expect that the emotional context shift may act as an event boundary which constructs our event memory.

Keywords：
Event boundary, emotion, episodic memory

P14

High Dream Lucidity Suggests Better Reality Monitoring Ability.

盧慕蓉、鄭仕坤

Abstract

Dream lucidity refers to the degree to which a dreamer is aware of the difference between the dream context and the real world. It pertains to the discrimination between self-generated contents in a dream and externally derived experiences when awake; hence, dream lucidity could be associated with cognitive operations involved in “reality monitoring”. According to the fMRI analysis of lucid dreaming state, the BOLD activation of DLPFC is higher than non-lucid dream state. Besides, by training of the ability of reality testing, dreamers can increase the ability to differentiate the dreaming state and the waking state. Therefore, we hypothesized that dream lucidity is positively correlated with the performance of reality monitoring. In this study, participants were recruited to rate their lucidity with LuCiD scale. Then, they engaged to a study-test reality monitoring task. During the study phase, participants were presented with visual words referring a concrete objects and followed by a picture or a blank screen. Participants were asked to make a judgement based on the object being perceived or object being imagined. In the subsequent test phase, participants had to make an old/new judgement and identified the objects was perceived or imagined. The index of dream lucidity was compare with the participant’s performance in the reality monitoring task. Behavioral results revealed that not only recognition memory but source memory performance were better in the imagined trials than perceived trials. Then, it showed an asymmetric source misattribution that the internalization error was greater than externalization error. It means that participants tend to misattribute the external-perceived trials to internal-generated trials. A correlational analysis found that dream lucidity to be positively correlated with source accuracy especially in the external-perceived trials. The results supported a close link between dream lucidity and the performance of reality monitoring.

Keywords：
dream,lucidity,reality monitoring

P15

Ruminating Activity As a Basis for Neuroanatomical Abnormality in Major Depression Disorder: a VBM Study.

Paul Zen Cheng, Niall Duncan, Tzu Yu Hsu

Abstract

Brooding rumination is one of the pronounced symptoms of Major Depressive Disorder (MDD), characterized by repetitive and cyclical negative thoughts in individuals. A recent Voxel-Base Morphometry(VBM) study demonstrated an increased gray matter volume in the frontal regions, ACC and DLPFC due to higher ruminating activity, measured using the Rumination Response Scale (RRS). Since MDD patients have known to show an abnormal anatomical and functional difference in these associated regions, we set out to delineate and straighten the association between ruminating activity and neuroanatomical abnormality of MDD. To our knowledge, this association has not been formally tested with a clinical population. Thus, we collected 35 MDD patient MRI T1 Images with age-matched controls, use Freesurfer Reconall command to transfer the image into surface space and contrasted difference. We were able to replicate the previous VBM studies and found a significant difference in the bilateral DLPFC regions of the brain. We hypothesized there would be an interaction between ruminating activity and grey matter volume between the two populations. To our expectation, a significant interaction has been found between cortical thickness, surface area to ruminating activity in the right hemisphere of the occipital regions. With the result of this investigation, our findings may advance understanding MDD clinical populations neuroanatomy and pinpoint key regions for further imaging studies.

Keywords：
MDD, VBM, rumination, DLPFC

P16

High Gamma Activity in the Human Prefrontal and Insular Cortices Represent Monetary Gains and Losses During Decision Making

吳孝真、吳仕煒

Abstract

Many decisions we face involve choosing between options that carry potential gains and losses. Decades of research from psychology show that people are loss averse — that “losses loom larger than gains”. Human fMRI studies showed that many brain regions, including the ventromedial prefrontal cortex (VMPFC), orbitofrontal cortex (OFC) and ventral striatum, represent information about monetary gains and losses during decision making. It remains controversial, however, whether these regions simultaneously represent gains (positive) and losses (negative). In this study, we attempted to address this issue using human intracranial electrophysiology. In a mixed-gamble task, human subjects (n=18) on each trial faced a 50/50 lottery of a potential monetary gain or loss and had to decide whether to play the lottery. As part of treatment plan attempting to identify epileptogenic zone, multi-contact depth electrodes were implanted in different brain regions including the OFC, dorsal-to-mid cingulate cortex, amygdala and insula. These four brain regions, with a total of 221 contacts across subjects, were the focus of this study. Behaviorally, we replicated loss aversion in the patient population. Lambda, the ratio of sensitivity to changes in losses to gains inferred from choice behavior was around 1.5, suggesting that subjects were mildly loss averse. Neurally, we found evidence for gain and loss representations in high-gamma activity. However, most contacts represent either gains or losses; very few contacts represent both gain and loss information. Together, these results suggest that gains and losses are more likely to be represented by different populations of neurons in these regions rather than by the same neurons.

Keywords：
decision making, frontal cortex

P17

Development and Validation of a Novel 32-Channel Rodent EEG System

謝雨蓁、林士傑

Abstract

Event-related potentials (ERPs) are widely used as biomarkers of cognitive functions in humans in both healthy and neuropsychiatric conditions because they reflect the stereotypical EEG responses of large-scale cortical dynamics to relevant behavioral events. Despite the broad applications of ERP, the mechanisms underlying the generation of ERPs remain poorly understood. A key reason in this knowledge gap is that parallel systems for high-channel EEG recording have not been established in pre-clinical animal models to take full advantage of neuroscience techniques that can record and manipulate specific neuronal populations in distinct neural circuits to probe underlying neural mechanisms. To address this issue, we developed and validated a novel miniature 32-channel EEG system in pre-clinical rodent models that reveals detailed spatiotemporal dynamics of ERP responses across the entire cortical network. To achieve high-density sampling or EEG signals across the entire cortical surface in rodents, we adopted miniature metal pins currently used in the electronics industry as EEG electrodes. EEG electrodes implanted through the skull had low impedance (1-2kOhm) that were stable over six-months and well-tolerated by rats. Auditory and visual stimuli presented passively to freely moving rats generated stereotypical and distinct spatial distributions of ERP responses that are consistent with the respective sensory modalities. The spatiotemporal profiles of those ERP responses were modulated by the arousal state of the animal (wake and sleep) and whether the same stimuli predicted rewarding outcomes. Together, these results establish a novel, low-cost and highly flexible 32-channel EEG system in the rat. We envision that the rodent EEG system developed here will have a broad impact by serving as a translational platform that bridges ERP studies of cognitive functions in humans and mechanistic studies of neuronal circuits in rodent models.

Keywords：
rodent EEG,ERP,

P18

Envelope Modulation Effect on the Incoming Signals As Revealed by Holo-Hilbert Spectral Analysis

陳彥勳、張文乘、阮鐘堅、梁偉光、黃鍔、阮啟弘

Abstract

The carrier frequency and its variation in amplitude (i.e., the envelope) are two fundamental components of signals. Recently, Holo-Hilbert spectral analysis (HHSA) has been reported to be a powerful tool to decipher the envelop information of the signal (Nguyen et al., 2019). Nguyen et al. (2019) used HHSA and steady-state visually evoked potentials (SSVEPs) to explore amplitude-modulated (AM) signals provided by the light-emitting diode. Their results indicated that besides fundamental stimulus frequencies, a range of carrier frequencies was modulated by the envelope frequency of the stimuli. However, it remains unclear how the envelope information of a complex natural scene is processed by the brain.

To resolve this issue, SSVEPs elicited by AM luminance variation of a grating image was decomposed with HHSA. Specifically, the waveform of the luminance was composed by 2Hz envelope with 15Hz carrier frequency with pattern reversal in a Liquid Crystal Display (LCD) monitor. Considering the luminance of stimuli decreased as more Gaussian noise was added into grating image, the envelope was generated by variating the proportion of Gaussian noise. Accordingly, the modulation effect of the envelope on the signal was defined as the visibility of the envelope.

The present results found that responses to the 15 Hz frequency was modulated by AM frequencies (i.e., 2, 4 and 8Hz). Consistent with the previous finding (Nguyen et al., 2019), a broad-band carrier frequency (8~28 Hz) was also modulated by the 2Hz envelope. Importantly, when the envelope was more visible, the perceived response to the 15 Hz frequency became stronger. Therefore, this study suggests a dynamic mechanism underlying the modulation effect of the envelope information on the incoming inputs. Furthermore, by deciphering the response to the time varying amplitude of the gratings allows us to acquire a more realistic estimation of the sensory information in daily life.

P19

Lie to Me: Meta-Analysis of Functional Neuroimaging Studies of Deception

En-Syuan Huang, Ying-Chen Liu, Chih-Mao Huang

Abstract

Deception has been defined as the behavior to falsify others by conveying the wrong information or concealing the truth and such behavior is commonly observed in the human society. Previous functional neuroimaging studies suggest that information processing involved in deception relies on neural substrates of socio-cognitive systems for executive function, decision-making, theory of mind, and social cognition. In this study, we investigate the common and distinct neural correlates of deception and honest actions by performing a quantitative meta-analysis of functional magnetic resonance (fMRI) studies using activation likelihood estimation (ALE) approach. The meta-analytic results showed greater activation in insula for honest actions whereas greater activation in premotor cortex, dorsolateral prefrontal cortex (DLPFC), inferior PFC, and inferior parietal lobule for processing deception, probably reflecting cognitive efforts for reading intentions of others, conflict monitoring and resolution, and language comprehension. Moreover, when deception studies were divided in social and non-social conditions, increased activation in precuneus and posterior cingulate cortex was found to be greater in social than non-social deception, suggesting the integrative nature of socio-cognitive information processing in the social interactive setting. Our findings are congruent with the notion that the process of deception is supported by distributed fronto-parietal networks for integrating socio-cognitive information processing and may be influenced by social interaction.

P20

Musicians and Non-Musicians' Different Reliance of Features in Consonance Perception: an fMRI Study

HanShin Jo, Tsung-Hao Hsieh, Wei-Che Chien, Sheng-Fu Liang, Chun-Chia Kung

Abstract

Musicians learn complex motor and auditory skills from an early age. The training-induced brain plasticity is well demonstrated in musician's brain. Previous event-related potential (ERP) studies using EEG recorded on musicians' performance have reported that musician may rely on different features during the consonance/dissonance perception, distinct from non-musicians' performance. In the present study, 16 musicians and 14 non-musicians participated in fMRI experiment designed for jittered event-related task, get scanned while performing auditory judgement task by listening consonance/dissonance sounds at various frequencies intervals (50 ~ 500 Hz), orthogonally selected from across the "pitch interval" and "roughness" spectrum. The fMRI data were further processed into general linear model (GLM), ANCOVA modeling, multivariate searchlight mapping and representational similarity analysis (RSA) allowing us to estimate dissimilarity across different hypothesis models, and additionally, the data acquired by auditory event potential (AEP) and fMRI are cross-compared by using spatio-temporal searchlight RSA (ss-RSA), to reveal the corresponding brain regions at specific time-points from ERP data (N1, ~100ms; P2, 200 ~ 250ms). The results revealed that musicians showed more western tonal harmony corresponding auditory processing compared to non-musician group, yielding higher activations in the hierarchical (Top-down) processing of auditory brain networks.

Keywords：
Musician, Auditory event potential, fMRI, ss-RSA

P21

Exploring Familiar and Unfamiliar Face Perception in Young and Senior Adults with Morphing Paradigm

簡惠玲(Sarina Hui-Lin Chien), 何玟礽 (Mary Wen-Reng Ho), 林圻域(Chi-Yu Lin), 葉宇軒(Yu-Hsuan Yeh)

Abstract

The ability to recognize faces developed soon after birth and continues to enhance across childhood and early adolescence. But as human age, face recognition memory gradually declines, specifically at the later stage of adulthood. We wonder whether the ability to perceive subtle changes in familiar/unfamiliar faces declines in senior adults. Therefore, the present study explored familiar versus unfamiliar morphed-face perception in two different age groups: the young adults (YA), and senior adults (SA). A total of 24 YA (9 male, mean age: 21.11±1.60) and 23 SA (7 Male, mean age: 69.04±8.38) received the MMSE assessments, and three face perception tasks: (1) Name that STAR, where participants were to identify the familiar celebrity they recognize in a sequence of morphing faces; (2) Face & Object Solitaire, where participants were to sort four unfamiliar morphed-face cards in order; and (3) It Has to Be You, where participants were to sort familiar and unfamiliar face photos into pile(s) by perceived identity. Our results showed that: (1) the SA group identified the celebrity slower (i.e., needed more cues) than the YA group. (2) The SA group performed significantly worse in the face and object solitaire. (3) In photo sorting task, both groups performed equally well in sorting the familiar and the unfamiliar celebrity photos; however, the SA group had a higher probability of misidentifying unfamiliar face photos. In sum, our findings suggested that as people age, they require more cues to recognize well-known faces, but the overall ability to recognize familiar faces seems well-preserved. However, the ability to recognize unfamiliar morphed faces of subtle differences diminishes with advancing age. Our study supports the view that familiar face recognition is robust across life span.

Keywords：
face recognition, young adults, senior adults, MMSE, morphing paradigm

P22

Alternation Between- and Within-Class Selectivity Across the Ventral Occipital Cortex: Evidence by Region-of-Interest and Whole-Brain Multi Voxel Pattern Analyses

Meiselina Irmayanti Abdul, Chun Chia Kung and Alan Wong

Abstract

The Ventral Occipital Cortex (vOT) is involved in the perception of visually presented objects, but which kind of shapes influence the processing of visual perception and how they are processing in vOT has remained largely unclear. In the current study, we partly address the hypothesis by having observers categorize 9 novel objects ("Ziggerins") at either categorization (between 3 families) or individuation (within each family was 3 individual Ziggerinss) level. Each trial consisted of a 5 -repetition – 1 – test (totally 6 TRs, with each TR 1.5s covering 30 axial slices), interleaved with 4 - TR fixation period in between, making it a 10 - TR blocked fMRI. Each subject completed 2 sessions of fMRI, with 8 runs of 36 trials each, counterbalanced with either categorization or individuation task first. We conducted Multi Voxel Pattern Analysis (MVPA) searchlight analysis of 3 different comparisons: within - class or between - category classification, and individuation _ vs _ categorization comparison, for each 10 time points of a trial. The results show a number of significant regions on vOT where more medial areas contain information better suited for categorization, whereas more lateral/widespread areas contain information better suited for individuation.

Keywords：
Ziggerin, Multi Voxel Pattern Analysis, Ventral Occipital Cortex, Medial Occipital Cortex

P23

習慣與筆記方式對於記憶表現的影響

王妤,林君昱

Abstract

數位科技的進展下，人們將資訊存於電腦或是網際網路的行為日漸增加，Google Effect 的提出，讓我們首次發現這樣的行為可能會影響人類的認知。在課堂中，使用電子裝置取代紙筆進行筆記的學生越來越多，也開始有研究者探討筆記方式的改變是否會影響學生的記憶表現，但目前的研究結果並不一致，雖然較多研究發現手寫筆記的記憶表現比打字筆記好，卻也有相反的結果出現。

先前研究的結果不一致，可能是打字筆記的門檻較高，需要參與者對於使用工具硬體與軟體的熟悉，才能避免做筆記時佔用太多認知資源而干擾聽課，因此本研究在比較手寫筆記與打字筆記的記憶表現外，另外加上習慣的變項，蒐集參與者平常習慣使用的筆記工具，以探討筆記方式與個人習慣之間是否存在交互作用。參與者在實驗中需觀看三部短影片，並分別以紙本進行手寫筆記、以電腦進行打字筆記，以及一部影片不進行任何筆記。在三十分鐘的分心作業後，參與者回答依據影片內容所出的試題，以瞭解參與者的記憶表現。研究結果發現，手寫筆記的記憶表現比打字筆記好；而筆記方式與習慣之間也存在顯著的交互作用。使用手寫筆記對於記憶表現可能更具優勢，但卻不能忽略個人習慣在其中扮演的角色，對於習慣打字的人來說，打字筆記可能是更為有利的選擇。

Keywords：
筆記、手寫、紙本、電子、打字、記憶、學習、習慣

P24

Dynamic Modulation of Excitation and Inhibition Equilibrium by High Frequency Repetitive Transcranial Magnetic Stimulation in the Early Visual Cortex

連芸, Shang-Hua N. Lin, Ching-Po Lin, Li-Hung Chang

Abstract

Visual cortex excitability has been widely studied by occipital transcranial magnetic stimulation (TMS). Previous studies suggested the plasticity-like effect after repetitive TMS (rTMS) had resulted from the TMS-induced alterations in neurochemistry and synaptic function. Although current models between animal and human brain studies came to a consensus that both excitation and inhibition neural systems modulate the plasticity across the lifetime and tasks, the underlying mechanism of the neurochemistry function, the cortical reaction of rTMS-mediated neural plasticity and rTMS-based therapies remained incompletely comprehended. To address the questions, we applied either high frequency (HF, 10Hz) or sham stimulation over visual cortex on healthy volunteers, and observed the phosphene thresholds (PT), magnetic resonance spectroscopy

(MRS)-derived glutamate/glutamine (Glx) and γ-aminobutyric acid (GABA) before, 0.5hr after, 3.5 hr after, and 24 hr after rTMS intervention. Then, the excitation/inhibition ratio (E/I) was calculated by the concentration of Glx over GABA. Surprisingly, we found that the cortical sensitivity to single TMS pulse increased in the early stage (within 0.5hr) (baseline vs. 0.5hr, $p<0.05$) and recovered few hours later; however, the shifted neurochemical balance (E/I ratio) in local tissue seems to be affected longer (+3.5hr) (baseline vs. 3.5hr, $p<0.01$; 0.5hr vs. 3.5hr, $p<0.01$) than PT measurements in the HF group. On the other hand, changes in GABA concentration were more prominent than those in glutamate, and the dynamical changes of the E/I balance were mostly driven by the inhibitory neurotransmitter, GABA. Thus, our results showed that 10 Hz rTMS might shift E/I balance in neural networks toward more excitation and instability state. The negatively correlated feature between Glx and PT was also altered at 3.5h, indicating temporarily decoupled cortical excitatory factors. Here, we propose that short-term HF rTMS intervention may facilitate an extended time window toward increasing cortical excitability through weakened inhibition that possibly allow more plasticity induced.

Keywords：Transcranial Magnetic Stimulation (TMS), Magnetic Resonance Spectroscopy (MRS), γ-aminobutyric acid (GABA), Glutamate & Glutamine (Glx), Excitation/Inhibition (E/I) ratio, Phosphene Threshold (PT)

P25

The Relationship Between Individual Differences in Measurements of Statistical Learning and Episodic Memory

方云柔,陳品瑋, 吳嫻

Abstract

The relationship between statistical learning (SL) and individual abilities has been the focus of recent research. Empirical evidence from some neuropsychological and neuroimaging studies has also shown that hippocampus and the medial temporal lobe (MTL), which are critical to the formation of episodic memory, may play an important role to one's SL ability. Based on these previous findings, one's abilities in SL and episodic memory might be closely related to the same neural mechanisms. To investigate the unexplored relationship through individual differences between these two domains, we adopted a within-subject design to measure performance in sensitive SL tasks in both visual (VSL) and auditory (ASL) modalities, in an implicit learning (serial reaction time, SRT) task, in different aspects of standardized long-term memory tests, and in tests of basic cognitive abilities including IQ and working memory (WM). Analysis of Pearson correlation indicated that the correlation between learning indices in the ASL and VSL tasks and in the SRT task was low. Consistently, only the performance in the SRT task but not that in the SL tasks, correlated with executive functions in a WM test. These results suggest that SL and implicit memory rely on distinct mechanisms. For the relationship between SL and episodic memory, only the scores in the ASL but not that in the VSL task correlated with the scores in a logical memory test significantly. Therefore, it is unlikely that the cognitive domains of SL and episodic memory share the same neural mechanisms. The overall pattern of the present findings from the individual difference approach revealed that the capacity of learning and memory measured in different tasks indeed exhibit distinct characteristics and might be subserved by different neuronal mechanisms.

Keywords：statistical learning, long-term memory, individual difference

P26

Persistence in Base-Rate Neglect Is Associated with Weighting Subjective Uncertainty on Prior Distributions

李嘉仁,吳仕煒

Abstract

Historically, base-rate neglect was demonstrated and discussed without having to incorporate variability in prior distributions and likelihood function. It therefore remains unclear whether people would show the same bias when variability needs to be taken into account in weighting prior and likelihood information. In this study, we developed a novel lottery decision task in which subjects had to combine prior and likelihood information about probability of reward in order to maximize payoffs. We manipulated the variability of both the prior distributions and likelihood function and found that base- rate neglect arose due to insufficient changes in weighting prior information in response to changes in prior variability but not likelihood variability. In a series of 5 experiments aiming to test three different hypotheses on base-rate neglect, we found that subjects consistently underweight prior information even when (1) information about prior variability was explicitly revealed to the subjects, (2) the time gap between acquiring prior knowledge and using it to combine with likelihood information was shortened, and (3) subjects were given the opportunity to learn how to combine prior and likelihood information through feedbacks. Unexpectedly, subjects after learning showed more pronounced neglect that took place irrespective of prior and likelihood variability. And offering prior information did make subjects weighting prior information more, but also made their weighting unideal when the prior information was not reliable. Together, these results provide insights into base-rate neglect by identifying a novel cause in subjective uncertainty about prior distributions and its persistent effect through several design strategies previously considered effective in diminishing it.

Keywords：
base-rate neglect, decision making, Bayesian decision theory, probabilistic inference

P27

Reduced Hippocampal CA1 Subfield Volume Associated Age-Related Decline in Retention of the “When” Memory Component

Chia-Hsing Chi, Chih-Hao Lien, Di-Hua Luo, Yu-Ling Chang

Abstract

Objective: The hippocampus, one of the most age-sensitive brain structures, is presumed as a critical convergence zone for episodic memory to bind different aspects of an episodic event from different brain regions into a coherent representation. Recent studies suggest that the hippocampal subfields are differentially vulnerable to aging process. However, the association between age-related gray matter atrophy in the hippocampal subfields and recollection of different content components of episodic memory remains uncharacterized. The study investigated age-related differences in recollection of four memory content components (i.e., who, when, where, and what) of verbal episodic memory, and their associations with volumetric alterations in the hippocampal subfields.

Participants and Methods: The study consisted of 30 cognitively intact older adults (OA) and 29 young adults (YA). All participants completed standardized neuropsychological tests, including the Logical Memory test of the Wechsler Memory Scale-III (WMS-3) with a revised scoring method. The volumes of hippocampal subfields were obtained using Freesurfer software.

Results: Significant age-related decreases in all four memory components during the immediate recall phase were observed. Moreover, greater age-related susceptibility to retention of the when component over time relative to other memory components was observed. Furthermore, the immediate recall of the four memory components were associated with the volumes of the CA1, dentate gyrus, molecular layer and subiculum, while the retention of the when component was significantly correlated with the CA1, molecular layer and subiculum. Specifically, the volumetric atrophy in the CA1 subfield was associated with lower performance in the retention of the when component in older adults.

Conclusions: These findings suggest that multiple hippocampal subfields contributed to verbal information bindings during memory encoding and retention stages, but the CA1 is particularly important to account for age-related decline in recollection of when information.

Keywords：
Aging, Hippocampal Subfields, episodic memory, memory content components

P28

People with Specific Social Traits Behave a Higher Tendency to Cooperate or Compete with Others During Communication-Decision Task.

張宜晴、翁明宏、龔俊嘉、徐亦礽、鄭任唐、曾士恆、陳德祐

Abstract

There are many studies exploring the neural mechanism underlying social interaction. In order to understand cooperation and competition between people, we designed a two-stage communication-decision task for two participants, which is a kind of coordination game. Our hypothesis is that the behavioral pattern in this task may be correlated with the participants' social interaction traits as measured by questionnaires. There are two stages in each trial. In the first 'communication stage', each participant will indicate his/her choice between two options to communicate with the other. After receiving this message, they will decide their final choice in the second 'real decision stage'. Their rewards depend on both final decisions. However, the reward is always unequal. Only one can have the higher reward, otherwise both of them get nothing. They need to coordinate well to earn more rewards eventually. The behavioral results showed two distinct patterns. The reward differences of participants in some groups were very small, but extremely large in other groups. It seemed some participants tried to cooperate with their partners, but some participants tried to compete and dominate. In the former groups, they tended to take turns to get the higher reward in each trial, which resulting more balanced total rewards. We used an alternating index of reward to describe their behavioral pattern. The alternating index of the former groups was significantly higher than the latter groups. In addition, they filled out various questionnaires about social interaction traits. Some of them were significantly correlated with their alternating indexes. In conclusion, the present study demonstrated that participants showed different social interaction patterns in this simple communication-decision task, and their patterns could be predicted by their social traits. Based on our findings, this coordination game can be used to study the neural mechanism of cooperation and competition between people.

Keywords：
Social interaction, coordination game, communication, decision making

P29

Brain Responses Elicited by Recollecting a Break-Up Event of Oneself

簡菱瑤、郭文瑞

Abstract

We humans are social animals. Social rejection or exclusion will induce negative emotions and cause psychological feelings of pain. Evidence indicates that the neural networks of social pain and physical pain matrix overlap, which suggests an integrated biological system for various pain processing. However, for social pain, the contrast conditions used in studies to reveal pain/negative feelings varied--some were positive and some were neutral only. Characterization to the spectrum of this neurocognitive pain system could be biased. In this study, in order to have a more comprehensive emotion spectrum to profile the neural bases of social rejection, we included one more condition which could help to induce positive emotions for comparison. We recruited female participants who had just experienced a romantic relationship break-up within one year. The major task was arranged as follows. By cuing with presenting photos of their ex-partner, their good friend, and an acquaintance, the participants were instructed to recollect their common life event in the past and try to re-experience it. For the task, several mental processes were expected to take place, including recollecting autobiographical memories, eliciting corresponding emotions, self-evaluation processing, and emotional regulation. The subjective rating scores indicated that the participants seemed to feel sadder over the ex-partner trials than over the friend and neutral trials. The fMRI results showed that the brain areas activated by the ex-partner condition overlapped with the pain processing network. We also found that the mPFC was significantly activated in both the ex-partner and good-friend conditions. It positively correlated with subjective rating. On the other hand, the processes of implicit and explicit emotion regulation were not found. Taken together, we replicated the findings that the psychological pains will recruit physical pain network for responses. More important is the finding that the emotion evaluation was involved as well.

Keywords：
social rejection, physiological pain, emotion

P30

The Response of Left Temporal Cortex to Modifier-Head Compounds

Chun-Hsien Hsu, Ya-ning Wu, Ting-hsin Yen

Abstract

Purpose: During the reading of disyllabic-compound words, brain imaging studies have demonstrated that morphological complexity and structural complexity substantially modulate activities in left temporal cortex. This study aims to further evaluate whether the activity in the left temporal lobe would be sensitive to the internal structures of modifier-head compounds.

Methods: Magnetoencephalography (MEG) was recorded from 14 native Chinese-speaking adults in a lexical decision task, in which real words were consisted in two types of modifier-head words, including cocomposition- and basic-relation (Jackendoff, 2009). In both categories, the first root is the modifier and the second root is the head. In cocomposition-relation condition, a proper function of the head noun is required to define the relation between the head noun and the modifier (e.g., photo album: the head is a container; eye doctor: the head is an agent of an action). In basic-relation condition, the meaning of the words is literally derived from the roots and the modifier classifies the head (e.g., beta cell, x-ray). In the analyses, source analysis is used to trace the minimum norm activity in the brain. Effects of word types were estimated by comparing brain activities during the reading of cocomposition-relation words and that of basic-relation words.

Results: The statistical analysis demonstrates a significant cluster in the left posterior temporal lobe (LPTL) at 350 ms after the onset of words. That is, reading cocomposition-relation words reveal larger activity in the LPTL than reading basic-relation words.

Conclusion: Previous MEG studies have suggested that the LPTL is involved in basic phrasal composition during language comprehension and production. The present study further demonstrates that LPTL region appears to play a role in accessing the specific compound-internal structure during the reading of modifier-head compounds.

P31

Investigation of Physiological Indicator Using Wireless EEG in Military Scenarios

何聰穎、張揚、蔡博宇、湯士堅、葉佳龍、陳韻如、柯立偉

Abstract

In recent years, brain science research has flourished, integrating brain-computer interface systems into military development, and has become a brand-new application field. If we can develop a real-time monitor EEG system, we can analyze the soldier brain's attention, fatigue, and other physiological conditions through brain-computer interface technology. Dynamic adjustment of the training time and intensity can enhance the effectiveness of soldier training. This study is focused on constructing an Attention Network Task experimental scene that adapts to the military, and to find the characteristics of the brain area corresponding to attention and fatigue. Participants (n = 20) responded to the military scenarios' task on the computer until 1 hour passed. For EEG segments from task periods and rest periods, we compared the EEG power spectrum during the two-period and compared the pre- and post-task period. The result shows that attention was associated with decreased power in frontal theta (θ) EEG rhythms. Fatigue increased and energy decreased. Fatigue was associated with increased power in occipital theta (θ) and alpha (α) EEG rhythms.

Keywords：
Military scenarios, physiological indicator , attention, fatigue

P32

利用接觸熱刺激感覺誘發電位來探討神經病變患者的痛覺

潘春君、趙啟超、江明彰

Abstract

痛覺是由小直徑有髓鞘的 A- 型神經纖維以及無髓鞘的 C 型神經纖維來傳遞。周邊神經病變的患者常因這些小直徑的痛覺纖維受到損害而引起劇烈的疼痛，統稱為神經痛。傳統的神經傳導檢查通常無法偵測到小直徑痛覺纖維的病理變化，因此病人的疼痛只能依賴主觀的症狀描述而常為臨床醫師所忽略。本研究應用接觸性熱刺激儀器(Contact heat evoked potential stimulator) 來評估小纖維神經病變相關的變化。藉由瞬間刺激皮膚內熱痛覺受器來活化熱痛覺的神經纖維，搭配 64 頻道腦波記錄可以得到大腦熱刺激感覺誘發電位。6 位家族性類澱粉神經病變患者及 23 位健康受試者參加本實驗。接觸熱刺激探頭置放於小腿外側。每位受試者共接受 40 次熱刺激。每次熱刺激的溫度是由基準溫度 32C 以 70 ˚C/s 上升到目標溫度 44C，再以 40 ˚C/s 下降回到基準溫度。 我們接著以 SPM 12 的 EEG toolbox 對接觸熱刺激感覺誘發電位做前處理，並以一般線性模式 (general linear model) 來比較病患與控制組的誘發電位在空間與時間的差異。 與健康受試者比較，家族性類澱粉神經病變的患者在左側感覺運動區（sensorimotor area) 有較低的熱刺激誘發電位（effect size t = 2.15)。但可能由於樣本數太小，此差異未能通過多重比較（multiple comparisons)檢定。本研究結果顯示，末梢神經病變所造成的熱痛覺傳導缺損，可能降低腦部相對應的電生理反應的強度。

Keywords：
熱刺激,神經病變,痛覺,誘發電位

P33

不同的心理物理測量方式對痛覺主觀強度的影響

丁俊源、江明彰

Abstract

痛覺是主觀的感覺，難以用儀器將疼痛程度加以量化。近年來研究者開發不同的神經生理造影技術，例如痛覺相關誘發電位，或是功能性磁振造影，嘗試將痛覺與大腦的神經生理或血流變化相連結，然而這些技術尚不足以可靠定量疼痛的程度。在研究和臨床上常用來評估疼痛程度的方法是心理物理測量 (psychophysical measurement)，例如視覺類比量表 (Visual Analogue Scale; VAS) 或口述評分表(Verbal rating Scale; VRS)。本研究的目的是探討在相同的疼痛程度下，受試者以 VAS 與 VRS 來評估疼痛的差別。24 位健康受試者 (13 女 11 男) 接受 20 次機械性鈍針感覺刺激。在其中的 10 次刺激，受試者用 VRS 方法評分疼痛程度，亦即口頭給痛覺一個從 0 到 10 分的分數，其中 0 分表示完全不痛，而 10 分表示經驗中最痛的程度。在另外的 10 次刺激，受試者用 VAS 方法評分疼痛程度，亦即以線段的最左端是 0 分(完全不痛)，最右端是 10 分(經驗中最痛的程度)，在線段上標記目前的痛覺。為了避免受試者前一次刺激的 VRS 或 VAS 對下一次刺激的評分產生干擾，VRS 與 VAS 是以偽隨機(pseudorandom)方式請受試者評分。實驗結果發現，VRS 與 VAS 的分數隨著刺激的強度而增加。在同樣的刺激力量下，VRS 比 VAS 有較高分數。此結果顯示以不同方式表達疼痛的強度，例如本研究中的口頭報告與視覺量表，可能會造成疼痛程度的主觀評估上的差別。

Keywords：
痛覺、VAS 量表、VRS 量表

P34

The Other Race Effect in Face Recognition and Attractiveness Judgment

Muniba Khan, Denise Hsien Wu

Abstract

People are better at recognizing own-race faces than other-race faces, which is known as the Other Race Effect (ORE). According to recent publications, this phenomenon is due to people less experience with other-race faces and has been found in raters of different races. However, it remains to be determined whether the ORE preferring own-race faces would be observed in attractive judgment. In our previous study, data obtained from Taiwanese participants confirmed the ORE in recognition accuracy but revealed higher attractiveness ratings for Caucasian than Chinese faces. To examine whether the Caucasian and Chinese faces employed in the previous study had different degrees of attractiveness, and to assess how contact affects the ORE in both recognition and attractiveness judgment, 29 Pakistani participants were tested in the Cambridge Face Memory Test and in the facial attractiveness rating test both of which included Australian and Chinese faces. Besides, participants were given a Race Contact Questionnaire (RCQ) to measure their social interaction with Caucasian and Chinese people. Consistent with the fact that both Caucasian and Chinese faces are foreign to these Pakistani participants, no significant difference in recognition memory was found. As for the attractiveness judgment, Caucasian faces were rated as more attractive than Chinese faces, similar to the findings from Taiwanese participants. In addition, we found no evidence that participants' memory accuracy and attractiveness ratings correlated with their answers in the RCQ. In summary, the present results indicated that experience measured by the RCQ did not correlate with memory or attractiveness judgment, or the RCQ was not sensitive enough to reveal such a relationship. They also suggested that there might be systematic difference in attractiveness between the Caucasian and Chinese faces employed in our previous and current study. An objective standard of facial attractiveness would be necessary for future research on this topic.

Keywords：
Other race effect, face recognition, face memory

P35

Facial Attractiveness is Identified Later Than and modulated by Race of Faces

Denise Hsien Wu, Pei-Xuan Luo, Leo Dong

Abstract

Previous research suggests that facial beauty is perceived unconsciously in extremely short presentation time. To verify this effect and to determine whether the perception of facial beauty is modulated by the race of faces, Chinese and Australian male and female faces with different degrees of beauty were employed. College students in Taiwan were asked to judge the attractiveness, gender, or race of each face that was presented in one of six durations between a forward and a backward mask. Participants' accuracy of judgement indicated that both the gender and race of faces were identified better than the chance level as early as 33 ms. On the other hand, the attractiveness of faces, according to ratings from an independent group of participants, was identified reliably when the presentation duration was 50 ms or longer. When considering the performance of attractiveness judgment based on individual participants' own preference, the d-prime of participants' decisions was also computed in addition to the response accuracy to control for the effect of response bias. Although the accuracy of attractiveness judgment suggested early identification of facial beauty as quick as 17 ms, the d-prime revealed that participants' sensitivity to facial attractiveness was comparable to their sensitivity to gender/race of faces before 50 ms, but the former did not improve as much as the latter when the presentation duration increased. Interestingly, the d-primes of attractiveness judgment of Chinese faces continued to improve with presentation duration, but the same judgment of Australian faces did not improve after the race of faces was clearly identified. Because Australian faces were rated more attractive than Chinese faces overall, this effect might be due to stereotypical thinking of westerners being more beautiful. In summary, facial beauty is not perceived before the identification of race or gender, but is modulated by race of faces.

Keywords：
neuroaesthetics, facial attractiveness

P36

Using Beamformer Source Analysis to Localize Brain Oscillations Underlying Manual and Speech Motor Sequence Production

Mei-Jing Lin, Erik Chihhung Chang

Abstract

Self-paced production of movements has been widely applied as a behavioral paradigm to localize the cortical site(s) underlying the motor control of various effectors. In the current report, we illustrate the application of beamformer source analysis in localizing manual and speech regular movements. All participants (6M/10F, 21.8±2.0yrs) were instructed to repeat a fixed sequence (1-2-3-4) of which each element response separated by four seconds. The manual production was carried out with right-hand button presses (RH), while the following speech production (SP) session was carried out with speaking the numerals outloud. We used event-related beamformer (ERB) source analysis by BrainWave toolbox. We observed movement-related field activity in both RH and SP conditions. Specifically, we found that 1) in the RH condition, maximal movement-evoked fields (MEFs) was observed in the left post-central gyrus (Talairach coordinates = -34, -25, 44) at 30 ms after movement onset; time-frequency power plots show movement-related mu ERS (synchronization) between 0 ~ 250 ms, beta ERD (desynchronization) between 200 ~ 250 ms, beta ERS between 300 ~ 800 ms, and gamma ERS around 500 ms ; 2) in the SP condition, the movement-related activation was found in the left precentral gyrus (-42, 1, 24) at 50 ms and power changes show stronger gamma ERS between 0 ~ 200 ms, mu ERS between -800 ~ 0 ms, and beta ERS between 700 ~ 1000 ms. These findings reveal the oscillations in the contralateral sensorimotor cortex following movement onset: modulation of mu (8–12 Hz) and beta (15–30 Hz) oscillations for right hand movements and high-frequency (70–80 Hz) gamma bursts for speech, respectively. These distinct features of simple manual and speech movements may serve as features for localizer tasks or brain-computer interface applications.

Keywords：
Beamforming, motor sequence production , manual, speech

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Disparity Dependent Luminance Contrast Response Functions in Human Dorsal Visual Areas

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Abstract

The perceived depth from disparity in random dot stereograms depends on luminance contrast in the image. Here, we investigated the neural mechanisms underlying such effect by using a block-design fMRI experiment. We measured the BOLD activation in retinotopically defined visual areas as a function of luminance contrast and disparity. The test stimuli were square random dot stereograms (20.16 x 20.26 degree) that gave the percept of either a flat surface (zero disparity) or a sinewave modulated in depth (raised cosine surfaces). The luminance contrast ranged from 5% to 80%. The task of the observer was to indicate whether the peak of the depth modulated surface was to the left or the right of the fixation. The accuracy of depth judgement increased with luminance contrast. In all visual areas, BOLD signals increased monotonically with luminance contrast. In the early visual areas, including V1, V2, V3and hV4, such contrast response functions were independent from disparity modulation. In areas V3A, V3B and KO (defined by a separate localizer that contrasts activations to moving edges from uniform motion), the contrast response functions saturated at relatively low contrast compared at the zero disparity condition. However, the BOLD response in the raised cosine surface condition showed no sign of saturation even at the highest contrast and reached an activation level up to 40% greater than that in the no disparity condition. Such disparity modulated contrast response function was highly correlated with the change of perceived depth under different luminance contrasts. Our results suggested that disparity information can reduce the contrast gain control signal in V3A, V3B and KO and thus not eliminates the saturation in the response function but also increases the contrast dependent activation to a greater level.

Keywords：
extrastriate cortex, contrast, fMRI

地圖及路線指引 Map & Directions

國立成功大學社會科學院

交通指引：

A. 搭乘台鐵：抵達台南車站，由後站出口，沿前鋒路北行至小東路右轉，可至社會科學大樓門口(步行時間約 10-15 分鐘)。

B. 搭乘高鐵：抵達高鐵台南站走出二樓出口後，左轉經通廊或至一樓大廳 1 號出口前往台鐵沙崙站，搭乘台鐵區間車前往台南火車站，由火車站後站出口，沿前鋒路北行至小東路右轉，可至社會科學大樓門口(步行時間約 10-15 分鐘)。

C. 自行開車：

a. 南下：走中山高速公路南下→於永康交流道下高速公路→走中正南路(西向)往台南市區→轉中華路→達小東路口→抵達社會科學大樓門口。

b. 北上：走中山高速公路北上→於仁德交流道下高速公路→走中山路/182 縣道→中華東路二段台 1 線→小東路/180 縣道向左轉→抵達社會科學大樓門口。

c. 停車資訊：請參閱：https://web.ncku.edu.tw/p/412-1000-16489.php?Lang=zh-tw

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