Cognitive & Affective Neuroscience: From Circuitry to Network and Behavior

Monday, Jun 18: 8:00 AM - 9:15 AM
1835
Symposium
Monday - Symposia AM
Using a multi-disciplinary approach integrating cognitive, EEG/ERP and fMRI techniques and advanced analytic methods, the four speakers in this symposium investigate neurocognitive processes underlying nuanced cognitive and affective functions in humans. the neural basis of changing social norms through persuasion using carefully designed behavioral paradigms and functional MRI technique; Yuejia Luo will describe how high temporal resolution EEG/ERPs predict dynamical profiles of distinct neurocognitive stages involved in emotional negativity bias and its reciprocal interactions with executive functions such as working memory; Yongjun Yu conducts innovative behavioral experiments in conjunction with fMRI and computational modeling approaches to dissociate interactive neural signals involved in affective decision making; and Shaozheng Qin applies fMRI with simultaneous recording skin conductance and advanced analytic approaches (i.e., MVPA, network dynamics) to determine neural representational patterns and subjects can modulate resting state networks, and also uses graph theory network activity levels to delineate dynamic changes in large-scale brain network interactions involved in complex interplay of attention, emotion, memory and executive systems. These talks will provide perspectives on new ways to study brain circuitry and networks underlying interactions between affective and cognitive functions and how to best link the insights from behavioral experiments and neuroimaging studies.

Objective

Having accomplished this symposium or workshop, participants will be able to:
1. Learn about the latest progress of innovative research in the field of cognitive and affective neuroscience;
2. Learn applications of multimodal brain imaging techniques (i.e., EEG/ERP, fMRI) into understanding human cognitive and affective functions in different populations.
3. Gain awareness and knowledge of multimodal brain imaging techniques and advanced analytic methods, and interpretation of neuroimaging data

Target Audience

This session would be suitable to a broad audience, especially for psychologists, cognitive neuroscientists, and psychiatrists.

Co Organizer(s)

Yuejia Luo, Shenzhen University
Yu Rongjun, National University of Singapore

Organizer

Shaozheng Qin, Beijing Normal University (BNU)

Presentations

Neural Dynamics of Emotional and Executive Function Interactions (index.cfm?do=ev.viewEv&ev=1650)

Neural correlates of the reciprocal interaction between emotion and executive function are related to psychology, neurobiology, neurology, biomedical engineering and sociology, as well as other cutting-edge interdisciplinary research of the major scientific issues related to mental health. Executive function refers to the control and regulation of other cognitive ability and behavior, including attention, working memory, and decision-making. The presentation

will summarize a series of EEG/ERP studies from my laboratory in past years to elucidate neural dynamics of the reciprocal interaction between emotion and executive function. Our data shows that: (1) Emotional negativity bias constitutes three major temporal stages distinguished by attention, evaluation and reaction readiness components; the fronto-central scalp distribution of the neonatal brain discriminates fearful voices from angry voices. (2) The differential effects of negative emotion on special and verbal working memory; and the differential effects of negative emotion on spatial and verbal WM mainly take place during information maintenance processing. (3) We found significantly different FRN responses between high-anxious and low-anxious participants in both ambiguous and negative outcome conditions. Moreover, FRN responses under the ambiguous outcome condition were larger than the negative outcome condition. Our work demonstrates the relationships among emotion and attention, memory, and decision-making, as well as the neural mechanism of the production of the emotion. These findings provide scientific theoretical basis and technological means for the clinical diagnosis and treatments of the emotion disorders. By Yue-jia Luo Ph.D., Qing Guan Ph.D., Shenzhen Key Laboratory of Affective and Social Cognitive Science, Shenzhen University, China

Presenter

Yuejia Luo, Shenzhen University

Neural Circuitry of Changing Social Norms through Persuasion (index.cfm?do=ev.viewEv&ev=1651)

Social norms regulate behavior, and changes in norms have a great impact on society. In most modern societies, norms change through interpersonal communication and persuasive messages found in media. We examined the neural basis of persuasion-induced changes in attitude toward and away from norms using fMRI. We measured brain activity while human participants were exposed to persuasive messages directed toward specific norms. Persuasion directed toward social norms specifically activated a set of brain regions including temporal poles, temporo-parietal junction, and medial prefrontal cortex. Beyond these regions, persuasion away from an accepted norm specifically recruited the left middle temporal and supramarginal gyri. Furthermore, in combination with data from a separate attitude-rating task, we found that the activity in left supramarginal gyrus represented participants' attitudes toward norms and tracked the persuasion-induced attitude changes that were away from agreement. Kenji Matsumoto Ph.D., Tamagawa University Brain Science Institute, Japan, Yukihito Yomogida Ph.D., Department of Mental Disorder Research, National Institute of Neuroscience, National Center of Neurology and Psychiatry, Japan

Presenter

Matsumoto Kenji, Tamagawa University

Maximising Rewards vs. Happiness: Interactive Neural Computation of Affective Decision-making (index.cfm?do=ev.viewEv&ev=1652)

Traditional economic theories assume that an individual acts as if balancing costs against benefits to reach a decision that maximizes personal advantage. However, even very smart people make decisions that deviate from these theoretical predictions. The prevalent view of decision biases is the dual systems account: when slow but rational analytic thinking is dominated by an emotion system that is automatic but prone to error, individuals make suboptimal decisions. My lab uses novel behavioral paradigms combined with neuroimaging methods to study why people fall prey to decision biases, such as the default bias and social conformity. Our findings suggest that the processing of cost/benefit information is heavily susceptible to contextual information and emotional experiences. We point out that decision-making depends upon the interaction between the prefrontal cortex supporting value

integration and subcortical regions that represent different types of emotion-related information. Brain regions that encode a domain-general value signal in decision-making also track the value of emotional stimuli. We argue that discrete emotions are represented in distinct and overlapping brain regions and are integrated into a final utility function, referred here as emotion-as-utility. By Rongjun Yu Ph.D., Department of Psychology, National University of Singapore

Presenter

Yu Rongjun, National University of Singapore

Mapping Dynamics of Emotional Brain States and Memory Consolidation: From Circuitry to Network and Behavior (index.cfm?do=ev.viewEv&ev=1653)

Brain regions engage and disengage constantly with each other to support rapid and flexible changes in emotional states and access to memories. Conventional approaches on analyzing regional brain activity and static functional connectivity patterns provide little information about transient dynamics in brain functional organization. Novel approaches are needed to investigate how transient brain dynamics contribute to human emotion and memory with rapid and flexible access to disparate aspects of information. I will present a series of task- and resting-state fMRI studies with concurrent skin conductance recording and advanced analytic approaches (i.e., K-means, HMM and network dynamics) to investigate how dynamic states of emotion-related brain circuitry evolve over time at both encoding and at rest, and how these brain dynamics contribute to emotional memory consolidation. We found that: (1) emotion-related amygdala circuitry undergoes rapid changes in integration and segregation of functional connectivity with other brain regions critical for attention, salience detection and emotion regulation; (2) emotion-charged reactivation of hippocampus-based memory system at encoding enhances subsequent episodic memories; (3) re-occurrence of emotion-charged brain states at post-encoding rest predicts better episodic memories; (4) large-scale brain functional networks among neocortical regions are gradually building up to support long-term memory retention after 24 hours. Altogether, our findings point toward the dynamic nature of brain emotional states and memory systems, and rapid changes in emotional memory organization with consolidation. By Shaozheng Qin Ph.D., The State Key Laboratory of Cognitive Neuroscience and Learning, IDG/McGovern Institute for Brain Research at BNU

Presenter

Shaozheng Qin, Beijing Normal University (BNU)