Sino-German Multisensory Symposium
BEIJING, CHINA

2023 | BEIJING

SINO-GERMAN MULTISENSORY SYMPOSIUM

Host:
Lihan Chen (Peking University)
Zhuanghua Shi (LMU Munich)

Sep 17th ~Sep 23rd
@ Sino-German Center for Science (CDZ)
Shuangqing Road 83, Beijing, China

Sponsor:
Sino-German Center for Science (CDZ)
German Research Foundation (Deutsche Forschungsgemeinschaft, DFG)
National Natural Science Foundation of China (NSFC)

WELCOME

We are pleased to have you all at the Sino-German Bilateral Symposium on Multisensory Processing, Neural Mechanisms, and Applications, co-hosted by Dr. Chen Lihan from Peking University and Dr. Shi Zhuanghua from LMU Munich.

A heartfelt appreciation to our guest speakers, your patience is truly commendable. We acknowledge the patience required during the unforeseen three-year delay brought on by the COVID-19 pandemic restrictions, and we are deeply grateful that you chose to attend this event today.

This symposium is more than a meeting of minds; it's a call for Chinese and German scholars to come together. Let this be a platform to share and learn the very latest in multisensory research, driving innovation and further collaboration.

We thank the generous support of the Sino-German Center for Science (CDZ), the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), and the National Natural Science Foundation of China (NSFC). Your dedication and support have been the pillars that have made this symposium possible.

Let's embrace this remarkable journey of knowledge and collaboration together. Welcome aboard!

Warm Regards,
Sino-German Symposium Committee

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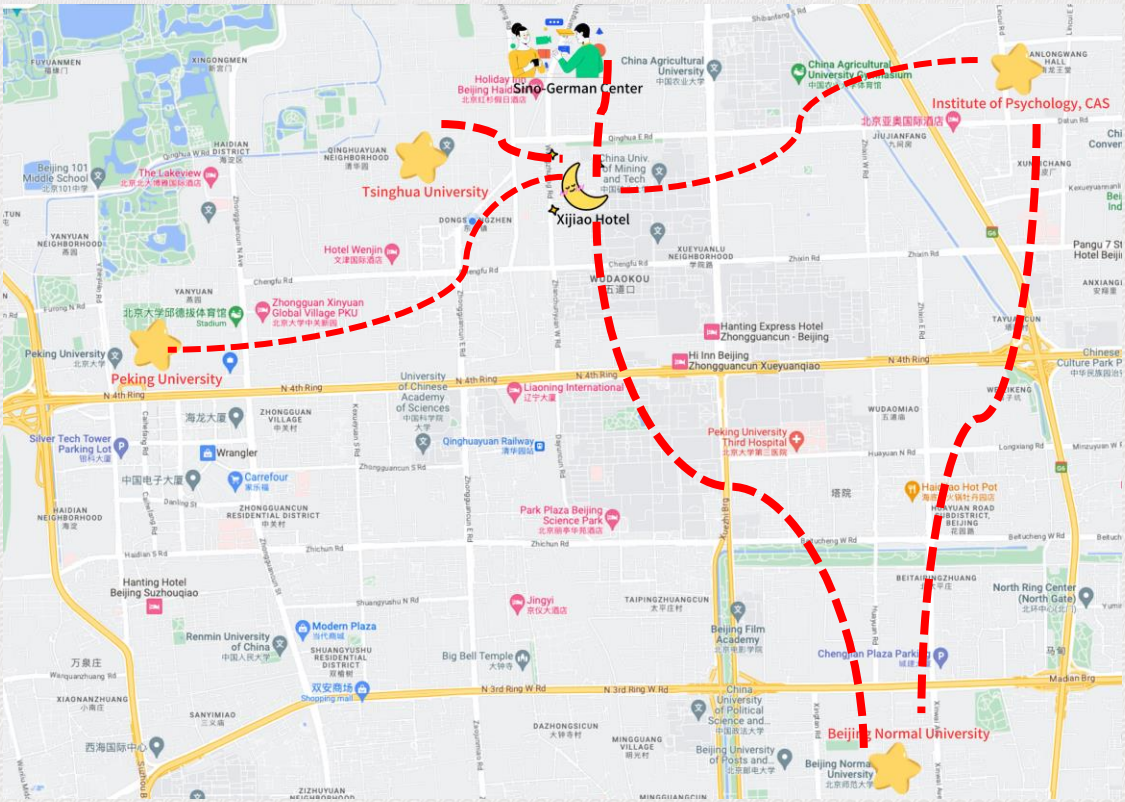
Agenda Mapping



Meeting Agenda

Symposium 1	Crossmodal Integration and Learning
Host	Gui Xue/Dan Zhang
9:00-9:30	The neural mechanisms underlying cross-modal sequence representations and predictions (Gui Xue: Beijing Normal University)
9:30-10:00	How motor adaptation relates to multisensory integration and agency processing (Kunlin Wei: Peking University)
10:00-10:30	Complex crossmodal correspondence across visual and auditory modalities (Zhenzhu Yue: Sun Yat-sen University)
10:30-11:00	Contrastive Learning of Subject-Invariant EEG Representations during Audiovisual Video Watching (Dan Zhang: Tsinghua University)
11:00-13:30	Lunch break
13:30-14:45	**Keynote Host: Zhuanghua Shi** **Keynote 1 by Prof. Agnieszka Wykowska (Italian Institute of Technology), Examining human cognition with the use of humanoid robots**
Symposium 2	**Crossmodal Processing dynamics and Conflict Resolution**
Host	Xun Liu/Tim Rohe
14:45-15:15	Integration of control learning and irrelevant stimulus-response learning (Ling Wang: South China Normal University)
15:15-15:45	Cognitive neural mechanisms of crossmodal conflict processing (Xun Liu: Institute of Psychology, Chinese Academy of Sciences)
15:45-16:00	Tea/Coffee Break
16:00-16:30	Cross-Modal Impact of Recent Word Encountering Experience (Xingshan Li: Institute of Psychology, Chinese Academy of Sciences)
16:30-17:00	Multisensory causal inference along the cortical hierarchies (Tim Rohe: Institute of Psychology, University of Erlangen-Nuremberg)

Special Session	Sensory processing and cognitive modeling
Host	Daniel Senkowski
9:00-9:30	The psychological, computational, and neural foundations of indebtedness (Xiaoxue Gao: School of Psychology and Cognitive Science at East China Normal University)
9:30-10:00	Multisensory processing and multi-scale temporal brain dynamics (Daniel Senkowski: Charité – Universitätsmedizin Berlin)
10:00-10:30	Generalised Time-Window-of-Integration models of multisensory integration (Hans Colonius: Oldenburg University)
10:30-10:45	Tea/Coffee Break
10:45-12:00	**Keynote Host: Lihan Chen** **Keynote 2 by Prof. Salvador Soto Faraco (Universitat Pompeu Fabra, Spain)** **Multisensory research in the real world and applications**
12:00-13:00	Lunch Break
Lab visit	Visit tour
13:00~13:30	Xijiao Hotel to Bejing Normal University
13:30~15:00	Visit Beijing Normal University
15:00~15:30	Beijing Normal University to Institute of Psychology of the Chinese Academy of Sciences
15:30~16:30	Visit in Institute of Psychology of the Chinese Academy of Sciences
16:30~17:00	Back to Xijiao Hotel

Note: Please take passport or ID card when visiting labs.

Symposium 3	Visuomotor Learning and Tactile Processing
Host	Guanlan Kang
9:00-9:30	Cognitive modulation and intelligence augmentation via haptic interaction (Dangxiao Wang: Beihang University)
9:30-10:00	The use of prior visual information in active touch (Knut Drewing: Justus-Liebig-Universität Gießen)
10:00-10:30	Crossmodal learning of target-context associations (Siyi Chen: Ludwig-Maximilians-Universität München)
10:30-11:00	Cross-modal effect of value on motor sequence learning (Guanlan Kang: Beijing Sport University)
11:00-13:30	Lunch break
Symposium 4	**Contextual and perceptual learning**
Host	Sheng Li/Stefan Pollmann
13:40-14:10	Microgenesis of audiovisual integration (Lihan Chen: Peking University)
14:10-14:40	Exploring the Power of Contextual Learning: Robust Acquisition, Flexibility, and Social Enhancement in Spatial Contextual Cueing (Xuelian Zang: Center for Cognition and Brain Disorders, Affiliated Hospital of Hangzhou Normal University)
14:40-15:10	Visual learning and memory following foveal vision loss (Stefan Pollmann: Department of Psychology and Center of Brain and Behavioral Sciences, Otto-von Guericke University)
15:10-15:30	Tea/Coffee break
15:30-16:00	Gravity as an embodied constraint in shaping visual motion perception (Ying Wang: Institute of Psychology, Chinese Academy of Sciences)
16:00-16:30	Beyond perception: Mnemonic mechanism in perceptual learning (Sheng Li: Peking University)
16:30-17:00	The attentional earlid: Visual search is surprisingly robust to auditory distraction (Heinrich R. Liesefeld: University of Bremen)

Symposium 5	Multisensory Perception and Behavior
Host	Shuguang Kuai
9:00-9:30	Neurobiological Bases of Bribe-Taking Behavior and Its Individual Differences (Yang Hu: East China Normal University (ECNU))
9:30-10:00	Multisensory cues nudge healthy eating behavior (Jianping Huang: Soochow University)
10:00-10:30	Vision-taste cross-modal interaction and the tentative underlying brain mechanism (Pei Liang: psychology department, Faculty of Education, Hubei University)
10:30-11:00	Human Social Interaction Field Model and Its Application (Shuguang Kuai: East China Normal University)
11:00-13:30	Lunch break/Poster Session
13:30-14:45	**Keynote Host: Lihan Chen** **Keynote 3 by Yanchao Bi (IDG/McGovern Institute for Brain Research and the State Key Laboratory of Cognitive Neuroscience and Learning, at Beijing Normal University) Knowledge representation and multi-sensory experiences**
Symposium 6	**Neural Mechanisms and Perception**
Host	Lihui Wang
14:45-15:15	Selective and Replicable Neural Indicators of Pain Discriminability (Li Hu: Institute of Psychology, Chinese Academy of Sciences)
15:15-15:45	Object-related eye-movement representations in high-level visual cortex (Lihui Wang: Shanghai Jiao Tong University)
15:45-16:00	Tea/Coffee Break
16:00-16:30	Neural Mechanisms Underlying Multimodal Person Familiarity (Xiaoqing Gao: Center for Psychological Sciences, Zhejiang University)
16:30-17:00	**[Online]** Central-Peripheral dichotomy: multisensory orienting and recognition across animal species (Li Zhaoping: University of Tuebingen and Max Planck Institute for Biological Cybernetics)

Symposium 7	Sensory Perception and Attention
Host	Qi Chen
9:00-9:30	Simultaneous auditory input lowers temporal resolution of vision by modulating alpha-band oscillations (Qi Chen: School of Psychology, South China Normal University)
9:30-10:00	The different effects of breaking an object at different time points (Yonghui Wang: Shaanxi Normal University)
10:00-10:30	Neural mechanisms underlying the cross-modal effects of sound on visual perception (Wenfeng Feng: Department of Psychology, Soochow University)
10:30-11:00	Visual and Vestibular Integration for Self-motion Perception (Yong Gu: Institute of Neuroscience, Chinese Academia of Sciences)
11:00-13:30	Lunch break
13:30-14:45	**Keynote Host: Zhuanghua Shi** **Keynote 4 by Pro. Stefan Glasauer (Brandenburg University of Technology Cottbus-Senftenberg) On optimality in perception and action**
Symposium 8	**Temporal perception, expectation and decision-making**
Host	Ping Wei
14:45-15:15	Modality-specific sensory and decisional carryover effects in duration perception (Baolin Li: Shaanxi Normal University)
15:15-15:45	Influence of crossmodal expectation on consumer experience and preference: A sensory marketing and consumer neuroscience study (Xiaoang Wan: Tsinghua University)
15:45-16:00	Tea/Coffee Break
16:00-16:30	Expectations of immediate and delayed reward differentially affect cognitive task performance (Ping Wei: Capital Normal University)
16:30-17:00	Understanding Time: Contextual Modulation, Logarithmic Encoding, and Their Neural Correlates (Zhuanghua Shi: Department of Psychology, LMU Munich)

Notes

For keynotes and talks:

- Keynotes are allocated 1 hour, with an additional 15-minute discussion period.
- Regular talks are allocated 25 minutes, followed by a 5-minute discussion period.

Please make sure you arrive at least 15 minutes before the start of your session, which is typically at either 8:45 a.m. or 2:30 p.m., to set up your presentation.

Presentations can be in PowerPoint, Keynote, or PDF format. We will provide a projector and sound system for your use. The connection of the project is HDMI (Type A) or is via USA wireless projection. If you need additional equipment, converter, or tools, please let us know well in advance. We would suggest that you use your own laptop for the presentation.

For Posters:

- You are invited to design your poster in the Portrait A0 dimensions, with the maximum size being 1m × 2m in portrait orientation.
- Each poster will be assigned a specific number. Please check your number on this booklet.

On the day of your session, please affix your poster to the designated poster board marked with your corresponding number. Your poster will be displayed throughout Thursday and Friday (Sept. 21-22). Please ensure you remove your poster at the end of the day of your designated poster session.

❖A welcome reception dinner is scheduled in Falian Hall of Quanjude Roast Duck Restaurant (Qinghuayuan), at 18:00 on September 17th.

Speakers

Gui Xue

Presentation time: Sep 18th 9:00~9:30

Brief Bio:

Professor Gui Xue mainly studies the cognitive and neural mechanisms of human learning and memory, using various neuroimaging methods and deep learning techniques to reveal the structure of human cognitive ability, the mechanism of effective learning, and the dynamic and interactive nature of human memory. He has developed the theory of neural pattern reinstatement for effective learning, and has been committed to applying the latest findings to the assessment and improvement of primary and secondary school students' learning ability, selections and training of talents, as well as the diagnosis and treatment of psychiatric disorders. He has hosted or co-hosted the key programs of National Natural Science Foundation of China (NSFC; 2011,2018), the 973 Program, the NSFC and the Israel Science Foundation (ISF) joint project, the NSFC and the German Research Foundation (DFG) joint project. He has published more than 100 influential papers in international SCI journals such as Science, PNAS, Trends in Cognitive Science, Science Advances, Nature Communications, Current Biology, eLife, Journal of Neuroscience, Cerebral Cortex and so on. He was selected as the Elsevier Highly Cited Chinese Researchers (2019,2020) in psychology, selected as Changjiang Distinguished Professor of Ministry of Education (2012), and he obtained the first prize of natural science of Ministry of Education (2013,2019).

Title: The neural mechanisms underlying cross-modal sequence representations and predictions

Abstract: Cross-modal prediction serves a crucial adaptive role in the multisensory world, yet the neural representational mechanisms are poorly understood. We addressed this question by combining a novel cross-modal audiovisual sequence memory task, high spatial resolution fMRI and high temporal resolution MEG, and multivariate analytical approaches. Our studies revealed several findings that could advance our understanding of cross-modal sequence representations and predictions. First, we revealed distributed brain regions where the neural activations and oscillatory features that represent the unimodal, multi-modal and cross-modal item and position information, which contributed to cross-modal predictions. Second, sequence prediction was accomplished by predictively activation of the neural representation of the next item, but not further later items. Third, while the direct connectivity within modality-specific areas supports within-modal predictions, the indirect neural pathway that was relayed by high-order association areas (i.e., superior parietal lobe) were involved in the visual to auditory cross-modal predictions. Finally, the theta-gamma coupling was also implicated in the cross-modal sequence predictions, showing both phase consistency for items at the same sequence position but phase separability for items at different sequence positions, in particular for cross-model sequence.

Kunlin Wei

Presentation time: Sep 18th 9:30~10:00

Brief Bio:

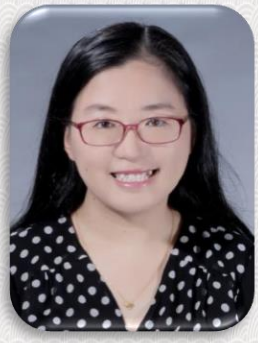
Professor in School of Psychological and Cognitive Sciences, Peking University, supervising the Motor Conrol Lab. Research interests include human motor control, perception and action, motor learning and adaptation. Research means include psychophysics, behavioral experiments, virtual reality, biomechanics, computational modeling, and neuroimaging.

Title: How motor adaptation relates to multisensory integration and agency processing

Abstract: Motor adaptation typically refers to how humans counter the influence of environmental changes and restore their baseline motor performance. Contrary to the conventional view that it largely reflects the functionality of the motor system, we present evidence that motor adaptation is largely determined by multisensory integration between visual and proprioceptive feedback, where the motoric response remains stagnant. Furthermore, we also find that implicit motor adaptation to disturbed feedback correlates with the judgment of agency and substantially reduces its magnitude when no active movements are involved. Thus, in addition to its reliance on the perception of action-related cues, motor adaptation is also driven by implicit agency processing, which is often investigated in the realm of self-consciousness.

Zhenzhu Yue

Presentation time: Sep 18th 10:00~10:30



Brief Bio:

Professor Zhenzhu Yue works in Department of Psychology at Sun Yat-sen University. She received a PhD degree of science from Peking University in 2009. During 2006-2008, she visisted biological psychology and neuropsychology lab at the Hamburg University in Germany.

Focusing on attention and multisensory processing, prof. Yue uses psychophysical methods, event-related potential (ERP) to investigate the cognitive and neural mechanisms of crossmodal attention. Especially, she focuses on how inter-modal (e.g. semantic, number, time, space, etc.) and intra-modal features (e.g. brightness, size, pitch, loudness etc) modulate multisensory processing, and how the multisensory prosessing modulated by top-down processing (e.g. causality, conflict control, working memory, etc.). Beside general population, she also pays attention to multisensory processing of hearing impaired population, e.g. tinnitus patients and coclear planted children.

Title: Complex crossmodal correspondence across visual and auditory modalities

Abstract: In the real life, objects or events are comprised of features from different modalities. Crossmodal correspondence is an important open-window for the exploration of multisensory integration, in which two or more sensory features are linked together to form a unified perception of the physical world. In the present study, we manipulated pitch-brightness and pitch-size crossmodal correspondences in a sound source localization task. In the behavioral experiment, we set up five locations of sound source and investigated the modulation of crossmodal correspondence on the performance of sound source localization task. The results suggested a significant interaction between pitch-size and pitch-brightness crossmodal correspondences. In the event-related potential experiment, the interaction between pitch-size and pitch-brightness crossmodal correspondences was also found at the P200 waveform (175-240 ms), which was further localized in left precuneus, cuneus, lingual gyrus, and some region related to default networks such as posterior cingulate and parahippocampal gyrus. Graph analysis supported that such an interaction of crossmodal correspondence was related with different patterns in delta and beta bands. Those converged evidence supported the existence of the interaction of different crossmodal correspondences, which could be explained by an exclusive-or (XOR) integration model.

Dan Zhang

Presentation time: Sep 18th 10:30~11:00

Brief Bio:
Dan Zhang received the B.E. degree in automation in 2005 and the Ph.D. degree in biomedical engineering in 2011, both from Tsinghua University, Beijing, China. He was a postdoctoral fellow in School of Medicine, Tsinghua University from 2011 to 2013. He is currently an associate professor at the Department of Psychology, Tsinghua University, Beijing, China. His research interests include social neuroscience, brain-computer interfaces and affective computing.

Title: Contrastive Learning of Subject-Invariant EEG Representations during Audiovisual Video Watching

Abstract: EEG signals have been reported to be informative and reliable for emotion recognition in recent years. However, the inter-subject variability of emotion-related EEG signals still poses a great challenge for the practical applications of EEG-based emotion recognition. Inspired by recent neuroscience studies on inter-subject correlation, we proposed a Contrastive Learning method for Inter-Subject Alignment (CLISA) to tackle the cross-subject emotion recognition problem. Contrastive learning was employed to minimize the inter-subject differences by maximizing the similarity in EEG signal representations across subjects when they received the same audiovisual emotional stimuli (videos) in contrast to different ones. CLISA achieved state-of-the-art cross-subject emotion recognition performance on two EEG datasets with audiovisual video watching tasks. Furthermore, the spatiotemporal representations learned by CLISA could provide insights into the neural mechanisms of human emotion processing.

Agnieszka Wykowska

Presentation time: Sep 18th 13:30~14:45

Brief Bio:
Head of the unit "Social Cognition in Human-Robot Interaction" at the Italian Institute of Technology (IIT, Genoa) and Coordinator of the Center for Human Technologies (IIT, Genoa) . She received her PhD (2008) and Habilitation (2013) in psychology from LMU Munich. In 2016 she was awarded the ERC grant "InStance: Intentional Stance for Social Attunement". She is Editor-in-Chief of International Journal of Social Robotics and the President of the European Society for Cognitive and Affective Neuroscience (ESCAN). Her research combines cognitive neuroscience methods with human-robot interaction to understand the human brain in social interactions.

Title: Using robots to understand human cognition

Abstract: As robots are believed to soon populate human environments, they have received enthusiastic support in the scientific community. Most research aims at designing robots for assisting humans in daily lives, healthcare, or elderly care. However, there is also a less explored way of using robots - robots as tools to understand human cognition. We take this approach in our lab in examining human cognitive mechanisms in interaction. In this talk, I will present the work from our lab where we have examined how attentional orienting, sensorimotor processes, and cognitive control unfold in interaction or joint action with others, i.e., natural and artificial partners. Our results showed, both at the behavioural and neural level, that interaction modulates attention, sensorimotor processes, as well as adaptation to cognitive conflict. I will discuss these results in a broader context of using robots at the service of psychological research.

Ling Wang

Presentation time: Sep 18th 14:45~15:15

Brief Bio:

Ling Wang is a professor of psychology at South China Normal University. He examines cognitive control, decision making, and learning with various methods, including behavioral measures, fMRI, EEG, and computational modelling. A central goal of his research is to build computational models for understanding cognitive and neural mechanisms underlying behavior. Current areas of focus include: a) how contingency or reinforcement learning of irrelevant stimulus-response associations and cognitive control interact with each other and b) optimality of decision making with stimulus or response biases.

Title: Integration of control learning and irrelevant stimulus-response learning

Abstract: The proportion congruency (PC) effect refers to the findings that the size of the Stroop, Simon, or Eriksen flanker effect increases or reduces with increasing or reducing the ratio of congruent to incongruent trials. In the last two decades, empirical and theoretical studies have established that both cognitive control and irrelevant stimulus-response (S-R) learning are cognitive mechanisms underlying the PC effect. However, the interaction between the two mechanisms in terms of their roles in producing the PC effect is unclear and less investigated. To investigate this question, a neural network model implementing both control learning (the dynamics of cognitive control) and irrelevant S-R learning (changes in the strength of task-irrelevant stimulus-response associations) based on reinforcement learning principle was presented in the present study. We reviewed empirical findings of PC studies that cannot be accounted for by either mechanism alone, rather suggesting an interaction between the two mechanisms. These included that 1) a reversed Simon effect when the proportion of incongruent trials is high, suggesting that learning of irrelevant S-R associations modulates cognitive control; 2) a reduced effect of irrelevant S-R learning within the context of high proportion of incongruent trials, suggesting that cognitive control modulates the effect of leaned irrelevant S-R associations; 3) dissociable effect of cognitive control and irrelevant S-R learning, suggesting independent operation between the two mechanisms. The model successfully simulated these empirical findings, which implicate 3 types of relationship between cognitive control and irrelevant S-R learning in optimizing decision-making: cooperation, competition, and independence.

Xun Liu

Presentation time: Sep 18th 15:15~15:45

Brief Bio:

Professor Xun Liu is a scholar of the "BR Program" of the Chinese Academy of Sciences and currently the academic deputy director of the Institute of Psychology. His research interests mainly involve basic and applied research on cognitive neural mechanisms on cognitive control, reward, and social decision-making (e.g., fairness, empathy, and prosocial behavior). He has published more than 100 SCI academic papers and been cited more than 4,000 times. He currently serves as the director of the International Academic Exchange Committee of the Chinese Psychological Society, the vice president of the Beijing Psychological Society, the deputy editor-in-chief of *Acta Psychologica Sinica*, and the editorial board members of *Frontiers in Psychiatry* and *Psychological Communications*.

Title: Cognitive neural mechanisms of crossmodal conflict processing

Abstract: How cognitive control resolves crossmodal conflicts is still under investigation. It is also unclear whether the involvement of cognitive control in different stages of crossmodal conflict processing is domain (modality, processing stage) general or specific. In this talk, I will present three studies, which help reveal the temporal dynamics of crossmodal conflict processing and elucidate the common and distinct aspects of cognitive control in different stages of crossmodal conflict processing.

Xingshan Li

Presentation time: Sep 18th 16:00~16:30

Brief Bio:

Xingshan Li is a Professor of Psychology at the Institute of Psychology, Chinese Academy of Sciences. He acquired his Phd degree in Psychology at University of Massachusetts Amherst in 2007. His research interest focusses on Chinese reading and language processing. In the last few years, he has tried to understand how Chinese readers deal with some unique properties of Chinese text during reading. He has published more than 80 journal articles on journals such as Psychological Review, Nature Reviews Psychology, JEP:General, Cognitive Psychology. He is an Associate Editor of Quarterly Journal of Experimental Psychology.

Title: Cross-Modal Impact of Recent Word Encountering Experience

Abstract: In this talk, I will present a study that was designed to distinguish the degree of sharing of representations between different modalities by investigating whether a word encountering experience in one modality impacts word processing in another modality. In three experiments, participants experienced some words frequently in the auditory modality (Experiment 1) or visual modality (Experiment 2) in the training session, and were tested whether the word encountering experience impacts the results of Chinese word segmentation in the visual modality in the test session. In Experiment 3, we used a within-subjects design, in which each participant received both auditory and visual training tasks. The results of the three experiments showed that encountering a word frequently in a short period of time in the auditory modality or visual modality can affect word segmentation results in Chinese reading, with a recently experienced word being more likely to be segmented as a word. This effect was long-lasting, as it could still be observed after 7 days. The results suggest that the effect of a word encountering experience in listening can be transferred to reading. Thus, word encountering experiences should be stored at a location in the mind that is used for both listening and reading.

Tim Rohe

Presentation time: Sep 18th 16:30~17:00

Brief Bio:
Professor for Perceptual Psychology at the Institute of Psychology, Friedrich-Alexander-University Erlangen-Nürnberg, Germany.
I studied Psychology in Freiburg and received my PhD in Neuroscience from the Max Planck Institute for Biological Cybernetics, Tübingen. My research investigates multisensory perception in the visual, auditory and olfactory modalities and emotional as well as cognitive processes and their
Psychopathological alterations using psychophysics, EEG, fMRI, TMS and computational modelling.

Title: Multisensory causal inference along the cortical hierarchies

Abstract: Humans integrate signals across the sensory modalities to obtain a multisensory perception of their environment. For veridical multisensory perception, observers should only integrate multisensory signals if they infer that the signals arose from a common cause, but they should segregate signals from independent causes. To infer the causal structure of multisensory signals, humans combine intersensory causal evidence from the signals' spatiotemporal relations (e.g., spatial disparity and temporal correlation) with a priori causal assumptions (i.e., a causal prior or "binding tendency"). Previous fMRI and M/EEG studies demonstrated that the brain represents intersensory causal evidence along the cortical hierarchies on distinct levels. The causal prior not only adapts to the multisensory statistical regularities of the recent stimulus history, but the causal prior also fluctuates with the brain's oscillatory state before stimulus onset, especially in the alpha band (i.e., alpha power and phase). In this talk, I will present fMRI, EEG and psychophysical studies that investigate how spatial disparity and temporal correlation of audiovisual signals jointly influence causal and perceptual inferences along the cortical hierarchies and whether prestimulus alpha-phase has a causal effect on the causal prior. Our data suggest that the brain represents the temporal correlation and spatial disparity of audiovisual signals on distinct levels of the cortical hierarchies to inform multisensory causal and perceptual inferences. Alpha phase may indicate a transient prestimulus time-window for optimal multisensory interactions between sensory and/or higher association regions as captured by a causal prior at the computational level. Thus, the brain recruits different levels of the cortical hierarchies and distinct mechanisms to combine sensory causal evidence with prior causal assumptions to perform causal inference in multisensory perception.

Xiaoxue Gao

Presentation time: Sep 19th 9:00~9:30

Brief Bio:

Xiaoxue Gao is a principal investigator (PI) in the School of Psychology and Cognitive Science at East China Normal University. She received her B.S. degree in Biotechnology from Shandong University and her Ph.D. degree in Basic Psychology from Peking University. During Ph.D., she visited the Department of Psychological and Brain Sciences at Dartmouth College as an exchange student. After Ph.D., she worked as a postdoctoral researcher in the School of Psychological and Cognitive Sciences at Peking University. Xiaoxue Gao's lab is dedicated to social cognitive neuroscience research, combining behavioral tests, computational modeling, and functional magnetic resonance imaging (fMRI) to investigate the psychological, computational and neural mechanisms underlying the generation and abnormalities of social emotions (e.g., gratitude, guilt, etc.) and related social decision-making (e.g., help-seeking decisions, inequity aversion) in humans. Her work has been published in prestigious international journals such as *Proceedings of the National Academy of Sciences (PNAS)*, *Psychological Medicine*, *Journal of Neuroscience*, *Neuroimage*, and others

Title: The psychological, computational, and neural foundations of indebtedness

Abstract: Receiving help or a favor from another person can sometimes have a hidden cost for the beneficiary. In this study, we explore these hidden costs by developing and validating a conceptual model of indebtedness across three studies that combine a large-scale online questionnaire, an interpersonal game, computational modeling, and neuroimaging. Our model captures how individuals perceive the altruistic and strategic intentions of the benefactor. These inferences produce distinct feelings of guilt and obligation that together comprise indebtedness and motivate reciprocity. Perceived altruistic intentions convey care and concern and are associated with activity in insula, ventromedial prefrontal cortex and dorsolateral prefrontal cortex , while strategic intentions convey expectations of future reciprocity and are associated with activation in temporal parietal junction and dorsomedial prefrontal cortex. We further develop a neural utility model of indebtedness using multivariate patterns of brain activity that captures the tradeoff between these feelings and reliably predicts reciprocity behavior.

Daniel Senkowski

Presentation time: Sep 19th 9:30~10:00

Brief Bio:
Professor of Clinical Neuropsychology, Charite – Universitätsmedizin Berlin, Department of Psychiatry and Psychotherapy, Berlin, Germany. Head of the Multisensory Integration Research Group and the Computational Neuroimaging Division. He received his Ph.D. degree from the Max Planck Institute for Human Cognitive and Brain Sciences. His research, focuses on cognition, attention and multisensory integration in healthy individuals and in psychiatric populations.

Title: Multisensory processing and multi-scale temporal brain dynamics

Abstract: The processing of stimuli from different sensory modalities relies on the integration, segregation and selection of information. The stimuli entering our sensory systems can have different temporal properties, and thus adaptable and flexible neural mechanisms are required to process and integrate them across different temporal scales. In this talk, I will present evidence from human and animal electrophysiological studies which suggests that neural oscillations may be a crucial mechanism underlying multisensory integration. Neural information processes at different time scales, reflected in different frequency bands, can operate independently or they can interact via cross-frequency interactions. Several neural mechanisms are involved: power and phase modulation within and across sensory modalities, functional connectivity, amplitude and phase coupling. The implications of these findings for the development of multisensory neurotechnologies for people with disabilities or sensory impairments and for the optimization of AI-based systems for multisensory computations are discussed.

Hans Colonius

Presentation time: Sep 19th 10:00~10:30

Brief Bio:
Hans Colonius is Professor em. of Psychology at Oldenburg University. He has been a member of the Center of Excellence "Hearing-for-All" and the Interdisciplinary Research Center for Neurosensory Science at Oldenburg. His field of research is mathematical psychology including quantitative modeling of multisensory perception and response inhibition, psychophysics, and decision making. Colonius obtained his habilitation in psychology from Technical University Braunschweig.

Title: Generalized Time-Window-of-Integration Models of Multisensory Integration

Abstract: The notion of a temporal "binding window of integration" is central to "explaining" many findings in multisensory studies. It usually refers to an estimate of the temporal distance between two stimuli that is still enabling multisensory integration. For example, it equals the stimulus onset asynchrony between a flash and a tone burst such that mean reaction time to the combined stimulus pair is reduced relative to the unisensory reaction times. In contrast, in the time-window-of integration (TWIN) model, first proposed in Colonius & Diederich (2004), *time window* is conceived of as a component in a quantitative computational modeling framework, with its width becoming an estimable parameter. The TWIN model has been applied to data from various different experimental paradigms. In its non-parametric version, it has been analysed via the statistics of copula theory. Here we present first results on a TWIN approach towards the famous flash illusion.

Salvador Soto-Faraco

Presentation time: Sep 19th 10:45~12:00

Brief Bio: ICREA Research Professor at the Department Information and Communication Technologies , Universitat Pompeu Fabra in Barcelona (Spain), where he is currently the director of the Center for Brain and Cognition. He received his Ph.D. degree in Cognitive Sciences at Universitat de Barcelona, Spain, and worked at University of Oxford (England) and University of British Columbia (Canada) as postdoc. His research focuses on the neurocognitive bases of perception and attention in multisensory environments.

Title: Multisensory research in the real world and applications

Abstract: Many perceptual phenomena are well characterized under controlled laboratory conditions. However, whether these phenomena generalize to the more complex scenarios of real-world conditions and whether they can be potentially used for applications, is less clear. In the first part of this talk I will present some studies from our laboratory addressing how multisensory and unisensory perception pan out in complex, dynamic scenarios similar to real-world situations using behavioural, eye-gaze, and EEG approaches. I will show visual search and speech perception multisensory benefits with complex dynamic stimuli in naturalistic contexts, as well as the results of unisensory studies suggesting the role of conflict processing in the perception of cinema and advertisement images. In the second part of the talk, I will introduce new results addressing potential applications in Brain Computer Interfaces (BCI) harnessing pre-stimulus neural activity. Our studies have addressed offline proof-of-concept correlations between pre-stimulus phase and long-range synchrony with attention and memory, and online Closed-Loop BCI to modify behavioural outcomes in real-time using occipital Alpha phase and power.

Dangxiao Wang

Presentation time: Sep 20th 9:00~9:30

Brief Bio:

Dangxiao Wang is a professor in Beihang University, Deputy Director of State Key Laboratory of Virtual Reality Technology and Systems and Deputy Director of Robotics Institute of Beihang university. He had been the General Chair of AsiaHaptics 2022 and visiting scholar in Stanford University, Karolinska institute, and University of North Carolina. He had been the Chair of Executive Committee of IEEE Technical Committee on Haptics (IEEE TCH), Associate Editor of IEEE Transactions on Haptics, Guest Editor of IEEE Transactions on Industrial Electronics.

His research interests include haptic technology, cognitive haptics, brain-computer interaction and medical robots. He is the deputy director of haptic perception and interaction professional committee of China Instrument and Control Society and member of the standing committee of human-computer interaction professional committee of China Computer Federation.

Title: Cognitive modulation and intelligence augmentation via haptic interaction

Abstract: Haptics is the basis for human to perceive the world and to perform fine and dexterous manipulations. Immersive virtual reality human-computer interaction systems built on haptic feedback devices and haptic rendering algorithms are expected to provide new tools for understanding the patterns of cognitive activity in the human brain. This presentation will introduce the concept and research hotspots of cognitive haptics, highlight the research progress of integrating haptic technology with EEG and fNIRS for attentional state evaluation and modulation using different types of haptic interaction task paradigms such as fingertip force control task, fine force-position collaborative control task, and haptic-assisted meditation task. The presentation will also look into the feasibility of using cognitive haptic techniques for the diagnosis and treatment of neurological disorders such as ADHD..

Knut Drewing

Presentation time: Sep 20th 9:30~10:00

Brief Bio:

Professor in Justus-Liebig-University, Giessen, Germany. Head of Haptic and Multisensory Research Group. Knut Drewing received the Ph.D. degree in psychology from Ludwig Maximilian University of Munich, Munich, Germany, in 2001, and the postdoctoral lecture qualification (habilitation) in psychology from JLU Giessen, Giessen, Germany, in 2010. He worked in the MPIs for Psychological Research (Munich), for Biological Cybernetics (Tuebingen), and in the Experimental Psychology, JLU Giessen. His research interests include haptic perception, multisensory integration and time perception.

Title: The use of prior visual information in active touch

Abstract: When humans explore objects by active touch, they use sensory as well as prior haptic information to adapt their exploratory behaviour, and thus improve perceptual precision. In natural situations humans typically first look at an object and collect visual information, before they explore it by touch. Hence, we studied how prior visual information influences exploratory behaviour. In a series of experiments, we investigated the role for prior visual information that indicates a texture orientation in directing exploratory movement in a grating discrimination task. From previous work we know that over the course of an exploration people adjust the direction of their stroking movements across groove-ridge gratings so that the finger moves orthogonal to the grooves, to improve perception. Visually, we presented prior information on grating orientation in five different qualities: 50% (excellent information), 35%, 25%, 15% and 0% (none). Participants discriminated two gratings according to their spatial frequency by active touch. The frequency of initial orthogonal strokes, that is the extent of exploratory adaptation, increased with the quality of prior visual information. Further findings demonstrate that a certain frequency of at least medium or better quality visual priors is crucial for establishing adjustment behavior in the first place, and they suggest a role for task difficulty in the learning process. Furthermore, experiments using other tasks demonstrate that visual prior information also plays a role for an efficient choice of an exploratory movement scheme that is appropriate for a haptic task in question, and that it is rather implicit than explicit prior information, which is effective in adaptation of exploratory behaviour.

Siyi Chen

Presentation time: Sep 20th 10:00~10:30

Brief Bio:
Junior researcher at the Center for Advanced Studies, Ludwig-Maximilians-Universität München (CAS LMU) and Principal Investigator in the Department of Psychology, LMU. Research interests include visual attention and working & long-term memory, multisensory attention and integration. Research means include psychophysics, eye-tracking, neuroimaging, and electroencephalography.

Title: Crossmodal learning of target-context associations

Abstract: Contextual cueing is the effect frequently reported of visual search becoming faster for visual targets presented among previously encountered visual distractor layouts relative to random ones. Two important, and interrelated, questions arise on this type of learning: 1) does contextual cueing operate across sensory modalities? 2) is this type of learning supported by modality-dependent or -independent long-term memory (LTM) mechanisms? To answer these questions, we developed a cross-modal search task, in which the invariant predictive context and the target came from different (visual, tactile) modalities. First, we found that when the searched-for target was visual, with repeated (and nonrepeated) distractor configurations presented either within the same (visual) or a different (tactile) modality, both uni- and crossmodal context cues benefitted the same, visual processing stages related to the selection and subsequent analysis of the search target. In contrast, when the searched-for target was tactile, both somatosensory and visual cortical regions contributed to more efficient processing of the tactile singleton in repeated stimulus arrays. Thus, contextual cueing of search is supported by cross-sensory target-context associations; and these LTM mechanisms operate in separate co-existing reference frames, though in different weighting ratios, which is set by the modality that contains the predictive, i.e., learnable information. Furthermore, redundant multisensory, tactile-plus-visual contexts would enhance contextual cueing of visual search, particularly the guidance component, over and above the level attained by unisensory contexts alone. However, we observed no redundancy gains in tactile search. This argues that the reference frame for contextual learning is determined by the task-critical modality. And whether redundant predictive contexts from another modality can enhance contextual cueing depends on the availability of the corresponding spatiotopic-visual to somatotopic-tactile remapping routines.

Guanlan Kang

Presentation time: Sep 20th 10:30~11:00

Brief Bio:
Guanlan Kang is an associate professor in the School of Psychology at Beijing Sport University. She earned her PhD in Psychology from Peking University in 2018. She has presided over a youth project of the National Natural Science Foundation of China (2021-2023) and two university-level scientific research projects. She has co-authored 14 peer-reviewed publications related to reward, attention, cognitive control, and multisensory, which have received more than 100 citations.

Title: Cross-modal effect of value on motor sequence learning

Abstract: Recent studies have found that stimuli associated with reward during the training phase capture attention on subsequent tasks. The present study combined a training-test paradigm and a serial reaction time task (SRTT) to investigate the influence of task-irrelevant reward-associated auditory information on motor sequence learning. The study contained two experiments with the SRTT pre-test phase, sound-reward association phase, SRTT learning phase, and SRTT post-test phase. In the sound-reward association phase, participants completed a rewarded sound localization task to establish the association between monetary reward (high or low) and sounds (high or low tone). In the SRTT learning phase, participants completed 5 SRTT learning blocks for each of the two pre-designed sequences pairing with a high- or low-reward-associated sound. No reward was given in the learning phase. The differences between the two experiments were that auditory stimuli were presented in all the SRTT task phases in Experiment 1, but only presented in the SRTT learning phase in Experiment 2. Results showed a larger learning effect (RT difference between pre-test and post-test phases) for the motor sequence pairing with a high-reward-associated sound than for the motor sequence pairing with a low-reward-associated sound in both experiments. In conclusion, the results suggest that reward information can transfer between different sensory modalities to enhance motor skill learning.

Lihan Chen

Presentation time: Sep 20th 13:40~14:10

Brief Bio:

Lihan Chen is an Associate Professor and deputy director of the Department of Brain and Cognitive Sciences at School of Psychological and Cognitive Sciences, Peking University. He obtained his Bachelor degree in Biomedical Engineering from Zhejiang University in 1999 and Master degree in General Psychology from Zhejiang University in 2005. He got his PhD degree in Experimental Psychology at Ludwig Maximilians University Munich in 2010, working with Dr. Zhuanghua Shi and Dr. Hermann J. Müller.

He was a postdoc fellow between 2009 and 2011 and was an Assistant Professor during 2011-2015 at Department of Psychology, Peking University. His major research interests include multisensory time perception, cross-modal correspondence and tactile perception.

Title: Microgenesis of audiovisual integration

Abstract: Since Wertheimer seminal paper: "Experimentelle Studien über das Sehen von Bewugung", apparent motion has become a hot topic in cognitive sciences. Using Ternus motion, a typical visual apparent motion, we have addressed the spatial,temporal and semantic groupings in apparent motion, and have redefined the temporal integraton window from brain oscillations perspective. We extended the Ternus motion in crossmodal domain and implemented the Bayesian modeling to account for the multisensory integration.

How to describe the audiovisual integration in very brief time window remains a challenge. Evidence has shown the characteristic pupil dilation and microsaccade inhibition has been observed in response to "salient" events/stimuli. Although the "saliency" account is appealing in the spatial domain, whether this occurs in the temporal context remains largely unknown. Here, in a brief temporal scale (within 1 s) and with the working mechanism of involuntary temporal attention, we investigated how eye metric characteristics reflect the temporal dynamics of perceptual organization, with and without multisensory integration. We adopted the crossmodal freezing paradigm using the classical Ternus apparent motion with synchronous beeps.We found dominant Ternus 'group motion' percept and prolonged sound-induced oculomotor inhibition (OMI), whereas the sound-induced OMI was not obvious in a crossmodal task-free scenario (visual localization without audiovisual integration). A general pupil dilation response was observed in the presence of sounds in both visual Ternus motion categorization and visual localization tasks. This study provides the first empirical account of crossmodal integration by capturing microsaccades within a brief temporal scale; OMI but not pupillary dilation response characterizes the microgenesis of task-specific audiovisual integration (as shown by the crossmodal freezing effect).

Xuelian Zang

Presentation time: Sep 20th 14:10~14:40

Brief Bio:

Xuelian Zang, Ph.D., is a distinguished professor at the Center for Cognition and Brain Disorders, Affiliated Hospital of Hangzhou Normal University. She holds a Doctoral degree in psychology from the University of Munich, with "Summa cum laude" distinction, and a Master's degree in Engineering from China Agricultural University. Dr. Zang has completed post-doctoral terms at the University of Munich and Shenzhen University.

Her research expertise focuses on contextual cueing mechanisms in spatial and cross-modal search, as well as the central tendency effect in time perception. With over 30 peer-reviewed research articles, she has secured multiple research grants and has been recognized as an exceptional teacher, winning the First prize in the Young Teachers Teaching Competition at Hangzhou Normal University twice. Dr. Zang's contributions to academia encompass exemplary research and teaching, establishing her as a respected figure in the field.

Title: Exploring the Power of Contextual Learning: Robust Acquisition, Flexibility, and Social Enhancement in Spatial Contextual Cueing

Abstract: Spatial contextual cueing (CC) enhances visual search efficiency by learning familiar or repeated contexts, resulting in faster reactions and greater accuracy. Our extensive research reveals CC as a robust yet flexible learning effect. Firstly, we observed that the contextual cueing effect is highly robust, manifesting not only in conditions of high luminance and foreground-background contrast but also in low luminance and contrast conditions. Moreover, this effect persists regardless of the duration for which the visual display is presented, ranging from a few seconds to as short as 300 milliseconds. Importantly, in the former case, the learning process relies on both global and local contexts, whereas in the latter case, it primarily depends on global context. Additionally, we identified a significant contextual cueing effect in mean response time across diverse demographic groups, including individuals aged 60 years and above, young college students, 8-9-year-old children, and even deaf individuals. Further analysis on the standard deviation of participants' mean response time revealed a robust improvement in cueing for young and older adults, but not for children, suggesting that response variability is more sensitive than mean response time in detecting distinct learning patterns among participant groups. Lastly, we explored contextual learning in social settings and found that engaging in joint action enhances contextual learning, allowing participants to acquire context relevant to their partners even if it is not directly relevant to themselves. Conversely, individual visual search tasks showed limited learning of irrelevant context, highlighting the influence of social interaction and the significance of shared experiences in facilitating the acquisition of irrelevant contextual information.

Stefan Pollmann

Presentation time: Sep 20th 14:40~15:10

Brief Bio:
Professor of General (Experimental) Psychology, Department of Psychology and Center of Brain and Behavioral Sciences, Otto-von Guericke University, Magdeburg, Germany. Research foci in Cognitive Neuroscience of Visual Attention and Learning. Research methods: Behavioral, including eye movement, measures in normal and patient populations, Neuroimaging.

Title: Visual learning and memory following foveal vision loss

Abstract: In normal-sighted viewers, visual learning and memory is closely tied to exploring the environment with eye movements. Fixating an object goes along with attending it and with better memorizing it. So what happens when fixation is compromised by foveal vision loss? I will report patient studies and gaze-contingent scotoma simulation studies on this topic showing a differentiated pattern of memory problems and their link to inefficient exploration patterns. I will then talk about recent training paradigms to increase visual search efficiency and their potential benefit for visual learning and memory.

Ying Wang

Presentation time: Sep 20th 15:30~16:00

Brief Bio:
Dr. Ying Wang is an associate professor at the Institute of Psychology, Chinese Academy of Sciences (CAS) and an Excellent Member of the Youth Innovation Promotion Association of the CAS. She studies human visual perception and cognition using a combination of psychophysical, behavioral genetic, and neuroimaging (EEG, fMRI) techniques. Her research interests cover the spatiotemporal dynamics of visual perception and attention, visual awareness, bio-social information perception, and how vision interacts with other sensory modalities.

Title: Gravity as an embodied constraint in shaping visual motion perception

Abstract: As inhabitants of the Earth, humans have evolved under the influence of gravity. Without even noticing it, we keep our head aligned with the gravitational "up" and our feet pulled "down" towards the center of the globe. While this internal sense of gravity arises primarily from bodily (e.g., vestibular) cues, whether and to what extent it shapes our perception of the external world remains obscure. Here I present evidence from a spaceflight experiment and its on-ground analog to demonstrate that our selective sensitivity to gravity-constrained motion signals, as manifested by an inversion effect in biological motion (BM) perception, declined substantially after prolonged microgravity or simulated microgravity exposure. The observed perceptual change was associated with attenuated orientation-dependent neural responses to BM and correlated with strengthened functional connectivity linking cortical regions dedicated to visual BM processing and vestibular gravity estimation. By contrast, these effects did not extend to perceptual and neural responses to static faces, indicating they result particularly from the vestibular interaction with visual motion analysis. These findings suggest that physical gravity may act as an embodied constraint, presumably implemented through visuo-vestibular integration, to sustain the human brain's selective tuning to life motion signals. In addition, I will introduce our recent work that explores the possible role of gravity in shaping more general aspects of visual motion perception, especially coherent motion perception.

Sheng Li

Presentation time: Sep 20th 16:00~16:30

Brief Bio:

Dr. Sheng Li is an associate professor with tenure at the School of Psychological and Cognitive Sciences, Peking University. He received his B.Eng degree from Beijing University of Posts and Telecommunications, China, in 1998 and D.Phil degree from the University of Sussex, UK, in 2006. From 2006 to 2009, he was a postdoctoral research fellow at the School of Psychology, University of Birmingham, UK. His research focuses on the cognitive and neural mechanisms of visual perception, attention, learning, and memory.

Title: Beyond perception: Mnemonic mechanism in perceptual learning

Abstract: Perceptual processing in the human brain can be significantly improved through perceptual learning. Early studies of visual perceptual learning identified strong location specificity in the learning effect, indicating the plastic changes in early visual cortex following the learning. In recent years, perceptual learning investigators shifted their focuses from sensory and perceptual systems to higher cognitive functions. We combined psychophysics and brain imaging techniques and examined the mechanisms of perceptual learning related to short-term and long-term memory systems. Our results revealed profound contributions of these mnemonic process in perceptual learning.

Heinrich R. Liesefeld

Presentation time: Sep 20th 16:30~17:00

Brief Bio:

Senior Researcher for Applied Statistics and Cognitive Modeling at University of Bremen.

Heinrich Liesefeld received his Ph.D. degree in Psychology from Saarland University, Saarbrücken, Germany, in 2012, and his Habilitation (incl. teaching qualification) in Psychology from Ludwig-Maximilians-Universität München, Germany, in 2020. He works mainly on attention and working memory, with a special focus on salience and distraction, using various methods, including electroencephalography and computational modeling. His theorizing is based on the Dimension-Weighting Account, Guided Search, and Search-Mode Dichotomies. In addition, he contributes to methodological developments, such as EEG latency measures and handling of speed-accuracy-tradeoff confounds. Open science measures and a strong theoretical grounding of his research are of high importance to him.

Title: The attentional earlid: Visual search is surprisingly robust to auditory distraction

Abstract: People often complain about distraction by irrelevant sounds that reportedly hampers performance on concurrent visual tasks demanding the allocation of focused attention towards relevant stimuli, such as processing street signs during driving. To study this everyday issue experimentally, we devised a cross-modal distraction paradigm, inspired by a standard visual-distraction paradigm (*additional-singleton paradigm*) that is highly sensitive to measure interference on the allocation of attention. In a visual-search pop-out task, participants reported whether a salient target (a tilted bar) was present or absent, while a completely irrelevant, but salient auditory distractor accompanied some trials. To our surprise, the results revealed no notable distraction on visual-search performance (controlled for speed-accuracy tradeoffs) and this held true for various levels of task difficulty. Reliable auditory distraction failed to occur even when the distractor was a (highly salient) auditory oddball. However, when the auditory modality was made relevant globally while maintaining its irrelevance to the visual-search task, we finally observed the expected interference effect. Together, our results indicate that a highly effective attentional mechanisms exists for blocking auditory distraction. We call this mechanism "the attentional earlid".

Yang Hu

Presentation time: Sep 21st 9:00~9:30

Brief Bio:

Dr. Yang Hu is an Associate Professor at the *School of Psychology and Cognitive Science*, *East China Normal University* (*ECNU*). He obtained his bachelor's and master's degrees from *ECNU*. In 2017, he completed his Ph.D. at *Center for Economics and Neuroscience* (*CENs*), *University of Bonn* in Germany, and subsequently conducted postdoctoral research at *Centre national de la recherche scientifique* (*CNRS*) in France and *Peking University* in China. Dr. Hu's primary research interest is social and decision neuroscience. He employs behavioral economic games, computational modeling, and various cognitive neuroscience techniques, such as functional magnetic resonance imaging (fMRI), transcranial direct current stimulation (tDCS), and eye-tracking, to explore the cognitive and neural mechanisms underlying different forms of social and moral decision-making. His current research primarily focuses on topics corruption and third-party justice, as well as the factors modulating these processes. He has published papers as the (co-) first author or corresponding author, in highly influential journals such as *eLife*, *Psychological Science*, *Journal of Neuroscience*, *Social Psychological and Personality Science*, and *Social Cognitive and Affective Neuroscience*.

Title: Neurobiological Bases of Bribe-Taking Behavior and Its Individual Differences

Abstract: Corruption behavior generally refers to illegal (unethical) behaviors of individuals in power who abuse their authority for personal gains, leading to significant social and economic consequences. Here, I will introduce three recent studies of mine that combined cutting-edge neurocognitive methods and novel behavioral tasks to examine the cognitive and neural mechanisms of bribe-taking behavior, as an example of corruption, and its individual differences. Using functional magnetic resonance imaging (fMRI) along with cognitive computational modeling, Study 1 showed that participants, acting as power holders, considered two moral costs during the corrupt decision-making process: the violation of moral rules due to bribery and the loss incurred to the interests of third parties. At the neural level, the anterior insula and temporoparietal junction respectively encoded the moral costs brought by corrupt decision-making, which were then integrated in the ventromedial prefrontal cortex.

Yang Hu (Continued)

Presentation time: Sep 21st 9:00~9:30

The dorsolateral prefrontal cortex (dlPFC) was selectively engaged to guide anti-corrupt behaviors when a third party would be harmed. Leveraging transcranial direct current stimulation (tDCS), Study 2 showed that disrupting dlPFC through tDCS specifically made individuals in power more willing to accept offers in the bribery condition as the offer proportion increased. This neural modulation reduced moral costs associated with bribery-induced personal gains and reshaped the concern for the distribution inequity between oneself and the briber. Through two large-scale online experiments, Study 3 showed the guilt proneness, a crucial moral-related personality trait, curbs bribe-taking behaviors, especially when higher harm salience was involved. Furthermore, the concern for others' suffering was identified as an underlying psychological mechanism guiding this trait-behavior association. Taken together, these findings advance our understanding of the underlying mechanisms and individual variations in corrupt behaviors. In practice, they provide valuable scientific evidence to guide the development of effective anti-corruption policies for governments and corporations.

Jianping Huang

Presentation time: Sep 21st 9:30~10:00

Brief Bio:

Dr. Jianping Huang is currently an associate professor in the psychology department of Soochow University. He obtained his Ph. D. degree from the psychology department of Tsinghua University in 2020. His research interests lie primarily in the area of multisensory integration, crossmodal expectation and dietary decisions. His work has been published in international scholarly journals such as Journal of Business Research, Cognitive Affective & Behavioral Neuroscience, Computers in Human Behavior, Food Quality and Preference, etc.

Title: Multisensory cues nudge healthy eating behavior

Abstract: People receive information from multisensory models in their daily dietary lives, and integrate multisensory information to form the perception of dietary stimuli. By utilizing a combination of behavioral experiments, event-related potentials (ERPs), and computational modeling, we aimed to elucidate how external visual cues of products, ambient lighting cues, background music, and other multisensory cues influence individuals' decision-making processes related to healthy eating. The findings provided compelling evidence that the presentation of multisensory cues significantly contributes to individuals' healthy eating behavior.

Pei Liang

Presentation time: Sep 21st 10:00~10:30

Brief Bio:

Dr. Pei Liang is a professor of psychology department, Faculty of Education, Hubei University, China and leads Brain and Cognitive Research Centre (BCRC). She is Deputy Director of Brain Imaging Research Center (BIRC), Changshu No. 2 Hospital, China. She was Director of Sensory Cognition and Design Institute, Changshu Institute of Technology, China. She got second Level Prize in National Physics Competition during high school, in China in 1995. She has been selected as CIM Returning Expert from the German Federal Ministry of International Migration and Development in 2011, and was awarded Suzhou Excellence China in 2021. She is Fellow of the Royal Society of Arts (FRSA), and Member of American Psychology Association (APA).

She finished Clinical Medicine Bachelor (MBBS) at Huazhong University of Science and Techology, China in 2002 and further completed Diplom Biology at University of Bielefeld, Germany in 2006, gained PhD in Neuroscience at the University of Bielefeld in 2010. Prof Pei Liang had brief stints of association at India's premier institute IISER Kolkata where she spearheaded the activities of the international office leading to nucleation of several academic international collaborations between India, Sweden, Germany and China, before she returned to China with a tenured faculty position. Her research area includes perceptual cognitive processing, multi-sensory integration and neuro-aesthetics with eye tracking, EEG and fMRI to understand the brain mechanism of sensory perception.

Title: Vision-taste cross-modal interaction and the tentative underlying brain mechanism

Abstract: Visual inputs such as affective pictures may influence taste perception and emotion may mediate as a key role in the cross-modal interaction. Many behavior researches have demonstrated that the visual inputs could affect taste sensitivity or taste choice. However, the underlying cross-modal sensory information process in the brain is still unclear. A series of work about visual-gustatory interaction from behavior to electrophysiology and brain imaging has been carried out in our group. Our observations show the positive pictures are strongly associated with sweet taste and the negative pictures are more associated with sour and bitter taste. One modality input can enhance the other modality perception, if their affective components are consistent. In more details, the shapes, invoking mild positive affection, such as circle, may enhance the sweetness perception and the triangle with mild negative affection may increase the bitterness perception. Conversely, sour taste could in turn enhance disgust face recognition. ERP components analysis shows that the significant interaction between vision and taste was observed with P1 (120-180ms) and LPP (500-600ms).

Pei Liang (Continued)

Presentation time: Sep 21st 10:00~10:30

The response amplitudes of both P1 and LPP to emotionally consistent stimuli were larger than those of inconsistent stimuli. Whole-brain analysis of brain imaging data was used to discover cross-modal interactions between taste and vision. When processing disgust faces, compared with the sweet condition, sour condition included more activities in the right middle temporal gyrus, left postcentral gyrus, left putamen, left precuneus and left lingual gyrus. No significant differences were found between different taste sensations when processing pleasant faces. The potential brain mechanism of the related visual-gustatory interactions will be discussed.

Shuguang Kuai

Presentation time: Sep 21st 10:30~11:00

Brief Bio:

Prof. Kuai Shuguang is a professor at the School of Psychology and Cognitive Science, at East China Normal University. He obtained his bachelor's degree from the Department of Psychology at East China Normal University and his doctoral degree from the Chinese Academy of Sciences. After completing his PhD, he conducted postdoctoral research at the University of Birmingham in the United Kingdom and worked at Philips Research. In 2015, He joined the School of Psychology and Cognitive Science at East China Normal University, where he currently serves as the head of the Laboratory for Visual Spatial Cognition and Virtual Reality. His research encompasses the use of psychophysics, neuroimaging, and computational modelling to investigate human social interaction behaviours.

Title: Human Social Interaction Field Model and Its Application

Abstract: As social beings, social interactions with others are of great significance for the survival and development of humans. These interactions give rise to a distinct social spatial configuration. Classical theories conceptually define these social spaces surrounding humans. However, due to technological challenges, there has been a long-standing lack of quantification of human social space based on quantifiable experimental data and computational models. Our research utilizes the technological platform of virtual reality to control various environmental variables, precisely measure the size and shape of human social spaces, and establish quantitative mathematical models. Based on this model, we have developed navigation algorithms to compute human social spaces. Compared to traditional navigation algorithms, this algorithm enables robots to exhibit more human-like behaviour, resulting in a better user experience.

Yanchao Bi

Presentation time: Sep 21st 13:30~14:45

Brief Bio:
Yanchao Bi is a Changjiang professor in IDG/McGovern Institute for Brain Research and the State Key Laboratory of Cognitive Neuroscience and Learning, at Beijing Normal University. She received her PhD from the Department of Psychology, Harvard University in 2006. Her work focuses on the study of functional and neural architecture associated with object representation, semantic memory and language, using cognitive, neuropsychological, neuroimaging, and computational methods. She is the senior editor of Eife and Neurobiology of Language, and on the editorial boards of Cognition, Cognitive Neuropsychology. She has won various awards, scholarships or recognitions such as "The National Science Fund for Distinguished Young Scholars", "The National Science Fund for Excellent Young Scholars", and her research is funded by Ministry of Science and Technology and National Science Foundation of China.

Title: Knowledge representation in the human brain: A neural dual coding position

Abstract: Human brain stores tremendous amount of knowledge about this world, which is the foundation of understanding of multisensory information, language, and thought. What's the neural codes of such semantic memory representation? Is the knowledge we have about roses the integration of multisensory experiences associated with interaction with roses? What about knowledge that is not directly perceived by senses, such as "freedom" or "rationality"? I will present a set of studies from my lab that addresses this issue, including experiments on object knowledge neural representations in several populations (congenitally blind humans, color blind humans, and typically developed macaques), and on semantic neural representation in individuals with early language experience deprivation. The findings point to the existence of two different types of knowledge coding in different regions of the human brain – one conservative, based on (multi-) sensory experiences, and one based on a language-derived machinery that supports fully nonsensory information.

Li Hu

Presentation time: Sep 21st 14:45~15:15

Brief Bio:

Li Hu is a professor at the Institute of Psychology, Chinese Academy of Sciences. He received his Ph.D. degree from the University of Hong Kong in 2010, and he has been a principal investigator at the Institute of Psychology (CAS) since 2015. Professor Li Hu's research is focused on the cognitive neuroscience of pain, with a particular emphasis on understanding the psycho-physiological mechanisms of pain and analgesia. Over the past five years, his research has concentrated on exploring cognitive and neural mechanisms of pain information processing, developing objective pain measurements, and investigating the pathophysiology of chronic pain. Professor Li Hu has successfully led several research projects sponsored by the National Natural Science Foundation of China and the International Association for the Study of Pain (IASP). To date, he has published more than 100 papers in peer-reviewed journals, establishing himself as an expert in the field of pain research.

Title: Selective and Replicable Neural Indicators of Pain Discriminability

Abstract: Discovering objective neural indicators of pain discriminability has far-reaching theoretical and clinical implications. However, previous studies have largely overlooked assessing neural responses that could encode pain discriminability. Here, we directly tap into this topic and explore neural indicators of pain discriminability using neuroimaging techniques. We applied signal detection theory to five large datasets (three electroencephalography [EEG, Datasets 1~3, total N=366] and two functional magnetic resonance imaging [fMRI, Datasets 4~5, total N=399] datasets), in which Datasets 1 and 4 were used for exploration and others for validation. In each dataset, perceptual ratings and neural responses were collected when participants received transient stimuli of four sensory modalities (pain, touch, audition, and vision) and two intensities (high and low). We found that most EEG and fMRI brain responses evoked by noxious stimuli robustly encoded pain discriminability across individuals in exploration datasets. These observations were well replicated in validation datasets using different statistical strategies and sensitivity indices. The neural indicators were pain-selective since they could not track sensory discriminability in tactile, auditory, and visual modalities, even though perceptual ratings and sensory discriminability were well-matched between modalities. Overall, we provided compelling evidence that pain-evoked brain responses can serve as replicable and selective neural indicators of pain discriminability.

Lihui Wang

Presentation time: Sep 21st 15:15~15:45

Brief Bio:

Lihui Wang obtained her Ph.D. at the School of Psychological and Cognitive Sciences, Peking University in 2016. From 2016 to 2019, She did her post-doc research at the Otto-von-Guericke University Magdeburg, while holding a Land Sachsen-Anhalt (LSA) Fellowship at the Center for Behavioral Brain Sciences in Magdeburg. Since 2020, Dr. Wang is a Principle Investigator at the Institute of Psychology and Behavioral Science, Shanghai Jiao Tong University, and a research group leader at Shanghai Mental Health Center. From 2021 to 2023, She worked as a Qiusuo Fellow at the Shanghai Center for Brain Science and Brain-Inspired Intelligence Technology. The research group directed by Dr. Wang takes an enactive approach to understanding human cognition, focusing on the cognitive and neural mechanisms of perception and action selection. The research group develops theory-constrained cognitive models for mental disorders such as depression and addiction, and translates the models into cognitive tests and training programs to assist the clinical diagnosis and intervention. The current research is funded by the National Science Foundation of China (NSF), the German Research Foundation (DFG), and the Science and Technology Commission of Shanghai Municipality.

Title: Object-related eye-movement representations in high-level visual cortex

Abstract: During visual exploration, eye-movements are carried out to collect information from the object of interest. In a traditional view of brain function, visual objects are represented in the occipital temporal cortex (high-level visual cortex) whereas the concurrent eye-movement processes are implemented by oculomotor areas such as the frontal eye fields (FEF) and the superior parietal lobule (SPL). However, we found that high-level visual cortex areas contain information about the eye-movement sequences during object viewing. In a series of fMRI experiments, eye-movements were firstly recorded while observers were looking at faces or houses. These eye-movement tracks were then replayed in the form of a dot moving on a uniform background that observers had to follow with their gaze. The brain activity showed distinct patterns to face- and house-related gaze-tracks that could be discriminated with multivariate pattern analysis (MVPA), in the absence of any face or house images. While the discrimination in FEF and SPL was in favour of the rich spatio-temporal information that provided by long gaze-tracks of multiple fixations (e.g., 3000 ms), the discrimination in the fusiform face area (FFA) and the parahippocampal place area (PPA) was less constrained by such information, showing a sensitivity to self-generated gaze-tracks when the gaze-tracks were restricted to the initial 600 ms. In a further MEG experiment, the brain activity aligned with gaze-tracks showed that the gaze-related representations emerged 200 ms after the first fixation.

Lihui Wang (Continued)

Presentation time: Sep 21st 15:15~15:45

Time-resolved whole-brain source analysis showed that the gaze-related representations were localized in the ventral pathway, emerging from the early visual cortex to the high-level visual cortex as a function of time. These findings indicate that high-level visual cortex represents category-specific eye-movement patterns during object viewing.

Xiaoqing Gao

Presentation time: Sep 21st 16:00~16:30

Brief Bio:
Assistant professor, Center for Psychological Sciences, Zhejiang University

Dr. Gao received his PhD in Psychology from McMaster University (2010). He studies visual development since graduate school. His research approach includes visual psychophysics and functional neuroimaging. He works with a very rare group of congenital cataract patients to study the impact of early visual deprivation on visual development and takes a multisensory perspective to investigate the interplay between senses during typical and atypical development. He is an associate editor of the *British Journal of Psychology*.

Title: Neural Mechanisms Underlying Multimodal Person Familiarity

Abstract: To quickly and effortlessly recognize a familiar person is a fundamental skill for social interactions. Both face and voice are crucial sources we rely on to recognize people. Previous studies have mainly focused on unimodal familiarity representation. Here, we explored the neural correlates of unimodal and multimodal person familiarity perception with fMRI. We found: 1) face-selective areas exhibited strong and predominant unimodal response to familiar faces while voice-selective areas showed predominant unimodal response to familiar voices; 2) the superior temporal gyrus encoded both unimodal and multimodal representation of person familiarity; 3) the inferior frontal gyrus also responds to person familiarity regardless of sensory modality. The current results identified unimodal and multimodal areas for person familiarity perception in typical adults. It can serve as a baseline for comparison with people who experiences sensory deprivation (e.g., the blind) to study related cortical reorganization in person familiarity perception.

Li Zhaoping

Presentation time: Sep 21st 16:30~17:00 [Online]

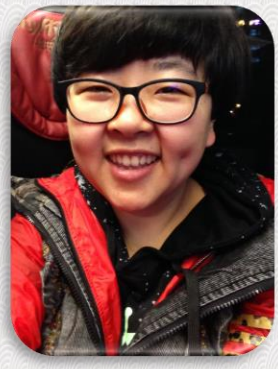
Brief Bio:
Li Zhaoping, professor in University of Tuebingen and a Max Planck Fellow in the Max Planck Institute for Biological Cybernetics. She proposed in late 1990s the V1 Saliency Hypothesis (V1SH) that the primary visual cortex in primates creates a saliency map to attract visual attention exogenously to salient locations, and authored a textbook "Understanding vision: theory, models, and data" by Oxford University Press 2014.

Title: Central-Peripheral dichotomy: multisensory orienting and recognition across animal species

Abstract: Attentional bottlenecks force animals to deeply process only a selected fraction of sensory inputs. This motivates a unifying central-peripheral dichotomy (CPD), which separates multisensory processing into functionally defined central and peripheral senses. Peripheral senses (e.g., human audition and peripheral vision) select a fraction of the sensory inputs by orienting animals' attention; central senses (e.g., human foveal vision) allow animals to recognize the selected inputs. Originally used to understand human vision, CPD can be applied to multisensory processes across species. I first describe key characteristics of central and peripheral senses, such as the degree of top-down feedback and density of sensory receptors, and then show CPD as a framework to link ecological, behavioral, neurophysiological, and anatomical data and produce falsifiable predictions.

Qi Chen

Presentation time: Sep 22nd 9:00~9:30



Brief Bio:
Professor Dr. Qi Chen, School of Psychology, South China Normal University

We adopt psychophysics, fMRI, EEG,and human ECoG to investigate cognitive and neural mechanisms underlying sensory dominance during multisensory selective attention.

Title: Simultaneous auditory input lowers temporal resolution of vision by modulating alpha-band oscillations

Abstract: It has been well documented that alpha oscillations gate the temporal window within which two successive visual inputs can be integrated. The shorter the integration temporal window, the higher temporal resolution of vision. Visual processing can be influenced by stimuli from other sensory modalities. It remains unclear, however, how such cross-modal stimulation impacts the temporal window of visual integration. Here, we conducted electroencephalography (EEG) recordings on 34 participants while they performed a double flash task. Two consecutive flashes were either accompanied by an auditory beep (the F2B1 condition) or not (the F2 condition), and the participants were required to report whether they perceived one or two flashes. Behaviorally, the visual integration time window was longer in the F2B1 than F2 condition, indicating lowered temporal resolution of vision induced by the auditory beep. Neurally, the auditory inputs resulted in a degradation of post-stimulus alpha frequency which was positively correlated with the increase in the integration time window. Further, we investigated how the pre-stimulus alpha oscillation predicted perceptual outcome. In the F2 condition, the pre-stimulus alpha frequency predicted subsequent percepts, which shows high consistency with previous evidence. In the F2B1 condition, however, it was the pre-stimulus alpha phase that successfully predicted perception outcome. Previous research demonstrates that auditory stimuli resets the phase of ongoing oscillations in the visual cortex, and thus influences simultaneous visual processing. Accordingly, we hypothesized that the degradation in visual alpha frequency in the F2B1 condition could result from the phase resetting induced by auditory stimuli.

Presentation time: Sep 22nd 9:00~9:30

To test this hypothesis, we developed a computational model based on the phase resetting hypothesis and the perceptual cycle theory, which successfully reproduced all the key behavioral and neural findings. Taken together, simultaneous auditory stimuli lower temporal resolution of vision by resetting the phase of alpha oscillations in the visual cortex, which consequently leads to a degradation in alpha frequency.

Yonghui Wang

Presentation time: Sep 22nd 9:30~10:00

Brief Bio:
Yonghui Wang, professor at the School of Psychology, Shaanxi Normal University, and doctoral supervisor in basic psychology. She is also the member of both the Professional Committee of General Psychology and Experimental Psychology, the Professional Committee of Neuropsychology, of the Chinese Psychological Society, and the Vice Director of Shaanxi Mental Health Association. In 2008, she was selected into the New Century Excellent Talents Support Plan of the Ministry of Education, and has been rated as Shaanxi Provincial Prestigious Teacher, got the award of Ming De Excellent Teacher, Bao Gang Excellent Teacher, etc. Her research interests include the development and neural mechanisms of attention, perception and cognitive control in normal and special groups. She has led and participated in multiple national and provincial research projects, and has published nearly 90 papers in Academic journals.

Title: The different effects of breaking an object at different time points

Abstract: Whether the Object-based Correspondence Effect caused by task-irrelevant handles of graspable objects is attributed to the spatial-based or motor-based accounts, or both, has been controversial thus far. In this study, we investigated this question from the time dynamic perspective with the modified stimulus-response (S-R) compatibility paradigm. Specifically, we used three different types of objects in three behavioral experiments: objects with a handle, symmetrical objects, and objects with unilateral protrusion. The objects were broken or remained intact at three different time points (i.e., 50 ms, 150 ms, and 250 ms). The results showed that the object with an intact handle had the correspondence effect at 150 ms, while the correspondence effect disappeared when the handle was broken (Experiment 1). However, no similar pattern was found for symmetric objects (Experiment 2) and objects with unilateral protrusion (Experiment 3). Meanwhile, similar compatibility effects were found in all three experiments when the breakage occurred at 50 ms, which suggests that spatial-based, attention-related factors play a key role in early visual information representation. Our findings suggest that both early spatial-based and later motor-based mechanisms are necessary for the object-based correspondence effect, corroborating the development of visual information representation over time.

Wenfeng Feng

Presentation time: Sep 22nd 10:00~10:30

Brief Bio:

Dr. Wenfeng Feng is currently a distinguished professor at the Department of Psychology, Soochow University, China. He obtained his PhD at Southwest University, China, and did postdoctoral research in Steven Hillyard's ERP Lab, University of California, San Diego. In recent years, Dr. Feng investigates a wide range of topics from a cognitive neuroscience perspective. Using behavioral, eye-movement, and EEG/ERP techniques, his interests are directed along several main lines of research: (1) Attention effects on sensory and perceptual processing; (2) The neural mechanisms of multisensory interactions; (3) The interactive relationship between attention and multisensory integration; and (4) Attentional biases among individuals with body dissatisfaction. His recent work has been published in several high-impact journals, such as *Journal of Neuroscience*, *Cerebral Cortex*, *NeuroImage*, *Human Brain Mapping*, etc.

Title: Neural mechanisms underlying the cross-modal effects of sound on visual perception

Abstract: It is well established that what we hear can influence what we see. However, the neural mechanisms responsible for how auditory inputs affect our perception in the visual modality are only beginning to be understood. Using EEG/ERP techniques, we have previously shown that a peripheral, task-irrelevant sound can activate contralateral visual cortex automatically as revealed by the auditory-evoked contralateral occipital positivity (ACOP) and desynchronization of the occipital alpha rhythm, which underlie the cross-modal cueing effect of sound on visual discrimination. Recently, we further showed that a short-latency (~200 ms after sound onset) cross-sensory neural activities over the occipital scalp is responsible for the effect of sound on stream/bounce bistable visual motion perception. More recently, we found that this relatively early occipital cross-sensory neural activity can even account for not only the nonspecific-sound-induced facilitation of visual target discrimination during the attentional blink *per se* but also the additional benefit of semantic congruence carried by a meaningful sound. Collectively, these findings suggest that the elicitation of the cross-sensory neural activity over visual cortex may well be one of the general neural mechanisms underlying a wide variety of low- and higher-level cross-modal effects of sound on visual perception.

Yong Gu

Presentation time: Sep 22nd 10:30~11:00

Brief Bio:
2011- Now: Investigator, Institute of Neuroscience, Chinese Academia of Sciences, China
2002-2011: Post-doc, Washington University School of Medicine, St. Louis, U.S.A.
1997-2002: Ph.D. Institute of Biophysics, Chinese Academy of Sciences, China
1993-1997: B.S. Department of Biology, Xiamen University, China

Research interests: Neural mechanisms underlying multisensory spatial perception.
Email: guyong@ion.ac.cn

Title: Visual and Vestibular Integration for Self-motion Perception

Abstract: Precise self-motion perception requires integration of visual and vestibular cues, yet how different cues are integrated in the brain remains unclear. To study where and how visual and vestibular signals in the brain contribute to multisensory self-motion perception, we combine psychophysics, neural recording and manipulations on behaving macaques when the subjects perform a heading direction discrimination task. Our data suggest that decision-related neurons in sensory-motor association areas, including posterior parietal area, frontal area, caudate nucleus process and accumulate vestibular acceleration and visual speed information. Since vestibular signals have been shown to contain plentiful temporal dynamics in the brain, e.g., jerk, acceleration and velocity, our findings imply that different vestibular temporal component may be used for different functions.

Stefan Glasauer

Presentation time: Sep 22nd 13:30~14:45

Brief Bio:
Professor for Computational Neuroscience at the Institute of Medical Technology, Brandenburg University of Technology Cottbus-Senftenberg, Germany. He received his Ph.D. degree at Technical University Munich and his habilitation at Ludwig-Maximilians-University Munich. His research focuses on principles and computations underlying sensorimotor function and perception by combining experimental approaches from psychophysics to brain imaging and neural recordings with theory and computational neuroscience..

Title: On optimality in perception and action

Abstract: Multiple approaches to understanding perception and action over the last few decades, such as the Bayesian framework or optimal feedback control, have emphasized the notion of optimality. Consequently, many researchers have also questioned this notion for various reasons. Here I will present examples from perception and action, either as thought experiments or as actual experimental results, together with computational modeling to demonstrate which factors might lead to apparent suboptimality, and reasons for why we find true suboptimality in our experiments.

Baolin Li

Presentation time: Sep 22nd 14:45~15:15

Brief Bio:
Dr. Li is an associate professor at School of Psychology, Shaanxi Normal University. He is a Member of the Time Psychology Professional Committee, Chinese Psychological Society. He received his doctoral degree from Southwest University in 2017 and worked as a postdoctoral researcher at Peking University from 2017 to 2019. His research focuses on understanding how the human brain represents and processes the time information in different sensory modalities by investigating the plasticity of time perception with psychophysics, computational modeling, electrophysiology, and brain imaging. Dr. Li's research has been published in journals including *Neuroimage*, *BMC Biology*, *Psychonomic Bulletin & Review*, and *Acta Psychologica Sinica*.

Title: Modality-specific sensory and decisional carryover effects in duration perception

Abstract: The brain uses recent history when forming perceptual decisions. This results in carryover effects in perception. Although separate sensory and decisional carryover effects have been shown in many perceptual tasks, their existence and nature in temporal processing are unclear. Here, we investigated whether and how previous stimuli and previous choices affect subsequent duration perception, in vision and audition. In a series of three experiments, participants were asked to classify visual or auditory stimuli into "shorter" or "longer" duration categories. In experiment 1, visual and auditory stimuli were presented in separate blocks. Results showed that current duration estimates were repelled away from the previous trial's stimulus duration, but attracted towards the previous choice, in both vision and audition. In experiment 2, visual and auditory stimuli were pseudorandomly presented in one block. We found that sensory and decisional carryover effects occurred only when previous and current stimuli were from the same modality. Experiment 3 further investigated the stimulus dependence of carryover effects within each modality. In this experiment, visual stimuli with different shape topologies (or auditory stimuli with different audio frequencies) were pseudorandomly presented in one visual (or auditory) block. Results demonstrated sensory carryover (within each modality) despite task-irrelevant differences in visual shape topology or audio frequency.

Baolin Li (Continued)

Presentation time: Sep 22nd 14:45~15:15

By contrast, decisional carryover was reduced (but still present) across different visual topologies and completely absent across different audio frequencies. These results suggest that serial dependence in duration perception is modality-specific. Moreover, repulsive sensory carryover effects generalize within each modality, whereas attractive decisional carryover effects are contingent on contextual details.

Xiaoang Wan

Presentation time: Sep 22nd 15:15~15:45

Brief Bio:

Prof. Wan is a professor of psychology at the Department of Psychology of Tsinghua University, Beijing, China. She has been conducting research on consumers' food-related behaviors using a combination of virtual reality technique and cognitive neuroscience methods, which has direct implications in sensory marketing, neuromarketing, and AI marketing. Prof. Wan's research is well funded by the National Natural Science Foundation of China, and she has published one book and more than 70 peer-reviewed articles in prestigious journals in the fields of psychology, business, and behavioral science, such as Computers in Human Behavior, Applied Psychology: Health & Wellbeing, Journal of Business Research, International Journal of Hospitality Management, Appetite, Food Quality & Preference and so on.

Title: Influence of crossmodal expectation on consumer experience and preference: A sensory marketing and consumer neuroscience study

Abstract: This talk will present a series of studies funded by National Natural Science Foundation of China and designed to examine the influence of crossmodal expectations on consumers' perception, evaluations, and choices of food and drink products. In Study 1, we examined how color expectations generated based on real flavors might influence consumers' preference for products and brands, and demonstrated the asymmetry of such crossmodal influence using the self-prioritization paradigm. In Study 2, we examined how real flavor cues could bias consumers' attention towards flavor-associated colors in a series of ERP and eye-tracking experiments, revealing the underlying mechanisms of such crossmodal influence. In Study 3, we conducted a series of ERP and VR experiments to examine the influence of multisensory imagery on consumer behavior, and demonstrated the applications of crossmodal expectations in the introduction of new products and the practice of multisensory nudging. Collectively, these findings revealed the influence of crossmodal expectations on consumer behavior, which has direct implications in sensory marketing and neuromarketing.

Ping Wei

Presentation time: Sep 22nd 16:00~16:30

Brief Bio:
Prof. Wei received her Ph.D. from Peking University in 2009, and she is now a professor at School of Psychology of Capital Normal University. She uses behavioral, electrophysiological, and neuroimaging methods to investigate the neural mechanisms of visual search and selective attention, and the interaction between reward and cognitive control. She has published her studies in NeuroImage, Human Brain Mapping, Journal of Cognitive Neuroscience, Social Cognitive and Affective Neuroscience, Neuroscience and Biobehavioral Reviews etc. She has received grants from the National Natural Science Foundation of China and she is one of the first elected Youth Beijing Scholars supported by Beijing Government.

Title: Expectations of immediate and delayed reward differentially affect cognitive task performance

Abstract: Although many studies have identified the neurocomputational mechanism of temporal discounting, in that people prefer to choose small-sooner rewards over larger-later rewards, much remains unknown about how the brain represents and computes delayed rewards beyond decision-making. We used behavioral, electrophysiological, and neuroimaging methods to compare the differential processing of incentives for immediate and delayed reward expectations, as well as how the representation of incentives formulated through temporal discounting transformed into actions in obtaining such a reward. Our results consistently revealed decreased incentive effect for delayed reward expectation as compared to immediate reward expectation. Electrophysiological P3 and CNV components in the reward expectation phase affected behavioral responses through target-related activities, and the ventral striatum is the key area in representing a delayed reward expectation based on the personal discounting tendency and in interacting with cognitive control areas to engage in required tasks.

Zhuanghua Shi

Presentation time: Sep 22nd 16:30~17:00

Brief Bio:
Professor at the Department of Psychology, LMU Munich, Germany, an associated faculty member of the Graduate School of Systemic Neurosciences (GSN-LMU), and a coordinator of Neuroimaging Core Unit Munich (NICUM). He received his Ph.D. degree at Zhejiang University. His research focuses on perception and action, multisensory processing, and perceptual learning.

Title: Understanding Time: Contextual Modulation, Logarithmic Encoding, and Their Neural Correlates

Abstract: Time estimation, notably precise under typical conditions, is subject to various contextual factors and our senses. This talk synthesizes insights from three studies that delve into how temporal ensemble statistics influence our temporal decisions, duration estimations, and their interaction with neural mechanisms. First, I introduce a study on how statistical characteristics of stimulus sets - spacing, frequency, and variance - impact performance in temporal bisection tasks and propose a unified Ensemble-Distribution Account (EDA) to explain these influences. Next, I present empirical evidence supporting the idea that the mean of ensemble distribution aligns more closely with logarithmic, rather than linear, encoding - a shift that carries theoretical implications for our understanding of encoding time. The final segment of the talk brings to light electrophysiological findings that substantiate these theories, highlighting that EEG components like the Contingent Negative Variation (CNV) and Late Positive Component of Timing (LPCt) are sensitive to contextual modulations. These findings offer a holistic view of how we perceive and decide on time matters, underpinned by cognitive and neural evidence.

Organizing Committee

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	Pujun Yuan	18108629605	NBypj02468
Finance	Huanke Zeng	18811577269	yuding1384
	Xiaoyuan Hou	15243669965	15243669965

Posters

Title: The neural mechanisms underlying cross-modal sequence prediction

Name: Liang Shi, Gui Xue
Affiliation: State Key Laboratory of Cognitive Neuroscience and Learning & IDG/McGovern Institute for Brain Research, Beijing Normal University, Beijing 100875, PR China

Abstract: Predicting the future accurately in a dynamic and multi-modal environment is an important function of the brain. However, less is known about how the brain achieve it. Here, we used an audiovisual sequence memory task and magnetoencephalography (MEG) to examine the neural mechanisms underlying cross-modal sequence prediction. Our results revealed multiplexed oscillatory codes underlie cross-modal sequence prediction. Specifically, after learned the sequences, late processing stages (1.2~2s) of predicting words were found to show predictive activation of early (0~0.75s) neural representations of the predicted words. This predictive activation strength of unimodal prediction was higher than that of cross-modal prediction. In addition, we found a significant phase-amplitude coupling of theta (2~6Hz) and low gamma (40~50Hz) during sequence prediction, and the strength of theta-gamma coupling increases along the sequence position, following the predictive coding model. Moreover, this theta-gamma coupling will exhibit position-based phase consistency (items at the same position between different sequences will lock to similar phases) and phase separability (items at different positions within the same sequence will lock to different phases). The phase separability between cross-modal pairs was significantly stronger than that of unimodal items. Together, these findings advanced our understanding of the neural oscillatory mechanisms underlying cross-modal sequence prediction.

Title: Tailoring sweetness sensitivity cued by affective pictures

Name: Ying Wen, Huajing Yang, Zhile Kang, Liuqing Wei, Simin Zhao, Pei Liang*
Affiliation: Department of Psychology, Faculty of Education, Hubei University, Wuhan, China

Abstract: In our previous study, we found that individuals tend to associate affective pictures with certain taste words. However, the extent to which such associations influence real taste perception remains unclear. The current study aims to assess the role of affective visual stimuli in cross-modal modulation of sweet taste sensitivity. We utilized the same set of affective pictures from our previous study and categorized them into nine sub-groups based on different valence and arousal levels. Twenty volunteers (7 males and 13 females, average age 21.0±0.7 years) were recruited to participate in the experiment. They were asked to taste various sucrose solutions after viewing each affective picture. Results showed that sweetness sensitivity can be modified by different valence and arousal levels of the affective pictures. Specifically, sweetness sensitivity increases as the valence level changes from negative to positive. The highest sweet sensitivity was observed for positive pictures with high valence and strong arousal. On the other hand, as the arousal levels of negative pictures increased, sweetness sensitivity gradually decreased. Moreover, this visual-gustatory cross-modal integration was most significant around the sweetness threshold level. Overall, this study extends our understanding of the cross-modal interaction between vision and taste in a systematically tailored pattern. Specifically, affective visual stimuli have been shown to influence sweet taste sensitivity, with both valence and arousal levels playing important roles. Such findings provide new insights into the complex interplay between sensory modalities and emotional states in shaping our perception of taste.

Title: Contribution of Macaque Caudate Nucleus to Multisensory Decision-making

Name: Zeng Zhao[1,2], Yong Gu[1,2*]
Affiliation:
[1] CAS Center for Excellence in Brain Science and Intelligence Technology, Institute of Neuroscience, Chinese Academy of Sciences, 200031 Shanghai, China.
[2] University of Chinese Academy of Sciences, 100049 Beijing, China.
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Abstract: In our daily life, we frequently make instantaneous decisions based on noisy information originating from different sensory modalities. Although many studies have shown that multimodal cues could be integrated to enhance perception, the underlying neural mechanisms remain unclear. Here we trained macaques to utilize visual and vestibular evidence to perform a heading-discrimination task, while we simultaneously recorded neuronal activity in caudate nucleus (CN). We found that the population activity of CN neurons represented upcoming choice of monkeys but not the sensory heading information. In addition, CN responses reflected unmatched temporal dynamics, that is, vestibular acceleration and visual velocity, which is consistent with that in the posterior parietal and frontal cortex. Causal contributions of CN were also explored by using electrical microstimulation experiment. We found that microstimulation in unilateral CN significantly biased the monkeys' choice, suggesting that CN plays a critical role in multisensory heading perception.

Keywords: caudate; causality; multisensory decision-making

Title: Gamma oscillations of antagonistic brain networks modulated multisensory processing

Name: Li Song[1,2], Biao Han[1,2], Qi Chen[1,2]
Affiliation:
[1]Center for Studies of Psychological Application, South China Normal University, Guangzhou 510631, China
[2]School of Psychology, South China Normal University, Guangzhou 510631, China

Abstract: When individuals are required to respond to simultaneous multisensory stimulus as simultaneously as possible, they still exhibit a sequential response to the multisensory targets. However, the underlying neural processes that determine the dominance of one modality in multisensory processing, as well as the neural mechanism facilitating sequential perception of multisensory information, have yet to be fully understood. In this study, we used human intracranial recordings to investigate the electrophysiological dynamics of multisensory processing in two antagonistic brain networks, the default mode network (DMN) and the frontoparietal network (FPN), during a simple visual and auditory detection task. Our results demonstrated that the pre-stimulus gamma (30-200 Hz) power in the DMN was significantly associated with the dominance of a particular modality in multisensory competition. Specifically, the visual dominance could be predicted by the higher pre-stimulus gamma power within the DMN, compared to the auditory dominance. The pre-stimulus gamma power in the DMN also significantly predicted the speed of the first response, irrespective of the visual or auditory dominance, i.e., the lower the pre-stimulus gamma power, the faster the first response. No such effect was observed for the subsequent second response. Moreover, the effect of DMN pre-stimulus gamma power on sensory dominance and the efficiency of the first response were orthogonal. For the FPN, however, the time to the maximum gamma power was positively correlated with the task performance not only for the first response but also for the second response, i.e., the earlier the time to maximum gamma power in the FPN, the faster the two responses. Taken together, our findings indicated that all these two antagonistic brain networks modulated multisensory processing, in which the DMN was involved in the multisensory competition, while the FPN was only related to the processing efficiency.

Keywords: multisensory competition; default mode network; frontoparietal network; sensory dominance; processing efficiency

Title: Hierarchical cortical entrainment reveals the audiovisual integration of rhythmic biological motion

Name: Shen Li
Affiliation: Institute of Psychology, Chinese Academy of Sciences

Abstract: The movements of living creatures, termed biological motion (BM), usually convey characteristic rhythmic patterns (e.g., walking) accompanied by corresponding sounds (e.g., footstep sounds). Our recent studies show that audiovisual correspondence in rhythmic BM signals facilitates visual search and neural entrainment to the hierarchical rhythmic kinematic structures in BM (e.g., basic-level step cycles and higher-level gait cycles for walking) is critically involved in the spatiotemporal summation of visual BM information, raising the question of whether and how cortical tracking of rhythmic signals underpins the audiovisual integration (AVI) of BM. In Experiment 1, using electroencephalogram (EEG), we found cortical entrainment to the audiovisually congruent walking stimuli and footstep sounds at both the gait-cycle (1 Hz) and step-cycle (2 Hz) frequencies. Importantly, the entrainment effect in the audiovisual conditions surpassed the unisensory sum (AV > A+V) at 1 Hz while showing an inverse pattern (AV < A+V) at 2 Hz, revealing a nonadditive integration of audiovisual BM signals with the neural tracking of different levels of kinematic structures playing distinct roles in this process. Experiment 2 adopted inverted BM as a control and found an AVI effect specific to BM signals, as reflected by enhanced neural entrainment in the audiovisually congruent condition relative to the incongruent condition, which was significantly stronger for upright BM than for inverted ones. Such BM-specific neural responses were only observed at 1Hz, and the sources for the AVI effect lay in the right posterior superior temporal sulcus and somatosensory cortex known to be engaged by BM processing, suggesting that the cortical tracking of higher-level kinematic structures selectively contributes to the AVI of BM signals. Collectively, these findings reveal the temporal neural encoding mechanism underlying the AVI of BM and shed light on the instrumental role of cortical entrainment in the multisensory processing of complex rhythmic stimuli.

Keywords: audiovisual integration; biological motion; cortical entrainment; cortical tracking; neural oscillations

Title: The neural dynamics of conflict adaptation within the prefrontal cortex

Name: Ke Wang[1,2], Biao Han[1,2], Qi Chen[1,2]

Affiliation:

[1] Center for Studies of Psychological Application, South China Normal University, Guangzhou 510631, China

[2] School of Psychology, South China Normal University, Guangzhou 510631, China

Abstract: The behavioral effects of conflict are not just limited to the current trial, they also affect performance in the subsequent trial. This impact manifests as behavioral improvement when individuals are faced with conflict again, which is referred to as the conflict adaptation effect (CA). It has been suggested that CA is caused by the exertion of flexible cognitive control, supported by many behavioral and neuroimaging studies. However, it remains unclear how information about conflict experienced in the preceding trial is maintained and conveyed to subsequent trials, leading to adaptation. Previous research conducted on monkeys reported that information about conflict experienced in the previous trials is encoded and conveyed in the activity of single neurons in the dorsolateral prefrontal cortex (DLPFC), and that DLPFC lesions impaired the conflict-induced behavioral modulation on the next trial. Similar findings, however, have not been found in human subjects thus far. In the present study, we investigated the oscillatory patterns within the DLPFC in human epilepsy patients with intracranial EEG electrodes during an audiovisual Stroop experiment. Data from the DLPFC were obtained from 36 patients. Our behavioral results replicated the previous studies in terms of the response latencies in incongruent trials are immediately preceded by another incongruent trial (II condition) are shorter than those in incongruent trials that are immediately preceded by a conflict trial (CI condition). Importantly, we found that the pre-stimulus theta band power represents the level of conflict experienced in the previous trial. Specifically, the pre-stimulus theta power is lower when the previous trial is incongruent than when it is congruent.

Keywords: conflict adaptation; dorsolateral prefrontal cortex; theta pre-stimulus

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Title: Auditory stimuli extend the temporal window of visual integration by modulating alpha-band oscillations

Name: Mengting Xu, Biao Han, Qi Chen, Lu Shen
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Abstract: The integration of inputs is critically dependent on the temporal proximity of stimuli. Substantial evidence supports the notion that alpha oscillations serve as the temporal window within which two successive inputs can be integrated in visual processing. Although it is established that visual processing can be influenced by stimuli from different modalities, the impact of such cross-modal stimulation on the temporal window of visual integration remains unclear. In the present study, we conducted electroencephalography (EEG) recordings on 34 participants while they performed a double flash task. They were presented with two consecutive flashes, either accompanied by an auditory beep (F2B1 condition) or without (F2 condition), and were required to report their perception of one or two flashes. Behaviorally, we observed that the integration threshold for perceiving two consecutive flashes was longer in the F2B1 condition compared to the F2 condition, indicating a prolonged temporal unit of visual perception. Neurally, the presentation of auditory stimuli resulted in a degradation of post-stimulus alpha frequency, and this degradation was positively correlated with the increase in the integration threshold. Additionally, we investigated the relationship between the pre-stimulus alpha oscillation and perceptual outcome. In the F2 condition, the pre-stimulus alpha frequency consistently predicted subsequent percepts, while in the F2B1 condition, it was the pre-stimulus alpha phase that successfully predicted perception outcome. Previous research has demonstrated that auditory stimuli can reset the phase of ongoing oscillations in the visual cortex, thereby influencing simultaneous visual processing. Building on this, we proposed a hypothesis that the observed degradation in alpha frequency in our study resulted from the phase resetting induced by auditory stimuli. To test this hypothesis, we developed a computational model based on the phase resetting hypothesis and the perceptual cycle theory, which successfully reproduced all key behavioral and neural findings. These results suggest that auditory stimuli extend the temporal window of visual integration by resetting the phase of alpha oscillations in the visual cortex, consequently leading to a degradation in alpha frequency.

Keywords: multisensory integrated processing; fusion illusion; alpha neural oscillations

Title: Biological motion affects multisensory integration

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Abstract: The mechanisms underlying the effects of different spatial attention on multisensory integration are distinct. The present study investigated the effect of biological motion cue validity on multisensory integration by using a modified central cueing paradigm in two experiments. The present study had a 2 (cue validity: valid cue vs. invalid cue) × 3 (target type: visual vs. auditory vs. audiovisual) within-subject design. A biological motion stimulus (walking direction to the left or right) was briefly presented in the center of the screen followed by a target stimulus (visual, auditory, and audiovisual). The location of the target would be consistent or inconsistent with the walking direction of the biological motion stimulus. There were 50% consistent trials in Experiment 1, and 80% consistent trials in Experiment 2. Participants were asked to decide the location of the target. The results showed greater audiovisual integration effect for the consistent trials than for the inconsistent trials in Experiment 2, but no significant difference in Experiment 1. These results suggest that social attention elicited by biological motion cues facilitated multisensory integration when the biological motion cues would highly predict the target.

Keywords: biological motion; multisensory integration; cue validity; social attention

Title: Simple shape feature computation across modalities: Convergence and divergence between the ventral and dorsal visual streams

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Abstract: Shape processing, whether by seeing or touching, is pivotal to object recognition and manipulation. While the low-level visual and haptic signals are initially processed by different modality-specific neural circuits, multimodal responses to object shapes have been reported along both ventral and dorsal visual pathways. To understand this transitional process, we conducted visual and haptic shape perception fMRI experiments to test basic shape features (i.e., curvature and rectilinear) across the visual pathway. Combining univariate activation analysis and support vector machine (SVM) decoding analysis, we found that bilateral occipital cortices (OC) in the ventral visual pathway are involved in the processing of visual shape features, whereas the bilateral posterior parietal cortex (PPC) in the dorsal visual pathway as well as the bilateral middle frontal gyri (MFG) and the bilateral supplementary motor area (SMA) are involved in the processing of haptic shape features. Using a voxel selection method, we found that the top visual-discriminative voxels in left OC could also classify haptic shape features, and the top haptic-discriminative voxels in left PPC could also classify visual shape features, indicating the multimodal representation of shape features in these two regions. Additionally, these voxels could decode shape features in a cross-modal manner, suggesting shared neural computation across visual and haptic modalities. In the univariate analysis, the top haptic-discriminative voxels in left PPC only showed rectilinear feature preference in the haptic modality, whereas the top visual-discriminative voxels in left OC showed no significant shape feature preference in either of the two modalities. Together, these results suggest that mid-level shape features are represented in a modality-independent manner in both the ventral and dorsal streams.

Title: Cross-modal meters shape sequential motor learning

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Abstract: The current study consisted of two experiments to investigate how meters from different sensory modalities shape sequential motor learning by the serial reaction time task (SRTT). Each experiment had 5 phases: pre-test, training, post-test1, random sequence test, and post-test2. The modality of meters was manipulated in the training phase. Participants completed the audiovisual meter, auditory meter, visual meter, and control training for four motor sequences, respectively, on four consecutive days. In Experiment 1, the 2/4m was used in training. The sequence-specific learning effect was calculated by the difference between the RT in the random sequence test and the mean RT of post-tests. The results showed a lower sequence-specific learning effect in the audiovisual and auditory conditions than in the control condition, indicating that auditory beats may interfere with sequential motor learning. Considering the internal structure of the sequence was more like 4/4m, Experiment 2 adopted auditory 4/4m, 2/4 m, and control conditions to further investigate the effect of the auditory meter on motor sequence learning. Results showed that a lower sequence-specific learning effect in the 2/4m condition was significantly lower than that in the control condition and the 4/4m condition. Taken together, the results suggested that the auditory beat may hurt sequential motor learning when the auditory beat was not consistent with the structure of the motor sequence.

Keywords: sequential motor learning; meter; cross-modal; sequence-specific learning effect

Title: Implicit contextual learning and its association with stability of sustained attention: a frequency-dependent study based on FFT

Name: Hongyu Yang, Xuelian Zang

Abstract: Chun and Jiang (1998) discovered contextual cueing, where participants searched for a target among repeated and non-repeated items. Prior studies suggest a close connection between attention and contextual cueing: On the one hand, contextual cueing arises from learning repeated contextual memory, guiding attention towards the target location. On the other hand, some studies suggest only attended context is learned and contributes to contextual cueing.

Despite the close link between attention and contextual cueing, the impact of sustained attention on contextual cueing remains uncertain. This is significant as the standard contextual cueing paradigm often entails participants searching for a target for over 30 minutes, highlighting the importance of sustaining attention. Our goal in the current study is to investigate how sustained attention stability interacts with contextual learning through two experiments. By presenting repeated and non-repeated displays separately in consecutive sessions, we employed Fast Fourier Transform analysis (FFT) to convert Reaction Time (RT) into the frequency domain, extracting measures of sustained attention stability.

Experiment 1 featured the successive session during the initial learning phase, allowing us to assess individual sustained attention during early learning. The later test session employed the standard contextual cueing search paradigm. On the other hand,

Experiment 2 had a reversed order of the successive and the standard phase to investigate sustained attention after the contextual cueing effect had been firmly established. The results demonstrated a significant improvement in both reaction time (RT) and standard deviation of RT when searching for repeated displays compared to non-repeated displays, indicating a clear contextual cueing facilitation. Moreover, our analysis in the frequency domain revealed a notable decrease in fluctuations below 0.2Hz (>5 s/cycle) during the successive session in both experiments. This finding suggests that learning repeated spatial contexts enhances participants' sustained attention stability. To summarize, our findings indicate that individuals exhibited enhanced stability in sustained attention, being faster and more consistent while searching for repeated displays.

Title: Specified Functions of the First Two Fixations in Face Recognition

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Abstract: While it is well known that the first two fixations are crucial and can even be sufficient for face recognition, the specific functions of the individual fixations remain unclear. Here we investigated the distinct roles of the first two fixations (Fix I and Fix II) in two face recognition tasks (identity and emotion recognition), and their contributions to behavioral recognition performance. We recorded eye-movement data from 28 participants during both tasks. Our findings revealed that Fix I had a global distribution on the face, whereas Fix II had a more local distribution on key facial regions. Fix I was more involved in extracting global facial information, correlating more with shared facial features. In contrast, Fix II correlated more with differentiating facial features, indicating its role in extracting local features. These observations were consistent across both identity and emotion recognition tasks. Further K-means clustering method was employed to show the graphical features related to the fixation distribution. Fix I cluster centers were located along the line from the middle of the eyebrows to the nose tip, whereas Fix II cluster centers were located in critical local regions such as the eyes, nostrils, and lips. Lastly, we examined the relationship between fixation patterns and behavioral recognition performance. Fix II distribution patterns significantly differentiated correct versus incorrect recognition performances, whereas Fix I showed no such differentiation. In conclusion, our findings not only elucidated the specific functions of the first two fixations in face recognition, but also suggested a general-to-specific mechanism of face processing implemented by the fixation sequence.

Keywords: face perception; eye movement; identity; emotion

Title: Active Action Selection in Reward-modulated Visual Perception

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Abstract: Under the traditional framework of serial information processing, the perceptual attribute of a stimulus is first recognized and then transformed into a motor response based on task-defined stimulus-response mapping. From this perspective, the reward-enhanced perceptual performance is mainly due to the sharpened perceptual representation whereas the motor output is a readout of the perceptual processing. On the contrary, here we show that the motor system was actively engaged by reward prior to the perceptual discrimination of the stimulus, and dominated over the perceptual processing in the task performance. In an electroencephalography (EEG) experiment, a visual cue was presented to indicate whether the correct and quick response of the current trial would lead to reward or no-reward. After a varying interval, a pentagon was presented and participants were asked to discriminate the head direction of the pentagon with the left and right hand respectively. Behavioral results showed that the reaction times (RTs) were significantly facilitated by reward. During the cue-target interval, both motor and visual activities were modulated by reward, suggesting enhanced visual and motor preparation during reward expectation. Importantly, reward increased the activity over both the ipsilateral (8-142 ms) and the contralateral (46-146 ms) motor cortex to the response hand immediately after the target onset, suggesting an early motor activation at both hands. This pattern persisted in a later time range (ipsilateral: 162-244 ms, contralateral: 164-248 ms). By contrast over the visual cortex, the reward-modulated activities were observed only in a later time range (ipsilateral: 140-200 ms, contralateral: 138-196 ms). Further multivariate decoding analysis showed that only the decoding performance based on the motor activity, but not the visual activity, was improved by reward. Moreover, the motor-based decoding performance could predict the reward-facilitated RTs. Our results suggested a more active and dominant role of the motor system in visual perception.

Keywords: electroencephalography; reward; motor cortex; action selection

Title: Dissociated amplitude and phase effects of alpha oscillation in a nested structure of rhythm- and sequence-based temporal expectation

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Abstract: The human brain can utilize various information to form temporal expectation and optimize perceptual performance. Here we show dissociated amplitude and phase effects of pre-stimulus alpha oscillation in a nested structure of rhythm- and sequence-based expectation. A visual stream of rhythmic stimuli was presented in a fixed sequence such that their temporal positions could be predicted by either the low-frequency rhythm, the sequence, or the combination. The behavioral modelling indicated that rhythmic and sequence information additively led to increased accumulation of sensory evidence and alleviated threshold for the perceptual discrimination of the expected stimulus. The electroencephalographical (EEG) results showed that the alpha amplitude was modulated mainly by rhythmic information, with the amplitude fluctuating with the phase of the low-frequency rhythm (i.e., phase-amplitude coupling). The alpha phase, however, was affected by both rhythmic and sequence information. Importantly, rhythm-based expectation improved the perceptual performance by decreasing the alpha amplitude, whereas sequence-based expectation did not further decrease the amplitude on top of rhythm-based expectation. Moreover, rhythm-based and sequence-based expectation collaboratively improved the perceptual performance by biasing the alpha oscillation toward the optimal phase. Our findings suggested flexible coordination of multiscale brain oscillations in dealing with a complex environment.

Keywords: temporal expectation; neural entrainment; pre-stimulus oscillation; alpha amplitude; alpha phase

Title: Common Structure of Saccades and Microsaccades in Visual Perception

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Abstract: Eye movements are considered crucial in object recognition by carrying distinctive traces for exploring different visual categories. While saccades in a free-viewing context are agreed to be functional for visual object perception, it remains unknown if microsaccades have a similar function when fixation is controlled. Here we demonstrated that saccades and microsaccades share common structures in the viewing of faces and houses. Participants were instructed to observe face and house pictures in both free-viewing and fixation-controlled conditions. Multivariate pattern analyses showed that a classifier trained with the face- and house-related saccadic patterns could be generalized to the classification of the face- and house-related microsaccadic patterns, and vice versa. Importantly, individuals who showed more distinctive saccadic patterns between faces and houses also showed more distinctive microsaccadic patterns. Moreover, the representational similarity analysis showed that the structural similarity between saccades and microsaccades was reflected in the perceived object structure, more so for faces than for houses. In face perception, both saccades and microsaccades showed a landing preference for the eye region over the mouth region, and this preference showed a positive correlation between saccades and microsaccades among individuals. These findings suggested a common oculomotor program that can be used to explore the visual object and optimize the information sampling.

Keywords: eye movements; microsaccades; face perception; representational similarity

Title: Impact of Babyface Schema on Time Perception: Insights from neutral and crying facial expressions

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Abstract: Facial expressions in infants have been noted to create a spatial attention bias when compared to adult faces. Yet, there is limited understanding of how adults perceive time of infant facial expressions. To investigate this, we used both infant and adult facial expressions in a temporal bisection task. In Experiment 1, we compared duration judgments of neutral infant and adult faces. The results revealed that participants felt neutral infant faces last shorter than neutral adult faces, independent of participants' gender. Experiment 2 employed sad (crying) facial expressions. Here, the female participants felt that infants' display spanned a longer duration than the adults', whereas this distinction wasn't evident among the male participants. These findings highlight the influence of the babyface schema on time, nuanced by emotional context and gender-based individual variances. Our study extends the understanding of the babyface schema's influence on time perception. Neutral infant faces, owing to their ambiguity, led to a shortened perceived duration, while crying infant faces lengthened perceived duration for females, lending weight to the concept of embodied timing.

Keywords: duration perception; facial expression; infant, attention; embodiment

Title: Upsytools: A virtual reality tool for psychological research

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Abstract: Virtual Reality (VR) has emerged as a powerful and indispensable tool for psychological studies due to its immersive experience and repeatability. However, there still exists a notable barrier to the wider application of VR in psychology, as both engines require coding for experiment control and lack original design for experimental control and data collection. To address this challenge, we have developed a toolkit specifically designed for psychological research based on the Unreal Engine. Our toolkit offers a range of functionalities to facilitate research, including Factorial design and randomization, File input/output (IO), In-VR questionnaires, Integration with third-party input devices for interaction with the virtual environment, Remote testing capabilities and Compatibility with functional near-infrared spectroscopy. We have made the toolkit, along with a comprehensive manual and a demo project, publicly available. By providing these resources, we aim to lower the barrier to entry and foster wider adoption of VR in psychological research.

Keywords: virtual reality; unreal engine; toolkit

Title: Beauty of nature vs. bustle of city: Chinese folk music influences virtual food choices via mental imagery

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Abstract: Background music is an effective marketing tool to impact consumer behaviors, especially food choices. We conducted two experiments to examine the influence of music-induced mental imagery on food choices. Additionally, we utilized hierarchical drift-diffusion models to investigate the cognitive processes underlying food choices. In Experiment 1, young healthy participants were required to select three dishes out of a choice set while listening to the background music. Two types of Chinese folk music were chosen as music stimuli, one known to induce urban imagery and the other, nature imagery. And each choice set consisted of two meat and two vegetable dishes, from which participants could choose either a meat-heavy meal or a vegetable-forward meal. The results revealed that participants chose vegetable-forward meals more often while listening to the music inducing nature imagery compared to that inducing urban imagery, indicative of an effect of music on food choice. In Experiment 2, we attempted to examine the role of music-induced mental imagery on food choices by manipulating the extent of music-induced mental imagery. The participants whose music-induced mental imagery were enhanced still chose vegetable-forward meals more often while listening to the music inducing nature imagery compared to that inducing urban imagery. By contrast, the other two groups of participants whose mental imagery were suppressed did not show such an effect of background music on food choices. Collectively, these results confirmed the role of music-induced mental imagery in the process of food selection. These findings shed light on the cognitive processes through which background music influences food choices based on music-induced mental imagery, which has direct implications in the practice of nudging consumers toward healthier and more sustainable food choices.

Title: Tactile Suppression in Different Stages of Movements

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Abstract: Tactile suppression (gating) is a phenomenon where tactile sensations become less accurate and less sensitive during movements. Previous research found that tactile sensations are also gated before and after voluntary movements. However, little research has investigated the effects of tactile suppression during different phases of movements. Our study aims to examine whether/how different stages (the preparation, execution, and completion) of movements influence the magnitudes of tactile suppression. Our study employed the method of constant stimuli in both movement and rest conditions. In the movement condition, standard stimuli (tactile vibrations of fixed intensity) were presented at one of three stages of movements, while comparison stimuli (vibrations of various intensities) were consistently given after movements had completed. In the rest condition, both standard and comparison stimuli were presented to resting hands. Participants discriminated intensities of standard vs. comparison. We analyzed the differences in the Point of Subjective Equality (PSE) and Just Noticeable Difference (JND) between the movement and rest conditions at each of these stages. Preliminary findings indicate that PSE decreased the most when standard stimuli were presented in the execution stage and the least during the preparation stage, compared to those in the resting condition. Meanwhile, JND shows the greatest increase during the execution phase and the smallest increase during the preparation phase. These results suggest that tactile suppression is most pronounced during the execution phase and minimal during the preparation phase, indicating the effect sizes of tactile suppression may be subject to featured stages of movement. Subsequent analysis should control for potential influences of movement velocity on suppression effects. Moreover, future investigations should explore whether and how movements impact the confidences in discriminating target stimuli.

Keywords: tactile suppression; elbow movement; motor preparation; motor execution

Title: The Neural Mechanisms underlying Tactile Object Individuation

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Abstract: Object Individuation (OI) refers to the process by which individuals separate target objects from the background using spatial information. The cognitive neural mechanisms underlying tactile OI remain to be investigated. To address this, we conducted two experiments utilizing electroencephalogram (EEG) decoding techniques. In Experiment 1, participants should complete a tactile numeration task (reporting the number of tactile dots presented on their fingertip). To control for the task-irrelevant physical attributes of tactile stimuli (total area, perimeter, etc.) across different OI conditions, in Experiment 2, participants performed a target detection task upon the same stimuli but without OI engagement. Around 860 ms after stimulus onset, we found that participants' neural activity could decode different number conditions within the range of tactile OI (1~3). Event-related potential (ERP) results revealed that the amplitudes of two distinctive components, namely the late contralateral negativity around 1000 ms (referred to as N1000-central-contralateral, N1000cc) and the tactile contralateral-delay activity (tCDA), increased with an increment in the number of objects during the OI process, peaking around 3 and stabilizing thereafter. Furthermore, time-frequency analysis showed stronger alpha oscillations within the tactile OI range compared to larger quantities (4~6). However, none of these effects were observed in Experiment 2, in which no OI process was involved. In summary, our study elucidated the precise temporal dynamics of tactile OI, unveiling neural markers (N1000cc and tCDA) underlying the limited capacity of tactile OI. The alpha oscillations elicited in frontal and central regions during tactile OI indicated a successful separation (as well as focused attention) of target objects from the background distractors.

Keywords: tactile object individuation; decoding; N1000cc; tCDA; alpha oscillations

Title: Visual memory load changes the time perception in encoding and reproduction process - a modeling research

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Abstract: Duration estimates are influenced by the sample context, resulting in the classic central-tendency effect: overestimation of short durations and underestimation of long ones. Much of the research on this central-tendency effect has focused on how sensory measurements are integrated with prior information but overlooking potential limitations of cognitive load. In this study, we delved into how the estimation of (visual) durations is affected by the cognitive load exerted from a concurrent visual working-memory task when this load is implemented on the duration-encoding phase, the duration-reproduction phase, or both. In four experiments, participants were tasked with estimating durations under dual-task conditions, where attention was shared between reproducing a visual duration (the primary task) and memorizing a variable array of color patches (the secondary task). Our findings revealed that increasing the memory load (i.e., the size of the memory array) during the duration-encoding phase amplified the central-tendency bias and make under reproducing durations as opposed to the duration-reproduction
phase. Moreover, this bias was more pronounced when the memory load was imposed solely during the encoding phase rather than during both phases. Prolonging the duration holding interval further augmented the central-tendency effect. To explain these observations, we developed a hierarchical Bayesian model incorporating attention sharing. This model posits that increased memory load on the encoding stage raise sensory noise, enhancing the central-tendency effect and leading to an underestimation of the target duration. At the same time, lapses in temporal monitoring during the reproduction stage contribute to a general overestimation of duration. The model's predictions closely match the behavioral findings.

Keywords: time perception; dual-task performance; attention-sharing; cognitive/memory load; bayesian integration; central-tendency effect

Title: Compensating disturbed audiovisual integration through top-down control on binding tendency: crossmodal correspondence as extra clues

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Abstract: Previous research has revealed that crossmodal correspondence could modulate audiovisual integration. The unity assumption attributed the modulation effect to the change of the feeling that stimuli from different modalities belonged to the same event, i.e., the binding tendency. Here, we explored the Bouba-Kiki effect on spatial audiovisual integration and the potential role of visual imagery residing it. Along with the Bayesian Causal Inference model, our results provided direct evidence supporting the unity assumption that the crossmodal correspondence would alter the binding tendency of audiovisual integration. Importantly, contrary to previous studies, we found the modulation of crossmodal correspondence only showed up when we disturbed the rIPS area, which was responsible for audiovisual fusion and crossmodal correspondence. To be specific, crossmodal correspondence had no impact on audiovisual integration when TMS was applied on a control site. However, when we applied TMS to suppress the rIPS area, we found that both the audiovisual integration magnitude and the binding tendency raised for the crossmodal congruent audiovisual stimulus pairs. That is, the congruent crossmodal correspondence increased the binding tendency as predicted by the unity assumption. We believe our results highlighted the importance of top-down control in enabling audiovisual integration adaptation. When the audiovisual integration process was disturbed by TMS stimulation, to compensate the hampered integration and decision processing, top-down control relied on extra information and cues to support the causal inference process. The top-down control enabled flexible integration to adapt the internal state changes induced by TMS.

Keywords: mental imagery; crossmodal congruency effect; spatial ventriloquism, transcranial magnetic stimulation (TMS); audiovisual integration

Venue and Commute

Conference Venue

The symposium will be hosted at:
Sino-German Center for Science (CDZ),
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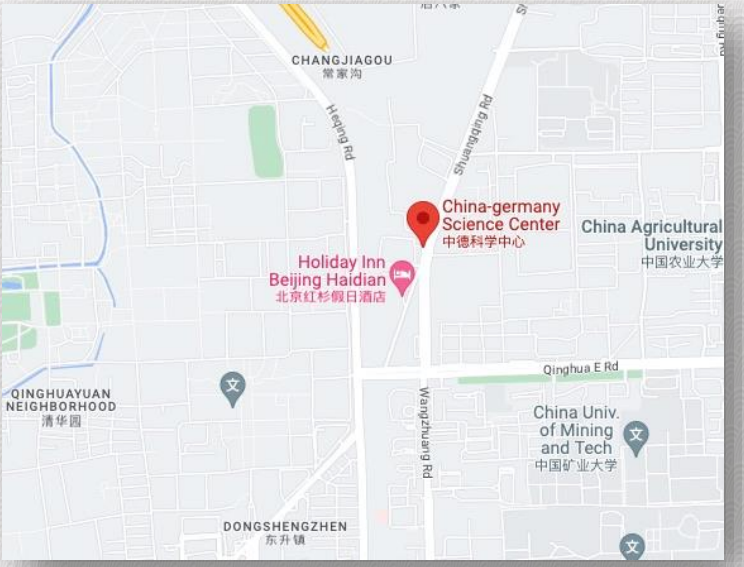

Wi-Fi:
SSID: NSFC-Meeting
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Commute

- From Beijing Capital International Airport (PEK) To the Xijiao Hotel
  - ➢ Subway (**Capital Airport Line** [to the direction of Beixinqiao]
  - ↓ Transit at Sanyuanqiao to **Line 10** [anti-clockwise, to the direction of Chedaogou, 外环方向]
  - ↓ Transit at Zhichunlu to **Line 13** [to the direction of Dongzhimen].
  - ↓ Get off at Wudaokou Station [leave at **Exit A**],
  - ↓ Then walk to the hotel (842 m, approx. 13-min walk)

  - ➢ Taxi (outside of the Gates 5-9, 1st Floor of Terminal 2, convenient but costly)

- From the hotel to the symposium venue
  - ➢ Walk (most convenient, 16min walking)
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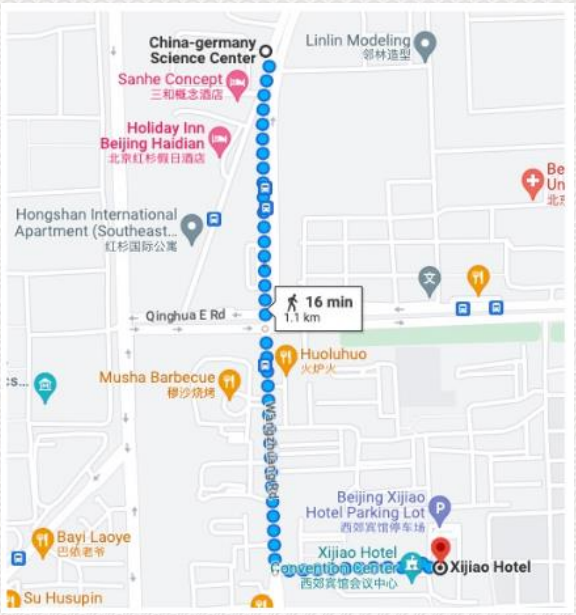

- The commute between the Xijiao Hotel and Peking University is arranged by Commute Bus.

Contact :
If you have any questions or the assistance from us, please do not hesitate to contact us.

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