

# 16<sup>th</sup> Human Brain Science Seminar

Date: Friday, December 16, 2022 14:00 pm ~ 17:00 pm

Venue: Seminar Room,

Department of Human Brain Science,

3F Smart-Aging Research Center Building,

IDAC, Tohoku University



## On Human Learning, Emotions, and Predictive Cognitive Processes: An International Exchange Seminar

Part 1 : 14:00 – 15:00

Presentation by Young Researchers

Speaker 1 – Chunlin Liu

***Social interaction enhances second language emotionality in the brain: an fMRI study***

Understanding emotion is essential for successful second language (L2) communication. However, learners may have difficulty perceiving emotionality embedded in L2 due to a lack of social/emotional experiences in L2. To investigate how the L2 social interaction modulates L2 processing, we invited 41 late L2 speakers with various amounts of L2 social interaction to do an L2 auditory lexical decision task inside the MRI scanner. Our results showed a significant positive correlation between left ventral striatal activity and social interaction intensity during L2 positive word processing. The finding suggests that even late L2 learners could acquire an enriched neural representation of L2 emotionality if they have sufficient social interactions.

Speaker 2 – Diego Elisandro Dardon

***Neural correlates of earning semantic-based rules: an fMRI study***

Learning a second language requires not just learning abstract grammatical rules, but rules that rely on language-specific conceptual information. However, previous studies have explored only the learning of abstract rules. To bridge this gap, this study investigated the neural correlates of learning semantic-based rules with language particular ways of conceptualizing the natural world. Participants learned a semi-artificial language consisting of three semantic-based classifications: animate, small inanimate, and large inanimate. Results showed the left inferior temporal gyrus and left anterior lobe are recruited to successfully generalize semantic-based rules providing novel evidence of additional brain areas involved in rule learning.

----- Coffee Break 15:00 – 15:30 -----

Part 2 : 15:30 - 17:00

Main Speaker Presentation

Dr. Piia Astikainen

University of Jyväskylä, Finland



***Electrophysiological change detection responses in studying brain's predictive perceptual mechanisms in depression and aging***

In the literature, the theory of predictive coding is increasingly connected to the study of perception. According to the predictive coding theory, the brain predicts future events based on previous sensory input. When the input does not match the prediction, a prediction error occurs in the brain, and the error signal is projected upwards in the hierarchical neural network to update the predictive model. Mismatch negativity, an event-related potential component, is suggested to reflect prediction error in the cortical brain areas. We have investigated predictive processing in the auditory, somatosensory, and visual modalities in depression and aging. Our results suggest that predictive processing is impaired in both conditions. These results may be useful in the search for biomarkers for age-related cognitive decline and depressive state.

Dr. Piia Astikainen is an Associate Professor at the Department of Psychology, University of Jyväskylä, Finland. Her research focuses on perception, especially social perception, and speech perception. She has conducted four large-scale projects funded by the Academy of Finland related to these topics, and the latest project investigates social foreign language learning. For more details, see her research group's web site: <https://www.jyu.fi/active-mind-lab>