

[2P]Autism Spectrum Disorder

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***Videos are available throughout the meeting period.**

[2P-235]Implementation of Social Evaluating Interface with Neurophysiological Signals for Children with Autism Spectrum Disorder

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Previous studies have mentioned the important neuroetiology of autism spectrum disorder (ASD) that causes social deficits, including the dysfunction of the mirror neuron system and the underconnectivity between brain regions. Some neurofeedback training games and social-cognition training games have been proposed which are capable of helping the ASD patients to improve their behaviors, cognition, and emotion regulation. However, the quantitative evaluation of the performance of these social training games with neurophysiological signal is still under investigation. In this study, we designed a real-life game-based interface for emotional regulation and social interacting with neurophysiological signals including electroencephalography (EEG) and eye-tracking signals integrated to provide a neurophysiological index to evaluate the improvement of social performance and emotional state of ASD patients.

An interacting and neurofeedback interface is implemented for ASD patients. The interface includes a non-player character interacting interface with two topics for ASD patients to learn, including the recognition of facial emotion and eye gazing points. The specified areas of interests are defined onto each frame of the game stimuli to enable the subsequent statistical analysis of the gazing points. Twelve-channel EEG signals are recorded and analyzed with event-related potentials compared during facial emotional recognition and the training of gazing points. The statistical analysis is then carried out between the ASD group and the common participants.

The eye-tracking results showed that ASD children spend more time than the control group to judge the answers and understand the options observed at the fixation sites. The behavior results of the two games revealed that the average correctness of the control participants is 94.9%, and that of the ASD children is 93.75%. Pronounced P100, P300, and N400 were observed in some of the emotional conditions in the control groups. In comparison, N200 and positive signals between 300 and 500 ms were observed in the ASD groups. The results suggested the altered eye-gazing patterns and EEG responses in ASD patients during the recognition of facial emotion and eye gazing points. This study demonstrated the possibility of incorporating gazing points and EEG as indices to evaluate the cognitive performance and emotional states regarding its benefit on the flexibility of portable applications than other neuroimaging techniques.