Lag adaptation for audiovisual temporal processing in individuals with autism spectrum condition

*Makoto Wada\textsuperscript{1,2}, Yumi Umesawa\textsuperscript{1}, Misako Sano\textsuperscript{1,3}, Seiki Tajima\textsuperscript{4}, Shinichiro Kumagaya\textsuperscript{5}, Makoto Miyazaki\textsuperscript{2} (1.Dev Disord Sect, Dept Rehab Brain Func, Res Inst of NRCD, Tokorozawa, Japan, 2.Faculty of Informatics, Shizuoka Univ, 3.National Rehabilitation Center for Children with Disabilities, Tokyo, Japan, 4.Hospital of NRCD, 5.Res Cent Adv Sci Technol, Univ of Tokyo, Tokyo, Japan)

Following frequent exposure to tactile stimuli in a specific order, temporal orders judgment (TOJ) of the stimuli will be biased in concord with the prior stimulus order. The positive aftereffect in tactile temporal order is called "Bayesian calibration" (Miyazaki et al., 2006 Nat Neurosci). In contrast, following repeated exposure to audiovisual stimuli with a specific lag, the stimulus lag will be perceived to be shorter (Fujisaki et al., 2004 Nat Neurosci). The negative aftereffect in audiovisual lags is called "lag adaptation".

Previously, we found the Bayesian calibration for tactile TOJ is weak in individuals with higher autistic traits (Umesawa et al., 2018 Neuroscience2018). In this study, we examined the lag adaptation of both typically developing (TD) participants (N = 28) and those with autism spectrum condition (ASC, N = 9). All TD and ASC participants answered autism spectrum quotient (AQ) and the ASC participants received Autism Diagnostic Observation Schedule Second Edition (ADOS-2) for evaluating severity of ASC.

We found obvious lag adaptation both in the TD and ASC participants, and found that the lag adaptation was not associated with autistic traits (r = -0.035, p = 0.84). On the other hand, temporal resolution of audiovisual TOJ was associated with deficits in communication score of ADOS-2 in the ASC participants (r = 0.80, p = 0.0089), but it was not associated with total AQ score both in TD and ASC participants (r = -0.11, p = 0.51).

Our findings suggest that the lag adaptation is functioned in individual with ASC. In contrast, atypical multisensory integration in individuals ASC is related to deficits of communications, which is one of core symptoms of autism spectrum disorder.