

Previous evidence highlighted an impaired processing of multimodal information in Autism Spectrum Conditions (ASC). In particular, individuals with ASC have been demonstrated to be less susceptible to multisensory illusions, such as Rubber Hand Illusion (RHI). Here, we aimed at investigating whether a monochannel variant of the RHI is more effective in inducing an illusory feeling of ownership over the fake hand in ASC, thus allowing to describe an efficient integration of multiple sensory sources when they involve the same channel. To this purpose, we exploited a previously described non-visual variant of the RHI that, excluding vision, leverages only on the somatosensory channel. We recruited two groups of adolescents with a comparable ASC severity, and the first group (n=25) underwent the classical visual-tactile RHI, whereas the second group (n=26) underwent the tacto-tactile RHI. Moreover, two groups of TD adolescents (n group 1= 25; n group 2= 26) were enrolled as control samples.

The 2*2*2 ANOVA run on Proprioceptive Drift (one within subjects factor: Stimulation= synchronous-asynchronous; two between subjects factors: RHI = visual-tactile and tacto-tactile – Group= ASD and TD) showed a main effect of Stimulation [$F(1;98)=15.048$; $p<0.001$; $\eta^2=0.148$], with a greater shift towards the rubber hand after synchronous (mean \pm SEM:2.58 \pm 0.36cm) than after asynchronous stimulation (mean \pm SEM:0.99 \pm 0.30 cm). Then, we found a main effect of Group [$F(1;98)=18.223$; $p<0.001$; $\eta^2=0.158$], with a higher Proprioceptive Drift in TD (mean \pm SEM: 2.83 \pm 0.48 cm) than ASC (mean \pm SEM: 0.75 \pm 0.42 cm) individuals. Crucially, a significant Stimulation*RHI*Development interaction was found [$F(1;98)=4.986$; $p=0.028$; $\eta^2=0.048$], showing that, while in TD individuals the effectiveness of the illusion was comparable in visuo-tactile and tacto-tactile group, in ASC individuals the illusion occurred only in tacto-tactile group. Post-hoc analyses showed that in TD individuals the Proprioceptive Drift was significantly greater in synchronous than asynchronous stimulation in both tacto-tactile ($p=0.030$) and visual-tactile ($p=0.004$) group. Conversely, in ASC individuals the Proprioceptive Drift was significantly greater in synchronous than asynchronous stimulation only in the tacto-tactile group ($p=0.001$), but not in the visuo-tactile group ($p=0.785$).

Our results point out that, while the visual-tactile procedure is not able to shift the perceived hand position toward the fake hand in ASC individuals, the tacto-tactile procedure is effective in modulating proprioception in this population, to a similar extent as that found in TD individuals. This evidence suggests that the integration of multiple inputs is more effective in ASC when administering two stimuli originating from the same sensory channel, thus revealing a monochannel preference in such population.