Review of: "Cortical activation during cooperative joint actions and competition in children with and without an autism spectrum condition (ASC): an fNIRS study"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

I am really glad to review the research article entitled “Cortical activation during cooperative joint actions and competition in children with and without an autism spectrum condition (ASC): an fNIRS study”.
In this study, Su and colleagues investigated the motor performances and the functional near-infrared spectroscopy (fNIRS)-related cortical activations in autistic children and in non-autistic peers during a Lincoln Log dyadic game. This game required participants (and their adult partners) to act as leader or as follower, move in synchrony or taking turns, and move cooperatively or competitively. During these joint action tasks, the authors recorded the hemodynamic changes in five region of interest: i) middle frontal gyrus; ii) inferior frontal gyrus; iii) precentral gyrus; iv) superior temporal sulcus (STS); and v) inferior parietal lobule (IPL). With respect to behavioral responses, autistic children showed more spatio-temporal errors than non-autistic individuals. With respect to cortical activations, autistic children presented lower STS activation during Turn-take and Compete, and greater IPL activation during Lead and Turn-take compared to non-autistic peers. Furthermore, as dyadic play demands increased, non-autistic children showed greater STS activation during Turn-take (vs. Synchrony) and Compete (vs. Cooperate), autistic children showed greater IPL activation during Lead and Compete (vs. Cooperate). Interestingly, hemodynamic changes were also associated with adaptive functioning measures and with the extent of social atypicalities. On the basis of these findings, the authors concluded that autistic children could rely on self-generated action plans as shown by the increased IPL activation more than relying on their partner’s action cues (in light of the reduced STS activation).
The rationale of the study is clear. The article is generally well written, and covers an important topic, understanding the mechanisms used by autistic children to process socio-motor-perceptual information for planning/execution of joint actions. The methods are clearly explained, especially with respect to the fNIRS registration. Based on personal experience, it could be particularly challenging to record fNIRS activations in children with neurodevelopmental conditions; I therefore applaud the authors for their efforts on collecting this kind of data.
The authors stated in the limitation section that the study involved a small sample size (15 autistic vs. 15 non-autistic children). This is true also in light of the statistical plan they used. For cortical activations, they indeed conducted a repeated measure ANOVA with three within-group factors (each with 4, 5, and 2 levels, respectively), a between-group factor (group) and three covariates. Based on this this, I think describing the current study as a more in-depth descriptive study and exploratory study up front would have highlighted its strengths. In addition, while I generally appreciated their discussion of the results, I would have respectfully suggested less emphasis in claiming them as potential neurobiomarkers before having replicated the findings in a larger, independent cohort of children.

As for future extensions of this study, it could be particularly interesting to replicate the present work using hyperscanning techniques to investigate possible interbrain synchronizations between the autistic participants and their partners. Lastly, I will gladly look forward to reading the results of the RCT the authors are conducting to validate fNIRS-related synchrony-based indexes as intervention response measures.