

NAME: Alisa Zoltowski, alisa.r.zoltowski@vanderbilt.edu

PI: Cascio, Carissa

First theme choice: Systems Neuroscience

A Pilot Study of Active Social Touch in Autism

Authors: Alisa R. Zoltowski, Ekom Eyoh, Kacie Dunham, Tiffany Woynaroski, Michelle D. Failla, Jacob Feldman, Ting-Shuo Chuo, Jeffrey L. Krichmar, Carissa J. Cascio

Introduction: Social/affective touch processing has been an area of interest in autism, as our earliest social interactions tend to occur in the context of caregiver touch that is processed via distinct neural pathways from those tuned to process nonsocial touch. Accordingly, this sensory system plays a foundational role in socioemotional development and is increasingly processed reciprocally between individuals as one matures and gains motor autonomy. Though some studies provide evidence of altered social touch perception in autism, to our knowledge, no studies have examined how individuals on the spectrum apply social touch during interactions with others. CARetaker RoBOt (CARBO), an animal-like robot containing built-in trackpads, was designed to objectively measure properties of active touch while approximating affective touch preferences of animate beings.

Methods: We conducted a pilot study in $n = 15$ youth on the spectrum (AUT) and $n = 15$ typically developing youth (TD), comparing performance on CARBO's "ColorMe" game. In the "ColorMe" game, participants are instructed to swipe across CARBO's trackpads in a specific direction, mimicking petting an animal. During the game, CARBO's trackpads are illuminated if swiped similarly to a preferred velocity, and corrective feedback is generated in response to non-preferred speed or direction. The "ColorMe" game ended when the number of illuminated trackpads surpassed the game's threshold. Accuracy in preferred velocity, average speed, variation in speed, and number of trackpads targeted per swipe were compared between groups.

Results: In this initial pilot study, we did not find differences in accuracy, speed, or number of targeted pads between the groups that met criteria for statistical significance. However, there were several preliminary trends in performance that may warrant further investigation, including that on average, the speed of swipe was slower and more variable for autistic participants than typically developing participants (d values = -0.02 and 0.33 , respectively). Additionally, the group distributions of number of trackpads targeted per swipe suggested greater consistency in the autism group compared to the typically developing group.

Discussion: Trending differences in speed of swipe are consistent with known differences in motor development in autism; future work may aim to disentangle the extent to which differences in active social touch may relate to general motor differences versus specific to social touch processing. Though further work is needed, the consistency of trackpads targeted per swipe in the autism group suggests that autistic individuals may apply a more consistent strategy towards game completion, compared to typically developing individuals. In addition to collecting more data, future directions also include studying the extent to which patterns of active touch to an "animal-like" robot may translate to humans.

Keywords:

Social touch, Autism spectrum disorders