Movement Imitation in Autism

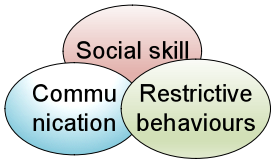
Using motion tracking and eye tracking methods

A. Vabalas, A. J. Casson, E. Gowen, E. Poliakoff
andrius.vabalas@mancesther.ac.uk

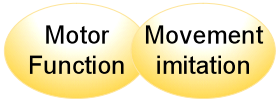
1. Introduction

Autism is one of the most prevalent developmental conditions - affects ~1% of the population, ~700,000 individuals in the UK.

Symptoms currently assessed for diagnosis:



Symptoms I concentrate on in my work:



MOVEMENT IMITATION IN AUTISM

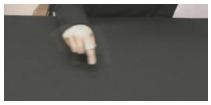
- Reduced spontaneous imitation
- Reduced imitation of the style/fashion of the movement
- Reduced imitation of non-meaningful actions which are not necessary/ important for task completion

2. Method

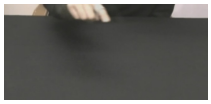
Participants: 15 autistic and 15 typically developing adults

Task: participants were asked to watch videos of hand movements and to copy what they saw. The style of the movement was manipulated, some movements were low, some elevated.

Low movement



Elevated movement



Data collection: movements were measured using a motion tracker and looking behaviour was measured using an eye tracker

Motion tracker

Eye tracker

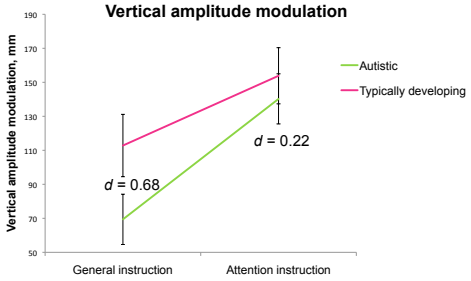
Attention manipulation: participants were also asked either:

- To simply copy what they saw
- Or to pay close attention to the movement being made, its speed, size and exactly where it started and ended.

3. Results

MOVEMENT RESULTS

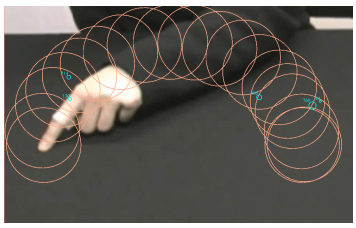
Autistic participants imitated movement style (elevation) less accurately, but imitation improved significantly after asking participants to pay close attention to the movement.

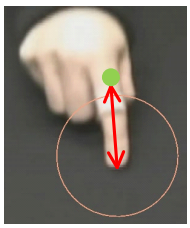


Vertical amplitude modulation = vertical amplitude in elevated trials – vertical amplitude in low trials.

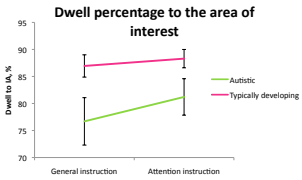
LOOKING BEHAVIOUR RESULTS

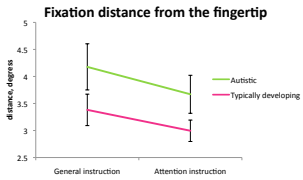
It was measured how closely participants looked to the moving finger by drawing an interest area around it and by measuring fixation distance from the fingertip





Autistic participants looked at the movement less closely than typically developing participants but visual attention to the movement increased after asking participants to pay close attention to it.





4. Conclusions

Autistic individuals showed reduced imitation of the movement style.

While watching videos with a movement to imitate autistic individuals showed reduced visual attention to the movement.

Asking participant to pay close attention to the movement being made increased both imitation accuracy and visual attention to the movement.

Imitation is important for learning new skills (e.g. a tennis stroke) as well as for social interactions. Imitation research could lead to the development of imitation based therapies that can improve social ability of autistic people.

This work also increases our understanding how autistic participants attend to and understand actions.

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