



UNIVERSITY OF OXFORD

# Sensory processing in children with and without developmental conditions

Thank you to all the children, parents, schools and organisations who helped with this project.

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## Background to the research

We often need to make decisions about sensory information – for example, deciding if we have time to cross a road. This study looked at whether autistic and dyslexic children make decisions about what they see in a similar way to typically developing children (children with no developmental conditions). Previous studies have shown that autistic and dyslexic children sometimes have difficulties making decisions about moving things, and we wanted to know why this might be.



## What did my child do?



Almost 200 children aged 6 to 14 years played a game set in InsectLand. They helped the zookeeper work out which direction fireflies were escaping in.

Children got points for answering quickly and correctly. Sometimes it was tricky as the flies looked like they were going all over the place!

If children wore an EEG net during the game, we also measured their brain waves.



## How did children do in the game?

The dyslexic children were slightly slower and made a few more errors than typically developing children. According to a mathematical model, this was because dyslexic children picked up sensory information more slowly than those without dyslexia. The autistic children were instead slightly more cautious in their responses, tending to emphasise accuracy over speed. This suggests that there are differences in how autistic and dyslexic children make decisions about moving objects. However, the differences between groups were small with lots of overlap between groups.

## What happened in the brain?

All three groups had similar brain activity when the fireflies first moved. However, the brain waves of autistic and dyslexic children started to differ from typically developing children about 400 milliseconds (ms) after the fireflies started to move.

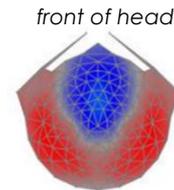
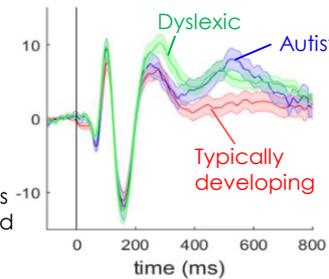


Diagram of EEG net with lots of activity (red areas) around the back of the head over visual parts of the brain



This shows each group's average brain activity after the fireflies started to move (0 ms) in the areas shown on the left. The groups started to differ from about 400 ms.

The brain activity of autistic and dyslexic children also differed from the typically developing children around the time they made their responses. There were some small differences between autistic and dyslexic children in their brain activity.

## Conclusions

- There are similarities and differences in how autistic and dyslexic children make decisions about motion information.
- Early brain responses to motion information are similar in autistic, dyslexic and typically developing children.
- Autistic and dyslexic children differ from typically developing children in later processing stages which could be linked to differences in filtering out irrelevant information, making decisions and pressing buttons.
- We are now working out exactly how differences in brain activity relate to children's responses in the game.
- These findings will help us to understand more about the role of sensory processing differences in autism and dyslexia. We also plan to investigate links with everyday life.