

Tailoring fNIRS and Virtual Reality for Use with Neurodiverse Children



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Introduction

Technological development is advancing at a groundbreaking rate, helping us understand the developing brain. But, ***are the new cutting-edge technologies suitable for all populations?***

In collaboration with families, researchers, and Gowerlabs, our partner company, we are tailoring fNIRS and Virtual Reality for use with neurodiverse children to guide future research and make science more inclusive.



Figure 1: Participant playing in the ToddlerLab CAVE.



Figure 2: Sticker trail used during the task.

Design & Methods

60, 3-to-6-year-old children, either neurotypical or neurodiverse (ASD, ADHD, low-empathy traits), are invited to participate in a Go/NoGo task within the ToddlerLab Cave -a child-friendly Virtual Reality (VR) room.

During the study children are asked to wear:

- A **neoprene cap** equipped with the LUMO DOT system (Gowerlabs Ltd.) to measure brain activity in the frontal areas.
- **Shutter glasses** to experience the virtual reality environment.
- A **cycling glove** tailored with 4 motion markers to interact with the CAVE and allow us to track their hand movements online.

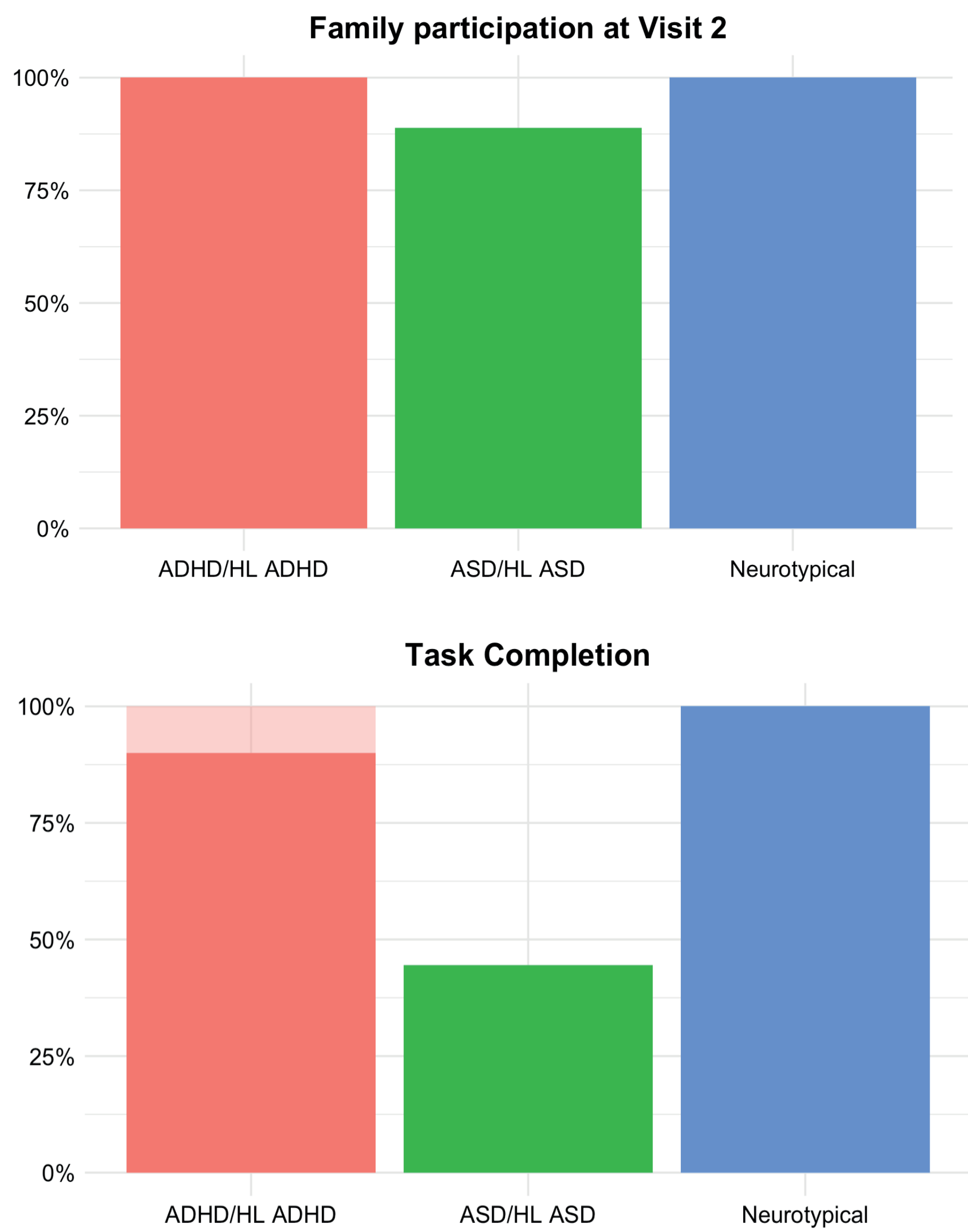
Each child performs the task twice, with a gap of 1 to 2 weeks between sessions. Children' caregivers complete a questionnaire pre and post testing to identify challenges associated with the VR/DOT testing set-up.

Preliminary Insights: What We Found Most Useful for Increasing Children's Compliance

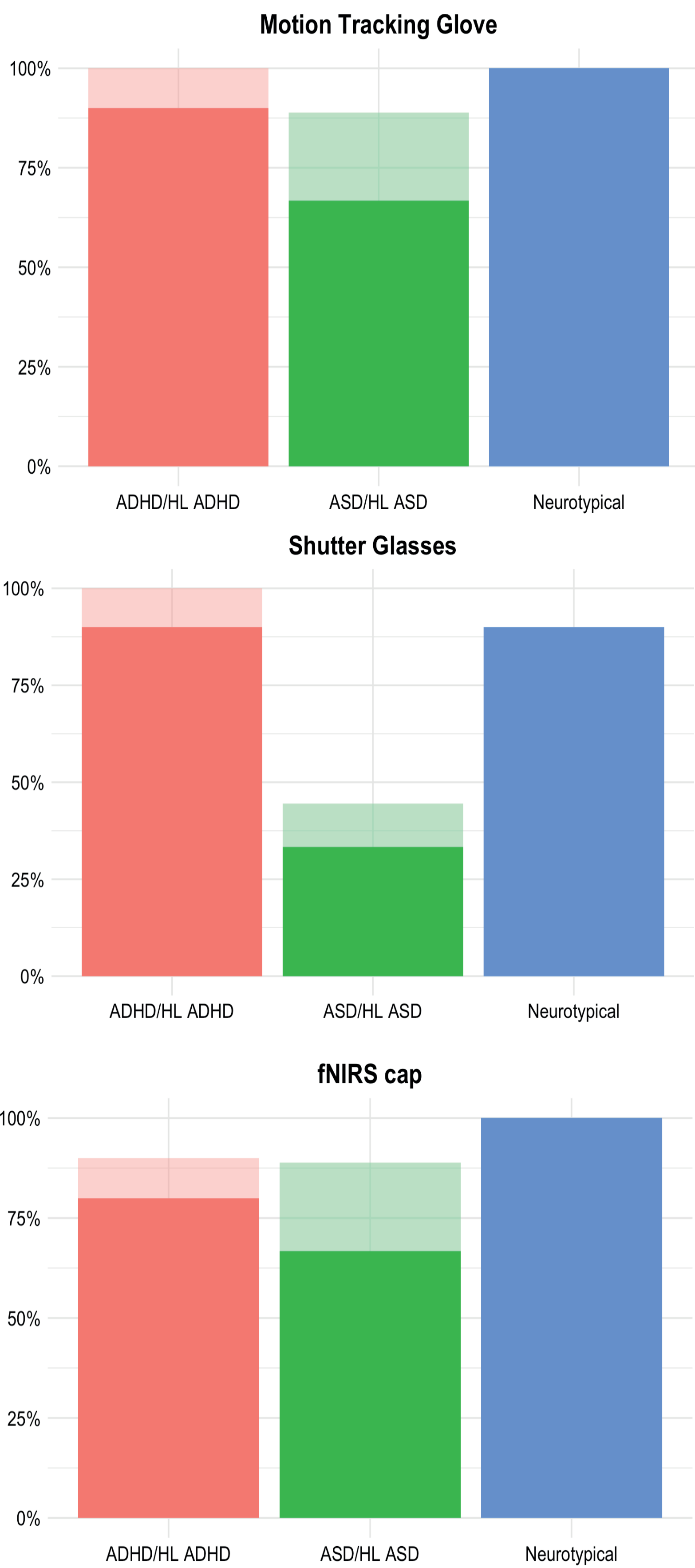
- Pre-testing video illustrating the study to the family and children
- Pre-testing questionnaire to assess the needs and preferences of each child
- Personalized rewards (e.g., stickers, toys, candies, cookies)
- Multiple lab visits
- Wearing the equipment according to the child's preferences (e.g., not using glasses)
- Introducing breaks during the study
- Showing children their favorite cartoons or storytelling while putting the equipment on them
- Physical contact with children during the study
- Head band instead of cap chinstrap



Preliminary Findings



Preliminary findings with 29 children: 10 neurotypical children, 10 children diagnosed with ADHD or at a higher likelihood of ADHD, and 9 children diagnosed with ASD or at a higher likelihood of ASD. The shadowed bars represent the improvement from the first to the second visit after tailoring the testing setup for each child, based on feedback from researchers, parents, and the children themselves.



Do you work with neurodiverse children? If so, are there any strategies you use that you would be willing to share with us?

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