



1-F-38

Ouvrai: Opening access to remote VR studies of movement

Evan Cesanek, Sabyasachi Shivkumar, James N. Ingram & Daniel M. Wolpert

Zuckerman Mind Brain Behavior Institute, Columbia University, New York, NY, USA



What can Ouvrai do for me?

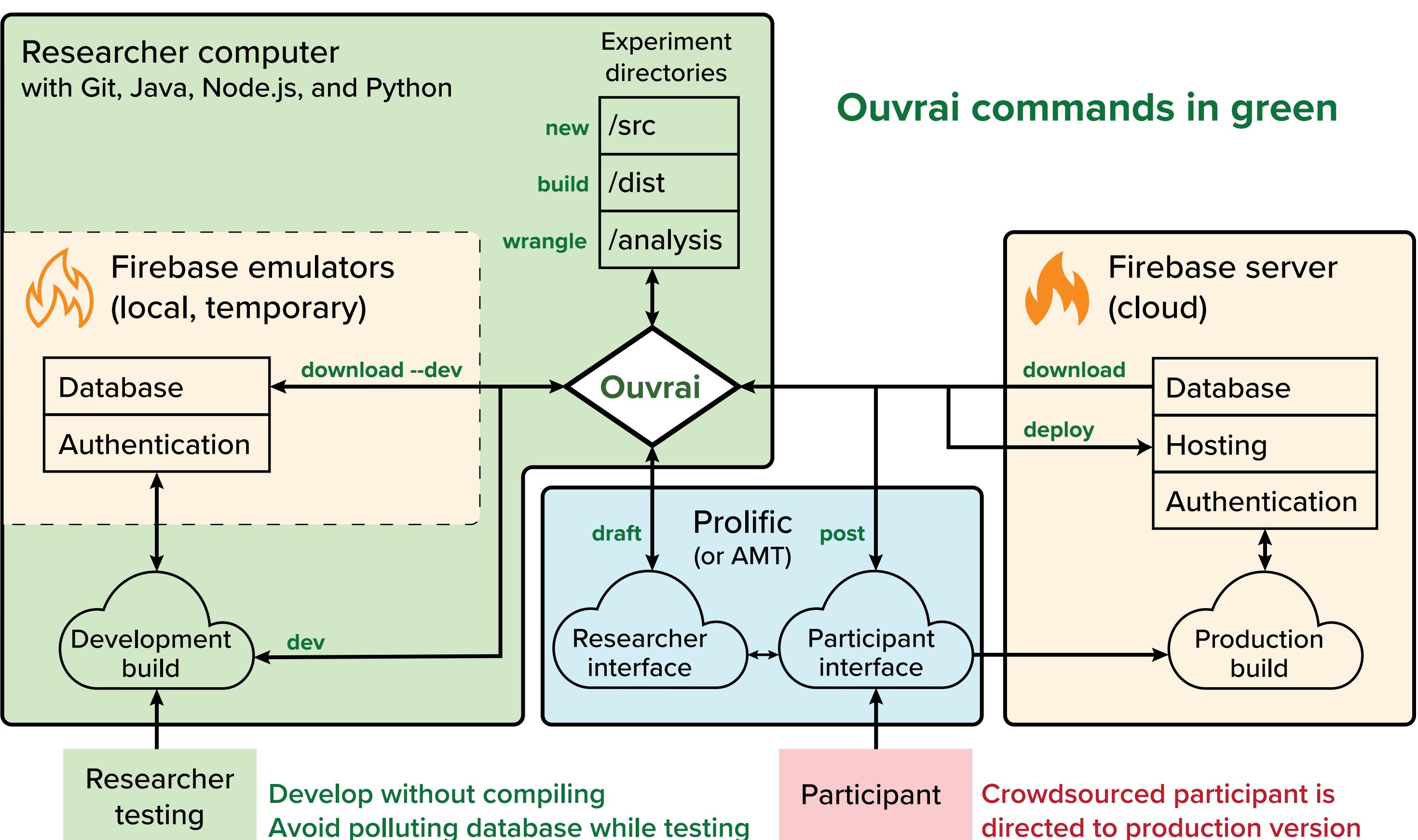
- Run remote studies for VR, desktop, and tablets
- Accelerate coding of interactivity and 3D graphics
- Uses a free web hosting and cloud database service
- Recruit and pay participants (Prolific, AMT)
- Open-source and free, except participant payments
- JavaScript template experiments to get you started

Collect high-quality data quickly from VR headsets

- Record 6-DoF kinematic data at 120 Hz from the head and two handheld controllers
- Capture hand configuration (19 joint angles per hand)
- Ideal for studying human motor control

Technical overview

- Command line interface for Mac, Linux, and Windows
- Develop and test experiments locally in a web browser
- Deploy experiments to Firebase web hosting sites
- Download, extract, and pre-process data
- Manage participant recruitment through Prolific or AMT



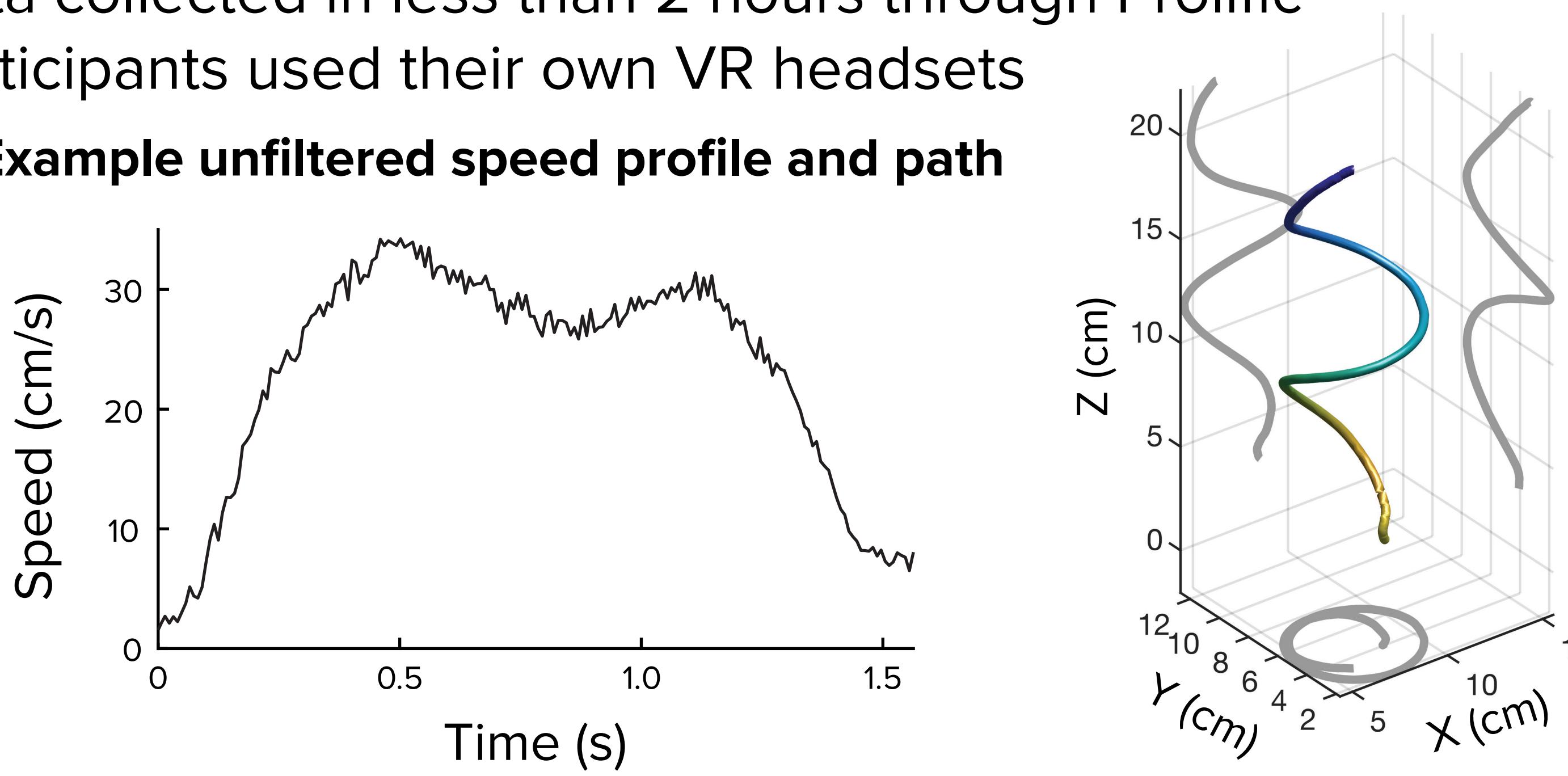
Etymology

Ouvrai sounds like *ouvrir*, the French verb “to open”, because it opens access to high-quality online studies of human behavior for researchers and participants around the world. It’s also a partial acronym for **O**nline **U**nmoderated **V**irtual **R**eality — the new type of study that Ouvrai makes possible.

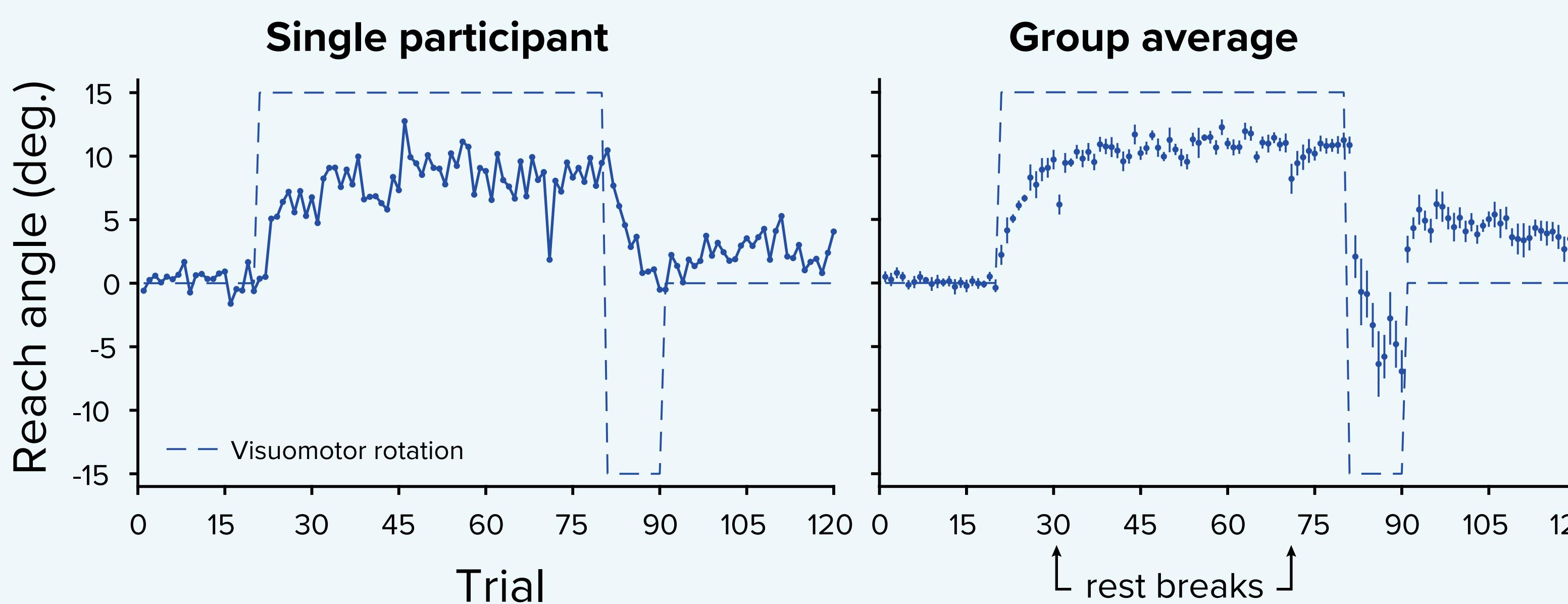
We validated remote VR studies in three standard motor learning paradigms.

- Ten remote participants in each experiment
- Data collected in less than 2 hours through Prolific
- Participants used their own VR headsets

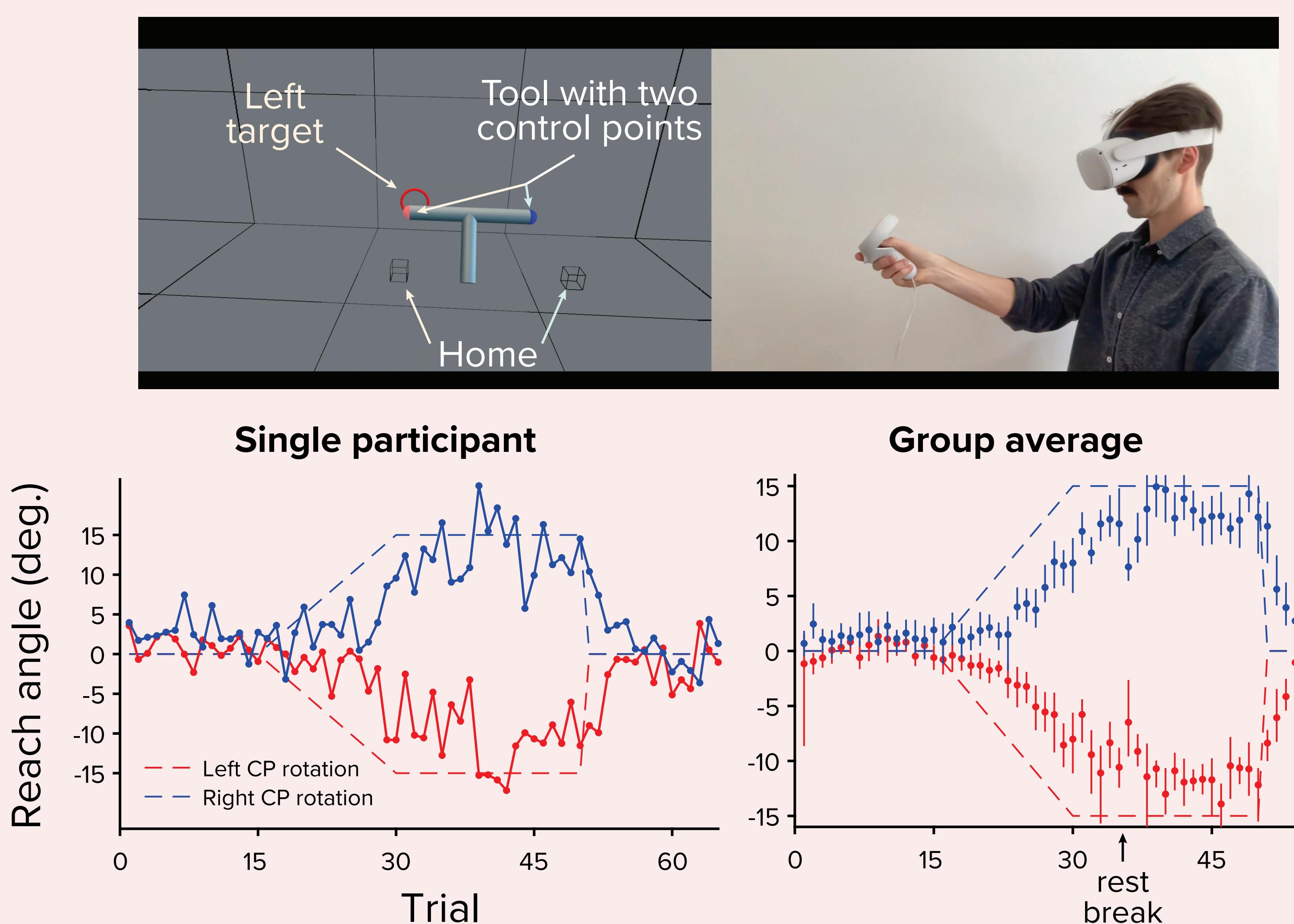
Example unfiltered speed profile and path



Experiment 1: Spontaneous recovery

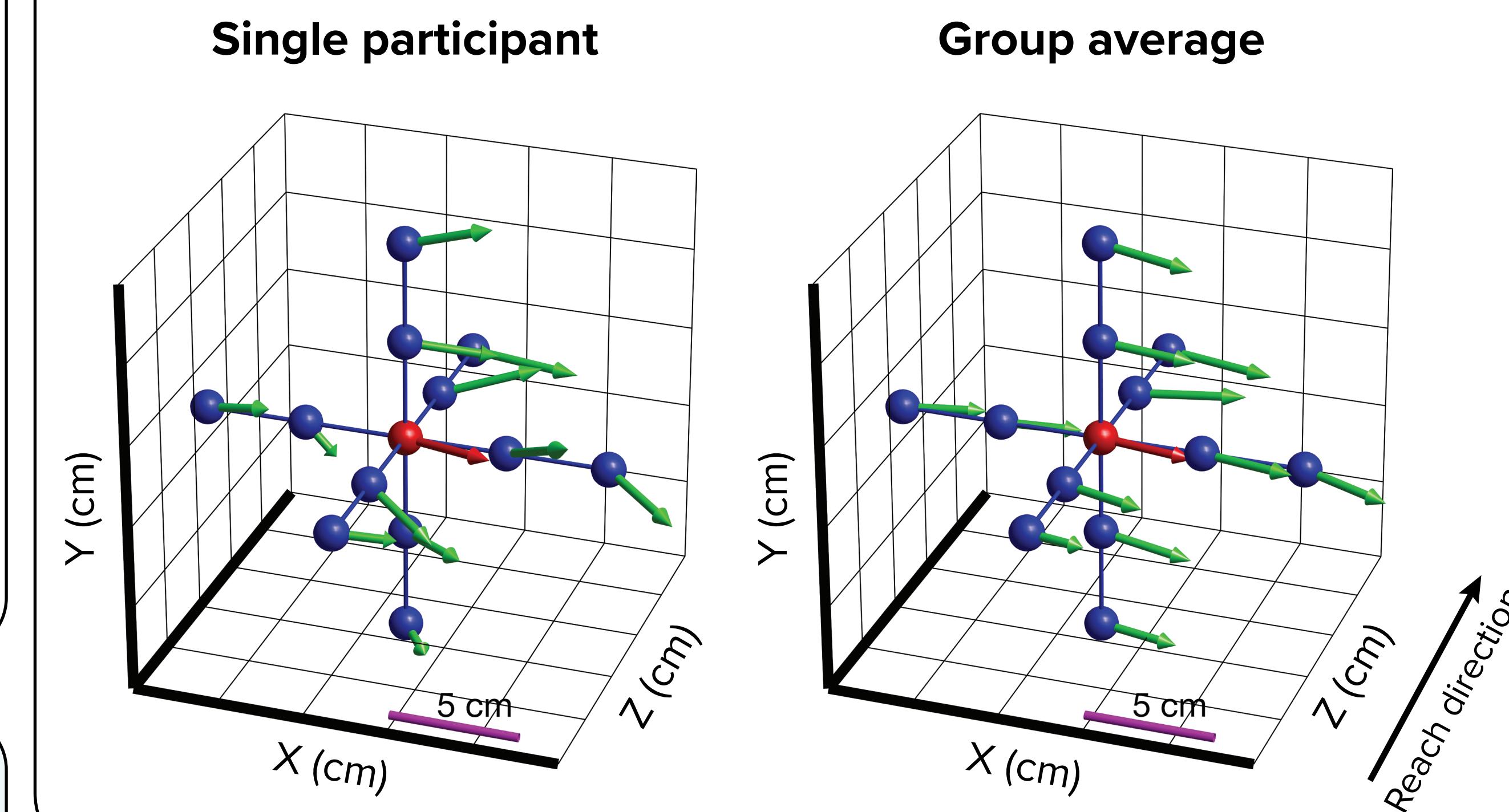


Experiment 2: Control points (dual adaptation)



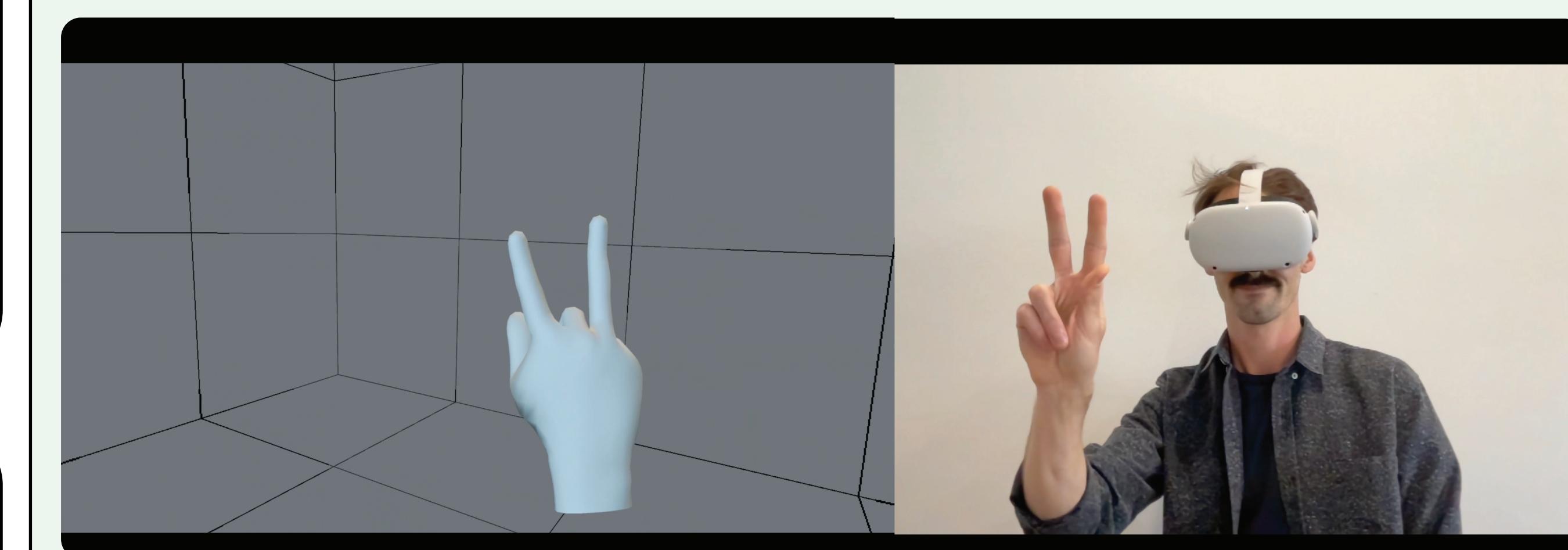
Experiment 3: 3D generalization of visuomotor rotation

- Adaptation to 16° rotation (5.7 cm) at **central target**
- No-feedback reaches to **untrained targets**
- **Arrows** show shift in reach endpoints at post-test



Bonus! Access hand tracking data

- Track 24 rigid bodies (19 joint angles) per hand
- Demo: Swapping fingers within each hand



- note that hand tracking is currently less accurate than controllers

Get started at

ouvrai.com

Need help?

Evan Cesanek is available in person at NCM to help with installation and setup. Come say hello! or email us any time at help@ouvrai.com

Acknowledgments

Thanks to NIH for funding and to the Bastian lab at Johns Hopkins University for testing.