

# The Feasibility of Online (Virtual-world) Eye-tracking with Young Children



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## Introduction

Visual-world eye-tracking has long been a useful tool for measuring young children's real-time interpretation of words and sentences.<sup>1-6</sup>

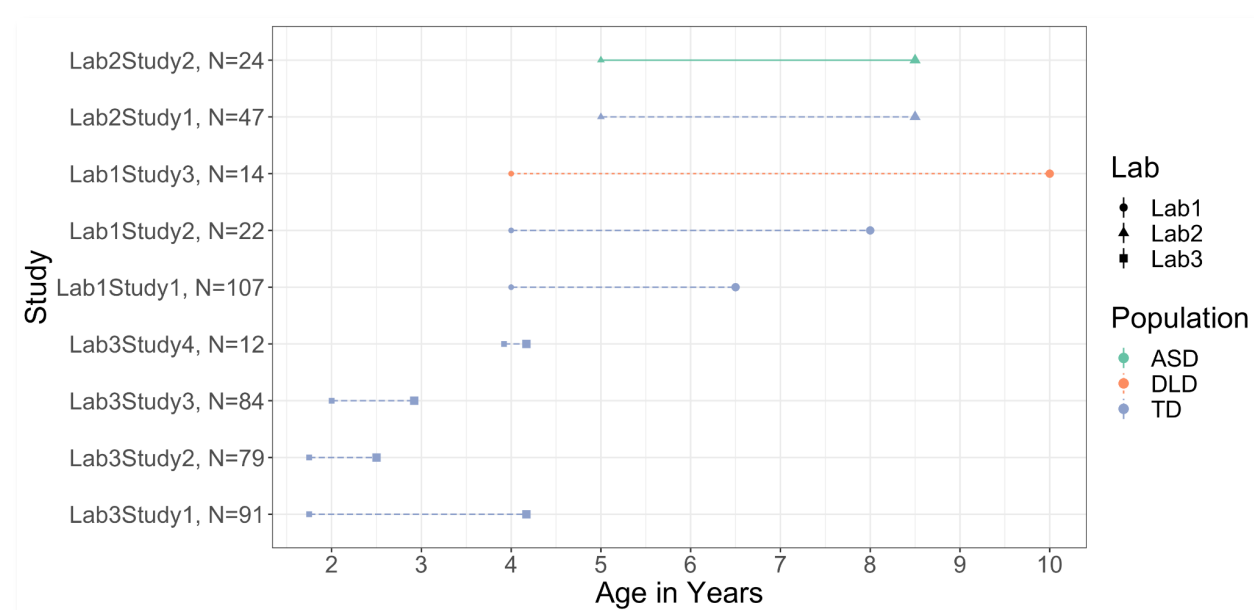
Recently, researchers have sought to move this research online to test participants outside of a lab setting, reduce equipment costs, and recruit from a more diverse participant pool.

Across 3 labs and a variety of individual studies, we investigate the feasibility of internet-based visual-world eye-tracking with young children. Rather than a single study comparing data collected in-lab vs. online, our goal was to show the range of studies that can be conducted online using this method, and to highlight issues with recruitment and data loss.

Overall, we establish a proof-of-concept that visual-world eye-tracking studies can be conducted online using various methods.

## Three Case Studies

Participant ages and population types by lab & study



**Lab 1:**  
-Ran studies via PCIBex<sup>7</sup>  
-Experimenters were co-present via a second device (e.g. phone or tablet) so that act-out actions could be coded.  
-Eye-movements were hand-coded using Vcode and Datavyu

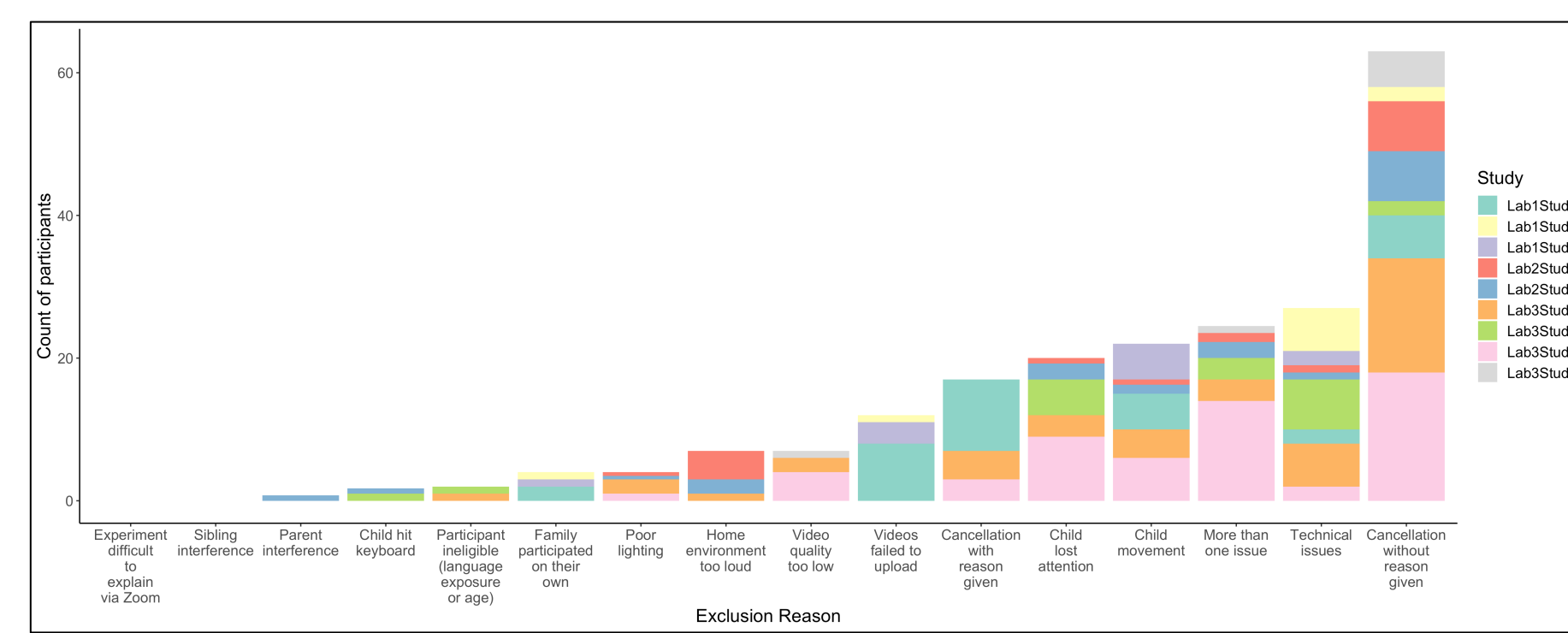
**Lab 2:**  
-Ran studies via Gorilla<sup>8</sup>  
-Experimenters were co-present via Zoom on the same device  
-Eye-movements were hand-coded using a Python script

**Lab 3:**  
-Ran studies via powerpoint sharing over Zoom, caregivers made local recordings (e.g. via Quicktime).  
-Experimenters were co-present via Zoom on the same device  
-Eye-movements were hand-coded using Datavyu

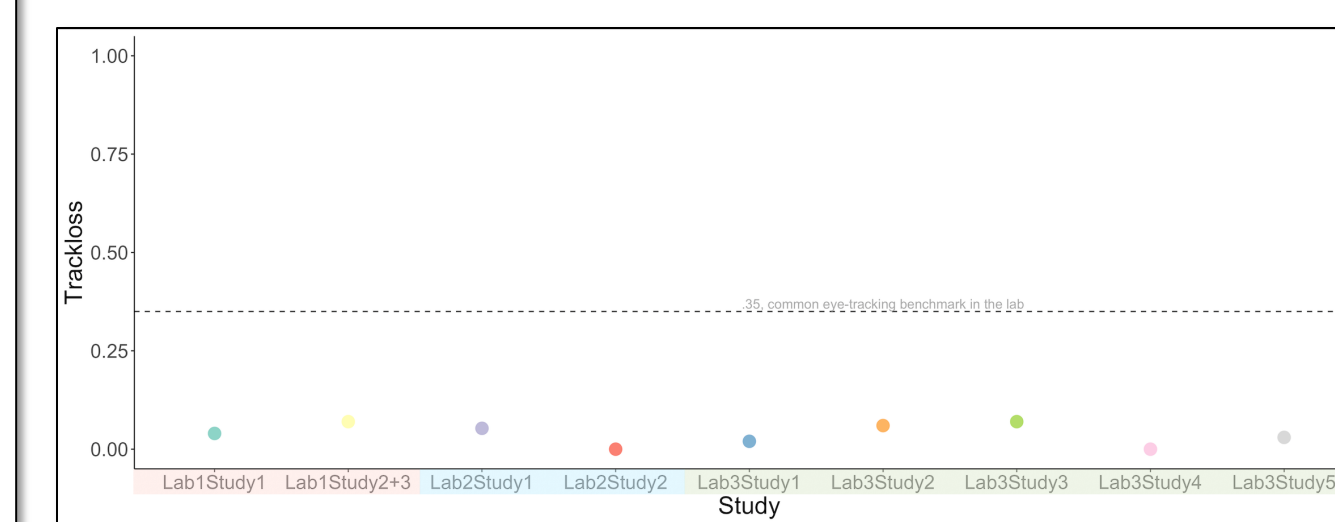
## Results

What are the major sources of data loss for internet-based visual-world eye-tracking studies with children?

Participant exclusion reasons across labs & studies

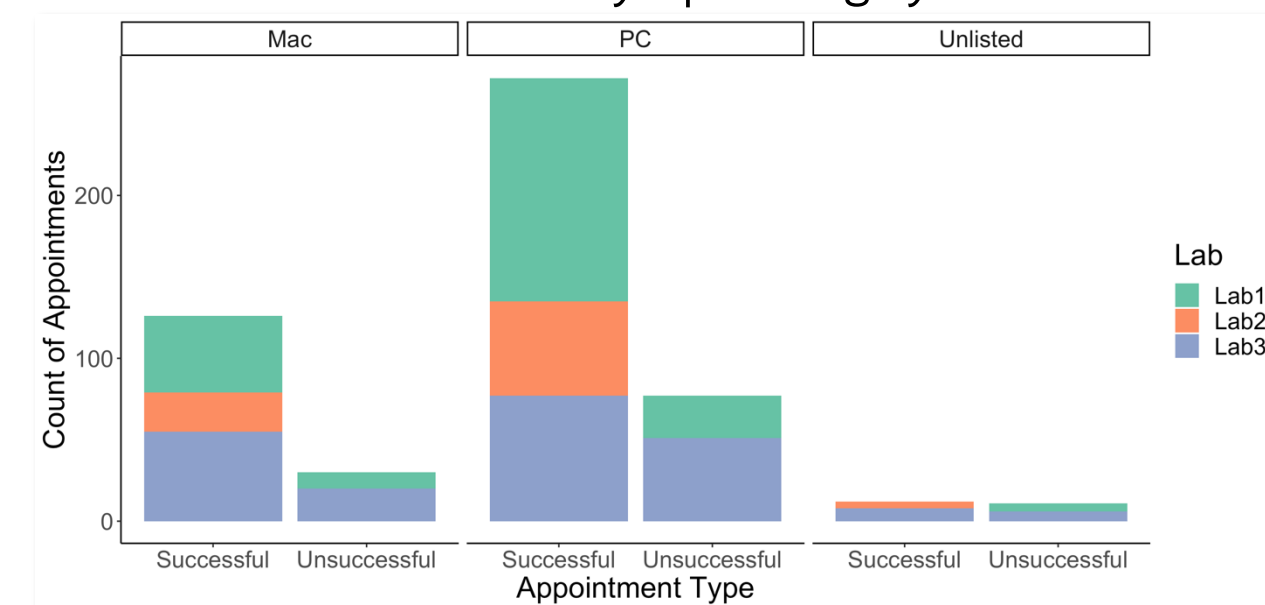


Trackloss across labs & studies

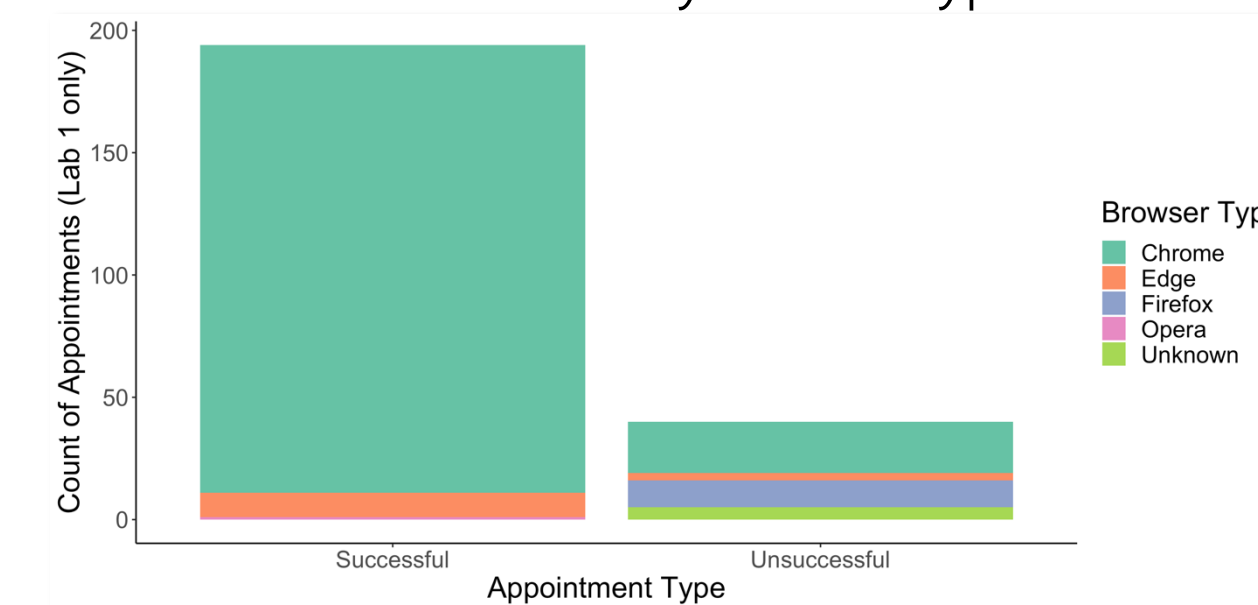


What else matters for appointment success?

Success rates by operating system



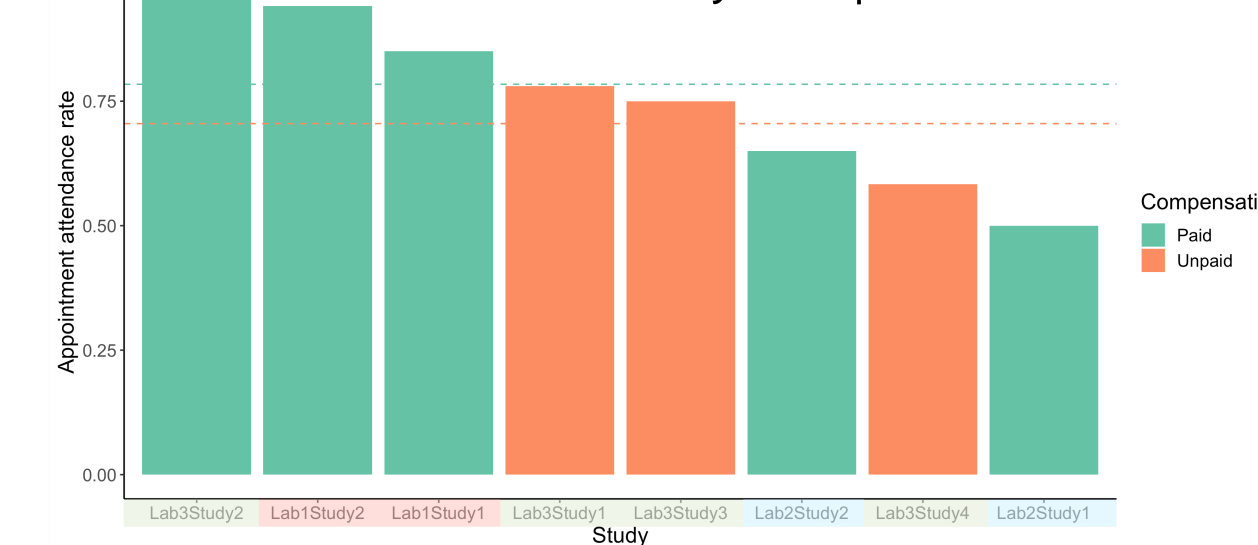
Success rates by browser type



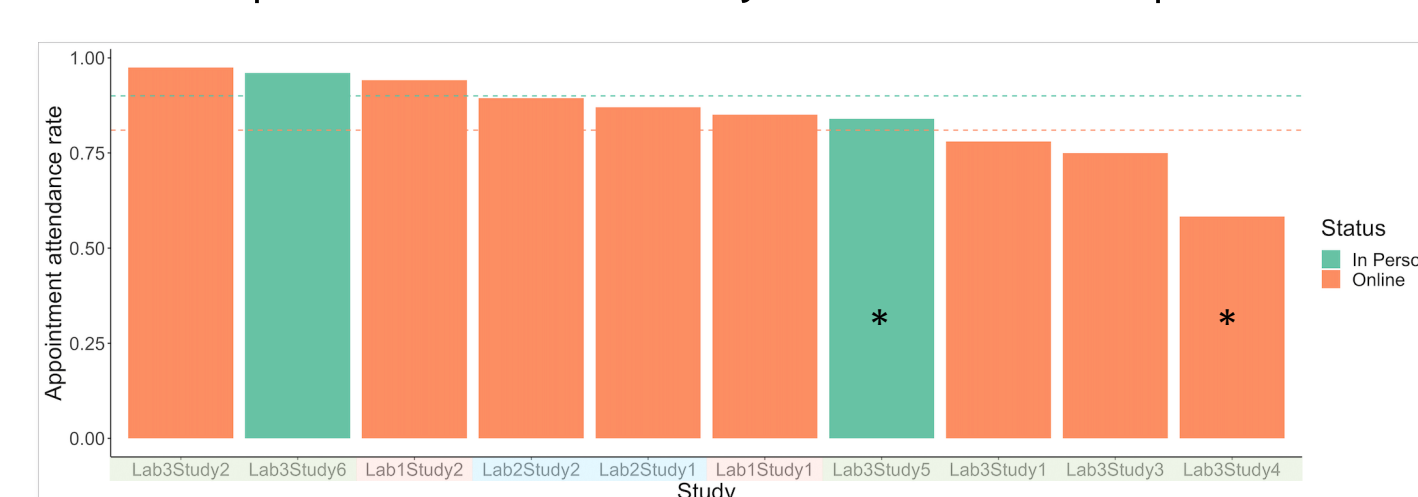
Success rates by number of AOIs coded for



Attendance rates by compensation

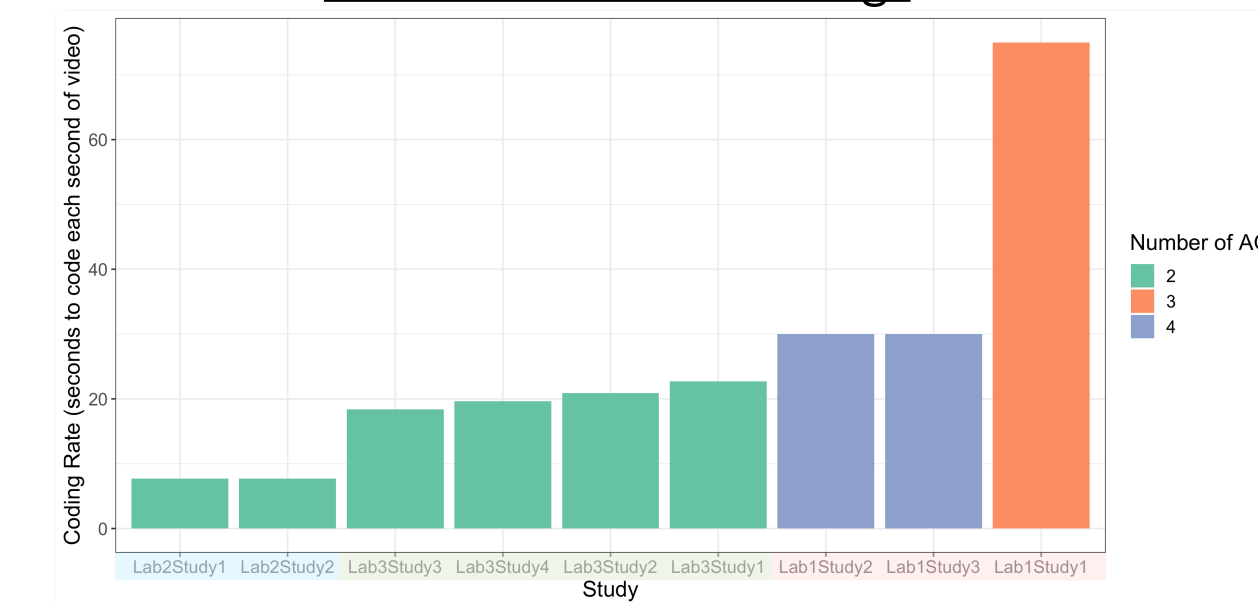


In-person vs online study attendance comparison



\*same study!

How fast is hand-coding?



## Conclusions

Conducting visual-world eye-tracking studies online is possible with children as young as 2 years-old.

Participants are less likely to attend their appointments online requiring 54% over-recruitment of participants (compared to 20-30% for similar in-person studies in the same labs).

Major sources of data loss during experiments across techniques and individual studies were technological errors preventing participants from completing the studies, child movement, and children losing attention during the task.

Other potential sources of data loss which were expected but not found across labs included lighting issues and parent or sibling interference.

Operating system, browser type, and number of AOIs did not affect success of appointments or amount of data loss, while participants were somewhat more likely to attend their online appointments when compensation was provided.

Hand-coding data results in very little trackloss (<7% of frames for all studies), lower than typical eye-tracking benchmarks.

While it may require additional recruitment efforts, conducting visual-world eye-tracking tasks online is feasible with multiple population types and ages, and can offer benefits over in-person collection including increasing participant diversity, reducing equipment costs, and reducing trackloss.

## References & Acknowledgements

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