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Background

Spatial neglect impairs stroke recovery and is associated with higher disability and dependence on caregivers [4]

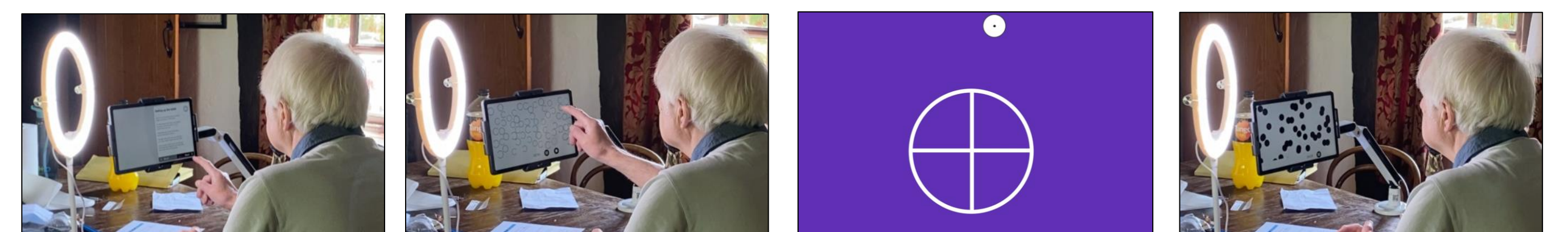
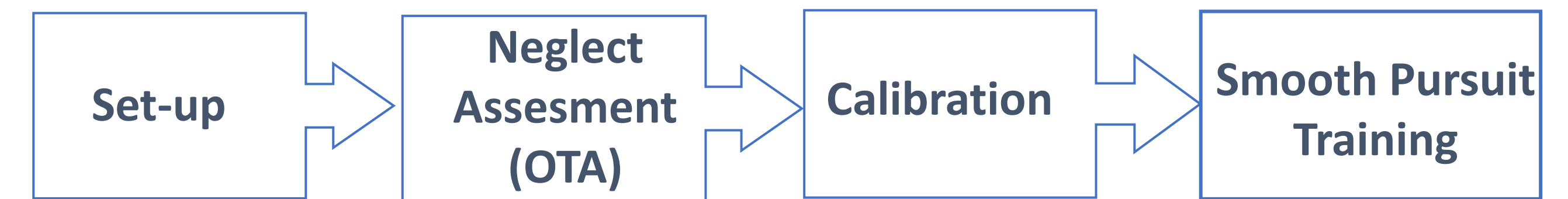
- 1/3 of stroke survivors, **400,000** in the UK, suffer from neglect [1] [2]
- By 2035, the number is projected to **double**, with societal cost **tripling** [3]

Stroke survivors need effective self-administered rehabilitation tools after hospital discharge

- There are currently no effective rehabilitation methods for neglect [5]
- SPT is an attention therapy using optokinetic stimulation proven to significantly improve spatial inattention [6][7].
- Existing solutions mainly involve visual search tasks, which may not be engaging without a therapist [8]

The EyeFocus app

Developed with end-users (stroke survivors, clinicians and carers), digitises evidence-based rehabilitation techniques



Smooth Pursuit eye movement Therapy (SPT)

- 75 trials with a binary success/fail outcome
- trial successful if the patient's gaze passes through each of the 5 quadrants into which the screen is divided, in any order

AI guided automated eye-tracking

- giving online feedback about performance to patient
- manipulating trial difficulty depending on success rate

Validation

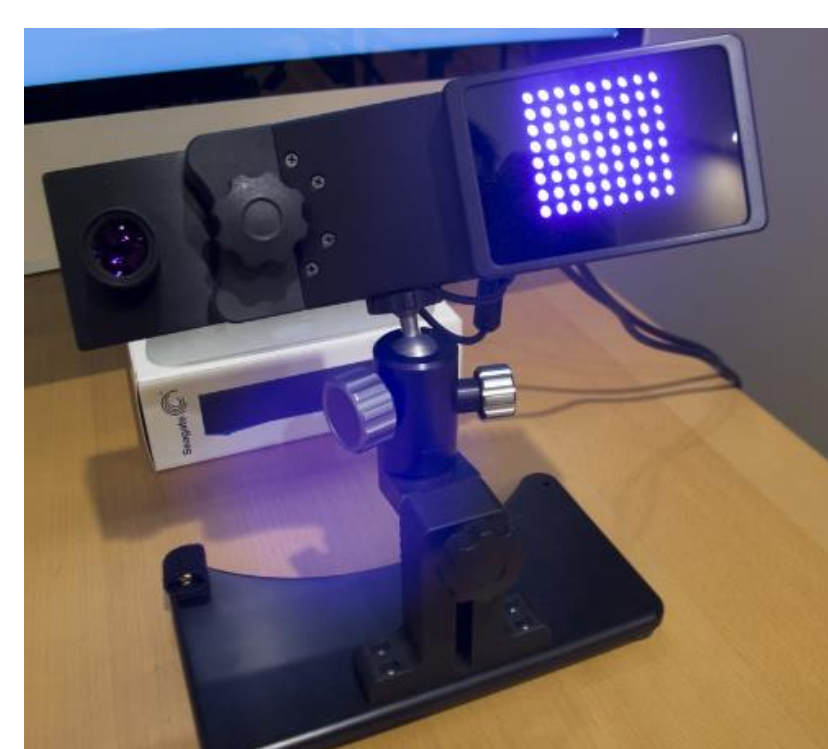
Testing the app against the industry standard eye-tracking EyeLink 1000

Participants

- N = 40
- two age groups (18-30 and over 65)
- no history of neurological disease



Setup



EyeLink

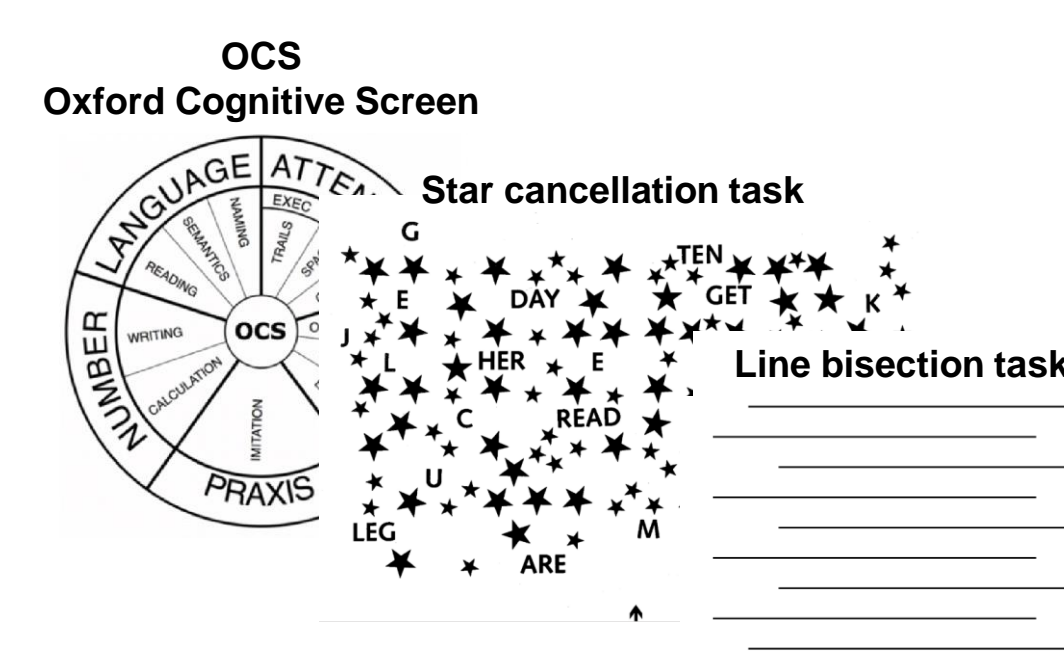
- reduced SPT training session (10 trials)
- eye movements tracked by camera-based EyeFocus and, infrared-light-based, EyeLink systems
- the accuracy of both systems will be compared

Usability

Testing EyeFocus with stroke survivors in their own homes to gather views about the app

Participants

- N = 20 stroke survivors
- 18 years or older
- can touch an object in front of them with less affected hand
- live within 70 miles of UEA



Cognitive testing



Full experience of the App

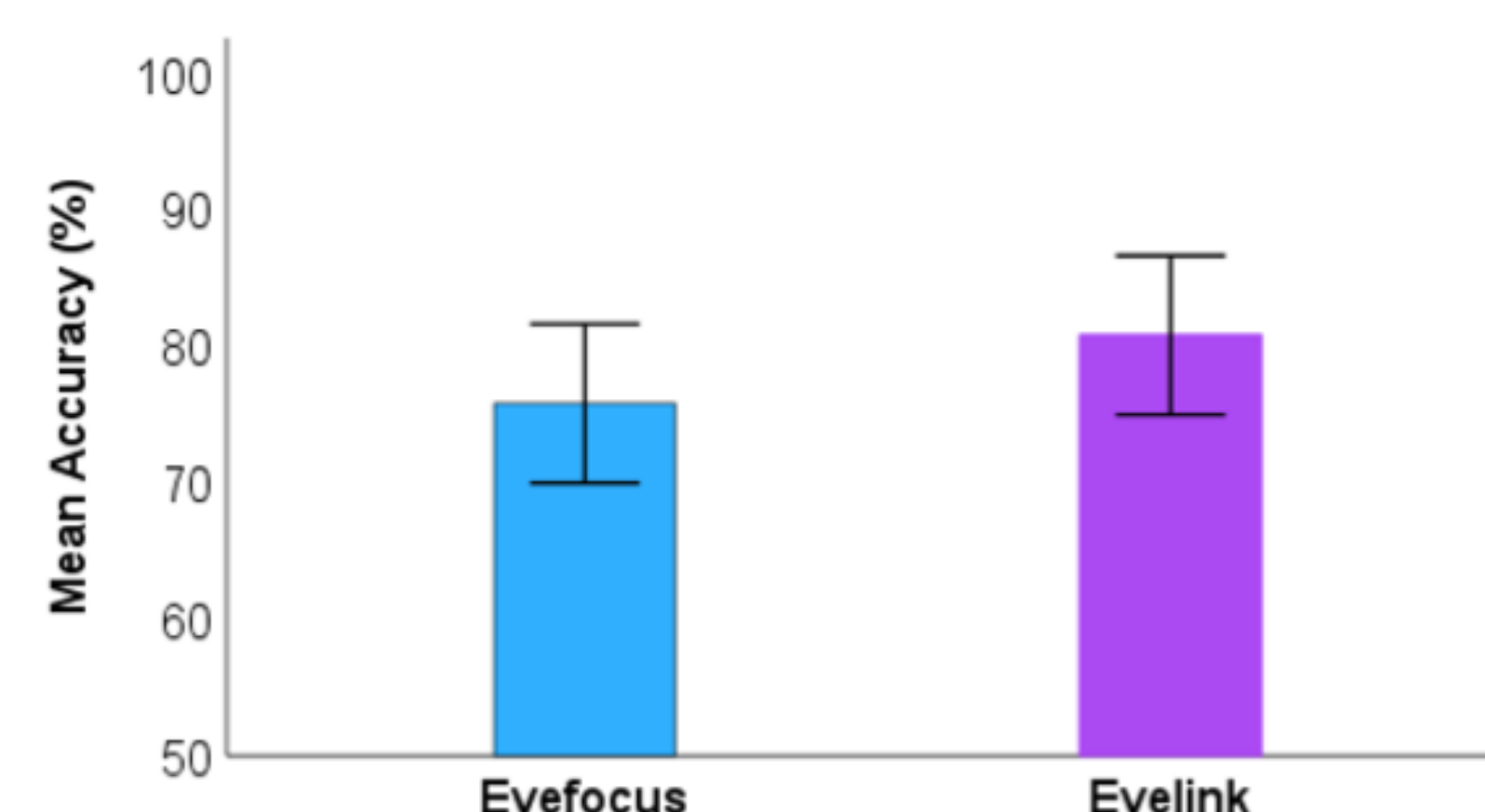


Usability scale and Semi-structured interview

Preliminary results and conclusions

Developing new technologies for home-based therapy, validating their performance, and enhancing their usability is crucial for improving rehabilitation accessibility and personalized therapy while reducing the burden on healthcare systems

- Participants, N= 12, 65+, show no significant difference in accuracy between the EyeFocus and the industry-standard EyeLink 1000 eye-tracking system.
- Data collected will inform app improvements to enhance accessibility and tailor the experience to the target population



I think this is a very good idea. That'd be far more help than I ever had.
PB, 74 yrs., stroke survivor



I would suggest to anyone who's had a stroke to have a go at this.
DS, 63 yrs., stroke survivor

Thanks to our industry partner



References

- [1] Hammerbeck et al., 2019, Brain Sci., 9(12):374
- [2] IHME. (2022, April). Worldwide stroke prevalence. Statista.
- [3] King et al., 2020, Age and Ageing, 49(2):277-282
- [4] Esposito et al., 2021, APRM, 64(5)
- [5] Chandler et al., 2016, Cochrane Methods, Cochrane Database of Systematic Reviews.
- [6] Kerkhoff et al., 2013, NNR, 27(9):789-98
- [7] Kerkhoff et al., 2014, NNR, 28(6):554-63
- [8] Chen et al., 2019, Int. J. Med., Inform., 123:11

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