

## Final Report

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### **Project Summary: Improving the diagnosis of spatial neglect after stroke**

#### ***Background:***

Every 20 minutes someone in Australia suffers a stroke and approximately half of the stroke survivors have spatial neglect. Persons suffering from spatial neglect are not paying attention to the space opposite of their brain lesion and severe forms of neglect can lead to numerous debilitating behaviours.

The presence of neglect is associated with poor functional outcomes, extended hospital stays and higher assisted care requirements. While the diagnosis of severe forms of spatial neglect is straightforward, measuring more subtle forms can be challenging. There is evidence that some neglect patients demonstrate neglect behaviour during everyday activities despite presenting with no signs of neglect on standard neuropsychological assessments.

Considering the low-test sensitivity of current tests, this project investigated the use of eye-tracking as an alternative assessment option. Assessing eye movements are a promising candidate for spatial neglect diagnosis due to the close association between spatial attention and eye movements.

Using eye-tracking glasses, we were able to measure eye movements while patients walked a designated course and searched for targets placed on the corridor walls. It was predicted that assessing patients in real-world environments would provide a more sensitive and reliable measure of neglect than common clinical neglect tests.

#### ***Findings***

We assessed a total of 20 stroke survivors (neglect patients and patients with hemianopia but without neglect) with standard neuropsychological assessments and during walking a designated course. The two patient groups did not statistically differ in standard neglect tests (line bisection ( $p = .178$ ), bells task ( $p = .076$ )) – speaking to the low sensitivity of some classical neglect tests.

While walking the course, neglect patients detected less left-sided targets ( $p = .003$ ), made more right-sided fixations ( $p = .039$ ), spent more time searching on the right and made more saccades towards the right compared to hemianopic patients – speaking to the idea that neglect becomes more apparent in real-world settings and when monitoring eye movements.

***Unanswered Questions:***

The current study highlights the potential benefits of assessing neglect in more natural settings and real-world environments. Eye-tracking demonstrated to be an objective measure for differentiating neglect and hemianopic patients during the walking assessment.

Although eye movement assessment seems sufficient to detect neglect, it is not currently clear whether the addition of the measure significantly adds to the diagnostic information derived solely from counting the targets missed by patients when they walk a designated course. This is an important consideration because assessing and analysing eye movements will require substantial resources. For instance, in a clinical setting a clinician would require extensive training to use the eye-tracking equipment and would need to be competent in analysing eye movement data to determine the presence or absence of spatial neglect.

Furthermore, there is currently no gold standard eye movement outcome which is recommended to clearly differentiate between neglect patients, controls, or other patient populations. Further research is required to uncover the most sensitive eye movement measure to detect neglect symptoms if eye movements are to be utilised for spatial neglect diagnosis.