

Chronic Stroke Rehabilitation: Exploring Technology and Neuromodulation Across Domains

26th June 2017

Workshop report

Chronic Stroke Rehabilitation: Exploring Technology and Neuromodulation Across Domains was a day workshop held at the University of Surrey on 26th June 2017. The event was co-organised by Hannah Thompson (Psychology), Annette Sterr (Psychology), Sofia Khan (biochemical sciences) and Cornelia Kranczioch (Psychology, University of Oldenburg). 40 attendees, including 12 speakers attended the workshop which included presentations and interactive question and answer sessions.

Workshop objectives

This multidisciplinary workshop sought to bring together clinicians, neurologists and researchers working in different domains, with the common purpose of using cutting-edge technology and neuromodulation in chronic stroke rehabilitation. This includes techniques such as transcranial direct current stimulation (tDCS) and virtual reality. These techniques show promising results for rehabilitation in chronic stroke patients across several domains, but as yet this work has not been linked.

Summary of Presentations

Our workshop was opened by **Hannah Thompson**, lecturer of psychology at the University of Surrey, who introduced our first invited speaker, **Pierre Petitet** from Oxford who looked at right hemisphere stroke patients with neglect and used tDCS to increase prism after-effect persistence, improving attention deficits. Papers then followed under the theme of visual deficits, with **Raquel Viejo Sobera** from the Universitat Oberta de Catalunya, Barcelona discussing transcranial magnet stimulation to target neglect. **Elena Olgiati** from Imperial College then concluded the session by discussing tDCS in the context of vigilant attention.

The next theme was introduced by our invited speaker, **Pedro Kirk** from Goldsmiths, who discussed his project to improve motor movements through the use of bespoke musical instruments. This was then followed by free papers from **Ulrike Hammerbeck** from Manchester, who discussed robotic manipulandum in the context of reach movement. **Annette Sterr** from Surrey then concluded this theme discussing sleep in motor rehabilitation, and the correlations between problems with sleep and recovery.

The language theme began with a presentation from **Anna Woollams** from Manchester, who opened discussed about limitations of tDCS in terms of how to measure recovery, where to stimulate and how best to incorporate it with behavioural treatment. **Jenny Crinion** from UCL continued this debate by showing her work on training and tDCS including MRI work. **Sheila Kerry**, from UCL, discussed tDCS in the context of central alexia, and how reading can be facilitated after training and tDCS. After a break, **Glyn Hallam** from York then discussed his work on training improvements in comprehension which included MRI evidence suggesting brain plasticity. **Richard Talbot** from City then began the final session on virtual reality, showing how a stimulating virtual environment can be beneficial to improving aphasia. Finally, **Lotte Meteyard** and **Holly Robson** from Reading linked both motor and language training in a combined activity, suggesting patients with multiple deficits can be aided through a more collective approach.

Event themes

Discussion and papers highlighted several key themes to the current work. The main points to emerge were:-

- The amount of treatment required to gain an effect may be different across domains. Domains such as motor movement require repetitive perseveration of the same movement.

Domains such as language require a more varied approach, and effects can be seen with fewer therapy sessions.

- Portability of treatment:- Access to tDCS kits can now be used by patients at home. There was also discussion about the impact of safety on improved portability of technology. A number of discussed treatments used apps, but some with limited portability had drawbacks of where to store equipment
- There was wide discussion about implementing research successes into clinical practice, and the trade-off between scientific rigour of controlled conditions in treatment, and the benefits of simply having a treatment that is enjoyable which patients freely opt to use in their own time.
- Several presentations noted that a limitation is a lack of generalisability. It may be that motor rehabilitation naturally lends itself to generalisability (context-generalisability) more than language, although this is still to be explored.

Next steps - Outcomes

Several outputs based on the workshop and other activities are planned by the organising committee. This includes publications from the organisers and fellow attendees of the workshop. Workshop participants will remain in contact with a view to future collaborations, including attendees of the workshop returning to the University of Surrey to give a talk on their area of expertise to the department.

Acknowledgements

Sponsors, helpers, and anyone deserving particular praise

The organisers are grateful to the Institute of Advanced Studies for financial support and particularly to Mirela Dumic for her support and advice in organising the workshop. We are also grateful to the School of Psychology at the University of Surrey for their support. Finally, our thanks to all our presenters and participants for their interesting, stimulating and thought provoking contributions. Hannah Thompson, Annette Sterr, Sofia Khan and Cornelia Kranczioch

Email: h.thompson@surrey.ac.uk