**Exploring the Feasibility of Automating Verbal Fluency Tasks for Cognitive Assessment: Data Collection and Analysis**

Ronan O’Malley 1, Eric Brook 1, Alice Lewis 2, Isobel Sonksen 2, Bahman Mirhedari 3, Annalena Venneri 4, Heidi Christensen3 , Daniel Blackburn 1

1 Sheffield Institute for Translational Neuroscience; 2 University of Sheffield School of Medicine; 3 Centre for Assistive Technology and Connected Healthcare, University of Sheffield; 4 Academic Unit of Neurology, University of Sheffield.

**Introduction:** Fluency tests are widely employed in the assessment of cognition. We assessed the feasibility of integrating these tasks into an automated cognitive assessment tool; the “Digital Doctor”.

**Methods:**  15 each of healthy controls (HC), Alzheimer’s disease (AD) and mild cognitive impairment (MCI) were recruited. Participants named as many words beginning with P (phonemic fluency) and as many animals (semantic fluency) as they could within one minute.

**Results:**

Manual Analysis: HC named the same number of words for both tasks compared to normative data. Patients with AD and MCI were able to complete the task and Z-scores showed significant decreases in category fluency between the AD and HC groups, -2.25.

Automated Analysis: Automatic Speech recognition (ASR) was 77.9% accurate for semantic testing and 64.8% for phonemic testing, ASR overestimated the mean scores in the AD and MCI groups. Comparison of phonemic fluency in AD compared to HC yielded a significant Z score, -2.17.

**Conclusions:** Automated collection of fluency data is feasible and comparable to manually collected data. The over-estimation of the number of correct responses provided by the ASR will be improved with more data along with training of the Machine Learning algorithms to recognise certain, expected words.