

AMBULATORY MEASUREMENT OF DUAL-TASKING BEHAVIOUR: METHOD AND PRELIMINARY EVALUATION IN OLDER ADULTS

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INTRODUCTION

Along with amnesia, decline of attention control of executive functions is among the earliest symptoms of dementia. Task performance under conditions of divided attention, or dual-tasking, are sensitive indicators. In particular, there is mounting evidence of poor performance of walking and talking simultaneously in patients with Alzheimer's disease [1]. While the laboratory evidence has been growing, there is a lack of translational research examining dual-task behaviour in everyday life. The objectives of this study are to: 1) develop an ambulatory technique of capturing dual-tasking behaviour and, 2) characterize the frequency of naturally occurring dual-task events in older adults.

METHODS

Ten community-dwelling older adults without mobility or cognitive impairment participated in the study. Ambulatory dual-tasking behaviour was assessed over a 3 daytime collection period (\approx 24 hrs). Participants wore: 1) 3-D accelerometers (X6-2 Mini, Gulf Coast Data Concepts, Inc.) on each ankle, and 2) a microphone attached to a smartphone (Nexus 1, Google, Inc.). For privacy, the audio recording system allowed the ability to be turned off and to remove previously recorded data.

Ankle acceleration data was high-pass filtered to remove gravity, followed by identification of bilateral limb activity using a cross-spectral approach. Time segments with bilateral leg activity were then inspected visually to confirm walking (\geq 3 steps). Audio data corresponding to the gait periods were segmented from the full record, and a standard voice activity detection algorithm (G.729, [2]) was applied. Detected voice activity was confirmed manually by a researcher.

RESULTS

To date, data from 2 of 10 participants have been processed. Over the 3 day collection, the total number of gait segments observed was 1085 and 807 for participant 1 (P1) and 2 (P2), respectively, with mean durations of 11.3s (P1) and 7.1s (P2). Corresponding audio data was recorded for the majority of the gait segments [P1: 673/1085 (62%); P2: 696/807 (86%)]. Verbal activity was detected in 297/673 (44%) and 252/696 (36%) of the gait segments for P1 and P2, respectively.

DISCUSSION AND CONCLUSION

The first objective of developing an ambulatory technique of capturing dual-tasking behaviour was achieved. Participants complied with wearing and using the equipment throughout the collection. Efforts to meet the second objective of characterizing dual-task activity are on-going. Surprisingly, initial data from 2 participants yielded occurrences of dual-tasking in greater than $\frac{1}{3}$ of gait periods (with a corresponding audio record). On-going work is focused on analyzing the remainder of the collected data and examining the influence of dual-tasking on gait characteristics (e.g., cadence, step time variability). Future work will extend collection to examine ambulatory dual-task behaviour in cognitively-impaired populations.

REFERENCES

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