

N. MANA, O. MICH, M. FERRON. *Are mid-air gestures perceived as strenuous when used to interact with mobile technology by older adults?* *Gerontechnology* 2018;17(Suppl): 85s; <https://doi.org/10.4017/gt.2018.17.s.085.00>

**Purpose** Mobile devices, able to meet needs and expectations of older adults, are fundamental to improve their independent living and maintain their social inclusion. Although mobile technology is nowadays widely present in every-day activities, older adults continue to lag in its adoption. This may be due to low self-confidence and technological familiarity, but also to cognitive and physical age-related functional decline (e.g. difficulty in selecting small buttons or in distinguishing fine details), which prevents an optimal use of touchscreen devices. Multimodal interaction, leveraging and combining multiple interaction modalities (e.g. touch, speech, vision and gesture), is a possible solution. However, the perceived exertion while performing multimodal interaction might be an obstacle. For example, a recent study<sup>1</sup> found that, although able to complete all the tasks using different gestures to interact with a Leap Motion sensor connected to a laptop, older adults reported more fatigue than younger users. Within the ECOMODE project<sup>2</sup> we investigated with a group of older adults how fatigue increases with interaction time when using the ECOMODE prototype<sup>3</sup>.

**Method** We involved a group of 17 older adults (9 males, 8 females; mean age = 69, SD = 7.3; range = 60-86) to investigate the fatigue they perceived while performing mid-air gestures interacting with the ECOMODE prototype, installed on an 8.0-inch tablet device. In particular, we asked the participants to carry out a series of defined interaction tasks that consisted in performing mid-air gesture commands with one hand while standing and holding the tablet with the other hand<sup>3</sup>. Within 3 intervals of 3 minutes each, we asked participants to score their perceived exertion on the Italian version of Borg's CR10 Scale<sup>4</sup>.

**Results & Discussion** A repeated measures ANOVA showed that the perceived exertion significantly increased between time-points ( $F(2, 26) = 21.8$ ;  $p < .001$ ; Mean fatigue at minute 3 = 2.5, SD = 1.9; Mean fatigue at minute 6 = 3.6; SD = 2.2; Mean fatigue at minute 9 = 4.8, SD = 3). This would suggest that a continuous short multimodal interaction (i.e. < 6 minutes) could be feasible for older adults. Taking into account that in realistic application contexts a continuous prolonged interaction is unlikely, multimodal interaction can be considered for this target group.

#### References

1. Cabreira AT, Hwang F. How Do Novice Older Users Evaluate and Perform Mid-Air Gesture Interaction for the First Time? In Proceedings of the 9th Nordic Conference on Human-Computer Interaction 2016 Oct 23:122. ACM.
2. <http://www.ecomode-project.eu>
3. Ferron M, Mana N, Mich O, Reeves C. Design of multimodal interaction with mobile devices. Challenges for visually impaired and elderly users. In Proceedings of the 3<sup>rd</sup> International Conference on Human Computer Interaction Theory and Applications (HUCAPP). 2018 Jan 27-29
4. Borg G. Borg's perceived exertion and pain scales. Human kinetics; 1998

*Keywords:* older adults, mobile technology, multimodal interaction, mid-air gestures  
*Address:* Fondazione Bruno Kessler, Trento, Italy;  
*E:* mana@fbk.eu



Figure 1. The ECOMODE prototype



Figure 2. A participant using the prototype