M.A. Rupp, E.L. Parkhurst, J.A. Smither. ***Usability of assistive robotic interfaces.*** *Gerontechnology 2016;15(suppl):24s*; doi:10.4017/gt.2016.15.s.754.00 **Purpose** We compared two user interfaces (UI) for a 6-degree of freedom wheelchair-mounted robotic arm (WMRA) designed to increase independence for upper body reach limited individuals (e.g. wheelchair users). The purpose of our study was to identify user concerns of each UI and improve their design. The current study was conducted using users with a normal range of motion in order to identify overall concerns that can be addressed before focusing on issues specific to reach-limited users. **Method** We randomly assigned 10 healthy older adult participants (M=62.90, SD=5.8) without cognitive or visual impairment to interact with one of two interfaces (A or B). Interface A included comparatively more labels and icons and used a body analogy. Interface B used fewer labels and icons compared to Interface A to define each function (*Figure 1*). First, participants received an introduction to assistive robotic devices and WMRA's for context. Participants were next guided through a tutorial of the interface then completed a cognitive walkthrough while stating aloud how they would use the interface to complete each task. The researcher took notes of the interaction. The walkthrough included several tasks designed to include all movement controls of the system (e.g. rotating, panning, and tilting the gripper to pick up a book or a dropped medicine bottle). After the walkthrough, we administered the System Usability Scale (SUS[1]), the desire for continued use 3-question scale, and open-ended questions to elicit design feedback. After this, we gave the participant the guided tutorial on the second interface and re-administered the SUS, the continued use measures, and the qualitative questions. **Results & Discussion** Repeated-measure ANOVAs on SUS and the Desire for use did not reveal any significant differences; however, when asked which interface was preferred, more participants chose Interface A (80%) over B (20%). Our analysis of qualitative data provided several suggestions to improve system design. General feedback included: 90% of users wanted a joystick over the touch screen; 40% felt movement speed was too prominent and instead would have preferred a delicate objects mode instead. Interface A: 30% did not like the separation between the arm and gripper controls. Interface B: 70% liked that buttons were co-located, but wanted separate labels for the arm and gripper controls, 60% were confused about the controls for rotate, pan and tilt, and 30% found using '0' for the slowest speed confusing. We used this feedback to improve UI design incorporating the detailed labels of UI A, but the 1-screen design and simplified feedback window of UI B and added the option for a touch screen or 3D-mouse. Conducting user research early in the design process allowed us to improve the UI design before testing with individuals that have specific reach limitations allowing for a more usable and effective design.

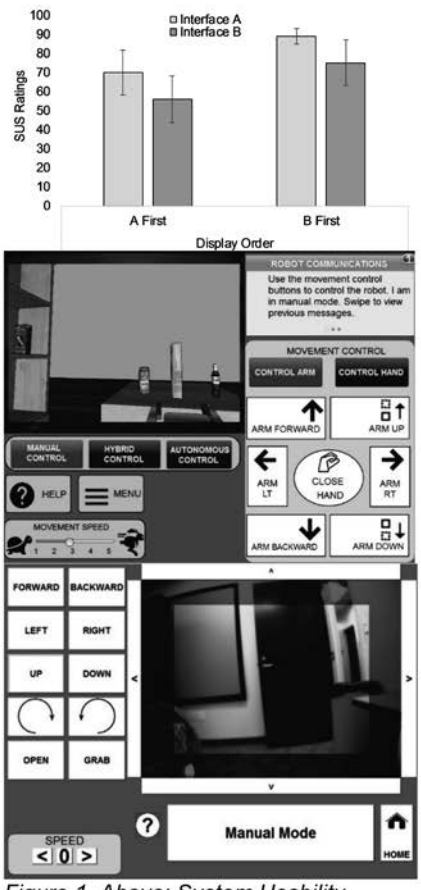

Figure 1. Above: System Usability Scores (SUS) for interface A and interface B by two different order conditions (received Interface A first or B first). Error Bars indicate Standard Error; Below: Mock-ups of both Interfaces (Upper A; Lower B)

References

1. Brooke J. SUS: A quick and dirty usability scale. In: Usability evaluation in industry. London: Taylor and Francis; 1996; pp 189-194

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