

J.T. MATTHEWS, S. SEREIKA, S. ENGBERG, J.C. ROGERS, S. THRUN. *Responsiveness of older adults to navigational guidance from mobile robots in retirement communities. Gerontechnology 2010;9(2):308; doi:10.4017/gt.2010.09.02.196.00*

Purpose As people age, changes in cognitive processes affect their ability to acquire and use information about the spatial structure of their environment¹. Disorientation and wayfinding difficulty, often early manifestations of progressive neurodegenerative disorders (e.g., Alzheimers, Parkinson's disease)^{2,3}, may also interfere with older adults' ability to move purposefully from one location to another and typically worsens with disease progression⁴. Degradation results in impaired performance of tasks requiring spatial planning, spatial memory, decision making, and mental representation⁵, such that the return trip from a destination can pose as much of a challenge as finding it from the original point of departure⁶. Mobile robotic devices capable of providing physical and cognitive assistance with navigation, to older adults in complex residential settings, hold promise for mitigating the disability associated with these impairments. Yet, little is known about how older adults respond to such intelligent technologies^{7,8} and the means by which they offer navigational guidance. **Method** We conducted a field trial in three southwestern Pennsylvania retirement communities with 28 older adults (7 males, 21 females; mean age: 82.82±4.96 years) with and without physical or cognitive impairment, for the purpose of observing their response to navigational guidance provided through audio, video, and gestural cues offered by two mobile robots operating autonomously or using a Wizard of Oz approach. Participants completed three sets of four, randomly-ordered, 200-foot walks in their own retirement community, on three occasions, over a two-week period. They were guided to an unknown destination by a humanoid robot known as Pearl and a robotic walker (8 walks) named the Intelligent Mobility Platform (IMP). Twelve participants (43%) normally used a cane or walker, and three (11%) had a MMSE score between 17 and 24. On a scale from 0 to 10, the participants evaluated guidance features of Pearl (voice, head motion/gestures) and the IMP (text, voice, graphical display) after each walk. **Results & Discussion** Both robots were rated highly (range of means: 7.90-9.21) for ease of use, comfort, security, walking stability, and confidence in the robot's ability to provide guidance to an unknown destination. Mean ratings were low (range: 0.87-1.63) for frustration and fatigue. After brief introduction and practice, participants readily learned how to follow Pearl and operate the IMP. Both robots were well received, though many participants suggested making the IMP (~43 pounds) lighter and enabling Pearl to recognize them and understand when/why they would stop or change their pace and route. Such 'person-awareness' warrants consideration by technology developers.

References

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Figure 1. The Pearl

Figure 2. The IMP