Introduction

As people age, they experience increasing impairments that affect how well they perform tasks using computers. One study, commissioned by Microsoft, shows that “the increase in severe difficulties and impairments occurs among people in their 60s and early 70s” (Microsoft, 2003). The same study shows that the average age of computer users is rising. The authors estimate that “in 10 years, there will be 2.5 times as many adults who range from 65 to 74 years old using computers as there are today” (Microsoft, 2003).

One of the most common impairments is motor impairment. The Microsoft study found that among the working-age adults (ages 18 to 64 years) responding in their study, 26% have a “dexterity difficulty” (Microsoft, 2003). Another study shows that motor impairment affects how well users perform computer tasks using a mouse. Smith, Sharit, and Czaja found that older adults (ages 60 to 75) had more difficulty than younger adults with clicking and double-clicking a mouse resulting in “longer movement times, more submovements, and more errors” (1999). The researchers suggest “age-related differences in motor control might make it difficult for older people to use mouse control devices” (Smith et. al., 1999).

Riviere and Thakor (1996) also found that “factors such as advanced age and movement disorders” (14) may cause greater inaccuracy when performing a tracking task with a mouse. Slowing the acceleration of a mouse may assist older computer users. Quoted in the Smith, et. al. (1999) study is a 1996 study by Walker, Millians, and Worden who found that a mouse with low acceleration “aided older users, particularly for small targets” (Smith et. al., 1999).

The rising age of computer users combined with those users’ impairments point to the need to make computers and the Internet easily navigable for older people. One alternative to mouse navigation is the use of keyboard shortcut navigation. According to one study, keyboard shortcut navigation is easier to use than a mouse for computer users who have severe arthritis, carpal tunnel syndrome, multiple sclerosis or other motor impairments because “clicking a single key or combination is a lot easier than try to position a mouse just so to click on a link or menu option” (Thomason, 2001). Yet little study has been
given to this low-cost and simple alternative to using the mouse or purchasing accessibility technology software.

This study will examine improving accessibility through the use of keyboard shortcut navigation. We will compare the performance of three groups of people, ages 65 to 75. One group will perform tasks by navigating Web sites with a mouse at medium acceleration, a second group will use a mouse at slow acceleration, and the third group will navigate using keyboard shortcuts.

**Hypothesis**

Teaching older adults (ages 65 to 75) to use keyboard shortcuts to navigate Web sites will increase their navigation accuracy and speed.

**Variables**

**Independent variables**

- **Age** – People of advanced age (ages 70 and over) may experience more severe motor impairments or even multiple impairments, such as a vision and a motor impairment, which would increase navigation difficulty.

- **Computer and Mouse Experience** – Previous experience using a computer or a mouse will likely improve participants’ navigation speed and accuracy, either with a mouse or with the keyboard shortcuts.

- **Impairments** – The type of impairment, level of severity of impairment, and the existence of multiple impairments will affect the level of difficulty participants experience while navigating Web sites.

**Expected Outcomes**

Participants will perform tasks more quickly and accurately using keyboard shortcuts to navigate than with a mouse at medium acceleration. Participants will perform tasks more quickly and accurately using keyboard shortcuts to navigate than with a mouse at slow acceleration. Participants will prefer keyboard shortcut navigation to using the mouse at either medium acceleration or slow acceleration.

**Design**

**Participants** – Participants in the study will be volunteers responding to fliers posted at a local senior citizens center. The fliers will explain the study and the time commitment required. We will select
participants who are ages 65 to 75 years old. We will randomly divide the participants into three groups. Because of the need to observe and time the performance of each participant, we will limit participants to 30 total, or ten in each group.

**Location and Time** – The test will take place in a classroom with personal computers, probably located at a local community college. The study will take approximately 2 hours to perform. We will use the latest version of Microsoft’s Internet Explorer for the test.

**Pre-test Questionnaire**– We will give the participants a pre-test questionnaire to verify age, computer experience, and impairments, if any, and the level of severity of those impairments. We will also ask the participants about their expectations of the test and of their performance and about any prior difficulty or success with any computer navigation device. This part of the study will take 15 minutes.

**Tutorial** – Before the test begins, we will tutor the participants briefly on how to navigate using either a mouse or keyboard shortcuts. Mouse tutorials will include learning to point, click, and double-click. The mouse groups will also learn how to adjust the speed of the mouse. In addition to a tutorial, the participants in the keyboard shortcut group will receive a reference card to refer to during the test. The reference card instructions will be taken from Microsoft’s Internet Explorer help menu. This part of the study will take 15 minutes.

**Test** – The test will consist of five tasks the participants will perform through the Internet, including locating an online class and finding information through a search engine. Some tasks are based on Jakob Nielsen’s usability study (Nielsen, 2002). Since older participants in Nielsen’s usability study took an average of 12 minutes to complete a task (Nielsen, 2002), we will allow 15 minutes for each task. This part of the study will take approximately 1 hour and 15 minutes.

**Measurement** - Each of five observers will time two participants as they perform each task and will note the accuracy of navigation. Speed and accuracy will be measured based upon performance measurements described in Jakob Nielsen’s “Usability for Senior Citizens” study (Nielsen, 2002). These are as follows: 

1. Success rate – task completed correctly,
2. Time on task – minutes and seconds,
3. Errors – erroneous actions per task, and
4. Subjective rating – using a scale from 1 (low) to 7 (high).
**Post-test Questionnaire** – After the test, the participants will complete a questionnaire rating their own performance and the navigation method they used to perform the test. They will also describe how their performance could have been improved, for example, by a longer tutorial or practice time or by using a different navigation device. This part of the study will take 15 minutes.

**Results Analysis** – The results will be analyzed using an f-test to test the independent variables (age, computer experience, and impairments) against the test results for statistical significance.

**References**


