Chapter 5.25
Mobile Evaluations in a Lab Environment

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ABSTRACT

The evaluation of mobile applications is increasingly taking into account the users of such applications' mobility (e.g., Mizobuchi, Chignell, & Newton, 2005; Mustonen, Olkkonen, & Hakkinen, 2004). While clearly an important factor, mobility on its own often does not require the user's visual focus to any great extent. Real-life users, however, are required to be aware of potential hazards while moving through their environment. This chapter outlines a simple classification for describing these distractions and two evaluations into the effect visual distractions have on the users of a mobile application. In both cases, the participants were required to monitor both their environment and the display of their mobile device. The results of both evaluations indicated that monitoring the environment has an effect on both task performance and the subjective workload experienced by the participants, indicating that such distractions should be considered when designing future evaluations.

INTRODUCTION

Mobile computing devices are becoming increasingly popular but the evaluation of such devices has not developed at the same rate. Many early evaluations were undertaken on desktop emulators, often because the real devices were not capable of supporting the applications being evaluated. As the availability and power of mobile devices grew, so too did their use in evaluations, but these evaluations were often still run in a static laboratory environment carefully devoid of distractions. Gradually, however, mobility has become an increasingly common component in the evaluation of mobile devices. Clearly, the fact that a user is likely to be mobile is the single greatest difference in context between users of mobile and

desktop devices. This mobility, however, leads to dynamic changes in users' context which may mean the users are not capable of solely focussing on the task at hand. Users may, for example, have to use their visual focus to navigate or they may be listening to a conversation while receiving audio feedback from their device.

This chapter describes two evaluations investigating how visual distractions affect the task performance of a mobile user. In the first evaluation participants were required to navigate a virtual 'maze' using different forms of navigational cues. While navigating through the maze, the participants were required to monitor projections on either side of them. In the second evaluation the participants were required to monitor the display of their wearable computer while moving through a lab and monitoring projections in front of them. The design of both evaluations highlighted the benefits in making the experimenter mobile while running the evaluation. The results showed that forcing the participants to monitor their environment had an impact on the results and should, therefore, be considered in the design of all mobile evaluations.

The remainder of this chapter is structured as follows. The second section gives an overview of the state of the art in mobile evaluations while the third section introduces a classification that can be used to describe the different forms of distraction that can affect mobile users. The fourth and fifth sections describe two experiments that evaluated the effect of visual distractions on users of mobile applications while the sixth section discusses the results of these evaluations in terms of their experimental design in general, and the distractions used in particular.

MOBILE EVALUATION

There are many examples of mobility having an effect on a user's task performance. Brewster, for example, showed that the amount of data entered using button presses was significantly reduced when comparing a seated, indoor user with a mobile, outdoor user (Brewster, 2002). It was also found that the subjective workload experienced by the participants was significantly increased. Brewster suggests that this is not surprising and goes on to say that further research is required to develop appropriate evaluation techniques for the evaluation of mobile devices in realistic situations. This section presents previous research that has incorporated mobility into the evaluation of mobile applications; and in particular, where it has been used in lab evaluations.

Mustonen et al. (2004) investigated the effect of walking on the legibility of mobile phone text. Four walking conditions—natural speed in a corridor, natural speed on a treadmill, fixed speed of 1.5 km/h on a treadmill, and fixed speed of 3 km/h on a treadmill—were compared to determine if the effect of mobility varied with speed. It was found that although mobility had an effect on legibility when reading normal text, there was no significant effect when parsing pseudo-text with a view to finding a text pattern. The overall workload of both tasks, as measured by NASA TLX ratings (Hart & Staveland, 1988), was significantly effected by mobility.

Mizobuchi et al. (2005) investigated the effect of walking on text input. Participants were required to enter English language sayings using one of four sizes of soft keyboard when either stationary or walking along a corridor. The size of the keyboard had a significant effect on the text input speed but walking had no significant effect on the speed. Furthermore, walking only had a significant effect on the number of errors when the participants were using the smallest keyboard. It is suggested that these results indicate that text input and walking can, in general, be viewed as separate tasks that have no effect on each other apart from a fixed cost to each task due to the presence of the other. This was indicated by a

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