Chapter LVI

Three Eye Movement Studies of Mobile Readability

Gustav Öquist
Karolinska Institutet, Sweden

ABSTRACT

Readability is important for mobile usability since text is the preferred way of dealing with information over distances in time and space. Making it easy to read on mobile devices has, however, proved difficult, primarily since the accustomed way to present texts is at odds with the limited screen space available. Simply enlarging the screen is an obvious solution, but since mobile devices need to be small to be mobile, this is just not viable. Instead, ways need to be found to present texts on small screens that facilitate the level of readability we are used to. To be able to do this, methods for evaluating novel text presentation formats on mobile devices are needed. This chapter presents findings and experiences from three readability studies where eye movement tracking has been used to learn more about how to improve readability on mobile devices.

INTRODUCTION

We live in revolutionary times. Information technology has radically changed both how information is shaped, how we work with it, and last but not least, how access to it is gained. Written language has ceased to be bound by the physical surface words which are scribed upon and have transitioned into a virtual realm. Now, texts are fundamental for the use of computers since almost all services and applications are based upon it in one way or another. With the introduction of the Internet, the greatest challenge in information access has become to find what you are looking for rather than how to gain access to it (Sahami, Mittal, Baluja, & Rowley, 2003). With the introduction of network connected mobile devices, such as mobile phones and personal digital assistants (PDAs), any electronic text can be displayed on any screen, anywhere and anytime. The mobile Internet has for several years been predicted to be the next big thing in how information will be accessed, and the predictions are well founded. Today there are over 2.5 billion users of mobile
Three Eye Movement Studies of Mobile Readability

phones globally; the figure is more than twice as large as the number of Internet users and growing at a rate of 40 million per year (Wireless Intelligence, 2006). In a few industrialized countries there are now more mobile phones than citizens, and in many developing countries, a mobile phone will probably be the first computational device that most people will come to own (GSM Association, 2006). However, regardless of the fact that mobile devices are readily available and most of them are network connected, the predicted success of the mobile Internet has so far not been realized.

There are many different reasons for the slow uptake of the mobile Internet. Service providers made a mistake by promising too much too soon when claiming that the Wireless Application Protocol (WAP) was the same thing as the Internet, which it never was and never will be. Producers of mobile devices made a mistake by not providing opportunities for third party developers to create applications. Companies have not been keen to invest in mobile solutions due to lacking standards and business models. Consumers have not thought of mobile phones as computers, but rather as phones for making calls. Developers, whom actually have thought of mobile phones as computers, failed to recognize that reusing desktop interaction methods might not be the ideal solution in a mobile setting. However, all of this is changing. Service providers now offer access to the real Internet and third party developers can create applications; something that combined makes it possible for companies to build upon existing standards to extend existing, or invent new, business models. The companies can then market these services to consumers, which make them realize that their phone can be used for so much more than talk. Developers have begun to explore and utilize the novel interaction possibilities offered by mobile devices, but there is still much that remains to be done. Challenging how things are done today is the first step towards succeeding in doing it tomorrow.

When wireless phones were enhanced with computational functionality and became Internet connected they inherited the interaction methods and office metaphors of the direct manipulation paradigm, justifiably so since these tools already had proved to be extremely useful for interaction with computers (Schneiderman, 1982). Nonetheless, the usefulness of any tool is dependent on a combination of design and use, and these tools were never intended for interaction with devices based on a design derived from mobile phones, moreover, used in a nomadic environment. It is important to see that limited input and output capabilities due to smaller keyboards and screens are not optional, they are a prerequisite since mobile devices have to be small to be mobile (Öquist, Goldstein, & Chincholl, 2004). This chapter focuses on the conflict between how text is traditionally presented, which requires a fairly large area to draw the text upon, and the limitation mobile devices put on the screen size available for this. One approach to overcome the size constraints may be to design interfaces that utilize the possibilities offered by mobile devices to dynamically work with the text and present it in a more suitable way for the user. Any such new presentation format must, however, still adhere to the principles for reading that has evolved over time. Moreover, to be able to see if the novel formats work, methods are needed to empirically evaluate them in usability studies. This chapter presents three usability studies where novel text presentation formats were evaluated on mobile devices. Apart from looking at factors such as efficiency and task load, eye tracking was used as tool to learn more about the formats. Although the results are interesting, the focus of this chapter will be on the methods used in the evaluations.

Any new format wanted to be used for text presentation must conform to how we are used to reading. Regardless of the device used for reading, or the format used for presentation, the physiological and cognitive limits for reading remain the same. A natural starting point for this chapter may, therefore, be an overview of the reading process and a clarification on what is meant by readability. This is followed by an introduction to text presentation on small screens and the merits and pitfalls of the most common approaches. Next, previous evaluations of readability on mobile devices are presented and the