Chapter 8.8
Non–Visual Programming, Perceptual Culture and Mulsemedia:
Case Studies of Five Blind Computer Programmers

Simon Hayhoe
London School of Economics, UK

ABSTRACT

This chapter describes an investigation into the premise that blind programmers and web-developers can create modern Graphical User Interfaces (GUI) through perceptions of MulSeMedia, and whether perceptual culture has a role in this understanding. Its purpose it to: 1) investigate whether the understanding of computer interfaces is related to perceptual culture as well as perceptual ability; 2) investigate whether it is possible for a person who has never seen to understand visual concepts in informational technology through non-visual senses and memories; and 3) provoke questions as to the nature of computer interfaces, and whether they can ever be regarded as MulSeMedia style interfaces. Beyond this, it proposes to: 1) inform accessible MulSeMedia interface design; and 2) investigate the boundaries of accessing computer interfaces through non-visual perceptions and memories.

In order to address these aims and objectives, this chapter discusses the following two research questions:1) Is the perceptual culture of a blind person as important as physical level of blindness in being able to understand, work with, learn how to use or create and program Graphical User Inerfaces (GUIs)?2) Can a cultural model of understanding blindness in part explain the difficulties in adapting Windows MulSeMedia applications for blind people?

DOI: 10.4018/978-1-61350-456-7.ch8.8

The study found that programmers who had been introduced to, and educated using a range of visual, audio and / or tactile devices, whether early or late blind, could adapt to produce code with GUIs, but programmers who were educated using only tactile and audio devices preferred to shun visual references in their work.

INTRODUCTION

It can be said that blind people have been using MulSeMedia for over three centuries. Since the development of pin-prick data sets in the early eighteenth century by the blind Cambridge mathematician Sanderson (Democodus 1774) and the evolution of embossed reading codes by Braille and Moon (Paulson 1987), technology has facilitated an interface for blind people beyond the standard elements of vision and sound. Indeed, it has only been in the latter quarter of the twentieth century that such technologies were usurped by the informal *everyman's* language of Windows, Icons, Menus and Pointers (WIMPs) and pseudo three-dimensional geometry, and that touch interfaces became outdated in information technology.

As Steve Alexander (1998) argued in a magazine article in 1998, "Blind programmers could compete quite nicely in the IT workplace when the mainframe was king. But today, as graphically oriented Windows tool kits displace the text-based mainframe development, blind programmers are facing an uncertain future." As the twentieth century drew to a close this not only made the use of information technologies more difficult to interpret by blind people, it also precluded blind programmers from developing computer applications in these new environments and thus participating in the development of information technologies and computer interfaces. As these technologies became more important in our modern cultures, it was believed that this also meant that people with disabilities of sight became more socially marginalised in business and communications, particularly as the world entered an era of rapid growth in the use of web technologies.

It was as a result of these assumptions that the author developed a research study that investigated the experiences of blind programmers and web developers[1], their educational backgrounds and the affects of this education on their ability to understand modern computer interfaces. The research began as a pilot study in late 2006, using data collected through questionnaires and interviews. The case studies described below then evolved from a post-pilot study analysis and was followed up by data collections over the course of the following two years. The aims of this study were: 1) to examine whether Steve Alexander's statement is valid; 2) to inform the teaching methodologies of IT and computing; and 3) to inform future accessible software development of MulSeMedia style interfaces for blind and visually impaired users. The objectives of this study were thus: 1) to inform a greater understanding of how blind and visually impaired computer users comprehend creating computer programs and two-dimensional interfaces used in the design of computer programs and web-pages; and 2) to inform greater access and equality for blind and visually impaired computer users in the work place and in their domestic use of technology.

What now follows in this introduction is a discussion of the context of this research. Firstly, The Author investigates traditional approaches of technologists to accessible hardware, software and educational methodologies; and secondly, The Author discusses alternative models provided by social researchers and authors in the related fields of the education of computing, technology and the visual arts.