

Designing and using efficient interfaces for switch accessibility

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Abstract. Access to Windows and Internet environments is now almost essential for learning and employment. These interfaces are not universally accessible to people with disabilities. However, they could provide such people with powerful tools for independence. There is therefore, a requirement for an alternative means of operating these systems. It is no longer acceptable or necessary to use conventional emulation of slow keyboard and mouse controls for doing this. This paper will demonstrate how such systems can be created, stressing the importance of providing alternative custom ergonomic solutions for people with severe physical disabilities. We shall also emphasise the important role the designer of a switch user's interface plays in this process and the requirements made of the 'normal' operating system. Examples of successful outcomes will be demonstrated.

1. INTRODUCTION

The ACE Centre has been concerned with providing tools for communication to children with physical and language difficulties since 1984. At the beginning only what now seem crude devices were available. Despite these limitations many groundbreaking communication systems were developed, programs that compare well even with those available today.

1.1 Challenges of windowing environments

The 'standard' user interface designs of all operating systems and mainstream applications often assume that it doesn't really matter where menus and buttons are placed on the screen. Buttons and 'hot' areas that are repeatedly used on different screens are rarely placed at consistent points. All in all this makes switch access to multimedia slow, laborious and even impossible. With the correct provision of access, switch users can fulfil their place in the world of work.

There is a core of people with severe problems for whom access to keyboard and mouse is impossible and key issues relating to effective access have emerged over the years since the advent of windowing systems. The first of these is the fundamental assumption that everybody can and wishes to control a graphical user interface exclusively with a mouse or trackball. This needs to be challenged.

2. THE SWITCH USERS AND THEIR INTERFACES

Most switch users access computers by means of scanning systems, often on-screen scanning keyboards or selection sets. (a collection of items on the screen that can be selected from.) A single item in a selection set can contain orthographic or symbol displays, output data including keystroke and sound, operating system commands and controls that modify the system. This description hides a range of needs that can be helped by quite subtle differentials in switch interfacing.) Using one or two switches to do anything is very slow and laborious; this is particularly true for mouse pointer control.

2.1 The designers role

The role of the interface designer is to match the needs of the severely disabled user to the capabilities of a range of applications, taking into account the intellectual and physical abilities. This normally requires the interface of the applications themselves to be compliant with the requirements of the switch input utility. The main requirements of the applications' interfaces in priority order are:

1. Direct keyboard shortcuts for all functions
2. All menu items to have single letter keyboard shortcuts
3. Menu access to all functions (through popup dialogues as necessary)
4. Mouse click only functions to be consistently placed on the screen
5. All mouse click 'hotspots' to be visible

2.2 Customising the switch user's interface

Utilities like SAW (Switch Access to Windows) provide the developer of systems for people with a broad range of disabilities with a powerful tool. SAW, gives great scope for producing efficient and custom designed user interfaces for switch users. Looking to the future the modular, Java based development system Comlink [Colven 96] will implement interfaces to Web based information retrieval for users who are unable to use orthographic systems.

The importance of the relationship in the interface design process between the designer and the switch user is critical and cannot be underestimated in the context of outcome. They should work in partnership with each other to produce flexible, fast and friendly access to a variety of software and hardware environments. This bond between the designer and the end user is intrinsic to the heuristic and iterative evolution and successful outcome of switch interfacing.

2.3 Selection methods

A simple or tracking scan is one where there is only one level, simpler selection set systems are easier to use and produce but are less efficient. The scan proceeds from one item to the next as set by the designer. Most 'simple to medium' complexity switch input systems allow a two level hierarchy of scanning and some are more complex, allowing for an unlimited hierarchy. In general the top layer of super-groups will be scanned first in the order set by the designer. [Venkatagiri 99] Row/column and column/row scans are special cases of the general group scan. They are set out in rectilinear grids where either the rows or columns are defined as the top-level groups and the columns in the rows or the rows in the columns are the bottom level items. These set-ups have the advantage of being easily edited by inexperienced designers.

REFERENCES

- [Venkatagiri 99] H. Venkatagiri y, Efficient Keyboard Layouts for Sequential Access, *AAC*, 15(2), 1999, pp 126-128.
- [Colven 96] D Colven, M Lundälv,, For SAW to Comspec, in *Med. Eng. Physics* 19 (3) 19996, pp 181-186.