Expectations and Their Forgotten Role in HCI

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INTRODUCTION

Technology with its continuing developments pervades the 21st century world. Consequently, HCI is becoming an everyday activity for an increasing number of people from across the population. Interactions may involve personal computers (PCs), household and domestic appliances, public access technologies, personal digital assistants (PDAs), as well as more complex technologies found in the workplace. Given the increasing use of technology by the general public, HCI assumes an ever-growing importance. User interactions need to be taken into account by designers and engineers; if they fail to do this, the opportunities presented by the new technologies will remain unfulfilled and unrealized. Furthermore, it is likely that those interactions that take place will be marred by frustration and irritation, as users fail to achieve the smooth transactions with the technology that they expect and desire. One aspect of HCI that appears to have been recently overlooked is that of expectations. When confronted with a new device or when using a familiar one, we have expectations about how it will or does work. These expectations are part of the interaction process and are important in the sense that they will influence our immediate and later use of the technology/device. It is suggested that in recent times we have neglected expectations and failed to consider them to any great extent in the design process.

BACKGROUND

Fifty years ago, expectations were recognized as having a role to play in human-machine interactions and the design of products. One of the first studies was concerned with the design of telephones (Lutz & Chapanis, 1955). At this time, Chapanis was working at Bell Laboratories, when a project was initiated to develop a telephone operated via a push-button keyset as opposed to a rotary dial. At that time, there was only one existing push-button model—the toll operators' keyset. The numerical part of this keyset comprised two vertical columns of five keys each. The first column included 4, 3, 2, 1, 0, while the second column held the numerals, 5, 6, 7, 8, 9.

However, when Chapanis studied the toll operators at work, he found that lots of miskeying was occurring. Although it was illegal to listen to calls, it was possible to do service observing where the number requested by the caller could be checked against the number dialed. It was found that 13% of long distance calls were being incorrectly dialed. In essence, the toll operators expected the numbers to be elsewhere. This led Chapanis to devise a study on the expected locations of numbers on keysets. The investigation had three aims: namely, to find out where people expected to find numbers and then letters on each of six configurations of 10 keys, and where they expected to find letters, given certain preferred number arrangements. In a questionnaire study, 300 participants filled in numbers/letters on diagrams of keysets according to the arrangements that they felt were the most natural. Analysis of this data allowed Lutz and Chapanis (1955) to deduce where people expected to find the various alphanumeric characters on a keyset.

In the 1950s, the discipline of HCI as we know it today did not exist; it was not until the launch of the first PCs that people began to recognize HCI as a distinct entity. Consequently, by the mid-1980s, there was a lot of information available on HCI for the designers of computer systems and products. One of the most comprehensive sources was the 944 guidelines for designing user interface software compiled by Smith and Mosier (1986). This 287-page report is still available online at: http://www.hcibib.org/sam/. Given the detail and breadth of this report, it is somewhat surprising that the topic of expectations is mentioned rarely; it is only referred to on five occasions, which are listed as follows:

Section on Flowcharts

1. "Flowchart coding within to established conventions and user *expectations*."
2. "… survey prospective users to determine just what their *expectations* may be."
3. Section on Compatibility with User Expectations
4. "… control entry are compatible with user *expectations*"
5. "User *expectations* can be discovered by interview, questionnaire, and/or prototype testing."
6. Section on System Load
7. "But load status information may help in any case by establishing realistic user *expectations* for system performance."

The guidelines suggest that the system should conform to established conventions and user expectations, and the way in which we find out about these expectations is through surveys, interviews, questionnaires, and prototype testing. However, the following comment implies that consistency in design is all that is needed:

Where no strong user expectations exist with respect to a particular design feature, then designers can help establish valid user expectations by careful consistency in interface design. (Section 3.0/16)

Given the relative wealth of information available on HCI in the 1980s compared to earlier years, it is somewhat surprising that expectations have not received more emphasis and interest. Lutz and Chapanis (1955) were certainly aware of their importance in their study, but despite the plethora of new technological developments since then, this aspect of HCI seems generally to have been forgotten.

DEFINING EXPECTATIONS

In terms of HCI, expectations relate to how we expect a product/system to respond and react when we use it. At one level, our expectations are an automatic response (e.g., when we perceive visual stimuli). For example, when we look at perceptual illusions, our past experience and knowledge of the properties of straight lines and circles in our environment determines how we perceive the objects. This may help to explain how we perceive straight lines as bending, circles as moving, and so forth.

At another level, expectations and beliefs are powerful forces in shaping our attitudes and behavior (e.g., schema and scripts). These are socially developed attributes that determine how we behave and what is appropriate/inappropriate behavior in a particular context. In both of these examples, the environment in which we have been nurtured and the corresponding culture will have a major influence. As an example, straight lines are very much a feature of the human-made world and do not exist in nature, so perceptual differences would be expected between those individuals living in a city and those living in the jungle.

The common feature in both of these examples is that expectations are based on past experience and knowledge; they also are quite powerful determinants of how we behave, both on an automatic level (i.e., the perceptual processing of information) and at a behavioral level. These are important considerations in HCI, and because of this, they need to be taken into account in the design process.

FUTURE TRENDS

Population Stereotypes

One example of the cultural influence on design is the population stereotype. These stereotypes are everyday artefacts that have strong associations (e.g., the way in which color is used). The color red suggests danger and is often used to act as a warning about a situation. For example, traffic lights when red warn vehicles of danger and the need to stop at the signal. Likewise, warnings on the civil flight deck are colored red, while cautions are amber. Often, these stereotypes are modeled in nature; for example, berries that are red warn animals not to eat them, as their color implies they are poisonous.

Population stereotypes are determined culturally and will differ between countries. They also change over time. For example, the current stereotype in Europe and North America is for baby boys' clothes