

Familiarity as a basis for Universal Design

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P. Turner, G. van de Walle, Familiarity as a basis for Universal Design. Gerontechnology 2006; 5(3):150-159. The aim of Universal Design is to make interactive artifacts usable by the broadest possible range of users and how best to achieve this lies at the heart of human-computer interaction (HCI). HCI relies on a variety of tools, techniques and a number of theoretical bases but it is specifically the use of metaphor which is of interest here. HCI has made a success of creating interactive artifacts but has always treated design in a typically dualistic manner with a clear distinction between “man and machine” and the use of metaphor itself is also based on an underlying dualistic ‘source-target’ structure. This paper presents an argument for familiarity as a basis for Universal Design. Familiarity, according to Heidegger, is non-dualistic; it is a fact of our existence, it is one of the primary ways in which we relate to the world. Familiarity is taken to mean a thorough knowledge of, or an intimacy with, something or someone and encompasses the ideas of involvement and understanding. The role of familiarity is illustrated by way of a study of a group of seniors learning to use a personal computer and the services it provides. Analysis of the resulting substantial body of interview and discussion group data leads us to conclude that to become familiar with technology is to integrate it into one’s everyday life - an everyday life which is correspondingly reconfigured. This perspective offers a holistic account of learning which has significant consequences for how technology is designed and introduced to everyone.

Key words: technology, Internet, training, familiarity, Heidegger

Children are growing up in a world filled with computers, instant messaging, mobile phones and the Web. Technological jargon, once the preserve of computer scientists, is now commonplace from high street stores to our living rooms. Living with ubiquitous interactive systems and devices instills a deep sense of familiarity - an unspoken, tacit knowledge of computing which is born of this immersion. But what of the generation who retired from mainstream work before this technological revolution? How should we best introduce interactive technology to this group? One route favored by human-computer interaction (HCI) specialists has been to use metaphor and analogy to bridge the gap

between technology and the ‘naïve user’¹⁻⁵. A mere 25 years ago, the designers of the Xerox Star decided to adopt a number of metaphors to make their office system understandable - usable - approachable by its intended users. The Xerox Star was the first computer to have a graphical user interface (GUI) which presented its tools and services by way of a number of metaphors, the most famous of which is the desktop metaphor. This is described by Johnson et al.⁶, in an early retrospective, as follows: “Every user’s initial view of Star is the Desktop, which resembles the top of an office desk, together with surrounding furniture and equipment. It represents a working environment,

which current projects and accessible resources reside. On the screen are displayed pictures of familiar office objects, such as document folders, file drawers, in-baskets and out-baskets. These objects are displayed as small pictures or icons. The Desktop is the principal Star technique for realizing the physical office metaphor ...”

Tognazzini⁷, an influential designer at Apple™, has offered the more general suggestion that communicating the underlying structure and operation of an interactive system is best achieved by means of a metaphor or analogy. This can be realized by using a set of objects (such as elements of the user interface) which can activate a metaphorical or analogical connection to the real world. Having made this connection, the user of the system can anticipate its behavior. Further, Lakoff and Johnson⁸ have argued that metaphor and analogy are the very bases of our cognition and these ideas have been developed further by Fauconnier and Turner⁹ who have argued that all learning and all thinking consist of blends of metaphors based on simple bodily experiences. So, if as we describe later in this paper, we are to introduce a group of seniors to computer technology (PCs in particular) and the World Wide Web, it would seem to be perfectly reasonable to employ metaphors. Marcus¹⁰, in discussing the range of metaphors commonly used, notes that these can be divided into nouns (e.g. desks, books, photographs, disks) and verbs (move, flow, select, create) but, of course, when discussing the Web, spatial metaphors dominate. The Web is conceived as space – a cyberspace (a term coined by the novelist William Gibson), which we navigate and in which we can become lost. But the Web is not a space, it is not *res extensa*: it is a distributed application running on the Internet. So, is there an alternative to this use of indirection - the use of metaphor – which might avoid the problems

associated with the use of metaphor?

Raskin¹¹ in discussing the meaning of intuitive (in the context of a user interface) finds that it is equated with being familiar. He writes that a user interface is ‘intuitive’ in as much as it resembles (or is identical) to something the user already knows. He continues “In short, intuitive in this context is an almost exact synonym of familiar”. Perhaps ‘familiarity’ offers a possible alternative to metaphor. Familiarity, however, is not a concept which has received sustained attention in the field of HCI excepting perhaps our recent work¹²⁻¹⁴. In approaching its study we have drawn upon the writings of Martin Heidegger¹⁵⁻¹⁶. Heidegger is famous for his treatment of everydayness, being-in-the-world and for being a Nazi - a point which cannot be ignored in referencing his work. Heidegger’s ‘Being and Time’ of 1927¹⁵ is primarily concerned with the question, ‘what does it mean to exist?’. By posing this fundamental question, Heidegger shifts the focus of attention from the theoretical to the practical; from the cognitive to the phenomenological; from abstract knowledge to the practical and everyday. We now consider metaphor and familiarity in a little more detail.

METAPHOR AND FAMILIARITY

Holyoak and Thagard¹⁷ describe metaphor as involving saying one thing in order to say another and observe that this is close to how analogy works. A metaphor thus connects two different domains just as an analogy works by mapping a ‘source’ and a ‘target’. Thus metaphor and analogy can connect, in the minds of the users, real world objects with corresponding elements and attributes of interactive devices. For some researchers, the use of metaphor (and analogy) has the added advantage of being the very substance of our cognition itself. For example, Lakoff and Johnson⁸ describe metaphor as ‘the way

we think, what we experience, and what we do every day'. They also note that while metaphor is most frequently expressed in language, much of human experience, especially its abstract aspects, is grasped in terms of broad conceptual metaphors. In a similar vein Gentner and Markman¹⁸ have argued that "analogy is a central process in learning and discovery" and attribute its power to the relations that can be mapped. Hence the metaphor 'my job is a prison' works by linking the two domains 'job' and 'prison' by way of the analogy of feeling trapped or being held captive. The linkage is, of course, partial - jobs do not entail being held behind locked doors or being made to sew mail bags (A once traditional practice in British prisons) - unless you happen to work for a company which supplies goods to postal services. Carroll and Mack² describe metaphors as 'seeds' or 'kernels' which stimulate associations and lead to the formation of mental models. They also discuss the embedded quality of self-generated metaphors in learning. Such metaphors have been found to be treated as 'givens' and accepted unconditionally by learners, whereas metaphors that are taught to learners have been found to be ineffective. Furthermore, Halasz and Moran¹⁹ have argued that the use of metaphor in the design of interactive systems is harmful because firstly, computers offer functionality which does not correspond naturally to their real world analogues (they suggest that a computer filing cabinet does behave like its real counterpart but the idea of password protected file access has no natural equivalent). Secondly, there are times when we intend to convey a point, not a whole system of thought (a computer desktop is a surface on which lie tools and documents but is not made from wood nor can be stood upon to change a light fitting). Finally, it might have been also noticed that most of the references to metaphor and interactive systems are quite old (most of them are mid 1980s).

It would appear that it has been twenty years since metaphor was an important design issue in HCI, since then the desktop has become a convention; an on-screen 'toolbox' merely the name of that particular interface widget. So, in addition to being harmful, partial and culturally-dependent, has metaphor and analogy become simply passé?

For Heidegger, familiarity encompasses the ideas of involvement and understanding. Here involvement may be taken as something approaching a synonym for 'being-in-the-world' while understanding should be interpreted as 'know-how'. Dreyfus²⁰ notes that "This know-how ... is more basic than the distinction between thought and action" and describes human beings as "We are such skills", thus directly equating humans with our know-how. In these terms, understanding a computer simply means being able use it (i.e. demonstrating our familiarity with it). We use these skills to cope with the world which, according to Heidegger, has three key characteristics. Firstly, it comprises the totality of inter-related pieces of equipment. Each piece of equipment being used for a specific task - hammers are for driving nails into wood; a word processor is used to compose text. The second 'component' of the world is the set of purposes to which these tasks are put. Of course, while we cannot meaningfully separate out purposes from tasks in these (non-Cartesian) worlds we can recognize that the word processor is used to write an academic paper for the purpose of publication and dissemination. Nails are driven into wood to provide illustrations for philosophical discourse. Finally, in performing these tasks we acquire or assume an identity (or identities) as carpenters, academics and so forth. In using these concepts and viewpoint we are moving away from thinking in terms of what is the nature of things (and ourselves) to how we manage and cope with things. More gener-

ally, we demonstrate our familiarity with the world by coping with situations, tools and objects or more specifically by our understanding of the referential whole. An example of a referential whole appear in Heidegger's 'History of the Concept of Time'^{16p187} and is described follows: "My encounter with the room is not such that I first take in one thing after another and put together a manifold of things in order then to see a room. Rather, I primarily see a referential whole ... from which the individual pieces of furniture and what is in the room stand out. Such an environment of the nature of a closed referential whole is at the same time distinguished by a specific familiarity. The ... referential whole is grounded precisely in familiarity, and this familiarity implies the referential relations are well-known."

This stands in contrast to the view which assumes that we have to synthesize a 'manifold' of things, perspectives and sense data. Instead Heidegger argues that we simply perceive the room's Gestalt and in doing so we are able to deal with its contents through our familiarity with other rooms. Familiarity is then a 'readiness' to cope with, say, chairs (e.g. by sitting on them) which has developed from our earliest days. Heidegger describes this readiness as "the background of ... primary familiarity, which itself is not conscious or intended but is rather present in [an] unprominent way"^{16p189}. Thus, assuming that we are in the world of modern computing, when we enter our places of work we see desks, chairs, computers, network points and so forth. We do not perceive a jumble of surfaces, wires and inexplicable beige boxes. However, if we are not in this (social) world the scene might indeed appear chaotic and meaningless.

A STUDY OF FAMILIARITY

We now turn to an empirical study of familiarity. One of us (Van De Walle) undertook the teaching of a group of seniors

at their residential home ('Redhouse') as part of the MITS initiative supported by Age Concern Edinburgh. MITS (Mobile Internet Taster Sessions) provided an opportunity for a group of older people to familiarise themselves with computers. The lessons and the data collection began in February 2003 and lasted nine months. Forty people registered for the lessons thus forming the Redhouse Computer Club. People were taught in groups of 8 or 9. The purpose of the lessons were as follows: (i) to overcome anxiety and to realize the fun that can be had from the computer in a relaxed and informal atmosphere; (ii) to explore what the computer can do and be confident in basic commands and file management; (iii) to introduce word processing, email and the Web and (iv) to serve as a data collection exercise for the second author. Computer technology was unfamiliar to the members. Consequently, the participants had to be taught on a step-by-step basis. Every group received a one hour lesson every week until July 2003. In August, lessons were reduced to 30 minutes per week, which was welcomed by all. Of the forty computer club members, twenty volunteered to take part in this research. Of these fourteen were also interviewed individually. Interviews were recorded and then transcribed in full.

DATA ANALYSIS

The recorded interviews and discussions run to some seventy hours so only a small part of this can be reported here. These accounts have been read and re-read with the intention of identifying recurrent themes. Some of these data have been reported elsewhere¹⁴. Having identified a number of candidates these were reviewed for duplication and edited appropriately. As in much qualitative research, the process is fundamentally interpretive: meaning is often implicit and can only be understood through familiarity with the entirety of the data. This approach is

consistent with Pollio et al.^{21p37} who describe the process of hermeneutic data analysis. We now present the major themes which we identified, namely 'Reconfiguring one's world', 'Computers are part of modern life', 'Participating in the modern world' and 'The meeting of two worlds'. The participants are identified by means of their initials.

RESULTS

Reconfiguring one's world

For participants, familiarizing with the modern world has required the reconfiguring of their everyday lives. This process of reconfiguration of peoples' worlds has involved a number of changes to the participants' relationships, language, ownership, and perceptions. This section examines some of these changes. SC indicated that "there are quite a lot of reasons for learning about computers, which really have nothing to do with the use of computers". One of them concerns computer terminology. Participants stressed their feeling that 'computer language' had now become part of everyday language.

M.K.: "... So it's almost worse if you have a little knowledge or a fair knowledge of something else. It's stands in the way, and I almost have the feeling that what we are learning now we have to regard very much as provisional because it is going to be out of date in six months. We are going to have DV, Oh no, what is it?... broadband."

M.K.: "Yes, the little totty things."

I.R.: "But you see, people who are advertising a lot for broadband, they assume too much from people like us."

M.R.: "Yes"

I.R.: "I said to my wife, "Eh, what's broadband? I have read about it." She told me, "I haven't the slightest idea."

M.R.: "No".

[Wednesday discussions February 27, 2003]

The presence of 'computer language' in

everyday language implies that it has penetrated the participants' everyday lives. By way of example, participants mentioned everyday conversations involving family relatives, friends, or other people they know. They have also mentioned television programs, which also show computers being used. Moreover, numerous references are made to web sites and email addresses in almost every program. The penetration of computer language in television programs is a big issue for some participants who are loyal television watchers. Another example of this change in everyday language was identified by SC who indicated that computing terms frequently appear in crossword clues. This, she believed, is a relatively recent phenomenon. According to SC, this is not a trivial issue as crosswords are very popular with people of her age. According to her, it is part of her generation's 'knowledge'. She revealed that her main motivation for learning to use computers was to upgrade the linguistic skills:

SC: "The only need that I have at the moment is not for the computer but the computer vocabulary because I am addicted to crosswords and for the last... just recently, they have started putting computer words in the answers to clues. That's really the only need I have for a computer at the moment."

[Wednesday discussions May 28, 2003]

NS also noted that computer terminology has become part of everyday language. Computer terminology is becoming commonplace with her fellow Quakers especially among the younger ones. NS observed that her lack of command of the 'language' was leading her to be excluded from Quaker house meetings.

Friends and relatives use e-mail.

Participants considered that computer-based communication had significantly increased their opportunities for com-

munication with their family and friends. This is because their friends and relatives often use email themselves. Email is often the best, if not the only, way they can be in touch with them, as some are difficult to reach by telephone.

DW: "My great nephew, even my nieces who are in their fifties, they would never communicate with me unless I have an email. I mean, they told me that. They don't even telephone."
[Thursday discussions October 16, 2003]

Communication has played an important role in motivating family members to encourage some participants (e.g. JC, NS, MK, and NM) to use computer technology. It should be noted that family also played a role in encouraging some of them (e.g. NS) to change their attitude toward computers, i.e. to go from a negative attitude toward a more positive one.

NS: "... to know about how to operate them. Because ... I had no time for them at all but now I realize that I was being a bit pig-headed towards them, you know. I just put it out of my mind as something that wasn't for me. And then I thought... and of course, my family said, 'Well, that's a very negative attitude that you are taking'."
[Wednesday discussions May 7, 2003]

New opportunities.

Participants were becoming aware of Internet shopping, specifically the savings on travel which could be had by booking online – similarly for theatre bookings. E-mail was also identified as a means to save money as a cheap alternative to long distance telephone calls.

NS: "I think that we prefer the telephone but when I phone Canada, I get a shock when the bill comes in. [Laughs] An occasional email is fine to let them know that everything is all right. And maybe once a month I ring and we have a con-

versation".

[Wednesday discussions May 21, 2003]

Questions of cost in general proved to be an important issue. The participants, who were frequent travelers, found both travel and communication to be costly.

Ageing makes computers relevant.

As indicated above, participants experienced and reported a number of changes related to computer technology that had affected the makeup of their everyday lives. Age-related changes were also a major factor, specifically the issue of mobility. Familiarisation with computers was seen as a possible means of ameliorating the expected loss in mobility (already restricted for JC and some others). Participants regarded the Internet as a substitute for 'going out' and a means of staying in touch with life in the outside world. Consequently, if the computer is not always seen as fitting into everyday life (for example, SC cannot find a place for computers 'at the moment') its potential was appreciated in the context of the loss of mobility.

DT: "... as you will get less and less able to go out and do things yourself physically, you can do some... you can keep in touch with this machine. The way you can operate it, you are going to bring in all sort of things, which you can't, you no longer can do physically. ...That's what it means to me."

[Wednesday discussions May 14, 2003]

SC: "I think that when you are housebound, it's going to be a link with the outside world."

[Individual interview February 13, 2003]

Even JC envisages that she might adopt new ways of doing things with the computer as she goes along, such as Internet shopping as she anticipates that she will respond to changes in her circumstances. The second age-related change

mentioned by a number of people is the worsening of hand-writing. Letters typed on a computer (and then printed) offer the potential to continue to communicate with friends and relatives legibly.

DW: "I think I might think of getting a word processor and a printer because I do write a great deal and it's not... Oh, you know one's handwriting becomes changed with the state of one's fingers and also, you know, it's much clearer. Even if one has got good handwriting it's much clearer for people to read. And that would definitely be something I'd use every single day, you know."
[Individual interview September 7, 2003]

SC: "But I think that... And, of course, when you get older your handwriting isn't so good and so that being able to type a letter is good."
[Individual interview February 13, 2003]

From the perspective of age-related changes computers offer a means of keeping in touch with people and the world and a means of keeping active despite disabilities.

Computers are part of modern life

Participants noted that computers have become ubiquitous and were actively defining modern living. For example, JC stressed that "everything is computerized now", adding that "It's a part of modern life". She mentioned the use of computers for library catalogues and people accessing web sites for information. Other participants (e.g. SC, NS, NM) commented that computers are now used by doctors for consultations as well as by staff in hospitals and in banks. Consequently people have to be computer literate in order to be employable and that many people were retiring in preference to learn about computers when these were introduced to their places of work. The participants also noted that television programs, especially soaps and other dramas, show

people using and talking about computers. MR especially stressed how much this issue mattered to her, as she watches television fictions regularly.

SC: "I think that in the future we are going to need it. Perhaps we don't need it now but we will in the future, like we needed pen and ink. Now we have letters but soon we won't use letters because we will be using computers."
[Wednesday discussions March 19, 2003]

Participating in the modern world

As we have seen, participants see computers as actively defining the way in which the modern world works. People unfamiliar with the technology are unable to understand situations where computers are involved. In turn this potentially excludes them from the opportunities which computers afford (for instance, information retrieval, communication, saving money on shopping).

DM: [reading her notes] "... I do not share the hostility to computers, which I find in the opinions voiced by some of my friends, friends of my own age I may say. My own attitude is that the computer won't go away however hostile one may be to it and therefore it seems sensible to accept this fact and at least make an attempt to cope with what has become such an ever present part of modern life."

[Wednesday discussions October 29, 2003]

JC: "You have to try the modern world if you can."

DC: "I think that we are learning to fit in the world that is developing, isn't it?"

[Wednesday discussions May 14, 2003]

Younger people use computers, knowing about computers and the 'computer language' is also synonym for connecting with these new generations and their world, i.e. with the culture in which they live. In DW's words, this

would create a 'link' between her and recent generations and their world. DW and MTu both indicated that by linking them to the new generations, becoming more knowledgeable about computers would contribute to bridging the existing gap between generations, especially between the generations of older and retired people and the generations of those who are involved in the modern world because of their studies or work. This is also important because most participants had direct relationships with younger people through their families or their activities.

MK developed her argument differently. She was less apologetic about technological progress and did not declare her willingness to take part in the modern world in a positive manner. She justified her attempts at taking part in the modern world by saying that this world is putting pressure on her to take part in it. She indicated that the new technological world was affecting a lot of her everyday experiences. Eventually, everybody in our societies – including her – will have to be either part of it or 'excluded from life'. According to her, ignoring computers would mean a fatal mistake. She argued that computers constitute something basic in the context of the modern ways of living and that life itself is at stake. This extreme proposition will be dealt with in more detail later. MK consequently considered that she had to learn how to use computers, which belong to the tool kit of modern ways of living.

MK: "The world is there. The world in which I have to function everyday is there and I am in it. And these machines are now in it. And I've got to come to terms with these machines if I am going to continue to live in this world."

[Thursday discussions March 27, 2003]

For DW the challenge is to enter in or benefit from the new world while keeping

the old one, as she is willing to benefit from the former while going on with the later.

DW: "Well, if you start at all, yes. And to be a novice is to be somebody who is wanting to start, yes. I think it has to be another world. And I don't think it could lead me to the exclusion of my own world, which has been built up over the seventy odd years. It's not an either, it can be a both and... I think, perhaps, until you came along I would have said, "well, that's not for me, that's not my world". I probably would have said that's not my world. And it isn't. And I mustn't deny the good things of what this strange funny background, educationally, has brought me. Yes it's both and ..."

[Individual interview May 13, 2003]

Even more radical, SC declared that her objectives were not to keep up with the modern world at all. She indicated that her motives were purely selfish. Here, a distinction should be made between SC's justification of her commitment to the MITS and the implications of her commitment. The fact that she did not commit to the MITS with the aim of keeping up with the modern world must not hide that she committed herself to a project that involves connecting with the modern world.

The meeting of two worlds

Participants acknowledged the existence of a new, unfamiliar, technological world. DW talked of a 'technological age', MK of a 'technological world', IB and MK of an 'electronic world'. MK stressed that a new world has emerged and that it extends far beyond the sphere of computers and technology, affecting every aspect of life.

MK: "... I am standing at a point where I see a new world in every aspect, as I say, whether it's sport or religion or politics, or cooking or the telly (televi-

sion) or anything [...] I am being dragged, kicking and screaming into the new world by my family, who started me off on the movement out of the old world a long time ago. And in that respect I think that I am better placed than most to make the transition”
[Thursday discussions May 1, 2003]

Participants indicated that they did not belong to this modern technological world. NS, IR, and MK stressed the differences between the new and old worlds. They commented on the novelty of the new world and the depth of the rift between the old and the new. Contrasting the new and old participants said that while the former involves mostly dealing with technology, the latter involves dealing with people. Beyond human relationships, IR also pointed to the predominance of language in his life, both oral and written. When she declared “there was nothing technical in my world” or “I haven’t used that much in the way of technology”, JC expressed a feeling common to many of the participants in noting that technology had only a peripheral role in their lives both at home and work (prior to retirement). Indeed these jobs had mostly involved other people. For example, JC had a guest-house so she “was familiar with the people coming and staying”. DW and NS had been involved in social work, NS working directly with people and DW more on the administrative and management side. DW also “studied quite a bit (...) on holy scriptures of different faiths” which is “far from technology. In fact, it really is far”, involving “a different use of one’s brain”. MTu was a secretary after she had trained and practiced a few years as a lawyer. In her job everything was done by hand. DW observed, “technology has not been part of my life” and NS reported that she had “no experience whatever with technology” and that she sees it as “a completely new thing” to which she “hadn’t paid much attention” and “I haven’t even touched a typewriter”.

DISCUSSION

This paper began by reviewing the role of metaphor in introducing interactive technology to ‘naïve users’. In doing so, it was recognized that despite the success of the ‘desktop’ and ‘toolbox’ metaphors and the enthusiasm of some researchers for them, their use is not without problems. Metaphors are paradoxically too powerful and too feeble. Too powerful in that they may seem to promise too much, they offer too many possible mappings. A true or complete desktop metaphor would permit many other functions beyond merely being somewhere to leave documents. They are also too weak in that they constrain the ways in which interactive systems can be presented. What, asked Alan Kay, is the real world equivalent of a hyperlink²²? And while I can walk on our local beach with my wife to talk over plans for such and such a thing while getting some much needed exercise, I cannot use the equivalent (cyber)space of the Web for the same purpose. The spatial metaphors associated with the Web are not just potentially misleading but have dubious psychological plausibility. In all the seventy hours of discussion and interview protocols captured as part of the Redhouse study there is no presenting evidence of metaphor being used as a means of acquiring an understanding of this technology. The participants did not appear to create and spontaneously use metaphor nor were they supplied with any. Instead they learned to use a PC, email, the Web and so forth in the context of their everyday lives. They reconfigured aspects of their everyday understanding to accommodate this new technology. They were motivated to engage with it as a means to an end and to satisfy their everyday demands, hopes and aspirations. They saw the technology as a way to access cheaper goods, to be in contact with relatives and, perhaps, to ameliorating some of the consequences of ageing. All of this is can be reason-

ably be described as 'practical coping'. Familiarity, as Heidegger has argued, is everyday living and practical coping: in this instance, living in a technological world and coping with information technology. This seems to be a more plausible than invoking the use of metaphor which involves 'saying one thing in order to say another'²³.

Given these findings we would advocate a holistic approach to introducing technology to older people. This should be human-centred rather than user-centred (and certainly not technology-centred). In HCI, users are often treated as idealised representations (cf. "naïve users") whereas we need to respect the person and not the abstraction. Specifically we should aim to build on the prior skills, self-perceptions and aspirations of older people as competent individuals and recognise that the issues of everyday coping relate not just to interactive media, but to the (modern) world in general.

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