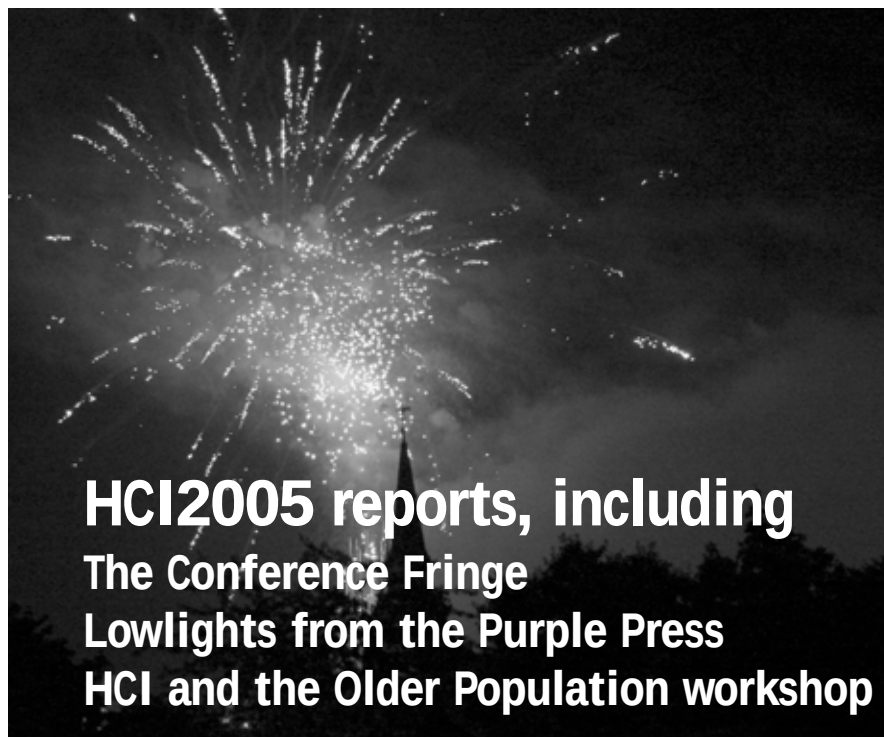


Interfaces

65 • Winter 2005

British
HCI
Group
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HCI2005 reports, including
The Conference Fringe
Lowlights from the Purple Press
HCI and the Older Population workshop

Plus

Treating phobias with virtual Reality
Memorability and security of passwords

And

Gilbert Cockton's Deflections

Russell Beale's opinions

Alan Dix's brain

Robert St Amant's tools

John Knight's book reviews





View from the Membership Chair

In the immortal words from Love Story (and that IS showing my age!) 'Where do I begin?' Having done some research (looked at what others have done with this column) it appears that what is required is an intro to me, an intro to my ideas, and some insight into whatever it was that got me into this post!

I am currently working at the University of Central Lancashire (UCLAN) in Preston, having arrived at this place via teaching in further education (IT and Computing) and teaching in secondary schools (Maths). When I first began work at UCLAN it was as a programmer and I taught, amongst other things, assembly language programming and algorithmic problem solving. An interest in children's language (I have four children) and a particular interest in speech and recognition technology lead me to consider a PhD in recognition technologies and children, and, after some forays into speech recognition, I settled on handwriting recognition and began a twilight existence that many of you will be either enduring or recalling as you read this column!

It was the PhD that put me into HCI, my supervisor suggested that teaching HCI would be a good move as it would bring me up to speed with the subject area. So, that is what I did and now, five years on, the PhD is finished, I now teach three different HCI courses and, inevitably, the children have grown up some!

In the course of doing my doctoral research, I co-founded the Child Computer Interaction (ChiCI) group within the Department of Computing at UCLAN and have recently moved my offices into the ChiCI building and am planning loads of fun stuff in our soon to be opened play lab. My current 'passions' are pen computing (including handwriting recognition), text input, and child computer interaction and I have several academic publications in these areas as well as several 'rants'.

So, how did I get to be the new membership chair? Well, that is a relatively long story that began in Sunderland (my first BCS-HCI Conference where I was remarkably well treated by the 'gurus' despite knowing very little about such mysteries as task analysis and GOMS!) and possibly had a moment in Bath (when I recall sitting with Adrian Williamson and talking about membership and things) and ended in Edinburgh (when I got the call!). My plans for the role are quietly ambitious, the usual things like double the membership statistics, double the member benefits, and double the member engagement, all come to mind, but, on a more realistic note, it is the case that the organisation needs to expand rather than contract, that we need to offer value for money, and that we need to have an interested membership.

In a world where most people in the West are money rich and time poor, I consider myself to be enthusiasm rich and organisation poor! I was once advised by a Head of Department to avoid all things admin as it was not my forte! However, knowing my own limitations and strengths, I hope to be able to add something to the three remits outlined above whilst also being able to offer some fresh ideas into the executive pot!

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As HCI2005 was a computing-related conference and as I was there as Press, it seemed appropriate to take along my wireless laptop so that I could report on the conference 'as it happened'. Rather than having the inconvenience of finding and logging on to strange lab computers all week, I had the back-breaking inconvenience of lugging around a laptop (and power adaptor) instead.

On the first day, an overly optimistic Student Volunteer gave me my WIFI user name and password and said: "just switch on your notebook and it'll try to connect". I'm not sure that wireless ever tries anything that helpful. And it didn't.

Still, I can proudly say that I beat the technology. I worked out a convoluted process to copy files from my laptop to my digital camera's flash card (for which I fortunately had a USB card-reader), and from there to one of the dumb Internet

terminals on which I could open or upload (but not edit) the files through the Web browser. A stunning example of human-computer interaction!

As a result, this issue of *Interfaces* can report back on the conference, look at some of the innovative projects demonstrated at the Conference Fringe, and, of course, reveal the true conference experience as told by The Purple Press,

Aside from conference coverage, this issue also contains a fascinating review of the research into using virtual reality to treat phobias, and a calculation (courtesy of Alan Dix) of the information capacity of the human brain and the web. Finally, this issue welcomes John Knight the new editor of the revamped book reviews column: *Interfaces* Reviews. This issue, the theme is Art, Design and Technology; future issues will take on a range of themes from Games to Information Architecture. If you're interested in reviewing books for *Interfaces* Reviews, please get in touch with John.

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RIGHT TO REPLY

Make *Interfaces* interactive! We invite you to have your say in response to issues raised in *Interfaces* or to comment on any aspect of HCI that interests you. Submissions should be short and concise (500 words or less) and, where appropriate, should clearly indicate the article being responded to. Please send all contributions to the Editor.

To receive your own copy of *Interfaces*, join the British HCI Group by filling in the form on page 27 and sending it to the address given.

Deadline for issue 66 is **15 January 2006**. Deadline for issue 67 is **15 May 2006**. Electronic versions are preferred: RTF, plain text or MS Word, via electronic mail or FTP (mail fiona.dix@hiraeth.com for FTP address) or on Mac, PC disks; but copy will be accepted on paper or fax.

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PDFs of *Interfaces* issues 35–64 can be found on the B-HCI-G web site, www.bcs-hci.org.uk/interfaces.html

NEXT ISSUE

Interfaces welcomes submissions on any HCI-related topic, including articles, opinion pieces, book reviews and conference reports. The next deadline is **15 January**, but don't wait till then – we look forward to hearing from you.

with thanks to commissioning editors:

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Marc Fabri, Laura Cowen; p19 Harold Thimbleby; p20 Joy

Goodman; p22–23 Laura Cowen.



Deflections

You can't burst seams if no-one will wear the clothes

Gilbert Cockton

The first 'Deflections' was my reply to an ACM *Interactions* 'Reflections' column. *Interactions* doesn't go for rights to reply (OK/Cancel, September 3rd), but I insist now that if Yvonne Rogers wants such a right, she can have my next column.

HCI's founders believed in the power of psychology. The Software Psychology Society co-organised the first CHI conference (one of its activists was Ben Shneiderman). Card, Moran and Newell's 1983 book looked to save computing via psychology: 'Our purpose... is to help lay a scientific foundation for an applied psychology concerned with human users of interactive computer systems.' (p. vii). I have no nostalgia for Yvonne and my PhD student decade where HCI's 'missions, goals and methods ... were well-established' (*Interfaces* 64, p.8). As an ex-secondary school teacher with an Education degree, I was horrified at the state of HCI in 1983. With professional experience applying inter-disciplinary human science, I knew that simply adding experimental Cognitive Psychology to Computer Science could never yield an adequate design science for interaction.

Card et al. did not fix the mission, goals and methods of HCI for long. Their colleague, Lucy Suchman, saw sociology as HCI's saviour, which was mundane to me after an undergraduate diet that included sociology of knowledge, sociolinguistics and teacher-pupil social interaction. HCI needed a broader interdisciplinary basis for design. The first HCI PhD to win the UK CPHC's Distinguished Dissertation prize, Eamonn O'Neill's thesis took a linguistically inspired approach to developer-user interaction. Expanding the H in HCI beyond Cognitive Science was clearly central to this. But already, Cooper and Bowers had drawn on Foucault's sociology of knowledge to explore how the HCI discipline used boundaries to exercise control. Yvonne's quest for new boundaries around an expanded HCI echoes Foucault, who unfortunately was no fan of academic disciplines.

So, when Yvonne opened her *Interfaces* article with 'The field of human-computer interaction is bursting at the seams', my first reaction was 'and it's still not fat enough!'. Yvonne's image of an obese HCI bursting at the seams suggests that only a XXL shell suit can cover us now, protecting our modesty but bestowing no dignity. This connects with the most recent failure to promote debate within the confines of SIGCHI's *Interactions*. In one corner, Susan Dray and David Siegel have concerns similar to Yvonne's that the seams between ethnography and usability are unravelling. In the other corner, Bill Buxton sees a pile of clothes on the floor with nothing inside (he actually talks about glue, not seams, but I won't mix metaphors). Whatever the wrongs and rights of reply for *Interactions* (my sympathies are with Susan and David), I'm with Bill on the actual argument. We're looking in the wrong place for either a holistic focus or disciplinary foundations of an ever expanding HCI. The best thing that HCI can do is to disappear and to reconstitute itself as a part of a Design discipline for interactive artefacts, focused on the human sources and achievement of design success, and the human constraints that diminish success when carelessly ignored.

Translating my 'Usability is dead, long live Product Value' polemic (www.usabilitynews.com/news/article1638.asp) into the clothes metaphor, this argued for dropping the pants

[sic] of simple minded usability. I now realise that not just the pants should come off, but like Yvonne I couldn't quite clear out my wardrobe. All Yvonne needs to keep is the (Wo)Men in Black look of Interaction Design with its more sensible cut around 'what gets designed'. Established HCI is the opposite of the Emperor's New Clothes. While he had no clothes, our clothes have no emperor, because we've made none to fit anyone yet. To do that, we must measure up an Emperor. The Emperor (Empress?) is Design, and until we make clothes for our new boss, what we have will still be shredded by potential customers. Yvonne knows this though. Her full call for a major rethink is easily found (Google with: Rogers New Theoretical Approaches) and in it she states:

a different frame of reference is needed – one which focuses more on the process of design and how ... different kinds of designers ... want to be supported. In addition, a quite different ... relationship between researchers and designers is needed ... working more as partners collaborating together

You're dead right Yvonne, but please stop talking of managing 'the rapidly expanding field of HCI' and consider reframing our whole enterprise as one of providing effective support for Design. You can have my next column to expand on your above words. And so can Susan, David and Bill.

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Ambient technologies

Russell Beale

Ambience is the new black. As the child of ubiquitous computing and artificial intelligence, it inherits a strong tradition of innovation and discovery, and some darker family secrets of over-hype and public disenchantment. Ambient technologies offer us the vision of quietly intelligent systems understanding our needs and requirements, and unobtrusively offering us support and technological enhancement whenever and wherever we need it.

For many different researchers, ambient technology means different things. For me, it's a term that encompasses a lot, but the provision of appropriate, subtle technical support in everyday activities is central to it. For this, there has to be a deep technical infrastructure of distributed computing, access and security controls, wireless communication of numerous sorts, device discovery and resource management, with the added frisson of charging models and e-commerce systems that could be overlaid to provide a commercially interesting angle. And hidden, the ghost in the machine, is the necessary A.I. to understand and infer, to filter and choose, to direct and support, allowing the environment to play an active role in supporting the user. It's not about direct manipulation any longer: it's about subtle facilitation.

One of the appealing characteristics of ambient intelligence is that it doesn't have to make the exaggerated claims of its parents. It requires only appropriate intelligence, rather than artificial intelligence, to perform remarkable feats of support. By this, I mean that relatively simple A.I. approaches can be used to give quantum leaps forward in support and system understanding. In a similar way, networking a variety of common-or-garden technologies allows them to provide a reasonable imitation of pervasiveness, and allows them to support users in many different situations.

For example, we've recently been working on supporting social interaction using smartphones. The aim is to help people interact better with each other, not with the underlying technologies. We have developed a number of different

systems, ranging from dating services and joke-telling over Bluetooth, to public display spaces with general news, views and comment, which can be interacted with using SMS and WAP as well as WIFI PDA and laptops.

Systems run on mobile phones, on PDA screens, appearing in public spaces, on people's doors, on their web pages and in their pockets. And all this is done with existing technologies that most users have access to in their homes, offices and personally. In general, they didn't really need a smartphone – any standard one would do. Nothing new or whizzy has had to be invented, and the A.I. used has not been particularly clever. But it provides summaries of the news, shows which topics people like to chat about, matches up the lovelorn and the randy, provides gossip and informal chat – and all of these help to improve group cohesiveness, increase conversation, and generally support the engagement of people with each other.

If ambient technologies can avoid the hype, then they may become the next frontier for really interesting HCI research. Well, not HCI, more HHIMT – human-human interaction, mediated by technologies. But maybe that's hype too.



Russell Beale leads the Advanced Interaction Group in the School of Computer Science at the University of Birmingham. His research focus is on using intelligence to support user interaction. Before returning full time to academia and research in 2003, he co-founded, ran, or worked for various internet-related companies.

Call for Abstracts

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250 word description

Interactive Experiences

250 word description



The brain and the web

A quick backup in case of accidents

Some years ago I did some back of the envelope calculations on what it would take to store an audio-visual record of your complete life experiences [1]. The figure was surprisingly small: a mere 300 MB per year. Furthermore, given that storage capacity is currently doubling approximately every 18 months, and extrapolating (not totally unreasonably), the space required for this is decreasing rapidly. For a baby born today, by the time they are 70, their complete life experiences will take no more than a grain of dust to store – sneeze and it's gone.

Of course this is about recording video and audio that come into the body – what about what is inside our heads?

Our brains contain about 20 billion neurons, each connected to between 1000 and 10,000 others. It is commonly assumed that our long-term memories are stored in this configuration; both what is connected to what and the strength of those synaptic connections [2].

If this is the case we can calculate the maximum information content of the human brain! One way to envisage this is as an advanced brain scanner that records the exact configuration of our neurons and synapses at a moment in time – how much memory would it take to store this?

For each neuron we would need to know physically where it is, but these x,y,z coordinates for each neuron turn out to be the least of the memory requirements, needing a mere 90 bits to give us a one in a billion accuracy for each coordinate. That is about 120 MB for all the neurons.

The main information is held, as noted, in what is connected to what. To record this digitally, we would need to have, for each of the 5,000 synapses of each neuron, a 'serial number' for the neuron it connects to, and a strength. Given 20 billion neurons, this serial number would need to be 35 bits and so if we store the synapse strength using 5 bits (0–31), this means 40 bits or 5 bytes per synapse, so 25,000 bytes per neuron and 500 thousand billion bytes for the whole brain state.

That is, the information capacity of the brain is approximately 500 terabytes or half a petabyte.

It is hard to envisage what half a petabyte is like in terms of information capacity. One comparison would be with a books. The Bible (a big book!) takes about 4.5 MB to store, so our brain's capacity is equivalent to a billion bibles, about the number that, stacked floor to ceiling, would fill a medium-sized church.

For a more computational comparison, the Internet Archive project (www.archive.org/about/about.php) stores dumps of the Web donated by Alexa® (www.alexa.com), an internet recommender and search company. These dumps are used for the 'Wayback Machine' (www.archive.org/web/web.php) which enables you to visit 'old' websites [3]. The current data comprises about 100 terabytes of compressed data. The uncompressed size is not quoted on the archive.org web site, but assuming a compression factor of around 30%, and also noting that the dump will not be complete, we can see the current web has a similar level of information capacity (but more in 'data' and less in link interconnections) as the brain.

As an alternative way to 'size' the web, consider that Google™ currently (August 2005) indexes about 8 billion pages;

assuming this is perhaps half the total accessible pages and that each Web page including images averages 40KB [4], we get 640 terabytes, just over half a petabyte.

This is not to say the web is brain-like (although it has some such features), nor that the web in any way emulates the brain, but sheer information capacity is clearly not the defining feature of the human brain.

In order to store data such as movies, the Internet Archive project has designed a low-cost large-scale storage unit called the Petabox [5]. Large 19 inch racks store 100 terabytes of data each so that 5 tall racks or 10 smaller, filing-cabinet-sized racks would store the 500 terabytes of our brain. In principle, if you had a brain scanner that could map our neuron connections we could store these in a small machine room ... then perhaps through nano-technology one could restore the patterns like a browser back button after a bad day ...

If such far-fetched technology could exist, it would mean people could effectively 'fork' their lives, have multiple streams of memory that share beginnings but have different experiences thereafter, time-sharing the body ... sounds like good science fiction!

Our brains are not just passive stores of information, but actively changing. Discussions of the power of the massive parallelism of the brain's thinking compared with the blindingly fast, but blinkeredly sequential, single track of electronic computation is now passé. However, having noted that the information capacity of the brain is not that great, what about the computational capacity – how does it rate?

At a simplified level each neuron's level of activation is determined by pulses generated at the (1000 to 10,000) synapses connected to it. Some have a positive excitatory effect; some are inhibitory. A crude model simply adds the weighted sum and 'fires' the neuron if the sum exceeds a value. The rate of this activity, the 'clock period' of the human brain, is approximately 100Hz – very slow compared to the GHz of even a home PC, but of course this happens simultaneously for all 10 billion neurons!

If we think of the adding of the weighted synaptic value as a single neural operation (nuop) then each neuron has approximately 5,000 nuops per cycle, that is one mega-nuop per second. In total the 20 billion neurons in the brain perform 10 peta-nuops per second.

Now a nuop is not very complicated, a small multiplication and an addition, so a 1 GHz PC could manage perhaps to emulate 100 million nuops per second. Connected to the Internet at any moment there are easily 100 million such PCs, that is a combined computation power of 10,000 million million nuop/sec ... that is 10 peta-nuops ... hmm.

Again, one should not read too much into this: the level of interconnectivity of those 100 million PCs is far weaker than our 20 billion neurons, good for lots of local computation (how many copies of Internet Explorer?), but poorer at producing synchronised activity except where it is centrally orchestrated as in a webcast. In our brain each neuron is influenced by 5,000 others 100 times a second. If we imagined trying to emulate this using those PCs, each would require 10MB per second of data flowing in and out (and in fact several times that for

routing information), but, more significantly, the speed of light means that latencies on a global 'brain' would limit it to no more than 10 cycles per second.

For an electronic computer to have computational power even approaching the human brain it would need those 10 million PCs' computation much more closely situated ... perhaps Beijing in a few years time ... or even Japan.

And talking of Japan ...

Let's recap, the computation of the brain is about 10 peta-nuop/sec. The speed of supercomputers is usually measured in flops: floating-point operations per second. A nuop is actually a lot simpler than a floating-point operation, but of course our brains do *lots* of nuops. However, supercomputers are catching up. The fastest supercomputer today is IBM's Blue Gene computer, hitting a cool 136.8 tera-flops, still a couple of orders of magnitude slower than the 10 peta-nuop brain, but Japan has recently announced it is building a new supercomputer to come online in March 2011. How fast? Guess ... you're right – 10 peta-flops [6].

Philosophers of mind and identity have long debated whether our sense of mind, personhood or consciousness are intrinsic to our biological nature or whether a computer system emulating the brain would have the same sense of consciousness as an emergent property of its complexity [7] ... we are nearing the point when this may become an empirically testable issue!

Of course, this does not mean that the web or a new supercomputer in some way is like or equal to the human mind. What it does mean is that the specialness of the human brain is not because of simple capacity or speed. If size were all that matters in cognition, we have already been beaten by our own creations. Really the specialness of our minds is in their organisation and the things that make us human beyond simple information: compassion, pain, heroism, joy – we are indeed fearfully and wonderfully made.

notes and references

1. A. Dix (2002). the ultimate interface and the sums of life? *Interfaces*, issue 50, Spring 2002. p. 16. <http://www.hcibook.com/alan/papers/dust2002/>
2. There is some debate whether the glial cells, powerhouses for the neurons, themselves are part of the brain's memory process. These are about 10 times more numerous than neurons, but do not have a similar level of interconnection so would not add significantly to the total capacity.
On the other side, it is certainly the case that neurons do not operate totally independently, but instead are in larger loosely defined assemblies. This is important: if one neuron or one synapse breaks we do not lose any identifiable item of memory, instead the memory structure is more redundantly stored. This means that the actual information capacity is probably several orders of magnitude smaller than the 0.5 petabyte estimate.
3. The Internet Archive was founded in order to preserve digital repositories in the same way as a traditional historical archive preserves documents and artefacts. As well as the web itself the project is producing archives of audio and video materials. <http://www.archive.org/>
4. My own 'papers' directory contains approx 180 html files comprising 2.3 MB and a further 800 files (jpeg, gif, pdf, etc.) totalling a further 73 MB of

which the images are about 4.7 MB. That is an average of around 13KB of html text per web page and a further 27KB of images and nearly 400KB of additional material. Looking just at a web page including images, this is about 40KB per page.

5. The Petabox was designed for the Internet Archive project, particularly as the archive expanded into audio-visual materials. A spin-off company Capricorn Technologies is also selling Petabox products commercially. <http://www.archive.org/web/petabox.php>
6. *The Guardian*, Tuesday July 26, 2005. p. 3. 'How 10 quadrillion sums a second will make computer the world's fastest', Justin McCurry. <http://www.guardian.co.uk/international/story/0,,1536006,00.html>
7. See John Searle's *The Mystery of Consciousness* for an overview of several positions on the relationship between brain and consciousness, although do beware – Searle is better at noticing the weaknesses in other people's arguments than his own! Whilst there is little stomach in modern philosophy for non-corporeal mind/soul/spirit as part of theoretical accounts of consciousness, some do look at quantum effects to explain some of the amazing qualities of the human mind. For example, Penrose postulates whether the tiny cytoskeletons within cells have a role. If this were the case, and superimposed quantum states were a significant issue in the brain's operation, the figures in this article would have to be multiplied enormously or maybe infinitely.
However, the broader tendency is to assume that our consciousness is a property of the more traditionally understood biological activity of neurons. Some, such as Dennett, would expect that a simulation of the brain would have the same level of consciousness as a living brain. However, it could be said that Dennett sees our experiences of consciousness and being as a kind of misapprehension or misinterpretation anyway. Searle himself argues that a non-biological mind would be different ... but the arguments end in mutually referential cycles! At heart is the issue of 'qualia', the actual 'felftness' of things rather than the computational responses we have to stimuli.
8. For web links related to this article: <http://www.hcibook.com/alan/papers/brain-and-web-2005/>

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Past, present and a virtual future

Treating phobias with exposure therapy

Exposure therapy is considered to be the treatment of choice to cure specific phobias; a condition that affects approximately 10% of US population at some point in their life (DSM-IV, 1994). However, only 15% of sufferers seek this treatment when it is administered *in vivo* (in a real-life situation). This article describes a history of exposure therapy, as well as the introduction of virtual reality as the new medium of an old technique. Short and long-term efficacy results are described along with limitations of the two mediums.

What is a phobia?

DSM-IV states that the 'essential feature of a Specific Phobia is marked and persistent fear of clearly discernible, circumscribed objects or situations' (p. 405). These fears can take the form of an aversion to animals, types of environments, blood, injury and injections, or certain situations e.g. flying; the results of which can lead to anxiety attacks and avoidance of the feared stimulus. It is estimated that approximately 10–11.3% of citizens in the US develop a specific phobia at some point in their life (Magee, Eaton, Wittchen, McGonale & Kessler, 1996; DSM-IV, 1994).

Is there a treatment?

The most widely researched, and proven, treatment of a specific phobia is exposure therapy (Marks, 1987; Ost 1989). The process involves repeated, progressive exposure to an anxiety producing stimulus until the patient is able to stand next to or even touch the feared object; for example, a person who is afraid of spiders would be placed at the opposite end of a room to a caged spider and instructed to move closer in stages.

Even though the patients are treated *in vivo*, exposure therapy has been shown to work for many phobia types including claustrophobia (Speltz & Bernstein, 1979), spider phobia (Miltenberger, Wright & Fuqua, 1986), and agoraphobia (Hafner & Ross, 1983). The procedure can last for a period of days, weeks, or even months, but has also shown success when phobic patients receive as little as one three-hour exposure session (Ost, 1996). In fact, Ost (1996) found, in a one-year follow up study, that 70% to 90% of patients still showed 'clinically significant improvement' (p. 713).

Despite the success of *in vivo* exposure therapy, less than 15% of all sufferers request treatment (Argas, Sylvester & Oliveau, 1969; Magee et al, 1996). But why is this when the success rate is so high? One possible explanation is that patients may be too afraid of their feared object or environment to contemplate being exposed to it; in reality 25% of patients who start *in vivo* exposure therapy drop out of the treatment for the above reason (Marks, 1992).

Second, there is an issue of confidentiality. Patients with acrophobia or claustrophobia, when treated *in vivo*, have to be exposed to public environments where people can see them being treated. Thirdly, the cost of *in vivo* exposure can be expensive. Attempting to cure a fear of flying *in vivo* can accumulate many costs and problems for the therapist. Hodges, Rothbaum, Watson, Kessler & Opdyke (1996) detailed how getting to an airport, renting a jet, and supervising the therapy can be an expensive, time-consuming task.

Virtual reality: a new medium for an old technique?

Virtual reality (VR) is not a new technology; it was first developed by Sutherland (1968) who showed how three-dimensional images could be presented through a head mounted device. However, due to the previously high costs it is only within the last decade that VR has been widely available. When applied to exposure therapy the only aspect that changes from *in vivo* is that patients 'experience' their dreaded stimuli through a VR system.

According to Emmelkamp et al (2002) there are many advantages to using VR that solve the problems associated with exposure *in vivo*. For certain phobias (e.g. fear of flying) the one-off cost of buying a VR system is cheaper than physically taking each patient to the airport and arranging the flight. It also addresses the problems of confidentiality and patient drop-out because they are treated in a virtual world where the objects and locations aren't real.

This, however, is the first hurdle that virtual reality exposure therapy (VRET) needs to overcome. If a patient knows that the objects in their feared environment are not real but virtual, they should be able to encounter them without any anxiety; making the whole process obsolete. Only if VR produces responses in the patient can it be considered a viable technique to treat phobias.

Can VR elicit responses in the patient?

If VR is to be used as a treatment for phobias then it must be able to elicit a response from phobic patients. Botella et al. (1998) report the findings of a case study involving a 43-year-old female with severe claustrophobia. The patient received eight 45-minute sessions of VRET, during which she was asked to report her anxiety level every five minutes using the Subjective Units of Discomfort Scale' (SUDS; see Wolpe, 1969). A high rating on this scale in the first session demonstrated the patient's adverse reaction to the virtual environment (VE), which persisted till the sixth session. Similar case study findings have been reported by Carlin, Hoffman & Weghorst (1997), and Wald & Taylor (2000).

The finding that patients are subjectively affected by VR is an important one, but do they also produce physiological responses to the medium? For VRET to be assessed objectively, physiological data is vital. Jang et al (2002) found that even for non-phobic patients, being placed in stressful virtual environments (VEs) can cause changes in skin resistance, skin temperature, and heart rate. In a similar study Meehan, Insko, Whitton & Brooks (2002) used traumatic VEs to assess the physiological measures of presence (the sense of actually being in the virtual world). They were able to show that the above measures can be used as 'reliable, valid, multi-level sensitive and objective measures of presence' for VEs (p. 650). It can therefore be assumed that exposure therapy using VR is plausible.

Is VRET effective?

Nevertheless, just because VR can produce both subjective and objective responses doesn't guarantee it will be an effective

treatment. Several case studies, including the ones mentioned above, have attempted to prove that it does. Botella et al. (1998) showed that VRET was sufficient to reduce their patient's claustrophobia; Carlin et al. (1997) did the same with spider phobia in 3 weeks; single cases of acrophobia, and fears of driving and flying have also been treated using the technique (Rothbaum et al., 1995; Wald & Taylor, 2000; North & North, 1997; respectively). In all cases, after treatment, patients' anxiety to their feared stimulus had reduced to within normal, non-phobic levels.

Garcia-Palacios et al. (2002) attempted to add weight to these findings by employing an experimental design which included a waiting list control group. Twenty-three spider-phobic participants were assigned to either the VRET condition or placed on a waiting list (control condition). Participants completed several measures, both before and after treatment, including a fear of spiders questionnaire and a behavioural avoidance test (BAT). No differences were found between the two conditions for pre-treatment scores; however, 83% of participants in the treatment condition showed clinically significant improvement after VRET. None of the waiting list condition achieved the same feat.

Hoffman, Garcia-Palacios, Carlin & Botella (2003) also found that VRET significantly improved participants' fears of spider on both subjective and objective measures, as well as being more effective than a waiting list condition. Similar results have been shown in participants suffering from acrophobia (Emmelkamp et al, 2002; Krijn, Emmelkamp, Biemond, Wilde de Ligny, Schuemie & van der Mast, 2004).

In terms of the long-term benefits, several studies have reported the effects of treatment persisting for up to 6 months (Botella et al., 1998; Emmelkamp et al., 2002; Krijn et al., 2004). Botella, Osma, Garcia-Palacios, Quero & Banos (2004) furthered these findings, showing that the effects of VRET for fear of flying remained after one year. The most conclusive result, however, came from Weiderhold & Weiderhold (2003) who showed that 100% of patients in one VR condition and 80% in another had still not relapsed after 3 years. Only 10% in the imaginary exposure therapy (where patients simply have to imagine that feared object) showed the same.

Virtual reality vs *in vivo* exposure therapy

These results empirically support the efficacy of VRET, but almost identical findings have been shown using *in vivo* exposure (e.g. Speltz & Bernstein, 1979; Hafner & Ross, 1983). Both are able to treat specific phobias to a very high standard, with the results persisting for many years, although in the case of VRET more research is required to support and strengthen this claim.

In terms of their effects it appears the two techniques are equally matched. However, the willingness of people to attempt *in vivo* exposure is very low; only 15% in fact (Argas, Sylvester & Oliveau, 1969; Magee et al., 1996). Garcia-Palacios, Hoffman, Kwong, Tsai & Botella (2001) assessed which of the two procedures participants with a fear of spiders preferred. When asked to choose between multi-sessions of either *in vivo* or VR exposure therapy, a resounding 81% chose VR. Even

when the participants were given the choice between a single session *in vivo* and multi-sessions with VR, they again chose the VR option (89%).

These results show that people are more willing to undergo exposure therapy when VR is used as opposed to *in vivo* exposure, indicating that VRET could be the successor for *in vivo* exposure. VRET solves the problems associated with 'traditional' exposure therapy, has just as high success rates, and is preferred by the people that need it most; phobic patients.

However, it would be wrong to end this article without reporting a few of the problems faced by VRET. Primarily, VR can have secondary effects. If the images shown to the patient during VRET don't match their movements there can be visuo-motor aftereffects that cause disorientation, uncoordinated movements, or dizziness (Anstis, 1995; Durgin & Pelah 1998, 1999). Even the smallest of disparities between the two can lead to these effects, and when this is combined with the amount of time patients are immersed in a virtual world the aftereffects can accumulate (Jackson, 2004).

Secondly, the cost of VR is still relatively high, putting the technology out of reach of the therapists who could make use of it. Nonetheless, recent research has shown that VR run using a standalone desktop PC can be as effective as more expensive systems in treating phobias (Krijn et al, 2004).

Conclusions and the future

Exposure therapy is considered to be the 'golden standard' for the treatment of phobias, yet only 15% of patients are treated. VR, over the last few years, has been shown to be just as effective in the treatment of phobias. It also appears to have solved the issues of confidentiality and is preferred to *in vivo* exposure. It isn't, however, without its own problems. The criticisms listed above, in theory, are only temporary. As technology advances VR will become more immersive and real, leading to scenarios that are indistinguishable from the actual world; this in turn should reduce the reported aftereffects.

The future of VRET is bright. Recent research has shown how the inclusion of a real object into the virtual world, e.g. a toy spider for patients to touch, or a railing to hold on to, can increase the level of immersion and facilitate treatment. Hoffman, Garcia-Palacios, Carlin, Furness & Botella (2003) showed that coupling real and virtual objects leads to better progress than when there was no real object. Slater, Usoh & Steed (1995) discussed the influence of walking in a virtual world; concluding that the immersion or presence rating of a system increases if the patient is allowed to walk through the VE.

Over the next few decades the prevalence of VRET is set to increase. As more research supports the already impressive results found to date and the progression of technology continues, VRET should go from strength to strength.

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My PhD

Social Networks in e-Learning

Andrew Laghos

Being from the island of Cyprus I have relied on the Internet for many years to get my outside information. During my studies for a Bachelor's degree I took several e-Learning courses which triggered my interest in HCI Design in e-Learning. Furthermore, I am an amateur musician and enjoy the audio aspect in these environments.

The initial stages of my PhD focused on Computer-Assisted Language Learning (CALL) Websites. The most important aspect from the data collected and analyzed in these stages was the importance of Computer-Mediated Communication (CMC) in e-Learning websites. Thus my focus shifted to CMC in e-Learning.

The study dealt with issues surrounding social interaction in online learning environments. After carrying out a literature review on CMC and online social communities, I have studied and evaluated a number of frameworks and models that are used to assess CMC in e-Learning environments. Aspects and attributes of CMC that were studied include content, cognition, social networks, discourse, and interaction. A gap was identified in the available methods for assessing the evolution of social networks in e-Learning environments. Hence, I have developed FESNeL: a Framework for assessing the Evolution of Social Networks in e-Learning.

The FESNeL framework has been developed to allow e-educators and online course instructors/maintainers to perform in-depth analyses of the communication patterns of the students on their e-Learning courses and to follow their course progression. FESNeL assesses the social network of the students over the duration of the course, mapping out the changes and evolution of these social structures over time. It is useful for monitoring the networks and keeping track of their changes, while investigating how specific course amendments, interface design, participation in computer-mediated communication, and/or conversation topics positively or negatively influence the dynamics of the online community.

When using this framework to assess their e-Learning community, e-educators are able to predict how certain actions will affect their network, and can incorporate various methodologies to alter the state of their network. FESNeL is a unified framework compiled of both qualitative and quantitative methods. The four components of FESNeL are:

- Attitudes Towards Thinking and Learning Survey (ATTLS)
- Social Network Analysis (SNA)
- Topic Relation Analysis (TRA)
- Log Analysis.

ATTLS

The ATTLS is used to assess the quality of discourse within a course by measuring the extent to which a person is a 'Connected Knower' (CK) or a 'Separate Knower' (SK). Differences in SK and CK scores produce different behaviours during an actual episode of learning, and result in different reactions to that session. People with higher CK scores tend to find learning more enjoyable, and are often more cooperative, congenial

and more willing to build on the ideas of others, while those with higher SK scores tend to take a more critical and argumentative stance to learning. Separate knowers look for what is wrong with other people's ideas, whereas connected knowers look for why other people's ideas make sense or how they might be right, since they try to look at things from the other person's point of view and try to understand it rather than evaluate it.

SNA

SNA is the mapping and measuring of relationships and flows between people, groups, organizations, computers or other information/knowledge processing entities. It provides both a visual and a mathematical analysis of human relationships. SNA is used to visualize communication/relationships between the students, study the factors which influence them, draw out implications of the relational data, and make recommendations to improve communication within the social network of students.

TRA

The TRA model is a content analysis tool. Content analysis is an approach to understanding the processes that participants engage in as they input messages. The tool assists us in understanding the messages and communication between the learners, and how important the discussed topics are for the learners to remain and complete the online course.

Log Analysis

Log files are used to track the users' interactions with the computer system they are using. Using logs we examine the areas of the website that the students visited, the frequency of their visits, and their patterns of navigation. Logs are also time-stamped so they can be used to calculate how long a user spends on a particular task or how long a user has lingered in a certain part of the website. By carrying out log analysis, we investigate the students' course attendance, CMC contribution and course progression, retention and advancement.

Furthermore, the proposed unified framework is currently being applied to a characteristic case study of a CALL course. Large amounts of data from a course with 55,000 students is being collected to be analysed, and the results will allow for suggestions for future research. The proposed unified framework will assist in answering questions like what causes student retention in online courses, and how this can be improved through the interface of the e-Learning course and the use of CMC applications. The final aim of this study is the generalization of FESNeL so that it is applicable to a wide range of e-Learning courses.

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Memorability and security of passwords

Alistair DN Edwards & Helen Petrie

People – and their passwords – are often seen as the weakest link in any secure system. There is a basic conflict in that a password ought to be easy to remember, but at the same time hard to guess. There is an assumption that the hardest password to crack is one which is composed entirely randomly, but that is also likely to be the hardest to remember. The main objective of a small experiment we recently carried out was to verify if that is truly the case and to get some indication of what is the best kind of password.

The experiment was carried out via the web and compared the kinds of password shown in Table 1. Memorability of the passwords was measured by getting people to attempt to recall them after one week. Security strength of the passwords was measured by submitting them to a password-cracking program and seeing how long it took to crack them – if at all.

Class	Description	Examples
1 Random	The eight characters of the password were automatically chosen entirely at random.	ap4AEp£p, djs843nd toc&201!
2 Nonsense	Letters were randomly chosen – but in alternating pairs of vowels and consonants, thereby creating non-words that are to some extent pronounceable.	mejadoro, gitekaba, bekumufi
3 Concatenated Pairs	This algorithm constructs a password by concatenating two four-letter words.	rungself, fastlace, banebong
4 Free Choice	The user was allowed to choose any 8-character password they wanted.	
5 Guided Choice	This was as in (4), except that the user was given advice on the choice of a good password.	

Table 1 Password classes tested. In order to make the measurement of strength fair, all passwords had to be exactly 8 characters long.

People were invited to visit a website set up for the experiment (including through an appeal in *Interfaces* 62). They registered by giving their email address and then were randomly assigned to one of the above password classes. For Classes 1 to 3 they were given a password; for Classes 3 and 4 they had to choose one themselves. In all cases they were asked not to write down their password but to attempt to remember it.

Participants then received emails one day later and one week later, asking them to return to the website. They would then re-enter their password or register the fact that they had forgotten it. The purpose of returning after one day was to give the participants some practice with their password. Therefore, if they did not remember it at this stage, they were told it again. Thus it was only the results of their second return to the website, after a week, that was used as a measure of memorability.

Strength was measured by setting up a Unix password file using 173 of the passwords and then running the public-domain password cracking software, *John the Ripper* (<http://www.openwall.com/john/>) on that file. As passwords were cracked the time taken was recorded.

Some passwords were cracked immediately (effectively in less than one second). The last password was successfully cracked at 15:18:22 on 20th February 2005 (69 days 22 hours and 2 seconds or 6,040,802 seconds from the start of the experiment). The software was left running until 09:51:22 on 9th March 2005. At that point 27 passwords had been cracked and it was assumed that no further ones would be.

Results

The password website went live in December 2004. Up to 24th March 2005 a total of 246 passwords were collected. The memorability and strength of the password classes are summarised in Figure 1 (overleaf).

Discussion

We are in the process of writing more detailed publications regarding this experiment – and related work we are undertaking. Among other things, there is clearly scope to discuss the appropriateness of the methods and the applicability of the results. However, we can already draw some useful results. As expected, random passwords are most secure; none of them was cracked. However, it is also not surprising that they were also the hardest to remember; a memorability rate of 25% does not seem of any practical use.

Guided Choice was the next most secure class, with a high degree of memorability (81%). This suggests that the conventional advice given to users is appropriate. Interestingly, though, the memorability of these was lower than that for Free Choice (85%), so that there is a price to be paid for security. Nonsense passwords are quite secure – but with a memorability of only 55% they are not likely to be practically useful. Concatenated Pairs are generated by a number of systems, such as some websites, but our data

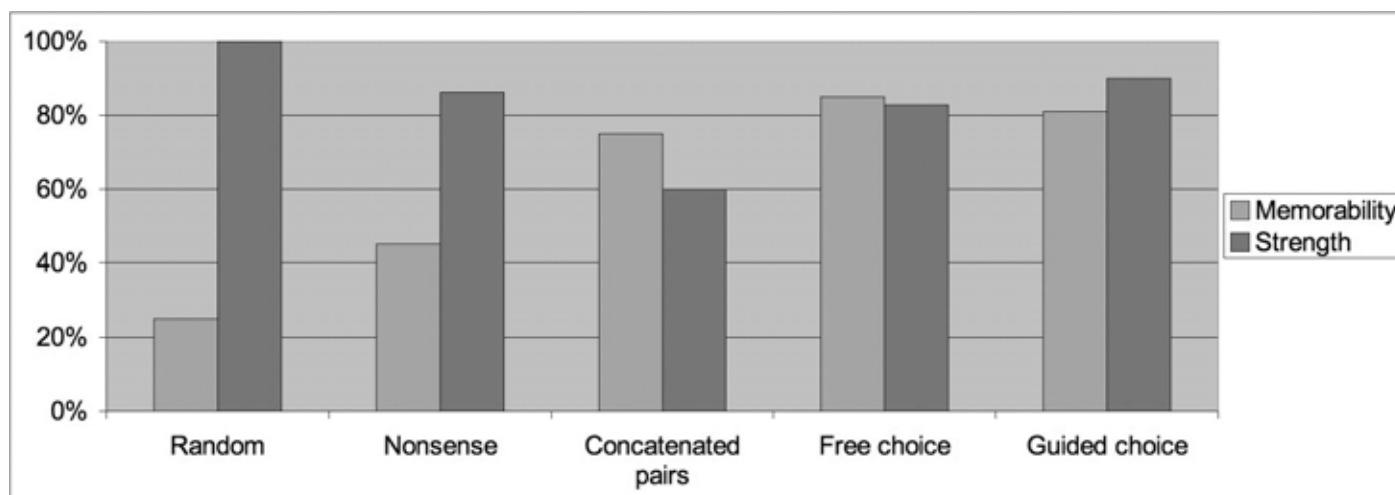


Figure 1 Summary of results. Memorability refers to the percentage of the passwords of the given class that users were able to correctly re-enter after one week. Strength refers to the percentage of passwords that were not cracked. Notice that none of the Random passwords was cracked, and hence its Strength is 100%.

suggest that they are not very secure. However, they are quite memorable (75%). This suggests that they may be appropriate for applications in which the consequences of violation are not likely to be severe – which are also likely to be systems that are not worth the hacker's attention.

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Experiencing design

Tools of the trade

Robert St Amant

Sometimes you'll hear people say, "I'm no good with tools." Don't believe them. Watch: they use tools to cook and eat their meals, clean their teeth, unlock the door to their house, and so forth, all with unremarkable virtuosity. Tools are more than just hammers and screwdrivers and saws. Rather, tools surround us in our everyday lives, and we have evolved to be very good at using them.

Well-designed tools can be a joy to use. When the act of using a tool breaks down, however, it can give us insight into what makes tools usable in the first place:

"My dad once owned a pair of pliers that always gave me a problem when I used them. Every time I tried to grip something to tighten it up, they clamped down on my fingers. I eventually learned to watch my fingers when I used them, but I still remember the pinch marks they left."

"[In putting together a bookcase] there was so many different types of screws and bolts of different sizes (some were metric and others were American sizes), that you had to have five different wrenches and screwdrivers to get the job done."

Tools work best when they are designed for the physical capabilities of their user (they are most commonly held in the hand), when they are well suited to the task that they are applied to (tools mediate interaction with other objects), and when they are ready at hand in a well-organised work environment. More basically, good tools help people reach their goals, by making incremental changes directly on visible objects. In their application, tools often act as amplifiers of some ability, but tools can also help people constrain objects (e.g. with clamps), gain information about objects (e.g. using a magnifying glass), or mark objects according to need (e.g., using a carpenter's or seamstress's pencil).

Some of what we know about the use of tools can help us build more effective software (or hardware) systems. Tangible user interfaces and handheld devices offer the most direct possibilities for mimicking tools in the real world. For example, the I/O brush, produced in Hiroshi Ishii's lab, takes the form of a large artist's paintbrush (<http://web.media.mit.edu/~kimiko/iobrush/>). A tiny camera embedded in the tip of the brush can pick up color and texture from any surface that the brush is touched to. Using the brush, the artist can transfer information from the physical environment onto an interactive canvas, painting in a natural way.

Graphical user interfaces based on tool metaphors take a less literal approach. The best-known work along these lines is the idea of "local tools," developed by Ben Bederson and colleagues as part of the KidPad project (<http://www.cs.umd.edu/hcil/pad++/papers/uist-96-localtools/>).

Local tools are an alternative to the modal behavior of tool palettes. In a drawing application, users can pick up a pen or an eraser, use it, and drop it in a convenient place for later use. More than one copy of a tool can exist at the same time, supporting collaboration.

Children as young as four can use local tools to draw pictures. Work in my own group has pushed this idea further, to explore the range of physical metaphors for

software interaction, again in a drawing environment (<http://www.csc.ncsu.edu/faculty/stamant/affordances.html>).

For example, a ruler in our HabilisDraw system can act as a straight edge for freehand drawing and can also be used, when picked up, to push drawn objects into alignment at arbitrary angles. Other physical analogs, aside from pens and rulers, include pushpins to constrain movement, compasses, inkwells, and magnifying lenses.

An important question is how the benefits of tool-based interaction for drawing might transfer to tasks with a less obvious physical interpretation. This requires a bit of thought, but some abstract properties of tools can provide guidance. For example, most tools in the real world must come in contact with an object to have an effect on it. This means that the effect of a tool is generally localised.

To see how this notion of 'effect locality' might improve a software interface, consider a Find and Replace dialog in a word processor. Suppose I want to change every occurrence of 'image' to 'icon' in a document. A global replacement may give unexpected changes, such as 'iconry' from 'imagery' (or the less likely 'pilgricon' from 'pilgrimage'). If I add spaces before and after 'image' to fix this, then I will miss forms that include punctuation, such as 'image'.

The safest route is to walk through all the matches and decide whether to change each one, in context. This has its own difficulties, however, with each successive match appearing at an unpredictable place on the screen and sometimes even with the dialog box moving to avoid obscuring matched strings.

An improved Find and Replace dialog might exploit effect locality by gathering all matches to a string in the same place, and letting the user refine the search criteria, directly apply the replace option to specific matches, or de-select some matches and then perform the replacement to the remainder automatically. This is just a brief example given to suggest further possibilities; who wouldn't like software to work as easily and transparently as a hammer or saw?

Further reading: Chris Baber has recently published an excellent book that reviews tool use from a human factors perspective, called *Cognition and Tool Use: Forms of Engagement in Human and Animal Use of Tools*.

Robert St Amant

<http://www.ncsu.edu/~stamant>



Robert St Amant is an associate professor in the computer science department at North Carolina State University, currently on sabbatical from January 2005 through December 2005 at the Information Sciences Institute, University of Southern California. The work in his lab is a blend of human-computer interaction and artificial intelligence, with an emphasis on planning concepts. He's interested in building intelligent tools to help users with complex tasks.

RAE response

Russell Beale

The Research Assessment Exercise assesses the quality of UK research and is used by the four UK higher education funding bodies (Higher Education Funding Council for Wales, Higher Education Funding Council for England, Scottish Higher Education Funding Council, and the Department for Employment and Learning) when distributing block grant funding to universities. Block grant funding is the public money given to universities for research; it is independent of the grants that are given for specific projects from Research Councils, charities and European Union and government departments.

The main assessment for RAE 2008 will take place in a couple of years but, in July this year, a consultation opened on the RAE 2008 draft criteria and working methods so that UK higher education institutions, subject associations, and other stakeholders could submit their views.

In September, Russell Beale, the Chair of the British HCI Group, prepared the Group's response, which is printed here in full. As Russell notes "The group was able to put in a coherent response to the consultation exercise, which would not have been possible without the support and contributions from many members – many thanks to them all for their input, big or small. These activities are important to ensure that HCI is effectively represented at a national level, and properly supported by government funding."

For more information see www.hefce.ac.uk/research/ and www.rae.ac.uk

Key points

The nature of HCI research is essentially interdisciplinary, and the research carried out by participants in the field has a number of different outlets, depending on the primary focus and impact of the work done. Research applicable to a particular user group or domain may be best disseminated through non-traditional HCI routes. Therefore, it is important that the panel recognise that HCI work will appear in diverse outlets and that work published outside mainstream Computer Science (e.g. in design, psychology or social sciences literatures) can have equal value to that published within Computer Science. We would expect such work to be cross-referred to other panels as appropriate, while recognising that the cross-disciplinary nature of the work may also make it difficult for other panels to assess objectively.

We would like to emphasise that the interdisciplinary nature of the field means that combining approaches and synthesising new material from a variety of fields is an integral and important aspect of HCI research, and that significant advances can be achieved in an interdisciplinary way which are holistically more significant than each individual progression within one particular field.

The UOA Descriptor refers to "...using methods drawn principally, but not exclusively, from the disciplines of mathematics, science and engineering." We would like to confirm that HCI might appropriately be drawing methods from psychology, sociology, design and other such fields as well.

"The sub-panel may, for example, examine in detail outputs that are published in outlets with which they are unfamiliar, and those which contain interdisciplinary research." We recognize, and indeed welcome, the fact that the panel will call upon the appropriate expertise as necessary in order to assess the value of contributions with which it may be unfamiliar. However we would ask the panel to ensure that HCI research is in no way disadvantaged by being more intensely scrutinized than other subject areas within the Unit of Assessment.

We confirm the panel's view that no one form of outlet is more appropriate than another, and in particular would want to emphasise that the value of rigorously reviewed conference material may well be of more significant impact than journal materials, given the more responsive nature of conferences and the fast-moving nature of the field, and that many HCI researchers understand this and take advantage of this. For some conferences in HCI (e.g. CHI, HCI, Interact) acceptance rates are around 15–25%; less than many journals. It is also true that there are other conferences in the field for which this is not true. There are many reasons for conference publication: a key one for HCI researchers is the wide exposure to, and feedback from, an international interdisciplinary audience, which is often of particular value in this domain in improving work.

It is important to recognise that case studies and exemplars, as well as prototype solutions to explore problems, are important in our work, and these are particularly difficult to assess, though we note that the panel is looking for "relevance to users", "practice-based research", and "direct engagement with users", so we have confidence that this style of work will be accounted for.

For HCI, the notion of a research group is less clear-cut than for other disciplines. Our 'groups' tend to be across disciplines, and often across Universities – it is these that give support and coherence to researchers, and we should find a way to recognise and identify this in the RAE return – perhaps by identifying collaborations with other individuals and organisations to form part of the appraisal of the connectedness and support that an individual receives.

Russell Beale

On behalf of the

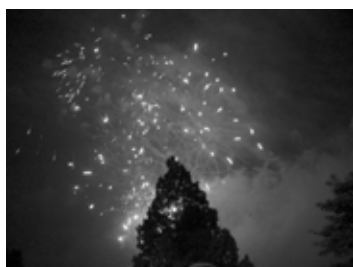
BCS Human-computer Interaction Special Interest Group



Aspects of HCI2005



Tom kicks off HCI2005



Edinburgh Festival fireworks



The conference dinner at the Caledonian Hotel



Ted Nelson, keynote speaker



Commercial Uses of Eye-tracking workshop



The Ceilidh



Alistair Sutcliffe gives his keynote in the Lindsay Stewart lecture theatre



Too early for inhabitants of the Haymarket residences



Doctoral Consortium



A bar somewhere in Edinburgh



With all-night licencing you have to go somewhere



Conference awards



HCI2005

A PhD student's reflection

Chris Creed

Since returning from my first HCI conference at Napier University, I wanted to share my thoughts about the whole experience from a PhD student's perspective. My main participation in the conference was as a member of the Doctoral Consortium which took place with all other workshops and tutorials on the Monday and Tuesday. The Consortium presented a great opportunity for all members involved to meet and socialise with other students of HCI as well as offering the chance to get some feedback on our work in a friendly and welcoming environment. I would like to thank Ann Blandford, Paul Curzon and Shailey Minocha for organising an informative and stimulating experience.

The main conference took place on the Wednesday, Thursday and Friday with Mary Czerwinski of Microsoft Research kicking off proceedings after the initial opening ceremonies. The main lecture hall had a unique and modern feel to it which provided an ideal setting for the keynote (and other) speakers. Prior to the conference starting, I was particularly looking forward to hearing the presentations of the keynote speakers and so attended Mary's talk with much anticipation. I wasn't disappointed – Mary touched on some of the fascinating research that is currently going on at Microsoft, including the use of large displays, brain-computer interfaces, and some new models for manipulating windows.

After the initial keynote on Wednesday morning, I went along to a session on trust and emotion and followed that by attending a session on awareness. Breaks between sessions provided a good opportunity to meet with others and discuss the work presented in each of the sessions. Facilities at the venue were also very good, making it easy to check email when any spare moments presented themselves.

The highlight of the whole conference for me was the keynote by Ted Nelson in the late afternoon of Wednesday. This was the first time that I have heard Ted speak and I found his talk to be inspiring and motivating. His questioning of the very way in which we currently interact with computers was intriguing and thought-provoking. As with any good presentation, I came away from Ted's keynote with a number of different ideas, thoughts and questions to contemplate further.

The conference dinner on Wednesday evening was at the Caledonian Hotel where the food and service were excellent. The night concluded by visiting a few local bars and then heading back to the halls of residence in Haymarket. All in all, a very enjoyable and productive day.

After a late night, I was up for an early start on Thursday morning and headed off to the conference venue from the halls of residence. The bus journey took about 15 minutes and after some breakfast (and numerous cups of coffee), I made my way to the first keynote of Industry Day. This keynote was by Ashley Friedlein, CEO of E-Consultancy.com, who gave an enlightening talk on the importance of usability in e-commerce.

Following Ashley's talk (and more coffee) I went to a session on searching and particularly enjoyed one of the presentations on digital books and how they could be

designed to fulfil the social and emotional needs that real books often do. After this session, I decided to go to Ted Nelson's tutorial on ZigZig® – the software engine he had introduced the previous day. Attendees of the tutorial were given an opportunity to test-drive a prototype of ZigZag by installing it onto their laptops and having a play under Ted's instruction. We were also allowed to take the prototype home with us to play around with further at a later date.

At end of the day Jackie Lee-Joe from Orange gave her keynote about the branding experience at Orange. Like Ashley's keynote earlier in the day, I found it interesting to consider usability from a different perspective and was surprised by the attention to detail and amount of effort that goes into branding at Orange.

After Jackie's keynote, a few of us went off to the reception for new British HCI members where free wine was on offer along with informal discussions about the British HCI Group. Following this, many of us set off for the Hub and a Ceilidh. This proved to be hugely entertaining and was great fun to see people enthusiastically taking to the dance floor to strut their stuff. Again the night was concluded by visiting a few bars and returning to the halls of residence in the early hours of Friday morning.

Unfortunately I had to miss the events taking place on Friday as I had an early flight leaving Edinburgh at 8.30am. However, the early start and waiting around at the airport gave me an opportunity to reflect on my experience at the conference. I think feeling more like of a member of the HCI community was perhaps the main thing I took away from the conference. It can often feel quite isolating completing a PhD in HCI, but meeting other students of HCI, as well as more established researchers, was helpful as I was able to discuss my work (and the work of others) with people who have a common interest in how we interact with computers.

In summary, I found the conference to be a fantastic experience. I thought the conference was well organised and there were a variety of different themes that were covered. Attending the conference has given me a fresh burst of much needed enthusiasm, inspiration and motivation going into my second year. I would like to take this opportunity to thank the British HCI Group for funding the whole experience for Doctoral Consortium students – it's heartening to know that the group places such high importance on new researchers entering the field. I look forward to meeting everyone again next year.

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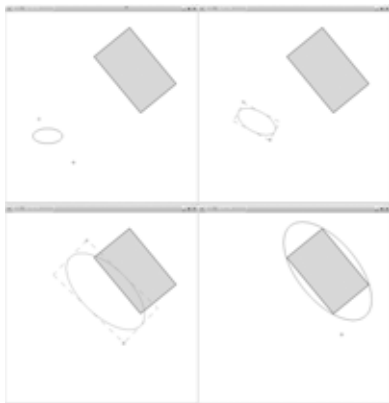
HCI2005: The Fringe

Scotland overrun with mice...

Celine Latulipe

Well, computer mice at least. I brought my Mac Powerbook and my two USB mice to HCI2005 in Edinburgh and showed what powerful little creatures mice are. Attaching two USB mice to any standard computer is very telling – the mice fight for the cursor because only a single input stream is registered by the OS. However, with my symPut driver, which works on Mac OS X and Linux, each mouse is given its own input stream and peace reigns in the mouse world.

What can you do with two separate input streams? The four degrees of freedom in spatial input can be mapped asymmetrically, such that the mouse controlled by the dominant hand does all the hard work and the mouse controlled by the non-dominant hand plays a supporting role. This type of interaction follows Yves Guiard's Kinematic Chain model [1] and is certainly useful for tasks that are naturally asymmetric.



symDraw object manipulation

My research focuses on tasks that are *symmetric*, where the two hands play equal roles in the interaction. I have developed symDraw, a 2-D vector drawing program in which shapes are drawn using the two cursors to stretch the shape out. Shapes can be steered across the screen by grabbing opposite corners, and this allows the shape to be simultaneously rotated, translated and scaled, similar to Kurtenbach et al.'s two-handed stretchies technique [2]. In symDraw, spline curves are drawn with one hand, but local editing is performed symmetrically with the two hands controlling the ends of a tangent to a point on the curve.



Spline manipulation



symTone

I've also been working with Ian Bell to develop symTone, a symmetric photographic manipulation program. In symTone, a tone reproduction curve can be manipulated symmetrically with two cursors. This allows fast and easy exploration of the domain space in which input tones are mapped through the curve function to determine the output tones of the adjusted image.

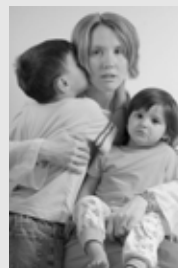
I'm currently working on a dual cursor prototype window manager called Duo. Imagine resizing and moving an application window by grabbing opposite corners of the window with two cursors and simply stretching the cursors out until the window is in the appropriate position and is the desired size. This single, fluid, motion can replace the two-step process of moving the window by dragging the title bar and resizing the window by dragging on an edge or corner. This example is just one of many ways that two cursors and two mice can be useful in a general computing environment. No need to call in the Pied Piper here!



Duo

References

- [1] Yves Guiard. Asymmetric division of labour in human skilled bimanual action: The kinematic chain as a model. *Journal of Motor Behaviour*, pp 486-517, 1987.
- [2] Gordon Kurtenbach, George Fitzmaurice, Thomas Baudel, and Bill Buxton. The design of a GUI paradigm based on tablets, two-hands and transparency. In *CHI'97 Proceedings*, 1997.



Celine Latulipe is a doctoral candidate in the Computer Graphics Lab at the University of Waterloo. She is studying two-handed interaction, and focuses her work on using standard devices, two cursors and symmetric interaction techniques. In addition to her doctoral research, Celine is the mother of two small children and is also very involved in trying to recruit more young women to study computer science. She expects to defend her thesis in 2006.

HCI2005: The Fringe

Weapons of Maths Construction

Will Thimbleby

Mathematics is boring. Like many people, at primary school I really sucked at mathematics, and maths seemed to suck me! Arithmetic and sums didn't interest me, and I wasn't very good at them. It was only when I was doing GCSEs that I began to enjoy it. Numbers disappeared to be replaced with letters, and I even enjoyed the ideas and principles behind the numbers.

Now I've come full-circle: I've left school, been to university, and started developing a new calculator.

My calculator started life as my university Masters project to design a calculator that didn't require learning or teaching. Maybe I was ambitious, but I wanted to build a calculator that was as intuitive to use as paper is. Magic paper, that is. The calculator I built behaves as much like paper as possible, but with magic added: it recognises your handwriting as you write, and you can write naturally using ordinary mathematical notation. So it really works like paper; then the magic happens when this writing is morphed into neat typeset equations which, while remaining editable as anything else, are filled in with the correct answers. Overall, this allows users not to worry about either the calculator's ability or their own. They just use it like a piece of paper, and can correct it when it goes wrong.

What I didn't expect from this idea was how exciting people would find it; people actually enjoy writing sums and seeing them magically transformed before their eyes. As a professor of mathematics said, he'd seen plenty of people cry over sums before, but he'd never seen people laugh and smile!

The calculator makes more sense when you see it working interactively; for this brief article, you'll have to make do with a series of static screen shots:

- 1
$$\begin{array}{r} 3 \times 6 = 18 \\ 5 \end{array}$$
- 2
$$\begin{array}{r} 3 \times 30 \\ 5 \end{array} = 18$$
- 3
$$\begin{array}{r} 3 \times 30 \\ 5 \end{array} = 18$$
- 4
$$\begin{array}{r} 270 \\ 3 \times 5 \end{array} = 18$$

1. Write anywhere
2. Changes automatically recognised and solved
3. Grab and move parts of a sum
4. The new sum, rearranged and solved

The screen shots of course only show the screen, not how you interact with it. Nor do static screen shots give any sense of the experience or the unique feel of using it.

We use a tablet or a touch screen, so it is very easy. In fact, it's a bit like the fancy user interface in *Minority Report* when John Anderton (played by Tom Cruise) plays around on the big glass screen.

"I've never seen anything that's brought a smile to my face while doing addition, but this has. For that reason alone, I want one!" – An artist

The initial responses I got and more formal HCI evalua-

tion confirmed it worked surprisingly well. Users really enjoyed using it and actually got more accurate results when using it than with the ordinary commercial handheld calculators they were familiar with!

Earlier this year we demonstrated an improved version of the calculator at the Royal Society Summer Science Exhibition to over 4000 people. We managed to get formal feedback from 436 people. Over 90% enjoyed using it – rating it top from the five choices we gave them.



Its surprising ease of use, and fun, has – we think – opened up entirely new ways of interacting with mathematics. It would have been an eye opener for me at school, and many of our subjects, particularly those still doing GCSE themselves, have expressed the same thought. The calculator allows users to play with mathematics, to try things out, and to learn and see the underlying process. One high school teacher said "I like the way it sets everything out clearly; you can see how it got the answer".

Hopefully, all this will fit into the HCI PhD I am now doing. We hope the calculator will have great opportunities for use in learning and teaching and also in everyday calculation tasks. And hopefully the principles and ideas behind it can be extended to other applications.

References

Thimbleby, W., Thimbleby, H. (2005). A novel gesture-based calculator and its design principles. In: *HCI2005 Proceedings*, Volume 2.

For more information please visit <http://cs.swansea.ac.uk/calculators/> You can also download the calculator from there. It is written in Java and should run on almost any computer, but note that it works best with tablets, touchscreens or interactive whiteboards rather than mice.

Will Thimbleby
will@thimbleby.net



I am a PhD student at Swansea University, researching generative principles for user interfaces. I work there with Harold Thimbleby. And yes that is my Dad! I am a second generation HCIer, so I guess he has had some influence. I don't think I ever consciously decided to enter HCI. But I love creating and making things better, and HCI today is one of the most wide reaching best ways to do that.



HCI2005

HCI and the Older Population workshop (two views)

The ageing population and a recognition of the utility of technology means there is an increasing interest in designing with older people in mind, whether this involves designing for all or producing specific items of technology to support older people. The HCI and the Older Population workshop at HCI2005 was intended to provide a forum for those working in the area and to encourage others to consider this user group. This was the latest of a series of such workshops at BCS HCI, starting in 2002. (Brewster and Zajicek, 2002)

A standard element in our workshops is a talk from, and the attendance of, members of the Dundee User Panel, a group of older volunteers. While we can discuss design issues *ad nauseam*, the most effective way of communicating the barriers that older adults encounter to technology use is to hear it from the users themselves.

This report on the workshop was written by Anna Dickinson (University of Dundee) who co-organised the workshop, and Francis Allen, one of the members of the User Panel.

Frank: It is very reassuring to know that there is a movement to consider 'Computers and the Older Generation'.

There was a very good and extensive presentation by Professor Alan Newell, stressing the need for designers to produce computers with the older user in mind.

There was an interactive 'Design Workshop' in which all participated, followed by an assessment and investigation of the resulting designs presented, with ease of use and suitability being paramount, being for the use of all groups. This was quite enlightening and highlighted the pressure on 'Design' to cover all aspects of the product.

Anna: The keynote by Alan Newell examined the different ways we have of thinking about design for older people: he compared the 'inclusive design' approach, which sees design being *extended* to include groups like older and disabled people, and an alternative approach, which starts from a consideration of these groups. Designing with older or disabled people in mind, he argued, produces technology useful for everyone – and often produces radical new solutions that would not otherwise occur, for example the cassette tape recorder, which was initially produced in England for talking-books for the blind (Newell and Gregor, 1997).

This was followed by a design workshop in which five groups separately designed paper prototypes of accessible navigation aids: two groups were enhanced by the inclusion of older volunteers, who took an active part in the design discussions. When the designs were complete they were publicly evaluated, with Alan Newell acting as an evaluator.

The designs were all interesting and carefully considered, and the evaluations were illuminating (and often very funny).





Anna Dickinson & Francis Allen

Frank: After lunch, two representatives of the older generation gave an individual talk on how computers appeared to them, again stressing design inclusion.

The resulting discussion concentrated again on the 'design' aspects and the awareness to allow for the needs of the older generation as forecasts emphasise a greater increase in the older group.

A generalisation of the one day workshop was that it did clearly stress the need for design application to the older group, but there was little to report on action as to what is to be implemented.

Anna: The talks by Isobel Lindsay and Wilf Lakie were really effective in underlining the frustration that novice users have with complicated computer systems. Part of Wilf's talk involved reading out the following:

Computers are still a mystery to me as my industrial experience was wholly mechanical engineering with only elementary electrics. I do find the computer to be a frustrating and confusing tool as there are always two, three or more ways of achieving a function, this I find to be superfluous... Having just upgraded to a new unit with the XP operating program, I understand that XP refers to 'experience', my personal view is that the program should be named the **Exaggerated Programme**. Personally it means I have to learn a whole new set of rules in order to obtain even the most basic function and there exists a whole conglomeration of new operating tools and menus that mean nothing to me.

The (too short) discussion which followed focused on some of the questions that this area consistently brings up: what are the characteristics of 'older people'? Is designing for this group different from designing for the population in general? What can inclusive design do for us?

Frank's conclusions: Designers have a great difficulty in producing something for a group of people who had a lifetime of contact only with mechanical objects, I only experienced electricity in electric motors, lighting, and torches. Note!!! There was no electric light in the house until I was aged about six. No telephone, not even a radio. The first radio in the house was a 'One valve' that I built from a design sheet with parts supplied by an enthusiast (I was then aged seventeen/eighteen).

I would like design people to stop designing units more suitable for *their own use* and to design a unit more suitable for general use by all classes of computer ability.

What I have in mind is a unit that has all the bells and whistles of the latest application covering all the latest innovations that the design people can produce *BUT* the same unit has the ability to be used by all computer users. To me this could be achieved by what is in common use in the games field, that is a keypad would select the LEVEL at which the unit would operate. If this was available then

anyone could use the unit at the level selected by themselves and would be able to progress to higher levels in the same way as they do in games, by practice and increased ability. *The technology appears to be there so why not use it?*

Anna's conclusions: One issue that consistently resurfaces is the difficulty of communicating effectively with older users about computers and the potential for design changes. While those researchers who attended the workshop seemed to learn a great deal from the presentations given by members of the User Panel, and from their involvement in the design exercises, (and at Dundee we have been learning from them since the beginning of the UTOPIA project in 2001) there was an important and unforeseen effect on those members of the User Panel who contributed. Attendance at the workshop, and especially involvement in the design exercises, demonstrated for them some of the difficulties and challenges facing designers. The result has been that instead of asking "Why can't you make computers that *work*?" the questions become, "Have you thought of trying this?". Such sophisticated involvement from our target users is a very positive step for all of us.

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A. F. Newell and P. Gregor (1997). Human computer interfaces for people with disabilities, *Handbook of Human Computer Interaction* (1997), pp.813-824.

Call for Papers

IWSAWC 2006

6th International Workshop on
Smart Appliances and Wearable Computing
In conjunction with ICDCS 2006

July 4, 2006, Lisboa, Portugal

Submission deadline January 15, 2006

<http://ubicomp.lancs.ac.uk/workshops/iwsawc2006>

Call for Papers

1st International Workshop on Physicality

6-7 February 2006, Lancaster, UK

This multidisciplinary workshop will bring together researchers who are interested in the way that physicality of digital artefacts influences their use, or in the way that digitality informs our understanding of the physical. Through invited talks, short research presentations and group discussion we will discuss views on the fundamental nature of physicality and how this relates to design in areas such as ubiquitous and tangible computing, virtual reality and digital arts.

submission deadline for position papers: 10 January 2006

<http://www.physicality.org/>



The Purple Press

Edited Lowlights from the Seedy Underbelly of HCI2005

Toilet Trauma

Oh but what's a girl to do when she arrives at the university halls of residence at 11pm to find there's no toilet paper and the '24hr' Student Volunteers are slightly off-pace and annoyed at being disturbed?

Without going into too finer detail, I soon discovered that I'd not brought any tissues either. According to the commandments left in each room (eg "thou shalt not park in residents' parking spaces" and "thou shalt empty the bin and strip the linen before leaving thy guest room on Friday"), each room has one supply of toilet roll and, after that has been thoroughly consumed, "replacements will need to be supplied by guests".

Well, with a little ingenuity, I pulled through; fortunately, I brought enough knickers that I don't need to wear today's again until Friday. And, happily, when I registered this morning, my (rather trendy) delegate bag contained enough scrap paper that I should be able to manage till the end of the week without giving in and supplying my own toilet roll. Hah!

The Purple Pixie
xx

Bathroom Bother

On the other hand, I appear to have been supplied with complimentary bottles of shampoo, conditioner, and shower gel, all nicely laid out on my loan-towels – like some fancy joint! To be honest, I'd rather have a comfy bed without the plastic tartan mattress (what's that about?!!) and a bedside light, thank you very much!

Being a girl, I brought my own shampoo, anyway.

This morning, though, clutching



said shampoo, I opted to brave the slightly mouldy shower (Aunty Mildew would've been proud, G'rest her soul). In the noble tradition of the Dastardly Dandy Dan (PP, 2004), I turned on the shower and was flung across the room by the force (small 'f').

Water ... water ... everywhere!

Still, enough about the facilities ... well, there's never enough about the facilities...but we'll leave them alone for now ...

Love,
The Purple Pixie
x

The Blue Genie

I've just been speaking to my pal, the Blue Genie. He actually got to Edinburgh early on Sunday but spent the majority of the afternoon confined to his room (*shudder*) awaiting the arrival of the Emergency Joiner. It seems the lock on his door was broken so he couldn't actually lock his door.

So he didn't have much choice but to hang around until the Emergency Joiner turned up, twiddled his tools, tutted a few times, and fixed the lock. Apparently his thingummy was too short for the whatsit.

At least he has a lock. That's all I have to say on the matter.

ThePP
xx

The Shower Persona

Good morning, I'm your shower, looking forward to freshening up?

No that's not me, that's the fan. Didn't switch it on? Well, get dressed, get out and switch it on then! Building regulations about unventilated toilets? Never heard of them.

This morning I've a really clean cubi ... WAHAY HERE WE GO WATER WATER WATER I LUVVIT SEE ME GO EVEN DAN'S NOT SEEN THIS KIND OF PRESSURE SINCE THAT AGGRESSIVE QUESTIONING AT SUNDERLAND BLOW THAT SHOWER CURTAIN AWAY ONTO THE FLOOR, THANK THE DAY THEY POINTED ME STRAIGHT OUT THE CUBICLE DOOR AND THEN FITTED A CURTAIN INSTEAD OF DOORS YO JUST SEE HOW FAST THE FLOOR FILLS UP I GO ALL THE WAY TO ELEV ... oh spoilsport

Ok, so a dribble shower then. Yes sir, certainly sir. Thank you sir, see you tomorrow sir?

I just hope the next one puts their towel on the rail so that I can give it a good blast ...

Shower 7/2

How to survive conference week in student halls

1 Sleep when you can: if you can't sleep on your plastic mattress, which creaks every time you move, find a quiet corner during tea breaks, or just slip into the back row of an especially dull presentation.

2 Take your own pillow: you can use it to (a) bolster the supplied pillow; (b) replace the supplied pillow; (c) get comfortable when



napping during the day (see Tip #1).

3 Slip the supplied towel between the plastic mattress and sheet to (a) provide some kind of padding; (b) reduce the level of creaking; (c) avoid waking up in a pool of your own sweat.

4 Or, alternatively, sleep on top of the duvet and use your coat as a cover.

5 Ignore all of the above and book into the Travel Inn across the road. That way you can ignore Tips #1–4, you'll get taps that you can actually turn off, showers that don't flood the bathroom, towel rails that break your fall when you slip in River Napier (i.e. bathroom floor) and don't contribute to it, and door locks that can resist more than your novice pickpocketing-with-a-paper-clip skills.

e-bsorbed

A bus commute to the conference each morning is a drag unless you



can find something more enjoyable to do at the same time.

Entertaining myself by flicking through the proceedings yesterday, a paper about tools for leisure reading caught my eye. It was fascinating – talking about things like the importance of mobility for books and e-books, the social life of print books, and the emotional attachment people have to them.

Just after I'd read the bit about print books often becoming invisible, with the user's attention being completely taken by the content of the reading experience, I looked up ... and realised I'd missed my stop.

Napier was long behind us ... which is really neat: an interactive research paper that gives you the actual experience it's discussing. Is there a name for this phenomena and does anyone have other examples ... or do these things only happen to me?

PC

Conference Fringe

It seems to me that the less effort that goes into organising something, the more fun it is.

This is not to rubbish the work of my pal, the Blue Genie, who ran the Fringe. What I mean is that there was no review process involved in selecting the participants in the Fringe.

Basically, if you had an idea or an interactive experience you wanted to demonstrate to the rest of the conference, you could just set up your laptop and away you went.

I was really rather impressed with the exhibits. Clearly, so were the other delegates that stuck around to see, because the presenters were talking constantly to people until it was all wrapped up at about 7pm.

If you didn't stick around to see the Fringe, shame on you!

The exhibits included the Thimbleby Two's funky calculator, Canadian Chick's two-handed mouse(s/mice), and a means of gathering data on how people 'skin' their applications and tools.

So, the question is: should we do away with the whole peer review process for HCI2006 in London? Afterall, it's tedious and time-consuming for all involved. Why not, instead, just have anyone who fancies coming to the conference turn up with their laptop to demo their projects?

I think it could work ...

Purple Pixie

Architectural ungreatness

Whoever dreamt up the design of the Lindsay Stewart Lecture Theatre? What's the first rule of auditorium design? Don't light the speaker from behind. So what does LSLT do? It has a bloody great window right behind where the speaker stands.

A feeble attempt has been made at some point to block the light with blinds that generate a headache-inducing moire effect for those in the audience; an overall effect demonstrated by Mary C. during her otherwise excellent keynote presentation.



Disclaimer:

The views expressed in The Purple Press are not those of the authors or anyone else and are not to be repeated in front of anyone who could take offence, although, of course, no one can take offence because the characters described in The Purple Press could not possibly exist in real or virtual life or death. Does that cover everything?



Interfaces Reviews

Welcome to *Interfaces* Reviews. Thanks to Sandra Cairncross for doing a great job as the last editor. I have now been given the baton and perhaps unfortunately for you, this means you get three reviews by me in this issue. This is a short-term measure and will soon be remedied. I have a willing cohort of reviewers and some great books to discover. *Interfaces* Reviews will feature a themed set of books in each edition. In the coming year the reviewers will be bringing you their views on books on novel interfaces, information architecture and games as well as some 'heavy stuff'. I will also be getting the latest news on up and coming HCI books, so if you are publishing, writing or have seen a great book, let me know. These are my contact details:

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The three reviews in this edition cover my interests in art, design and technology. Tangential to HCI perhaps, but it is interesting how each of these subjects tackles the human-computer interface, in terms of aesthetics, utility and ethics.

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*Human Factors Methods for Design:
Making Systems Human-Centred*
Christopher P Nemeth
CRC Press, 2004
396 pages, hardback, illustrated b&w
ISBN 0-4152-9798-2
CRC Price \$99.95 (about £57.00)

This book comes from the same stable as Patrick Jordan's *Pleasurable Products*. Other publications in the series include Jordan's *Introduction to Usability* and *Human Factors in Product Design* with William Green. With this pedigree, this new volume is unlikely to disappoint and it doesn't. It looks and feels trustworthy and complete.

The book has three parts. The first describes the practice of Human Factors. The second offers a compendium of methods. The last part looks at professional issues and applications. It is clearly aimed at practitioners and could be a single point of reference. Indeed, the introduction suggests that its writing came from the lack of such a work. It is aimed at the design disciplines and will have relevance to everyone from architects to software engineers. For the more 'designerly' it may be a bit dry and there are few illustrations. However, designers of any flavour would be well advised to read it.

The book begins by looking at the barriers to the take up of technology and the problems with designing products and user interfaces. Human Factors is proposed as a remedy to

these problems and a way of improving the user experience. The focus is pretty much on traditional ergonomic concerns. These include comfort, performance, reliability and physiological and cognitive fit. Applications centre on systems and especially those pertaining to activity and work.

Readers are taken through the history of human factors design and this is contextualised by a process cycle that dovetails with business needs and the product lifecycle. Indeed, despite looking academic, the content is firmly aimed at business and making products more useful and usable. Given the ergonomics focus it is understandable that the first section tackles human abilities, memory and physiology and the influence of the external environment. Motivation and problem solving are also considered and are firmly rooted in a cognitive perspective.

Given the practitioner focus it is unusual (but refreshing) to get some deeper stuff. Thus Nemeth slips in Montaigne and the nature of sensual experience. This is done in an accessible and businesslike manner. Chapter Four looks at products and innovation. This chapter provides an overview of process that integrates ideation and the product lifecycle within a typical user-centred design framework. Again, the book usefully links to business needs and widens the focus of Human

Factors to encompass new product development.

Chapter Five takes an overview of the discipline and maps out its application in industry. The first sections pave the way for the main content. Focusing on methods, this part will probably be of most interest to practitioners. In just under two hundred pages, Nemeth covers 36 methods. These are organised under six sections. The first concerns analytical methods. Next design guidance is dealt with. Evaluation methods are then described, followed by a useful chapter on surveys, interviews and questionnaires. The final chapters concern usability assessment and controlled studies.

Each method is described in terms of what it does. The necessary preparation work is outlined including the materials, equipment and environment that are needed. In addition, easy to follow procedures and methods for analysing results are provided. Short examples are given and the methods are also usefully cross-referenced. The final section of the book considers the business side of human factors. Beginning with the cost benefits, useful organisational issues are also examined. Finally, Nemeth looks at communications and the book concludes with case studies from a wide range of projects.

This is a useful practitioner's book, it is clearly grounded in industry

practice with an eye on current research and pertinent philosophical groundwork. At nearly four hundred pages it is comprehensive without any padding. The core of the book is its understandable descriptions of methods. These provide valuable professional guidance and make *Human Factors Methods for Design: Making Systems Human-Centred* an invaluable reference work.

Read_Me: Software Art and Cultures
Olga Goriunova and Alexei Shulgin
[eds]
Digital Aesthetics Research Centre,
University of Aarhus, 2004
397 pages, paperback, illustrated b&w
ISBN 8-7988-4404-0
University of Aarhus price £22.00.

This book offers an insight into a new and dynamic community of software artists. The book comes from the Read_Me festival that took place in Aarhus last year. The festival had two sections: a conference and interactive exhibition 'camp'. As well as a book, the organisers have an accompanying website at Runme.org. The site curates the artworks online, while Read_Me offers theoretical and practical dialogue offline.

From neither the art nor strictly interactive arts community, Runme has come together through informal groups and networks. Indeed, they have stronger links to the hacker community than to the establishment of Ars Electronica. This means they are often critical of the elitism of the gallery and museum culture (Andersen and Pold, p. 14). They are pragmatic, practitioner based and (thankfully) leave the more esoteric questions about AI and consciousness to the art establishment.

Many of the twenty articles tackle software formalism vs. software culturism. This debate, central to the community, concerns whether intervention should focus on the material (software) or culture. Intervention is an appropriate term as most contributors see their work in explicitly political terms. Formalism concentrates on artistic uses of code. Software

culturalism, on the other hand, reflects the world of software and critiques tools such as Google and Windows. Here political intervention concerns reflecting the hidden values and qualities of the technology. A third strand bridges both and concerns performativity and there is a healthy diversity of thought and action between the two poles.

The best theoretical papers are by Arns, Cox et al, Johansson and Lillemoose. Inke Arns' article compares software art to generative art. The latter is defined by Galanter as 'any art ... where the artist uses a system ... which is set into motion with some degree of autonomy contributing to or resulting in a completed work of art' (p. 178). Troels Degn Johansson looks at the crisis of art as a parallel to one in software art. Like most contributors he is critical of the interactive arts establishment and Margot Lovejoy. Indeed, he condemns her focus on art, which 'is only marginally interested in experiments at the level of program code' ... and is only interested in 'what is tactile, audible and visible' (p. 155).

Jacob Lillemoose contemplates Florian Cramer's distinction between two kinds of software art. Firstly the 'literary and mathematical aesthetics of formal qualities of programming and generative code' ... and secondly, the 'conceptual and discursive involvement with software culture' (p. 154). He argues that software art 'is often treated as a digitally updated version of the conceptual art that emerged in the mid 60s' (p. 138) rather than a qualitatively new discipline.

Certain kinds of technology crop up in a number of chapters. The predictably unpredictable functionality of Google and Open Source are clear favourites as opposed to the logical and the corporate. There are also a number of artists that are referenced regularly. These include John Cage and Sol Le Witt, both for their performativity and immaterialism.

As well as works being on show at Runme.org, the book also summarises thirty two software art projects. The works include Douwe Osinga's 'Google Talk' (p. 392) that generates

poetry from an initial keyword. Peter Luining's (p. 354) 'Window' is literally that, a transparent window that caricatures the graphical user interface version because you can see through it. In similar ways many of the 'software culture' works are witty and self referential, including a thank you to Jakob Nielsen.

From the more formalist wing, Boris Kopeinig's TMP (p. 370) is a seemingly random array of numbers that fill the screen and change through some hidden functionality. There are also some good works that bridge the video and computer arts such as Amy Alexander's 'Extreme Whitespace' (p. 362). Performativity is also addressed with live coding, where laptops are used in live performances (Cox et al, p. 170).

This book is testament to a new and dynamic community that has a unique take on art and software. It will be interesting to see how the community matures and begins to influence software culture and art. On the down side, there is sometimes little concern for the audience reception of the work. Occasionally, it seems as though the community is the audience and the practitioners are happy with this. This situation, however, is untenable if their interventions are to have wider impact on art, software and society.

The Network Society (Key Concepts)
Darin Barney
Polity Press, 2004
198 pages, paperback, b&w
ISBN 0-7456-2669-6
Polity Press price £14.99

This is a flawless book that will be provocative to anyone interested in technology, design and society. The book starts by asking the question what is a network? The answer is commonsense; networks comprise 'nodes, ties and flows' (p. 26). The author then brings together a number of political/theoretical strands including globalisation, post-Fordism, the information society, post-industrialism and post-modernism. These, he argues are the precursors of the network society, but the present is more than



the sum of the past. Drawing on the work of Manuel Castells in *The Rise of The Network Society*, Barney points to the unique qualities of the age (pp. 25–34):

In Castells's formulation, "the network society ... is made up of networks of production, power and experience, which construct a culture of virtuality in the global flows that transcend time and space" (Castells 1998: 370).

Well indeed, and Castells looms large in the book and especially his assertion that society is increasingly 'informational' (p. 28) and 'globalised' (p. 28). This means that power and conflict emanate from access to the network (p. 30) and creates a tension between 'placelessness' (p. 31) and people's need for 'rootedness'. Lastly, human activity is expanded across borders and time zones in the network society. These are all useful pointers to where things are going and what we could be designing.

The first section looks at network technology. Here Barney departs from Castells and critiques instrumentalist, substantivist and social constructivist theories of technology and offers a 'composite view' (p. 42). This approach sees technology as neither entirely deterministic nor neutral but instead mutable in the hands of human agency.

Barney considers the essence of network technology and notes how it embeds 'instrumental rationality' within seemingly neutral tools. He also points out some of the positive aspects of networks, in facilitating two-way communication, localisation and 'the reconstitution of local identity, interests and power' (p. 47). In addition, as open systems networks provide an arena for contesting values and opportunities unavailable in the past.

Network technology is also contextualised with issues in design, situation and use. The author looks to Andrew Feenberg, Langdon Winner (p. 49) and Lawrence Lessig (p. 51). These thinkers make similar points to Harvey Molotch and in essence they suggest that design fixes value and affordances for its users. Conversely value and affordances are not solely

within the province of the designer. Design is constrained and influenced by external agencies. These influences are wide and encompass everything from the law to methods of production. Winner offers a well known example of how design can fix a political value through creating constraints and affordances for users:

New York's Long Island highway overpasses were 'deliberately designed by Robert Moses so as to be too low to allow passage beneath them by public buses. This design decision was also a political decision, and the technical arrangement it put in place was also a political arrangement ... low overpasses effectively denied poor people and racial minorities ... access to the public park and beaches'. (p. 50)

The character of network technology is then described in terms of 'time-space compression' (p. 61) and 'deterritorialisation' (p. 62). In effect, this means increasingly scattered and interlinked methods of communication, production and consumption across time and distance. Emblematic of the network society is the Internet and the author notes that 'never has there been a mass communication system that seems so little contained or constrained by territorial expanse' (p. 62). Finally, decentralisation and control as well as interactivity and customisation are considered as unique features of the technology.

The interpretative focus of the chapter is perhaps the book's only weakness. By giving more weight to the influence of digital networks on consumption, Barney could have brought the issue much more alive. For example, in the rise of Amazon, eBay™, text messaging and even cheap air travel, the matrix of human and technological networks is tangibly present.

The next section concerns the network economy. This takes in everything from enterprise and work to the changing nature of property. The history begins with the formulation of an information economy in the 1960s and the liberalisation of the telecommunications sector in the UK and US. This materialist approach is rewarding. Barney shows how political, economic and technological expediency has produced fundamental change for better and worse.

The last two chapters concern politics and identity. Both are influenced by a collapse of legitimacy of the old, increasing fragmentation and new networks. This is brought into the context of the rise of globalisation and the changing role of enterprise and the state. The 'state's apparent crisis of sovereignty' (p. 114) is, the author argues, a result of deterritorialisation, although he surveys alternative interpretations of the geo-political map.

The network society is both spur and brake on political involvement and the author is ambivalent whether the changes it brings about are good or bad. He notes the rise of new (transnational) opposition movements at the same time as the hegemony of the old (national) media. These developments are contained within a 'new politics' that is highly networked and symbolic. The author also suggests that identity is an increasingly important question in the face of the delegitimising of organisations. The chapter begins with a quote from Castells (p. 145):

"In a world of global flows of wealth, power and images, the search for identity, collective or individual, ascribed or constructed, becomes the fundamental source of social meaning ... Identity is becoming the main, and sometimes the only source of meaning in a historical period characterized by widespread destructuring of organisations ..."

(Castells 1996:3)

Drawing on the work of Sherry Turkle, the mutability of identity is discussed and the chapter concludes by looking at community. Avoiding Castells's positive reading of the situation, the author is more concerned about whether the network society is real or is just a useful focus for understanding the world we live in (p. 181). We might broaden that focus to think about how the network society influences the way we design and the products and services we help to create.

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