Successful strategies of older people for finding information

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Abstract. Older people have successful search strategies for finding practical information in everyday situations but, increasingly, traditional information sources are being supplemented or replaced by web based ones. However, there are wider issues than just making information available if people are to replace existing strategies by new web based ones. In this paper we use three studies on the information usage of older people to explore the issues surrounding why they favour specific search strategy and technology combinations. The studies each investigate different aspects of information search in a natural setting and concern tasks relevant to older people as their lives change: finding e-government information and planning travel. Results suggest that a variety of measures are important in choice of strategy. Furthermore, interface mechanisms are needed that complement existing strategies, reinforce the existence and crossing of boundaries, and support interactive use of landmarks.

1. Introduction

Psychological and neurological research suggests that people retain high levels of ability at skills practiced over their lifetime, but some find it hard to develop new skills (Rabbitt, 1999). However, with respect to information searching the world is changing rapidly. Technological improvements can potentially benefit an increasingly aging western population. Older people are also often very positive about the idea of using the Web (Chong & Theng, 2004) although their actual use is much lower than that of other groups.

The European Design for All e-Accessibility Network stresses the need for design methodologies that include older people. Similarly, proactive design philosophy stresses that the needs of the widest possible end-user population is incorporated from the outset (Akoumianakis & Stephanidis, 2001). We are concerned with the factors that are important in the choice of information search strategies for older people, so that their needs can be considered at the design stage.

Electronic information search strategies have been examined from many angles. Bates (1990), for example, argued that search interfaces should take more account of users' existing search strategies, and in particular that there are situations where users wish to directly control the search. Fields *et al* (2004), showed that experts such as librarians have sophisticated online resource search strategies which are not shared by novices. As with the majority of the work in this area, they focused on computerised solutions rather than natural technology independent search strategies. Stelmaszewska and Blandford (2004) explored wider issues, looking at the use of physical libraries and the artefacts within them and ways of facilitating online searches, by bringing more of the physical within the digital library metaphor.

We draw together results from three studies chosen to explore issues concerning information search strategies of older people in natural settings from different perspectives. Study 1 considers a straightforward web-based search task concerning e-government information (Curzon *et al*, 2004b). Study 2 investigated planning routes for physical journeys. The final study also concerns journey planning (using ferries) but more explicitly probed the differences between paper and web resources.

Issues that arose from the studies that we do not discuss here include financial, physical and cognitive constraints (Curzon *et al*, 2004a).

2. Why Real World Information Seeking Tasks?

The study topics were chosen to provide real world examples that presented relevant, non-trivial questions to our users. They focused on practical financial and transport tasks as they are specifically relevant for older people as their lives change. At different life stages, people's transport use changes: because of retirement and/or moving home that different journeys are taken; or because of increased physical or sensory impairment different forms of transport must be used (by public transport rather than driving, for example). These lifestyle changes mean that older people need to obtain new transport

and journey planning information. There are also external agendas making online access to this kind of information critical. For example, many governments are pushing an e-government agenda, aiming to make it the main method of accessing government information. As older people are major users of government services it is of particular importance.

The tasks are both complex and difficult because they concern, to varying degrees, obtaining information for subsequent use in the real world. The web is a clearly better start point for more abstract tasks (such as "find out about William Shakespeare") and so might be easier for an Internet novice. The information could be found from several sites and there are multiple correct answers. Such a test could have appeared pointless to the older users, however. There are real-world tasks (finding the time of a film at a known cinema, for example) where arguably the web is also a clearly better starting position. However, older people are likely to already have simple and successful non-web strategies for achieving them (eg local newspapers) so the benefits of switching are likely to be less obvious.

3. Finding housing benefit information

In the first study participants were asked to think-aloud finding an application form for a housing benefit claim, then use the web to look for other information of their choice. A semi-structured interview explored how people normally found information and their criteria for choosing their personal strategy. The observations were made in a natural home setting: either in the person's own home, or at the home of someone they knew well. The setting is important as it affects the cognitive processes involved (Lave, 1998). Role play, whilst being only a replication of a naturalistic setting, aims to provide a close to the event accounting rather than a reliance on subjects remembering their activities with the subsequent distortion (see Yardley, 1995; Braille, 2003). The scenarios were designed to provide the high level of "engagement" crucial to the success of such a simulation.

Table 1. Participants in study one

Identifier	**Sex**	**Age**	**Computer User?**	**Ownership of PC used**
PA	Male	75	Yes	Family
PB	Female	73	No	Family
PC	Male	67	Yes	Researcher's
PD	Female	62	No	Researcher's
PE	Female	70	No	Researcher's
PF	Female	67	Yes	Own
PG	Female	82	No	Researcher's
PH	Female	79	No	Researcher's

3.1 Results

Existing Strategies and Measures of Effectiveness
From their comments participants strongly preferred existing strategies. For example:

PC: "I've spent my life going to libraries. There must be 50 computers there now. I would not go to the computer first. I would go to the catalogue index and see what they had on the shelves in the stacks, but that's what I am used to. "

PA showed transference of successful strategies, from the physical environment directly to the computer. Having misspelled the council's name, gaining no search hits, he added *", housing benefits"* to the end of the query. This was unsuccessful so he swapped the ordering of the terms – a useful strategy if using a paper directory. Tens of minutes later, still unsuccessful, he fetched a paper telephone directory. Within seconds he found the entry for the local council's "*Housing benefit enquiries*". This was done to find the correct terminology to type into the search engine, mirroring a strategy of "experts" (Fields, 2004). He then quickly found the correct site. His existing search strategies were thus successful, irrespective of difficulties with the computer.

After the interviews participants were handed a telephone directory and asked to show how they would find the same information as on the computer. All possessed successful search abilities finding the correct entry within a few minutes. Traditional, well-developed search skills can be more successful than more modern approaches and so be a rational choice.

Overall most participants, although generally positive about learning to use computers, could perceive no immediate, overriding advantage in using the web for searches for a government form. They felt their tried and tested methods were often quicker, less frustrating and fitted in with their lifestyle and requirements for reassurance. This matches previous results (Sourbati, 2004) where a volunteer stated "Just the whole language of computers. It's different. It doesn't relate to how I see, how I relate to literature or anything like that".

The comments suggested that their measures of effectiveness were broad. For example, asked how they would find such information in a real situation:

PB: "I would have given up in 2 minutes and gone to the phone book."
PC: "I would have gone to the council offices and asked to see someone."

Speed of obtaining information was an important criteria, but the web was not seen as necessarily being quick:

PB: "We tried it [using the internet] with train times once and it took so long I went to the phone and I found it all before he got anything on the computer".

It may be more about frustration than elapsed time.

PB: "Its quicker to wait until Monday and phone. It really drives me batty. You can read a book in between"

With experience of search engines this might become less important as illustrated by PF**,** who frequently accesses the web and located the information within 5 minutes.

Speed was not always a major factor. The pace of life on retirement can be slower. PC was content to wait days for information, visiting places physically when convenient. This was reinforced by an anecdote that in the past he had not used directory enquiries to find a telephone number but waited until he was near the library and looked it up in the full set of phone directories there.

Interacting with people

PC noted that using a physical approach gave confirmation that whatever you were trying to do had been done, citing banks where a cashier would say "That's done", reinforced by you seeing them do it. Although he used ATMs and phone banking when convenient, with phone banking he went straight to the option of speaking to a person. Whilst confirmation can be given by computer systems, the social essence was missing.

Similarly having a person at hand was important for advice in form filling.

PD: "… you might need to talk to someone, especially when you see all those pages of filling in…might need some advice".

Activities that supported social contact were important:

PE: "Can't you get insular in the end? You don't meet anyone in your own island in your own flat there is a danger there".

There was also a downside because:

PE: "[on phone or in person] you feel embarrassed if you don't understand… [the web's] much more private…I'd hesitate in case I'd meet someone and I'd be embarrassed".

Boundaries

The lack of physical boundaries to constrain the search was an issue in the attempts of the participants. Several participants left sites without realising. PG was diverted by adverts. PD clicked on "more information" in an advert. PA, followed a link from an advert in a search results page that repeated the query exactly. PA also typed in a query for the council into a ShopAOL search box. The web provides little in the way of obvious boundaries as you pass between areas.

4. Planning a route

Study 2 considered a more complex everyday situation: planning routes. It is particularly applicable because navigational strategies have often been applied to illuminate the problems of hyperspace navigation. For example, Edwards & Hardman (1999) and Van Dyke Parunak (1989) show that it is useful to consider the map-like structures that people

make when they use hypertext documents. Rather than just seeing if people can find and keep track of information, we looked at how they find what is useful for their purpose, how they come to recognise, organise and use it.

We used a scenario based design to observe 6 pairs planning routes from an area close to their home to a restaurant 15+ miles away. They were given one of four destinations in the area they claimed to know the least about. The activity was carried out in the home of one participant and they used their own artefacts including: paper, telephone directory, phone, maps, partners in other rooms and their past experiences. After planning the route the pairs reflected on their decision making activities and how they normally carry out such an activity, if indeed they do. Three pairs were observed navigating their route.

Table 2: Participants of Study Two

Identifier	**Sex**	**Age**	**Driver**	**Travel by car**	**Plans routes**
Pair A P1	Female	83	No (until 1 year ago)	Passenger	Never
Pair A P2	Female	53	Yes	Driver/passenger	Yes
Pair B P3	Female	83	No (drove until recently	Passenger	Never
Pair B P4	Female	71	Yes	Passenger/driver	Yes
Pair C P5	Male	66	Yes	Driver	Yes Daily
Pair C P6	Female	66	Yes	Driver/passenger	Yes
Pair D P7	Female	88	Yes	Driver	Yes
Pair D P8	Female	72	Yes	Driver/passenger	Yes
Pair E P9	Male	62	Yes	Driver/passenger	Yes
Pair E P10	Female	72	Yes	Driver/passenger	Yes
Pair F P11	Female	68	Yes	Passenger/driver	Yes
Pair F P12	Female	60	Yes	Driver	Yes

4.1 Results

Existing Strategies and Measures of Effectiveness

Not all measures of effectiveness involved speed. Finding a safe, pleasurable and achievable route was the main consideration.

P6: "…avoid the North Circular … I hate those sort of roads and it wouldn't matter to me if it took twice as long, as long as I got there".

Even those who struggled with route planning told stories of how well they had managed in the past. P4 described learning to drive late in life just so she could drive to her mother's 200 miles away. P1, who believed she had no sense of direction, clearly took pride in navigating her sister on foot and tube around London and described how she

would make an effort to recognise landmarks so they could retrace their steps. People instinctively enjoyed using their strategies and successful problem solving facilities. Rarely was the Web discussed for this activity. Some participants did not have access or experience of it. However, lack of experience was not necessarily the issue. Pair D did consider using the Web during their planning but despite having a computer on hand and the fact that P8 regularly used it; it was discarded in favour of their other more common strategies.

Interacting with people

Despite not being wholly successful, variations on asking others were used or alluded to by many of the subjects. Whilst following the planned route two pairs asked strangers for help. Several subjects mentioned that they would have discussed the route with a relative or friend. The importance of the social context cannot be underestimated; many people enjoy talking to others and feel confident in the conclusions obtained. This can be despite such information being inaccurate. Pair A ignored their computer generated route in favour of what turned out to be incorrect route advice from a daughter, because, the former lacked constraints not to use a particular road.

Overall those with less confidence preferred to talk to people. Those with more expertise seemed to spend less time discussing the route and to give their suggestions individually.

Boundaries

The visual space when using a map is clearly finite in a way that using the web is not and these boundaries are helpful. For several, fingers were used to secure boundaries to the information search. Pair D would share the framing of areas on a map under consideration –using two fingers each. P1 repeatedly marked the destination and could readily negotiate a route to it from any location of that particularly page. However for her, linking to other pages and other maps was almost impossible. She could not readily trace outside the bounds of immediate vision. Without physical boundaries to the information space the information is less accessible in meaningful and coherent ways.

Orienting within Boundaries

Route planning and its negotiation relies heavily on landmarks for orientation (Lynch 1960). The importance of these as recognisable and distinguishable features was identified even by pairs who struggled with the activity.

P2: "Just looking for a landmark that you and I know, Upper Edmonton, Right, so that's what we do we go to Edmonton".

Landmarks are not just important as planning end-results but also help in the planning task itself – familiarising and orienting themselves with the information source. The less well known the area (i.e. information being worked) the greater importance for salient features and the more difficult it is to provide them. Planning for landmarks and the ability to remember an internal picture of places we have been and our associations with those places are vital to the mapping process (Downs & Stea, 1973).

Landmarks were used together with physical gestures to help orientation. There was an apparent security in touching and pointing. People would repeatedly touch and point to places they were certain about, as well as to mark points of confusion so that they did not get lost whilst problems were considered. This physical interaction blended with and facilitated the planning process. Pair D, worked out the positions of two points by tracing a railway line having failed to do so by looking. Whilst finger movements such as running down an index and pointing to one item are repeatable on a web search, it is harder to temporarily mark several pieces of information as when fingers mark different pages, several places on a page or frame an area. Annotation and note writing are more complex on a screen.

This physical interaction (verbal and physical re-running of routes) highlighted the importance of repetition. Fingers would repeatedly run along a road to check its availability and for reinforcement. Larger routes were repeated verbally and physical movements on maps simulated them. Those people whose fingers jumped from area to area, ignoring the road formation, had more problems formalising and remembering their decisions. They were neither secure over whether they could navigate such a route nor was it easy to repeat steps for confirmation. Communicating with other people by asking for things to be repeated and repeating them back was used as a way of consolidating understanding.

The importance of landmarks suggests frequent redevelopment of web sites could hamper people's ability to maintain landmarks and their associations as with physical landmarks:

P6: "…you used to be able to drive down the A10 and know exactly where you were by which factory you passed…They've now changed them all so if you haven't been there for a long time you can't tell you're leaving Cheshunt".

5. Searching for ferry information

Participants in the first studies often had very successful search strategies based on physical resources. The third study involved a detailed analytical comparison between paper and web resources, to identify further specific differences that might affect older people. A real example, based on a proposed ferry journey, was used to produce an objective measure of the availability and ease of finding necessary information from the web and traditional information sources. Sixteen printed brochures and ten comparable web sites were examined. A list of information of special interest to older travellers, was generated and each item was searched for in all the brochures and websites. The researcher used the brochures as naturally as possible, annotating and moving back and forth through the brochure as they saw fit. The web sites were similarly reviewed. Real travellers were then interviewed to identify their preferred booking method.

5.1 Results

The results confirmed several issues identified, especially with respect to the physical nature of the computer used to access the web and the need for feedback to generate a feeling of success with respect to information retrieval.

Interacting with People
The interviewees divided into novice and regular users. Most novice users preferred to obtain help from an 'expert' when booking, to assist them with the task and provide confirmation of success. For more regular users efficiency became more important and they developed their own strategies. For instance one user booked using the web alone and did not bother to declare his disability or ask for help: as it took extra time, had no effect and he had to re-declare when he got to the port anyway so why bother.

Boundaries
The physical limitations of the brochure made it easy for the researcher to identify whether information required was there. With the website it was harder to identify whether specific information was available. An example was the ways in which they dealt with information for disabled travellers. In three sites this information was 'buried' in the terms and conditions, three put it in Frequently Asked Questions pages and three requested details of special requirements as part of the on-line booking process. This poor organisation together with difficulty in seeing the information boundaries meant it was hard to tell whether information was not present or had just not been found yet. That web pages could be accessed from several pages and could in turn access several pages also made it difficult to identify whether or not all the site had been searched.

Orienting and Fixing Information
When trying to locate information in the brochures the researcher was assisted by its layout, the formatting of the print and the ways in which the pictures were used to identify different sections. The brochures were generally easy to navigate and most information was easy to find, although difficulties existed within some sections. Generally, the brochures where more satisfying to search because of the user's ability to mark the parts they wanted and know that they had searched all the text and the information was definitely not there. O'Hara *et al* (2002) showed that paper has many physical properties that give benefits over working on a computer and this was confirmed here: corners were folded, post-it notes stuck down and sections highlighted or marked to enable a track to be kept of the information found and the areas already searched.

Information landmarks were important with the web for retaining and fixing information whilst actively using it. The habit of changing pictures on web pages as the pages are viewed and on different viewings, made it difficult to identify whether a page had been read before. Pictures that might otherwise serve as landmarks sometimes appeared on multiple pages. Whilst adding to the aesthetics this made it easy to go round in circles without realising it.

6. Discussion

Measures of Effectiveness
Accessing information quickly is important but not always the over-riding factor in choice of approach. Doing things well, fitting around other activities and utilising familiar, crystallized procedures were also important. In contrast to work-based

environments where getting things done matters, after retirement filling time can be more the issue. Sometimes it is more a matter of enjoying the process than just the end result.

Interacting with people

Many people prefer some element of human contact. Other people are valuable in providing help and advice. Talking to a person provides an opportunity for deciphering salient information, revealing quickly what is important and it allows for repetition and reinforcement. There is a tendency to talk to people who are already trusted due to their position or personal relationship. For older people social contact is not just important for the narrow aims of the task in hand but also for social inclusion. Talking to people can be enjoyable. So natural is this inclination that it ignores the large element of error that may be included.

Whilst social interaction is important for novices to a task, the more experienced a person was the less likely they were to ask for assistance as they developed relevant strategies. The advantages of interacting with people are countered by issues of privacy and embarrassment. Trusting that information given is correct or incorrect, or available or unavailable, is vital whatever the information sources.

Boundaries on the Information Space

The physicality of objects is important and currently not always directly replicable on-line. Physical things like maps and brochures naturally create a finite information space. When planning with paper resources people use physical devices such as pointing and folding to create additional boundaries. Talking to people was also used as a way to fix boundaries by determining salient information. By contrast, a website can give an illusion of containing more than it actually does. Problems occur when users cannot be certain whether information is within the boundaries and whether they have searched everything. With web pages, participants were easily distracted by links across site boundaries and the crossing of boundaries was difficult to detect. Similarly, with maps those with difficulties in planning a route had problems tying up separate maps and information on different pages in atlases thus creating a limitless and incoherent search space. Without strong boundaries the task is less manageable. Successful strategies avoided these problems.

Orienting within Boundaries

When planning a physical route people plan using landmark features. These act as clear signposts and contain information concerning the surrounding area, what to expect and act as memory prods as to what to do next. This is true in a virtual environment and does not just refer to getting from A to B, but also flags up the location of information and adjacent information. Landmarks help a person orient themselves within, and make sense of, an information space. In this way, on web pages, images provide salient landmarks. However, poorly used images confuse rather than inform – where the same image appears on multiple pages, or images on a given page are different on each visit.

Landmarks were also used in conjunction with pointing and line following, providing reinforcement through repetition. This was used to tie information from multiple sources

and mark information for later use. This ability to use external reminders to aid memory is important for older people. Using the web is less flexible in this way. It is hard to quickly and temporarily personalise a web information trail.

Use of Existing Strategies

The studies suggest people have a strong propensity to stick with familiar strategies for information searching developed over a lifetime. Neurological and Psychological research (Rabbitt, 1999) suggests that even when other skills are affected by aging, such crystallized skills are likely to be performed to a high level of expertise – better even than un-practiced younger individuals. Sticking to a familiar strategy is entirely rationale. Furthermore people take pride in their existing strategies. The studies also suggest that people naturally apply and mix strategies. The participants from study 2 used a variety and combination of information resources. Some of their current strategies potentially complemented computer use (e.g. the use of the telephone directory, and combining directions from a person and computer). However there were clear indications of a natural propensity towards using crystallised problem solving skills even when using new tools. If proactive design is an aim, then ways need to be found to support the use of existing search strategies and skills. Supporting combinations of traditional information seeking approaches with web based ones, rather than seeing the latter as a replacement for the former would be a fertile area for research. Novel interface design based on traditional search strategies may help.

7. Conclusions

Important usability requirements for older people emerge from the study. Qualitative social measures are as important as quantitative ones, and this should be taken into account in information system design. Human communication is a much richer social experience than a one-way information source, and aspects of this need to be included in information systems. Interface mechanisms are needed to reinforce the existence and crossing of boundaries and to support the interactive use of landmarks. Design of new systems should not aim to replace existing information sources but to complement them, building on the unique affordances of the new media. Ultimately this will lead to designs that are of more use to all. Or as an older chat room participant stated “When people talk of training, they usually think of training end users to use the monsters created. How about training those that created systems how to consider disability and age when creating these systems.” (Foskey, 2000)

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