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Elderly people as Web seekers: Needs, strategies and difficulties

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1. Introduction

The aim of this chapter is to determine the information needs of elderly, specifically the online information needs, the strategies used by these specific end-users to search for online information and their difficulties. Because in our new millennium individuals aged 60 years and older constitute one of the fastest growing age groups (Billip, 2001; Lawhorn, Ennis and Lawhorn, 1996) and because the populations of the developed countries are becoming older while computer use is increasingly affecting wide aspects of life, it is more and more important to understand specific information needs and strategies used by elderly end-users in their search for information through a computer.

The information needs of elderly must be established, as must the most acceptable method of provision of this information. What this group of people wants and what is acceptable to them should determine the criteria for information provision. All too often so-called experts make assumptions about what people need. But, as Barrett (2000) said, "the true experts on the information needed by these specific end-users to enable them to live as they want to and to participate in society, are the people themselves. […] It is necessary to explore how elderly people live and what their day-to-day difficulties are, the support and information that they and have and are aware of, what further support and information they need, and how they would prefer to get the information".

2. Online information needs of seniors and their difficulties

2.1 Previous studies

One of the first studies investigating the information needs for elderly people is the study conducted by Epstein (1980). This study included personal interviews with 900 people aged 65 and over in 6 areas in England. Interviewees were not asked directly what information they needed or wanted, but asked what their most worrying problem had been in the past year. The most common types of problems were health and financial, together accounting for 62 per cent of all problems.

In a vast study (of 5060 questionnaires sent out, 1936 completed questionnaires were returned), Barrett (2000) investigated the real information needs of seniors in UK. Several interesting results have been obtained. First, the elderly participants demonstrated a general

lack of awareness of the vast amount of information on practical help, services, health, benefits and equipment available to them and how to access it. Second, this group of respondents has information needs in three specific information areas: financial and practical help; how to adapt their homes and the products available to make life easier at home; whom to contact for advice on all these matters. A large majority of respondents wanted to be told where they could get this information locally. In other words, this study identified finance and benefits, community care (support, services and practical help at home), and housing as major areas of information need for elderly people.

In the same way, in her study of the information needs of people aged 50 and over in Scotland, Troup (1985) conducted a questionnaire survey including a question to discover the broad areas on which respondents wanted more information. For those that said they needed more information (77 per cent of respondents), the most frequent areas were money/housing (24% of responses), leisure opportunities (21 %) and health matters (21 %). Troup (1985) also carried out a series of group meetings involving some 40 people over the age of 50 in Scotland. She found general agreement among the participants that there was a great need for information for elderly people on a wide variety of topics. All aspects of finance, housing and benefits were considered to be the areas of most importance and where there was greatest need. Information on leisure opportunities was also considered important, but information on health was not.

In the study conducted by Tinker, McCreadie & Salvage (1993), 50 elderly interviewees (age 60 and over) were presented with various situations where information needs could arise and where there may be uncertainty about what to do. In each of 5 towns, half of the people interviewed were judged to be "in touch" with information services (attended an Age Concern Centre) and half were "not in touch" (no involvement with clubs, day centers, voluntary work or additional church activities). What information was required, where it has been obtained, and whether it was adequate was determined for each situation experienced by an interviewee, otherwise a situation was treated as a "what if" scenario. It was found that, in the 6 months preceding the interview, the elderly people were most likely to have experienced or thought about becoming less capable (48% of interviewees). This was followed by the practical domestic problems of getting repairs done in the home (34%), buying something for the home (32%), and finding help with the garden (24%). Ninety three per cent said that their needs had been met when they had sought information about a specific concern.

Older people lack precision using direct and indirect input devices, such as the electronic mouse. Difficulties using the mouse, which can be regarded as the most common type of indirect input device for computer systems are primarily accounted for by age-related changes in spatial abilities and manual dexterity (Fisk, Rogers, Charness, Czaja & Sharit, 2004; Sayago & Blat, 2007). Overall, there is widespread agreement in the literature that most widgets ought to be enlarged and the number of clicks / steps minimized as much as possible. These usability recommendations are suggested by guidelines for designing user interfaces for older adults (Hodes & Lindberg, 20002; Jastrzembski, Charness, Holley & feddon, 2005; Morrell, Dailey & Rousseau, 2003).

Older adults had more difficulty than younger adults when searching for information on the Web. However results obtained in recent studies revealed that the age-related effect resulted from ineffective search strategies and amount of Web experience rather than age per se (Stronge, Rogers & Fisk, 2006). In other words, the seniors' difficulties are related to the selection of inefficient search strategies, which may have been attributable to a lack of knowledge about available Web search strategies.

Because older people tend to need a reduced number of functionalities and require few elements per Web page (Arnott *et al*. 2004; Chadwick-Dias, McNulty & Tullis, 2003), in their paper, Sayago & Blat (2007) have focused on this requirement of simplicity for elderly end-users. More precisely, Sayago & Blat (2007) have focused on three strategies to find online information, which are likely to be the most predominant ones: basic search (Google); advanced search (Google Advanced Search); and directories (Yahoo! Directory). To be as much relevant as possible to real-life scenarios, seniors ranging in age from 65 to 74 were asked to conduct two information search tasks they could be interested in and were more complex than those with which they were familiar with: to find the exact dates when the film "X-Men" and to find the synopses of Iliad and Odyssey and their historical contexts. Two main results have been obtained: difficulties using the mouse have a stronger effect on the total search time than difficulties in typing queries and that older people found online information 3 times faster by using basic search (Google) than by means of advanced search (Google Advanced Search) or directory (Yahoo! Directory). According to Sayago & Blat (2007), the directory was the slowest because of difficulties using the mouse and information overload. Despite providing fewer but the most precise results, advanced search was slower than basic search mostly due to the complexity of its interface.

Nevertheless, very little research has gone into evaluating the usability of seeking online information strategies with older people and there are many unanswered questions. Finding online information is a process, which involves a series of cognitive activities, and investigating the effect of age-related changes in cognition on the time spent by elderly adults in each step is an interesting future research area.

Finally, an increasing number of elderly people use computers and the Web to search for information, especially health/medical-related information (Fow & Fallow, 2003; Karavidas *et al*., 2004; Meischke, Eisenberg, Rowe, & Cagle, 2004). Our modern industrial societies make it increasingly necessary for seniors to deal with expert information in many areas of everyday life, as a patient, client or customer. Elderly often retrieve health/medical information from the Web, which used to be available to experts exclusively (Bromme, Jucks, & Runde, 2005; Williamson, 1995, 1998). Today, seniors can have immediate access to a vast amount of health-related Websites, which are only a mouse-click away. The information they retrieve may help them to understand the assets and drawbacks of different therapeutical alternatives and eventually make a knowledge-based decision about their compliance with a suggested therapy (Morahan-Martin, 2004).

2.2 Health/medical information seeking from the Web

Individuals receive health information from a variety of information channels, including friends, family, health care providers, and the media (Johnson & Meischke, 1991; Meischke, Eisenberg, Rowe, & Cagle, 2004; Meischke *et al*., 2004). These channels have inherent differences in their capabilities for handling health information. For instance, the traditional media (e.g., television, radio, and newspapers) may be an excellent source for increasing the public's awareness of behaviors that help prevent heart disease, because it tends to provide information of a fairly general nature to a large audience with considerable speed and efficiency. However, interpersonal channels (e.g., doctors, nurses, friends, and family) may be more effective in persuading people to adopt health behaviors, because they are characterized by immediate feedback and situation specificity. In general, research shows that people receive most of their health information from media channels even though these

channels are rated as less credible than interpersonal channels (Johnson & Meischke, 1991; Meischke *et al*., 2004). The same seems to be true for information seeking on heart-related matters (Fox & Fallow, 2003). They are called "health seekers". A majority of health seekers go online at least once per month for health information. A great majority of health seekers say the resources they find on the Web have a direct effect on the decisions they make about their health care and on their interactions with doctors. Three quarters (73%) of health seekers say the Web has improved the health information and services they receive (Fox & Fallow, 2003). The most frequently mentioned health topic searched for online pertains to "specific disease or medical problem". Although there is a great deal of optimism about the Internet as a health information source, there are some concerns that dampen this enthusiasm. For instance, there is a great deal of debate on both the quality and quantity of health information on the World Wide Web (Katz & Aspden, 2001). Several studies show that health information on the Internet is not always accurate or complete (Tatsioni *et al*., 2003; Eysenbach, Powell, Kuss, & Sa, 2002; Lee et al., 2003). In addition, even if it is accurate, people cannot always find the information they want online (Meischke, Eisenberg, Rowe, & Cagle, 2004; Meischke *et al*., 2004). This means that people who are less familiar with computers, such as the elderly, may have a particularly hard time finding useful and accurate information on heart and treatment.

So, since many years, a lot of studies explore computer use and health-related information needs among the elderly adults. Three main types of research have been identified by Frase (2004): (a) studies involving interviews and/or focus groups of seniors (e.g., Karavidas, Lim, & Katsikas, 2005), (b) surveys given to organizations that offer information and/or services to senior users (e.g., Mühlhauser & Oser, 2008), and (c) experimental studies in which seniors are observed using computers to find information (e.g., Becker, 2004; Czaja and Lee, 2001; DeOllos and Morris, 2000; Ellis and Allaire, 1999; Selwyn, Gorard, Furlong and Madden, 2003). Even if these three types of studies provide very interesting information in the effective online information needs for elderly people, there are two several methodological limitations (Frase, 2004; Tolbert, 1993):

(1) the first one is the variation in age range. This variation in age range is mirrored by the ages used in the scientific literature: some studies chose 50 years as the beginning age (Czaja, Sharit, Nair ad Rubert, 1998; Hawthorn, 2000), others chose 60 years, and still others chose 65 years. Dee & Bowen (1986) note that social gerontologists separate "the old" into three groups: the "young old", aged between 60 and 75; the "old old", aged between 75 and 85; the "very old", those aged over 85" (pp. 16-17). Other studies (Chatman, 1991; Wilkinson & Allen, 1991) discussed a variation of that breakdown: the young old or young elderly, aged 50-64; the middle old or active elderly, aged 65-74; and the old old or older elderly, aged 75 and older. Moreover, the age rank is often very large: for instance, in the study conducted by Karavidas *et al*. (2005) to determine the effects of computers on the retired older adult users, the participants were ranged in age from 53 to 88;

(3) the second one concerns the origins (socioprofesional, ethnics, etc.) of the samples recruited which prevent us to generalize results For instance, in the study conducted by Karavidas *et al*. (2005), participants consisted of retired older adult computer users living in private residences throughout South Florida most of whom belonged to various computer clubs. On the other hand, origins are not controlled and are "mixed" in other studies. But, previous researches suggest that individual and demographic variables are important predictors of information-seeking behaviors for elderly adult population, such as health beliefs (Johnson, Meischke, Grau, Johnson, 1992), personal experience (Meischke & Johnson,

1995), age (Turk-Charles, Meyerowitz, & Gatz, 1997), ethnic background (Hsia, 1987), sex (Karavidas, Lim and Katsikas, 2005) and education (Benjamin-Garner *et al*., 2002).
So, the first study presented here investigates the Web interests and needs, and impacts of computer knowledge on seeking for health/medical information from the Web among 47 French seniors aged between 68 and 73, by using interviews with a semi-directed questionnaire.

3. Study 1. Why, where and how do elderly people search for online information?

Seniors' perceptions of the Web and of the information searching activity in general were assessed by a paper-and-pencil questionnaire (a Likert response scale) elaborated on the basis of a series of interviews and used in a previous research conducted with younger Web searchers (Dinet, Marquet & Nissen, 2003). Questions concerned: perceptions about the nature of health-related information found in the Web; 'strategies' of access to the interesting Websites and the reliability of different information resources (libraries, television, Web, etc.) about health/medical information. One individual factor was manipulated: Computer knowledge (low vs. high). Computer knowledge were evaluated by using the computer questionnaire elaborated by Lim, Bonge, Pellegrini, & Montagna (2001) and used in other studies (e.g., Karavidas, Lim & Katsikas, 2005).

3.1 Participants

47 seniors volunteers (19 males and 28 females), aged between 68 and 73 were recruited to participate in this study. If all the participants were Web users, two groups were constituted according to their computer knowledge: 24 seniors were considered with low level of computer knowledge and the Web (Low-CKnow) while 23 seniors were considered skilled with the computer and the Web (High-CKnow).

3.2 Material and procedure

Assessment of computer knowledge. To assess computer knowledge, participants completed the computer questionnaire elaborated by Lim, Bonge, Pellegrini, & Montagna (2001) and used in other studies (e.g., Karavidas, Lim & Katsikas, 2005). The computer questionnaire subscales tapped into: (1) software knowledge, (2) hardware knowledge, (3) general computer knowledge, and (4) Internet knowledge. Previous reliability analyses estimâtes (Lim, Karavidas & Katsamanis, 2001; Karavidas, Lim & Katsikas, 2005) of the coefficient α ranged from .86 to .93.
Assessment of needs and information search strategies. A paper-and-pencil questionnaire was elaborated on the basis of a series of interviews with open questions, conducted with six seniors who were not asked to fill it. This qualitative method provides a rich data set for studying seniors' perceptions of the Web and was appropriate to the exploratory nature of this study. During this interview, the six seniors were asked to explain what kind of information they found on the Web, to discuss the types of electronic resources they had access to, and their perceptions and opinions about the information they can find using different information resources. The researcher asked the following questions: (1) "Why do

you search for information on the Web?" (2) "How do you find an interesting Web site?" and (3) "In general, where do you find interesting information?"
On the basis of the responses obtained from these six interviews, several questions for a paper-and-pencil questionnaire items have been created (that can be rated on a 0-to-6 Disagree-Agree answer scale). The questionnaire used in this study was a Likert scale which is a way of generating a quantitative value (numerical) for a qualitative questionnaire (i.e., strongly disagree, disagree, undecided). For an ascending five (or six, or seven or eight, etc.) point scale, incremental values are assigned to each category and a mean figure for all the answers can be calculated. Each participant was asked to rate each item from the 0 ("strongly disagree") to 6 ("strongly agree") response scale. A forced-choice answer scale with an even number of responses and no middle neutral or undecided choice was used. In other words, the participants were obliged to decide whether they lean more towards the agree or disagree end of the scale for each item.
Moreover, the first section of the questionnaire consisted of questions related to demographic factors such as age, gender, and had questions concerning Web use, such as how long they had been using the Web and the average time they spent on it.

3.3 Main results

The measures from the computer questionnaire (Lim, Karavidas & Katsamanis, 2001) used in our study were general computer knowledge, software knowledge, hardware knowledge, and Internet knowledge. The estimated reliability α coefficients were .79, .84, .95, and .92, respectively. The computer knowledge subscales were correlated as expected (Table 1). So, on the basis of the global score obtained with the computer knowledge questionnaire, two groups were constituted: "Low computer knowledge group" or Low-CKnow (N = 24) and "High computer knowledge" or High-CKnow (N = 23).

Scale	General Know.	Hardware Know.	Software Know.	Internet Know.
General Know.	-	.85**	.72*	.64*
Hardware Know.		-	.73*	.81**
Software Know.			-	.84**
Internet Know.				-

Table 1. Intercorrelation among the computer subscales (N = 47; *Note*:* p < .05. ; ** p < .01).

We asked the respondents about their Internet behavior. In our study, 65% of the respondents indicated using the Internet to search for health/medical information. Other commonly cited reasons included reading news (51%), searching for product or auction information (37%), researching hobbyrelated topics (33%), searching for travel information (12%), and tracking investments (10%). Some differences have been found with results obtained by Karavidas, Lim & Katsikas (2005) because populations recruited in their study and recruited in our study are different from an ethnic and sociodemographic point of view. Moreover, results indicated that there were proportionately more users with High computer knowledge (High-CKnow) who reported using the Internet to search for health- or medical-related information (High-CKnow, 68.6%; Low-CKnow, 42.4%), $\chi 2$ (1, N) = 56, p = .002. When asked to indicate how the computer has enhanced their lives, the largest reason provided was their ability to maintain social

contact (48%) followed by ease of access to information (31%). Be as it may, to search for health/medical information is the major reason to use the Web for all our 47 participants.
Eight reasons were proposed to the seniors to describe why they search for health/medical information on the Web. Table 2 shows that the "patterns" of the opinions are similar whatever the group (Low-CKnow *vs*. High-CKnow).

	Computer Knowledge				
	Low		High		*p*
	M	SD	*M*	SD	
On the Web …					
I can find information in a quicker way	4.3	0.7	4	0.6	.32
I can find more information	4	0.5	3.8	0.6	.24
I can find more recent information	3.9	0.7	3.8	0.5	.18
I can find more interesting information	4.6	0.8	4.2	0.6	.17
I can find more beautiful information	2.6	0.6	2.2	0.4	.09
I can find information with clearer examples	2.6	0.9	2.3	0.8	.11
I can find all the information I need	2.6	0.7	2.5	0.5	.23

Table 2. "Why do you search for health/medical information on the Web?" Average scores of the answers

From the seniors' perspectives, the reasons are (in decreasing order): (1) the interest of the information found on the Web; (2) the quick of access; (3) the quantity; (4) the recency; (5) the superiority of the Web to give information; (6) the possibility to learn how to search for information through the Web; (7) the aesthetic of information; and (8) the accuracy and the number of examples. Several multivariate analyses (MANOVAs) were computed. There appear to be one general trend: low experienced seniors' (Low-CKnow) scores are always superior to high experienced seniors' (High-CKnow) scores. So, seniors with a high degree of computer and Web experience could become less confident and more critical than seniors with little Web experience.
Seven strategies to get access to interesting Web sites related to health were proposed. Table 3 shows that seniors' strategies for accessing interesting Web sites are partially dependent from their computer experience (Low-CKnow *vs*. High-CKnow).

	Computer Knowledge				
	Low		High		*p*
	M	SD	*M*	SD	
Through search engines	4.5	0.3	2.8	0.4	.003**
At random	2	0.6	1.5	0.8	.23
Through TV	3.5	0.9	3	1.2	.31
Through friends	5	1.1	4.4	1.3	.18
Through magazines	4.8	0.8	4.4	0.7	.42
With radio	2.4	0.6	2	0.8	.27
Through other Web sites	3.7	0.3	1.3	0.2	.001**

Table 3. "How do you find an interesting Web site about health/medical information?" Average scores of the answers

Whatever their computer knowledge, the strategies used by our participants can be dispatched into three categories (in decreasing order of preference): (1) friends, search engines, and magazines; (2) other Web sites and television and (3) radio and random. Results show that the scores of the seniors with high experience (High-CKnow) are always inferior to those with low experience (Low-CKnow), even if differences are only significant for two strategies: through search engines (p = .003) and through other Websites (p = .001). This means that the reliability of seniors in different 'strategies' to get access interesting Web sites related to health/medical information tend to decrease with experience, whatever the strategy used.

So, in accordance with some previous studies on the needs for information for elderly users (Williamson, 1995, 1998), the topics of interest for our participants were (in decreasing order): (1) health, (2) news, and (3) leisure activities (e.g., holidays, hobbies and travels). Other topics included consumer, housing and accommodation, safety, environment, pharmaceuticals, family and personal, education, and services.

4. Study 2. Impact of metamemory skills

An important aspect of the elderly adult population is the proportion having some type of disability: chronic disabilities include arthritis, hearing impairments, cataracts, hypertension, heart diseases, and diabetes, among others. Unlike younger adult users, there are physiological factors due to the normal aging process affecting older adults' use of the Internet. The normal aging process, including vision, cognition, metacognition and physical impairments, has an impact on Web usability (Karavidas, Lim & Katsikas, 2005; Selwyn, 2003). In other words, as adults are aging, their vision, cognition, metacognition, and physical skills are declining with an important impact on their ability in performing many tasks such as the information search on the Web. Unfortunately, little attention has been paid to the understanding of the impacts of these cognitive and metacognitive impairments on the information search activity performed through a digital environment.

Metamemory is defined as knowledge of one's memory abilities and functioning (Flavell, 1979). Two levels of metamemory can be identified (Nelson & Narens, 1990): monitoring concerns knowledge of the information being processed while control concerns knowledge of the strategies that enable to improve information processing. However, these two levels are strongly dependent on one another and it is difficult to distinguish the both experimentally (Lazonder & Rouet, 2008).

Poor metamemory appears to be a characteristic of elderly adults (Lovelace and Marsh, 1985; Turvey *et al*., 2000) due to a selective decline in frontal lobe functioning related in executive functioning (for a synthesis, see Souchay & Isingrini, 2004). Even if some studies have demonstrated little relationship between memory complaint and impairment (West, 1996), others studies have suggested that an older person's metamemory is mostly accurate (Souchay & isingrini, 2004; Turvey *et al*., 2000). For instance, in the study performed by Turvey *et al*. (2000), researchers examined memory complaint in a large national sample of 5 444 people aged ≥70, by using a longitudinal cohort study with two waves of data collection spaced 2 years apart. Participants were asked if they believed their memory was excellent, very good, good, fair, or poor. They were then administered a cognitive assessment. Results have shown that if people's assessment of their memory matched their actual performance on cognitive measures in general, large portions of the sample inaccurately assessed their

memory skills. In other words, poor metamemory appears effectively to be a characteristic of elderly persons.

Nevertheless, little attention has been paid to the investigation of the searching strategies used by elderly people when looking for information, even if some studies have shown that an older adult's performance on working memory tasks decline with age, s/he has a reduced ability to discern details in the presence of distracting information, and s/he has difficulties to search for information accurately and quickly (Becker, 2004; Lazonder & Rouet, 2008).

According to the recent theoretical models elaborated to describe the cognitive and metacognitive processes involved in the information search tasks (David, Song, Hayes and Fredin, 2007; Rouet & Tricot, 1998; Dinet & Rouet, 2008), the role of metacognitive skills such as metamemory in searching complex environments is crucial. In case of Web searching, these metacognitive skills pertain to a person's ability to plan a search (including the selection of appropriate search strategies), monitor the progress of the search process, and evaluate search outcomes in terms of relevance, reliability and authority (e.g., Branch, 2001 ; Lazonder & Rouet, 2008). In accordance with these recent models (Dinet & Rouet, 2008; Lazonder & Rouet, 2008; Rouet & Triot, 2008), the information search activity involves several cyclic processes and consists of three stages: preparation, exploration, and consolidation. The preparation stage begins when the end-user prepares to make choices from a menu of links in a hyperlinked system. In the exploration stage, the user navigates and explores the results of the choices and processes the information. After exploring and processing information, the end-user consolidates by evaluating the results against the goals set during the preparation stage. The outcomes of the evaluation stage play an immediate role on recalibration of goals that are carried into the preparation phase of the next cycle. The model is ideally suited for information seeking situations in which goals are emergent, which means that at the beginning of the information seeking task, the user has vague goals, which are refined during the searching process. So, using a vague goal as a starting point, user seeks different types of online information, perhaps beginning with the results from a search engine. With emergent goals, the definition of success in finding the right information evolves during the searching process and the criteria for success vary by different levels of fit between information sought and information found. The user may evaluate the information as 'this is not exactly what I was looking for, but it seems interesting', or 'I will keep this in mind and continue looking for something that fits more precisely into what I am looking for'. Because the user must remember her/his search topic during her/his information searching process and because she/he must decide to begin or to stop one of the three stages (i.e., preparation, exploration, and consolidation), metamemory is essential.

So, because poor metamemory appears to be a characteristic of elderly persons and because metamemory is essential during the information searching process, the main goal of this experiment was to investigate the impacts of metamemory skills on the information search activities performed by elderly end-users.

4.1 Participants

In this experiment, 50 French end-users volunteers (32 males and 18 females), aged from 66 to 71 years were recruited to participate. Each of them was individually asked to search for

information about three specific topics in the World Wide Wed by using a specific search engine (Google.fr).
The 50 participants recruited for this experiment had a range of experience with computers and the World Wide Web. Participants had been using a computer for an average of 63.7 months (SD = 22.67) and they all spent an average of 12.32 (SD = 5.71) hours per week using a computer. While all the participants had used the World Wide Web at least once, there was quite a wide range of experience. On average, seniors recruited had been using the Web for 26.34 months (SD = 8.21) and spent 5.15 h (SD = 3.17) per week using the Web.

4.2 Material

Assessment of computer and Web knowledge. To assess computer and Web knowledge, participants completed a computer questionnaire elaborated by using all the items created by Lim, Bonge, Pellegrini, & Montagna (2001; Karavidas, Lim & Katsikas, 2005) and by adding some items extracted from the questionnaire used by students in University of Washington to assess their computer and Web knowledge. So, our final computer questionnaire subscales tapped into:
(1) software knowledge, with 15 questions (e.g., "Do you know how to change text fonts, size, color and style?");
(2) hardware knowledge, with 14 questions (e.g., "If you have a program on a diskette or a CD, do you know how to tell the computer to RUN it?");
(3) general computer knowledge, with 15 questions (e.g., "Do you understand and use the functions of the left and right mouse buttons?");
and (4) Web knowledge, with 15 questions (e.g., "Do you know the difference between a search engine, subject directory and a meta-search tool, and know when it is most advantageous to use one over the other?").
For each of these 59 questions, each participant was asked to check one of the three following response : "no or unlikely" (= 0), "not sure, but likely" (= 1), or "yes" (= 2). So, a global score (from 0 to 118) was computed for each respondent.
Assessment of metamemory. A Likert scale elaborated by Fort (2005) was used to assess the metamemory of the participants. Each participant was asked to fill this questionnaire before to perform the three information search tasks. This questionnaire is a Likert scale with 41 items about the three dimensions involved in the metamemory identified by Fort (2005): 11 items about the stereotypes about memory aging (e.g., "I remember very well where I went"); 15 items about the subject's beliefs about one's abilities (e.g., "Now, I remember less well than before"); and 14 items about his/her knowledge about strategies and strategy uses (e.g., "You write your appointments on a calendar to help you remember?"). For each of these 41 items, each participant was asked to check "no" (= 0) or "yes" (= 1). On the basis of the mean result computed for all the participants, two groups were constituted: participants with low metamemory skills (Meta-; n=32) and participants with high metamemory skills (Meta+; n=18)

4.3 Procedure

Individually, participants were asked to perform three different information search tasks through the use of Google.fr. On the basis of results obtained in previous studies (Dinet, submitted; Karavidas, Lim & Katsikas, 2005), these search topics were chosen to provide real life examples that showed relevant to our participants and they focused on:

- health: "Can you find Web sites to get information on the causes, symptoms, treatment and prevention of senior's health",
- finance: "Can you find Web sites about the financial planning guidelines to seniors",
- and travels: "Can you find Web sites related to an adventure travel tour operator that runs small group for people over 60".

Each participant received the same instructions and followed the same experimental procedures as all the others. All the sessions took place in a quiet room equipped with one computer. One week before they attended their session, the participants had completed the computer and Web knowledge questionnaire. Moreover, a background questionnaire gave for each participant the gender, age, personal experience in the use of a computer, and the number of hours spent in a week searching on the World Wide Web.

At the beginning of a session, the experimenter presented the procedures to the participant. S/he was then given the paper with the three questions (health, finance, and travels), and s/he was asked to search for information on the World Wide Web to find answers to these three questions.

The participants were allowed a maximum of 50 minutes to complete each information search: the experiment began as soon as the participant turned the sheet over -with the three questions on it- to read them and finished 50 minutes later. The participant could ask questions to the experimenter before the search for information actually started. If s/he had no questions and said s/he was ready, the experiment could start. Finally, an informal interview took place after the participant had finished their information search task at the computer.

The search engine used by the participant in this study was Google.fr with Internet Explorer 6.0, as these electronic tools were commonly used in France. The same experimenter was with the participants all the time while they were searching for information on the World Wide Web. He did not intervene in the participant's activity during the search for information process, except when it was absolutely necessary to help them (for instance should an electronic bug or a technical problem happen).

4.4 Main results

Based on the results obtained with the Lickert scale used to assess the metamemory skills (Fort, 2005), two groups were distinguished: participants with low metamemory skills (Meta-) and participants with high metamemory skills (Meta+). As Table 4 shows, computer and Web knowledge were equivalent for the two groups.

		Group				
		Meta-n=32		*Meta+n*=18		
		M	SD	*M*	SD	*p*
Age (years)		69.3	3.4	72.1	2.6	.23
Metamemory skills	Stereotypes about memory aging (from 0 to 11)	4.3	1.8	8.8	1.7	.001**
	Subject's beliefs (from 0 to 15)	3.9	2.1	11.3	0.9	.001**
	Knowledge about strategies (from 0 to 14)	4.2	1.5	10.2	1.2	.002**

	Σ	12.4		30.3		.002**
Computer and Web knowledge	General Knowledge (from 0 to 30)	23	7	20	6	.18
	Hardware Knowledge (from 0 to 28)	21	5	19	9	.21
	Software Knowledge (from 0 to 30)	17	4	19	6	.19
	Internet Knowledge (from 0 to 30)	19	7	21	5	.18
	Σ	80		79		.23

Table 4. Distribution of participants in the two groups, Meta- and Meta+ (N = 50). *Note1*: "*M*" means Mean and "SD" means Standard Deviation; *Note2*: * p < .05 ; ** p < .01

The measures from the computer and Web questionnaire used in our study were general computer knowledge, software knowledge, hardware knowledge, and Web knowledge. The estimated reliability α coefficients were .79, .84, .95, and .92, respectively. As analyses revealed, the computer and Web knowledge subscales were significantly correlated as expected for the two groups (Meta- and Meta+).

As Table 5 shows, the average time spent to perform the information search tasks for participants with high metamemory skills (Meta+) is always inferior than the average time spent to perform the same activity for participants with low metamemory skills (Meta-). This difference is significant whatever the search topic (Health: $F(1\text{-}48) = 10.84$, $p < .0001$; Finance: $F(1\text{-}48) = 8.43$, $p < .0001$; Travels: $F(1\text{-}48) = 5.31$, $p = .002$). In other words, there is a significant impact of metamemory skills on the time spent to perform the information search activities performed by elderly end-users.

		Group				
		Meta-N=32		*Meta*+N=18		
Search topics	Indicators	*M*	SD	*M*	SD	*p*
Health	Answer time (in min.)	16.3	3.5	8.4	4.1	<.0001**
	Number of Web sites explored	9.5	3.2	8.9	2.3	.12
	Number of relevant Web sites	5.4	2.8	4.3	2.9	.10
Finance	Answer time (in min.)	24.7	5.1	11.8	6.9	<.0001**
	Number of Web sites explored	10.4	2.8	11.1	2.2	.11
	Number of relevant Web sites	3.5	1.9	4.2	2.3	.09
Travels	Answer time (in min.)	17.1	3.8	10.3	2.4	.002**
	Number of Web sites explored	9.3	3.1	7.6	4.2	.09
	Number of relevant Web sites	3.4	2.1	4.4	3.1	.13

Table 5. Impacts of metamemory skills on performance in an information search task. *Note*: * p < .05 ; ** p < .01.

For the number of Web sites explored and for the number of relevant Web sites found, results show no significant difference between our two groups (Meta- *vs*. Meta+), whatever the search topic (health, finances, and travels).
In other words, results obtained in this second experiment have mainly shown that there is a significant impact of metamemory skills on the time spent to perform information search activities performed by our participants. More precisely, the time spent to perform the information search tasks for participants with high metamemory skills is significantly inferior than the average time spent to perform the same activity for participants with low metamemory skills, whatever the search topic considered (health, finance, or travels). These results are consistent with the general view that age-related decline in cognitive functioning is partly due to executive dysfunction (Moscovitch & Winocur, 1992; Souchay & Isingrini, 2004; West, 1996).

5. Discussion and perspectives

Because some psychological and neuropsychological research suggests that it is hard for elderly people to develop new skills and because the ability to use information and communication technology is now assumed to be a prerequisite to living in our societies (Asla, Williamson & Mills, 2006; Curzon, Wilson & Withney, 2005; Selwyn, 2003), then understanding more about all aspects of information and communication in relation to elderly people is becoming increasingly crucial considering the changing demographic profile of communities and the implications for society. Second, our results confirm that the role of metacognitive skills such as metamemory in searching complex environments is crucial, according to the recent theoretical models (David, Song, Hayes & Fredin, 2007; Rouet & Tricot, 1998; Dinet & Rouet, 2008).
According to many authors (e.g., Alpass and Neville, 2003; Coulson, 2000; Groves and Slack, 1994; Karavidas, Lim and Katsikas, 2005), computers and the World Wide Web present two main opportunities for elderly adults: on the one hand, minimizing social and psychological problems through computer usage because computers and the Web can present unique opportunities for them to socialize and establish social networks that can help alleviate loneliness and alienation; on the other hand, improving quality of life with computers by increasing levels of independence. In addition, this increased perception of independence included engaging in more social activities and manifesting more positive attitudes. Another benefit of the newfound independence is higher confidence in one's ability that ultimately leads to higher levels of life satisfaction. Computers add a "functional dimension" in the lives of seniors that may contribute to a better self-concept.
Finally, this will require a considerable amount of research in forthcoming years if end-users have specific impairments because the normal ageing process, including vision, cognition, metacognition and physical impairments, has an impact on Internet usability.
Because an increasing number of elderly people will need to use computers and computer related systems in the future to avoid social exclusion and so as o be able to live more independently, there are considerable social and economic reasons why interface designers should rise to the challenge of designing interfaces which are usable by elderly people (Hawthorn, 2000; Zajicek, 2004). The number of seniors is growing more quickly than that of all the other segments of the population. This will impact on the cost of social care unless technological solutions can be found to enable people to stay longer in their homes (Czaja &

Lee, 2001; Lawhorn, Ennis & Lawhorn, 1996). Designers of interactive electronic products must take into account the special needs of such a significant population who often find current products difficult and complicated to use (Becker, 2004; Billip, 2001; DeOllos & Morris, 2000). Failure to do so will result in this large and growing group of citizens becoming marginalized through lack of access to information and services and also excluded from the use of interactive electronic products such as stair lifts and alarm systems that could help them to live longer in an independent way. As Zajicek (2004) said, even if there is also legislative pressure for the development of systems that are accessible to older and disabled people, unfortunately, the industry sector has not yet recognized the significant benefits of more accessible design and most providers continue to produce products that are primarily aimed at younger people.

6. References

Alpass, F.M., & Neville, S. (2003). Loneliness, health, and depression in older males. *Aging and Mental Health*, Vol. 73, 212–217

Arnott, J.L., Khairulla, Z., Dickinson, A., A.Syme, N.Alm, R.Eisma and P.Gregor (2004). E-mail Interfaces for Older People. In *IEEE International Conference on Systems, Man and Cybernetics*, 2004, pp: 111-118

Asla, T., Williamson, K., & Mills, J. (2006). The role of information in successful aging: The case for a research focus on the oldest old. *Library & Information Science Research*, Vol. 28, 49 – 63

Barrett, J. (2000). The information needs of elderly, disabled elderly people, and their carers. *Research report published by the Disability Information Trust*, retrieved online: http://freespace.virgin.net/julie.barrett/ April 14, 2009

Becker, S. (2004). A study of Web usability for older adults seeking online health resources. *ACM Transactions on Computer-Human Interaction*, Vol. 11, No. 4, 387–406

Billip, S.H. (2001). The psychosocial impact of interactive computer use within a vulnerable elderly population: a report on a randomized prospective trial in a home health care setting. *Public Health Nursing*, Vol. 18, 138–145

Branch, J. L. (2001). Junior high students and thinks alouds: Generating information-seeking process data using concurrent verbal protocols. *Library & Information Science Research*, Vol. 23, 107–122

Chadwick-Dias, A., McNulty, M. and Tullis, T. (2003). Web Usability and Age: How Design Changes Can Improve Performance. In *Proceedings of the 2003 Conference on Universal Usability CUU'03*, (Vancouver, British Columbia, Canada), pp: 30-38

Coulson, I. (2000). Introduction: Technological challenges for gerontologists in the 21st century. *Educational Gerontology*, Vol. 26, No. 4, 307–316

Czaja, S. J., Lee, C. C. (2001). The Internet and Older Adults: Design Challenges and Opportunities. In N. Charness, D.C. Park, D.C. and B.A. Sabel (Eds.), *Aging and communication: Opportunities and Challenges of Technology*. Springer Publishing Co, New York

Czaja S.C.J., Sharit J., Nair S. and Rubert M. (1998). Understanding sources of user variability in computer-based data entry performance. *Behaviour & Information Technology*, Vol. 17, No. 5, 282–293

Curzon, P., Wilson, J., and Whitney, G. (2005). Successful strategies of older people for finding information. *Interacting with Computers*, Vol. 17, 660 – 671

David, P., Song, M., Hayes, A., and Fredin, E.S. (2007). A cyclic model of information seeking in hyperlinked environments: The role of goals, self-efficacy, and intrinsic motivation. International Journal of Human-Computer Studies, 65(2), 170–182

DeOllos, I. Y. and Morris, D.C. (2000). The Internet as an information resource for older adults. *Journal of Educational Technology Systems*, Vol. 28, 107–122

Dinet, J. (submitted). Elderly people as Web seekers: Why, where and how do they search for health/medical information. *Canadian Journal on Aging*

Dinet, J. & Tricot, A. (2008). Recherche d'information dans les documents électroniques. In A. Chevalier & A. Tricot (Eds.), *Ergonomie cognitive des documents électroniques* (pp.35-69). Paris, Presses Universitaires de France

Ellis, R. D., & Allaire, J. C. (1999). Modeling computer interest in older adults: The role of age, education, computer knowledge, and computer anxiety. *Human Factors*, Vol. 41, No. 3, 345–356

Epstein, J. (1980). Information needs of the Elderly, Final Report, June 1980. *A Study Commissioned by the Department of Health and Social Security*. Research Institute for Consumer Affairs, London

Fisk, A.D., Rogers, W.A., Charness, N., Czaja, S.J. and Sharit, J. (2004). *Designing for older adults. Principles and Creative Human Factors Approaches*. CRC Press

Flavell, J. H. (1979). Metacognition and cognitive monitoring: a new area of cognitive-developmental inquiry. *American Psychologist*, Vol. 34, 906–911

Fort, I. (2005). La métamémoire: Analyse de sa mesure par questionnaire. *Psychologie Française*, Vol. 50, No. 2, 195–210

Groves, D.L., & Slack, T. (1994). Computers and their application to senior citizens therapy within a nursing home. *Journal of Instructional Psychology*, Vol. 21, No. 3, 221–227

Hawthorn, D. (2000). Possible implications of ageing for interface designers. *Interacting with Computers*, Vol. 12, 507–528

Hodes, R.J. and Lindberg, D.A.B. (2002). *Making Your Web Site Senior Friendly*, National Institute on Aging and the National Library of Medicine

Jastrzembski, T., Charness, N., Holley, P. and Feddon, J. Input devices for web browsing: age and hand effects. Universal Access in Information Society, 2005, 4. pp: 39-45

Karavidas, M., Lim, N.K., and Katsikas, S.L. (2005). The effects of computers on older adult users. *Computers in Human Behavior*, Vol. 21, No. 5, 697-711

Lazonder, A.W., & Rouet, J.-F. (2008). Information problem solving instruction: Some cognitive and metacognitive issues. *Computers in Human Behavior*, Vol. 24, No. 3, 753-765

Lawhorn T., Ennis D., Lawhorn D. C. (1996). Senior adults and computers in the 1990s. *Educational Gerontology*, Vol. 22, 193–201

Lim, N. K., Bonge, D. R., Pellegrini, A., & Montagna, S. (2001). *Computer anxiety, computer knowledge, and computer liking: Updated computer scales for the new century*. Unpublished manuscript, Carlos Albizu University at Miami

Lovelace, E. A., Marsh, G. R. (1985). Prediction and evaluation of memory performance by young and old adults. *Journal of Gerontology*, Vol. 40, 192–197

Meischke, H., Eisenberg, M., Rowe, S.R. and Cagle, A. (200)5. Do older adults use the Internet for information on heart attacks? Results from a survey of seniors in King County, Washington. *Heart & Lung: The Journal of Acute and Critical Care*, Vol. 34, No. 1, 3-12

Morrell, R.W., Dailey, S.R. and Rousseau, G.K. (2003). Applying Research: The NIHSeniorHealth.gov Project. In N. Charness and K.W. Schaie (Eds.), *Impact of Technology on Successful Aging*. New-York, Springer Series Societal Impact on Aging

Moscovitch, M. and Winocur, G. (1992). The neuropsychology of memory and aging. In F.I.M Craik and T.A. Salthouse (Eds.), *The handbook of aging and cognition* (pp 315–372), Hillsdale, Lawrence Erlbaum Associates

Nelson, T.O., & Narens, L. (1990). Metamemory: a theoretical framework and new findings. In G. Bower (Ed.), *The psychology of learning and motivation* (pp 125–140), New York, Academic Press

Rouet, J-F., & Tricot, A. (1998). *Les hypermédias: Approches cognitives et ergonomiques*. Paris: Hermès

Sayago, S. & Blat, J. (2007). A preliminary usability evaluation of strategies for seeking online information with elderly people. *Proceedings of the 2007 international cross-disciplinary conference on Web accessibility* (W4A) (pp 54 – 57), Banff, Canada

Selwyn, N. (2003). Apart from technology: understanding people's non-use of information and communication technologies in everyday life. *Technology in Society*, Vol. 25, 99 – 116

Selwyn, N., Gorard, S., Furlong, J., & Madden, L. (2003). Older adults' use of information and communications technology in everyday life. *Ageing & Society*, Vol. 23, 561–582

Souchay, C., & Isingrini, M. (2004). Age related differences in metacognitive control: Role of executive functioning. *Brain and Cognition*, Vol. 56, No. 1, 89-99

Stronge, A. J., Rogers, W.A., & Fisk, A.D. (2006). Web-based information search and retrieval: Effects of strategy use and age on search success. *Human factors*, Vol. 48, No. 3, 434-446

Tinker, A., McCreadie, C., & Salvage, A. (1993). *The information needs of elderly people – an exploratory study*. Age Concern Institute of Gerontology, London

Troup, G. (1985). Information and older people in Scotland (needs and strategies). *Report of a one year research project funded by Age Concern Scotland Development Advisory Resource Group and the Scottish Education Council*, January 1985

Turvey, C.L., Schultz, S., Arndt, S., Wallace, R.B., & Herzog, R. (2000). Memory complaint in a community sample aged 70 and older. *Journal of the American Geriatrics Society*, Vol. 48, No. 11, 1435–1441

West, R. (1996). An application of prefrontal cortex function theory to cognitive aging. *Psychological Bulletin*, Vol. 120, 272–292

Williamson, K. (1995). Older adults: information, communication and telecommunications. *Unpublished doctoral dissertation*. RMIT, Monash, Australia

Williamson, K. (1998). Discovered by chance: The role of incidental learning acquisition in an ecological model of information use. *Library & Information Science Research*, Vol. 20, 23–40

Zajicek, M. (2004). Successful and available: interface design exemplars for older users. *Interacting with Computers*, Vol. 16, No. 3, 411–430

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