

# A preliminary usability evaluation of strategies for seeking online information with elderly people

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## ABSTRACT

This short paper describes an experimental study with elderly users comparing three strategies for seeking online information, Google basic search, the Yahoo! Directory and Google advanced search. The effect of three general usability criteria for the elderly, simplicity, difficulties using the mouse and cautious clicking and reading, on the total search time older people spend seeking complex online information with the three strategies has been studied. The hypothesis that basic search is the fastest strategy because it meets the three usability criteria, unlike the other two strategies, is confirmed. Older people were 3 times faster in basic search than in either advanced search or directory. Advanced search was slower than basic search due to information overload but faster than the directory, which was the slowest strategy primarily due to difficulties using the mouse and information overload.

## Categories and Subject Descriptors

H.5.2 [User Interfaces]: *Evaluation/methodology, ergonomics*

## General Terms

Design, Human Factors.

## Keywords

Usability; older people; seeking online information strategies.

## 1. INTRODUCTION

Surveys in Spain, Europe and the U.S. show that seeking information on the Web is one of the most frequent online activities carried out by people aged 60 and over ([15], [6], [9]). Some studies ([2]) have focused on the use of these activities by elderly people. Nevertheless, very little research has gone into evaluating the usability of browsing and searching strategies with them.

The study described in this short paper is aimed at evaluating the effect of three general usability criteria for the elderly on the total search time literate older people with some experience looking for information on the Web spend seeking complex online information by using three of the most predominant strategies to find online information, basic search (e.g.; Google), advanced

search (e.g.; Google Advanced Search) and directories (e.g.; the Yahoo! Directory).

Aging is a complex process and older people are a very heterogeneous user group. Nevertheless, our literature review and work reveal that certain usability criteria play (or should play) a key role in a wide range of user-centered or inclusive design developments with the elderly. In this paper, we have focused on the requirement of simplicity, difficulties using the mouse, and cautious clicking and reading. All of them are expected to have an impact on the usability of seeking online information strategies with the elderly.

Older people lack precision using direct and indirect input devices, such as the mouse. Difficulties using the mouse, which can be regarded as the most common type of indirect input device for computer systems [13], are primarily accounted for by age-related changes in spatial abilities and manual dexterity [8]. 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 (e.g.; [12], [11], [16]).

Older people also tend to need a reduced number of functionalities and require few elements per page. The requirement of simpler user interfaces is well-documented in a myriad of studies, such as mobile phones (e.g.; [18], [20]), e-mail applications ([10], [1], [7]) and iTV (interactive Television) [3]. In addition to this, they have been found to be very cautious and often read all information on the computer screen [5]. In part this is due to a general lack of experience and confidence in ICT.

Regardless of age, finding online information on the Web as fast as possible is very likely to be a universal requirement. Nevertheless, our ethnographical research at La Verneda<sup>1</sup> focused on ICT-based communication applications for the elderly, an important component of Web 2.0, shows that if older people do not find the information they are looking for quickly, they start wondering whether they will be able to do it at all, unlike young and middle-aged people. This is a noteworthy usability / accessibility barrier, which, drawing upon our ongoing research, is primarily brought about by some negative social relationships established between adult children and older relatives<sup>2</sup>. Although family can have a positive impact on older people's motivation towards ICT [2], we have also found out that adult children tell their parents not to use computers because they will break them or

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<sup>1</sup> La Verneda is an adult school in Barcelona (Spain), <http://www.edaverneda.org>

<sup>2</sup> This observation may be influenced by culture and further research is needed to identify whether similar observations are found in other countries.

delete important information [19]. As older people do not want to cause problems for their adult children, many of them are afraid of using computers (e.g.; many elderly women regard computers as another object to dust). Moreover, when they try to use computers and experience difficulties, the idea of not being capable of looms over them. This belief is also supported by more general and negative stereotypes associated with the elderly, such as “*you can't teach an old dog new tricks*” [17].

## 2. DESCRIPTION OF THE STUDY

### 2.1 User's profile

Seven elderly people ranging in age from 65 to 74 took part in this study, carried out at La Verneda's computer room. All the users were familiar with Google Basic Search. They used Google on a daily basis for seeking online information about the towns where they were born and well-known Spanish national gardens (e.g.; Doña Ana Garden). These tasks were carried out as part of the activities they have been doing for more than two years in the courses in ICT organized at the school. None of the participants had ever used either the Yahoo! Directory or Google Advanced Search prior to this study.

### 2.2 Strategies to find online information and the total search time

There are different strategies to find online information. In this study, we have focused on three, which are likely to be the most predominant ones: basic search (Google); advanced search (Google Advanced Search); and directories (Yahoo! Directory). Google Advanced Search was selected because our users were familiar with Google. Therefore, possible differences in total search time deriving from using different search engines were expected to be kept to a minimum. The Yahoo! Directory was chosen because it is probably the most established and general Internet directory. We define total search time as the total time taken since a scenario is described until the user retrieves the specific information.

### 2.3 Tasks

This study aimed to be as much relevant as possible to real-life scenarios, where older people tend to look for more complex online information ([15], [6], [9]) such as medication, accommodation and traveling. Working towards this end, the participants were asked to conduct two tasks they could be interested in and were more complex than those with which they were familiar with:

- Task 1: To find the exact dates when the film "X-Men: the last strand" is on general release in the cinemas in Barcelona, and information about the cast and the director of this movie.
- Task 2: To find the synopses of Iliad and Odyssey and their historical context, provided by the *Instituto de Investigaciones Homéricas*.

### 2.4 Hypotheses

Basic search has been found to be the fastest strategy to find online information amongst young and middle-aged people (e.g.; [4]). In light of the difficulties elderly adults have using the mouse, there is evidence to claim that basic search is going to be the fastest strategy to find online information for older people as well, whereas directories will be the slowest. Nevertheless, we would like to note that directories might be faster than basic

search for the elderly. On the one hand, the process of seeking online information by means of directories requires clicking on links (either categories or web pages). In addition, directories' interface do not meet the usability criteria contemplated in this study; there are more elements on the computer screen and more clicks are required to find the online information than in basic search. On the other hand, many elderly adults are not used to typing, unlike young or middle-aged people (ordinary users). Moreover, independently of experience in typing, we have found out that older people type misspelled keywords in queries more often than ordinary users because of lower levels of education<sup>3</sup> and typical age-related changes in manual dexterity, such as arthritis. Both aspects have a negative impact on the total search time, despite the efforts made by search engines (e.g.; “did you mean” in Google). Hence, there is evidence to believe that the elderly will find online information faster by clicking on links than by writing queries.

The hallmark of advanced search is to allow users to specify the query in detail in order to obtain fewer and most precise results. Nevertheless, our hypothesis is that older people will find online information faster by using basic search. This hypothesis lies in the fact that the advanced search interface does not meet the three general usability criteria for the elderly contemplated in this study, unlike basic search.

As detailed in the following section, differences in total search time can be due to other factors. Amongst others, the number of queries and false pages visited deserve attention. Older people could have remembered both of them as a result of using advanced search prior to basic search after a short break time (5 minutes), despite the efforts made in the study to minimize their effects on the results. In light of this possibility, we decided to test the hypotheses that the participants will write fewer queries in basic search than in advanced search, and will visit fewer false pages in basic search than in the other two conditions. In none of these hypotheses are confirmed, both factors do not play a significant role in the overall results.

## 2.5 Experimental design

### 2.5.1 Pre-test: training

As stated earlier, our users lacked experience in both seeking complex online information and using advanced search and directories. In order to get rid of learning variables as much as possible, the participants received a one hour training session. As reviewed in [8], self-paced learning is a noteworthy requirement for training older people in carrying out computer tasks, and actual training times depend on the complexity of the topic. Drawing upon our ethnographical research at La Verneda, we have found out that a one hour training is a very good estimate for self-paced learning with the elderly.

At the outset of the training session, the main differences between advanced search and directories were explained in 15 minutes. We employed technical terminology which will be used in the test and participants did not know well, such as keywords and queries. Next, the participants were asked to carry out a number of searches they were familiar with by using advanced search and directory during 15 minutes. Afterwards, in the second half of the

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<sup>3</sup> They can be literate adults. However, they are likely to make grammatical mistakes such as writing ‘v’ instead of ‘b’, which is common in Spanish.

session, the participants were asked to seek complex online information. They were required to carry out Task 1 with the three strategies and find the page with the expected information.

### 2.5.2 Test

After the training session, the participants were required to carry out Task 2 by using advanced search, directories and basic search. In order to minimize issues of memory with an impact on the experiment, such as remembering the most effective query and avoiding clicking on false pages, the order in which the participants used the three strategies was: (1) advanced search, (2) directory, and (3) basic search. The participants were tested in different computers in order not to be influenced by the link choices of previous participants. In addition, the participants used different web browsers in the three conditions to get rid of their previous link choices; Mozilla Firefox 2.0 in advanced search and directory; Internet Explorer 6.0 in basic search. There was a five minute break, a standard break time in training studies with the elderly [8], between (1) and (2); (2) and (3).

A limited period of time was defined in order to standardize the results. The participants had 10 minutes to carry out Task 2. For each participant, we wrote down the starting (writing the query or clicking on a category) and final (localizing the correct web page) times. We confirmed that participants had found the results page by checking its URL on their web browser. For standardization purposes, they were also informed that the page with the expected information will appear on the first five positions of the results page in both basic and advanced search.

The participants sought different type of information before and during the test. In order not to bias the results because of using tasks with different levels of complexity, the same number of keywords (3) were required to be typed in queries (basic and advanced search) and levels (4) to go down in the directory to find the web page with the expected information in both tasks. Furthermore, neither Task 1 nor Task 2 was specialized for the three strategies. Regarding advanced search, the users did not need to fill in the whole form to find the information. As extracting keywords is one of the difficult aspects of searching and browsing, the tasks descriptions were directly taken from those provided by Google and the Yahoo! Directory.

### 2.5.3 Post-test and data analysis

In order to elicit qualitative data from the participants, a focus group was conducted at the end of the test, in the room where it took place. With the aim of ensuring a certain level of validity in our qualitative data, as suggested in [14] we asked participants to verify our summary of their comments at the end of the focus group. The final document contained the conclusions of the session, and no further qualitative analysis was carried out because the conclusions had been previously verified by the users. A questionnaire to gather how many queries the users wrote and false pages they visited was also administered during the test and validated during the focus group.

Two one-way within-subjects ANOVAs were conducted to identify significant differences between total search time and the number of false pages visited in the three strategies, respectively. A dependent-t test was carried out to compare differences regarding the number of queries in basic and advanced search.

## 3. RESULTS

The type of strategy has a strong impact on the time spent by older people seeking online information ( $F(2,12)=11,097$ ;  $p<0,005$ ). As depicted in Figure 1, older people were 3 times faster finding online information by using basic search than by means of advanced search or the directory. Tests of within-subjects contrasts confirm the hypothesis that basic search is faster than directory ( $F(1,6)=11,926$ ;  $p<0,05$ ), and directory is slower than advanced search ( $F(1,6)=10,331$ ;  $p<0,05$ ). Pairwise comparisons also show that differences between basic and advanced search are significant ( $t(6)=2,52$ ;  $p<0,05$ ).

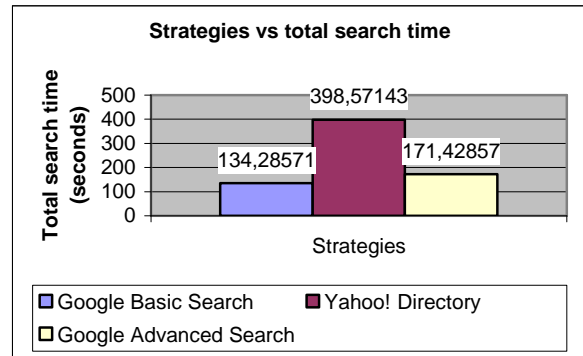


Figure 1: The impact of the three strategies on the total search time

The previous differences were not due to issues of remembering the most effective queries or avoiding clicking on false pages. Differences in the number of queries in both basic and advanced search were not statistically significant [Mean (Basic Search)=2; Mean (Advanced Search) = 2,14;  $t(6)=-0,176$ ; two-tailed,  $p<0,1$ ]. The effect of the type of strategy on the number of false pages visited was not significant [Mean (Basic Search)=2,29; Mean (Directory)=2,14; Mean (Advanced Search)= 2,14;  $F(2,12)=0,62$ ;  $p<0,1$ ], and pairwise comparisons show that differences amongst the strategies were not significant [Basic Search and Directory ( $t(6)=0,28$ ;  $p<0,1$ ); Basic Search and Advanced Search ( $t(6)=0,55$ ;  $p<0,6$ ); Directory and Advanced Search ( $t(6)=0,00$ ;  $p<1$ )].

Taken together, these results reinforce the impact of the three usability criteria considered in this study on interfaces for seeking online information with the elderly, and are also supported by the qualitative data elicited from the participants during the focus group session. All the participants agreed on the fact that they wrote and visited a similar number of queries and false pages, respectively, in the three conditions. Nevertheless, all of them brought information overload into light as the main perceived factor which accounted for by the differences in time. The directory-based and advanced search interfaces were very complex because they show a lot of information. Such amount of information forced the participants to read all the information on the computer screen in detail prior to deciding which link they had to click on (directories) or which fields they had to fill to specify the query in detail and make the most of advanced search, unlike basic search whose interface was regarded by all the participants as the simplest. Another frequently reported problem (six out of seven users commented on it) was the fact that that the directory-based search was the slowest strategy to find online information due to the great precision required using the mouse,

which most of the participants lacked despite having some experience seeking online information.

#### 4. CONCLUSIONS

The results initially confirm the three hypotheses tested and point out the impact of the three general usability criteria for the elderly contemplated in this paper on evaluating the usability of interfaces for seeking online information with older people. Difficulties using the mouse have a stronger effect on the total search time than difficulties in typing queries. Older people found complex online information 3 times faster by using basic search than by means of advanced search or directory. The directory was the slowest mainly 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. Issues of remembering the most effective queries or avoiding clicking on false pages, two relevant aspects to this study, did not impact on the results.

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. A larger sample of older adults, a wider range of tasks with different levels of complexity, a randomized block design and details on mouse clicks and misspelled queries would have allowed for a more detailed and controlled analysis. A control group with ordinary-users (i.e.; young and middle-age people), older people familiar with the directory or advanced search and estimated search times for each seeking-information strategies (e.g.; GOMS) would have provided an interesting baseline. We expect to address these limitations in our ongoing PhD thesis focused on ICT-based communication tools for the elderly, where have replicated this study with more older users and the data is being analyzed.

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