

# Learning How Older Adults Undertake Computer Tasks

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## ABSTRACT

This paper describes a study that was conducted to learn more about how older adults use the tools in a GUI to undertake tasks in Windows applications. The objective was to gain insight into what people did and what they found most difficult. File and folder manipulation, and some aspects of formatting presented difficulties, and these were thought to be related to a lack of understanding of the task model, the correct interpretation of the visual cues presented by the interface, and the recall and translation of the task model into a suitable sequence of actions.

## Categories and Subject Descriptors

H5.2. [Information interfaces and presentation (e.g., HCI)]: User interfaces - graphical user interfaces (GUI), interaction styles.

**General Terms:** Design, Human Factors

**Keywords:** Older adults, task models, cognition, file systems

## 1. INTRODUCTION

Older adult computer users often have difficulties in accomplishing many of the routine computer tasks that younger computer users take for granted. These difficulties can be attributed to age-related differences in perception and physical limitations, inadequate skills, and there is much evidence to suggest that cognitive slowing and limited processing resources are also a major factor [2, 3, 5]. A better understanding of why some of these difficulties arise can help in the design of interactions which are better suited to older users.

Hence, a study was designed to learn more about how older adults undertake computer tasks. The study provides empirical data on the difficulties encountered by older adults in carrying out tasks common to many computer applications. This data provides a useful starting point for a discussion on the factors underlying those difficulties, focusing on task models and visual cues, and their implications on interface design for older adults.

## 2. METHOD

11 older adults aged between 50 and 74 (mean = 64.5 years) participated in the study, all of whom had normal or corrected to normal vision, and no diagnosed cognitive or motor impairments. With the exception of one participant who had only 3 months computing experience, all had used a computer for at least 6 months, and had previous experience using email, a word processor and web browsing. Participants were recruited through IT training classes for older adults.

A collection of tasks were selected that reflect those commonly undertaken by computer users, and which are applicable to a number of applications. Each participant was asked to finish a partially completed letter by adding a small amount of text, apply

some basic formatting, and then save the document to two different locations. The formatting included boldening, underlining and italicizing text, and there was also some modification of the text and spellchecking. The final two tasks were to save the completed document in a new folder on the desktop of the computer, and save a copy of the document on a USB stick.

A set of printed instructions was provided and also a printed copy of the completed letter to use as a reference. A researcher was seated next to the participant throughout the sessions and was available to clarify any issues that may arise with the instructions.

The study was conducted using a Toshiba Satellite Pro A120 laptop with a 15.4 inch, 1280 by 800 pixel widescreen, running Windows XP Pro and using a Dell optical mouse. Participants used a think aloud protocol whilst completing the tasks which was recorded using a Phillips SPC900NC webcam positioned on a small tripod next to the keyboard. Activities on the computer were captured using screen capture software.

## 3. RESULTS

Screen captures, video and audio transcriptions for each participant were reviewed in detail, noting difficulties experienced by each person. Difficulties were characterized in four different ways: (1) when a person required several attempts to complete the necessary sequence of steps (e.g. clicking bold without having selected text and having to try again), (2) they stalled part way through a task and were not able to continue without help, (3) they performed an action that did not contribute towards the completion of a task (e.g. accidentally clicking on the minimize button during a formatting task), (4) they required verbal confirmation of the necessary steps (e.g. "Click here?" [referring to New Folder icon in the Save As dialog box]).

A list of difficulties observed across all participants was compiled and the number of participants encountering each difficulty was counted. The most common difficulties were as follows:

- a) Saving file to wrong location (7 participants)
- b) Difficulty selecting drive/folder using dialog (6 participants)
- c) Difficulty opening document from USB stick (6 participants)
- d) Difficulty determining correct toolbar button (4 participants)
- e) Clicking on the wrong toolbar button (3 participants)
- f) Not selecting text before applying formatting (3 participants)
- g) Difficulty selecting text with the mouse (3 participants)

Files were saved to the wrong location when participants saved to the dialog's default location rather than that specified by the printed instructions, when they created and saved to a folder on the wrong drive, or created a folder on the correct drive but did not open the newly created folder before clicking the save button. When selecting drives and folders using a dialog, some participants simply had no idea how to proceed and were unable to continue without help, some would scan the tree structure and be unable to find the correct drive or folder, and others having selected the correct drive were uncertain that they had done so. In terms of opening a

document all participants had their own usual method, e.g. opening My Documents from the Start menu and double-clicking on the document icon, or selecting from the recent Document list in the File menu. Difficulties arose when the required document was not available through these methods i.e. because the document was located on a USB stick and had not previously been opened. Some participants could not proceed without help, and others successfully opened the Open dialog but then had difficulties using it, as described above.

Formatting presented some difficulties too, with four participants unsure of which toolbar button to use when formatting with an underline, bold or italic, and needed time to hover over a number of toolbar icons to determine the correct one; three simply clicked on the wrong button, applied the incorrect formatting and had to undo the action.

In selecting text, three participants had difficulties with the mouse, either slipping during clicking and dragging, or not knowing what mouse actions were required to select text. Three other people did not select text before attempting to apply formatting. Instead they placed the cursor at a point within the text and clicked on the toolbar button with no effect, and often needed a reminder that the text needed to be selected first.

#### 4. DISCUSSION

These observations of a small group of older users performing a word processing task highlight difficulties with navigating the file system using a dialog box and also some formatting tasks. This section discusses possible reasons for why these difficulties arise, focusing on task models and visual cues.

The successful completion of a task requires both knowledge and understanding of a task model, the correct interpretation of the (mainly) visual cues presented by the interface [7], and the recall and translation of the model into a suitable sequence of actions. Our observations of older adult computer users have shown that some tasks, such as text formatting and navigating a file system, are often found difficult to perform. Participants sometimes missed important steps in a sequence, did not open a folder before saving a document and believed they had opened the correct folder when they hadn't. A possible explanation is that there may be only a partial understanding of a task model, particularly with a complex task sequence which may require many actions to complete and which must be carried out in a specific order. For instance, saving a document to an external drive requires the user to at least open the Save As dialog, select a location for saving, possibly create a folder, open the folder for saving, enter a file name and then save the document. Challenges in formulating a complete task model may be further exacerbated by age-related declines in such as those associated with short-term memory and cognitive slowing, could make it difficult to recall and successfully complete a sequence of actions [see 4, 6]. With the complexity of some task sequences, this means that it is more difficult for older people to perform some tasks, such as those discussed above.

A lack of understanding of the task model, or difficulties remembering and undertaking complex sequences of tasks could mean that users place a greater reliance on visual cues as a means of recalling the necessary steps. However, the meaning of visual cues, in the form of graphic symbols, may not always be readily apparent, particularly if the user is unfamiliar with the application. Furthermore, there is rarely a simple correspondence between a

symbol and its associated function, making it difficult to remember what the symbol does and what it is used for [1]. Some symbols have pre- or post-conditions, such as the requirement to select text before applying formatting, and these are not conveyed visually to the user. In addition, visual cues do not always indicate the correct sequence of actions to the user. For example, when saving a document there is nothing in the Save As dialog to indicate the order in which actions must be carried out, and consequently we have seen that in some instances users did not open a folder before saving a document, and therefore saved to the wrong location. It is worth noting none of the participants indicated that they had difficulties being able to see the icons, so this was not thought to be responsible in this case.

Translation of the task model into actions may also be problematic for older adults, since there are cognitive limitations on the time in which people can remember and execute a sequence of actions, and this is directly affected by speed of processing which declines with increasing age [8]. For instance, when undertaking a long sequence of actions, the later actions may be forgotten by the time the earlier actions have been completed, and this may be exacerbated by the complexity of symbols displayed by the interface, as described earlier.

We suggest that older adult computer users will have more success with the execution of tasks if the complexity of the function(s) associated with interface symbols are reduced, pre- and post-conditions are made explicit and some indication is provided to help in executing actions in the correct sequence. Future work includes studies to investigate this.

#### 5. ACKNOWLEDGMENTS

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