

**Instant messaging, older adults and interface metaphor.** S. Prior, (supervisors: J.L. Arnott and A. Dickinson), ACM Student Research Competition (SRC) Grand Finals, CA, USA, June 2009.

## Instant Messaging, Older Adults and Interface Metaphor

Suzanne Prior

Supervisors: John Arnott and Anna Dickinson

School of Computing, University of Dundee, Dundee DD1 4HN, United Kingdom.

### *The ACM Student Research Competition 2009 Grand Finals*

Association for Computing Machinery (ACM), USA, June 2009.

**URL:** <http://www.acm.org/src/candidates2009.html>

**Abstract:** An investigation has been conducted into the use of Instant Messaging (IM) by older computer novices, comparing different visual metaphors in the user interface. The objective was to try to create a more usable and acceptable instant messaging solution for older adults, amongst whom instant messaging is not currently widely adopted. Two user interfaces, a traditional one and an experimental alternative based on a café scene, were designed for the study. These were compared in use by older computer novices through measurement and participant interview. Outcomes indicated that the alternative metaphor interface performed better overall than the traditional one and that the majority of the participants would prefer the alternative metaphor for future use.

**Keywords:** Older adults, older people, instant messaging, interface metaphor, user interfaces, accessibility, usability, inclusive design.

**Contact Address:** S.Prior / J.Arnott / A.Dickinson,  
School of Computing, University of Dundee,  
Dundee DD1 4HN, United Kingdom.  
{sprior / jarnott / adickinson} at computing.dundee.ac.uk

## **Problem and Motivation**

Instant Messaging (IM) refers to real-time communication between at least two users using text rather than speech as the communication mode. It is commonly used across the Internet, allowing synchronous communication between users through quick and efficient transmission of messages. Instant messaging is the most popular means of communication amongst teenagers, surpassing even e-mail; 42% of online adults use IM, rising to 75% of teenagers. There are over 100 Instant Messenger programs (or clients) available with Microsoft's MSN (now Windows Live Messenger) being the most popular with over 185 million active users globally [1]. A study by Age Concern found that 33% of the UK population feel that time and other external pressures are preventing them from maintaining a close family unit, with 73% not having any face-to-face contact with their elderly relatives [2]. Severe loneliness affects 1-in-5 people of pension age [3] being more common amongst those who live alone. A study by UK media regulator Ofcom found that while only 16% of adults over the age of 65 said they used the Internet in their own home over a 30-day period under examination, those who did use the Internet used it for longer than any other age group [4]. It therefore would seem logical that the use of IM by the older adult could improve their quality of life including relationships with family members who might live far away, especially given the prevalence of IM use amongst the younger generation. The main reasons given for non-use of IM by adults over the age of 50 are fear of making errors and a lack of awareness of the benefits of synchronous communication [5]. This fear of being unable to use the technology and of making mistakes was not reflected in the actual ability of the respondents to use computers and the Internet.

The work described here examined the hypothesis that an Instant Messenger system with a User Interface based around a café metaphor would result in a more usable program for the older computer novice than one with a traditional style of interface.

## **Background and Related Work**

Little previous research has been carried out in this specific field; some attempts have been made previously [6] but failed to produce concrete results due to problems in recruiting participants.

### *The Metaphor*

The most important challenge facing modern computer designers is how to design software with which a novice user can become proficient quickly, with minimal tuition, but which can also be used by expert users without its training features becoming a burden or annoyance. The solution that most use is a metaphorical design.

The literal definition of a metaphor is "a figure of speech in which a word or phrase is applied to something to which it is not literally applicable" [7]. In computing design terms, it is used to apply a well known and understood concept and environment to the user interface of an item of computer software. The idea of metaphors in computing design was seen as early as 1973 with the arrival of the Xerox Alto microcomputer. This computer was the first to use a mouse, a graphical user interface (GUI) and, crucially, a desktop metaphor. It was not until 1981 that the desktop metaphor was used in a commercial personal computer. The Xerox Star was marketed for business and provided an office automation system including the desktop metaphor, coupled with the What You See Is What You Get (WYSIWYG) concept. In 1983 the desktop metaphor became more widely used with its inclusion on Apple's Lisa system. Today metaphors have become so commonplace in computing that we are often unaware of their being used [8].

Metaphors have to be used carefully, however, as they can have several disadvantages. There may be features present in the source domain which are not present in the target domain and vice versa. Also, where features are present in both, they may be used differently in both. Users may also struggle to see past the metaphor itself in order to use the system in the way it was intended. Designers also comment that the constraints of metaphorical design limit their creativity and ability to create more powerful and innovative interfaces [9].

The metaphor has several advantages for both the designer and the user, however, which have often been found to outweigh the disadvantages and have promoted their use. For a new user they allow faster assimilation of the skills to use the software [10]. Other work [6] found that people use metaphors when creating new cognitive structures and they use prior knowledge when learning new computer skills. Using a metaphor which is familiar to the user in the design of computer software means that the forming of an internal mental representation of the system in the user's mind is made easier through the provision of a schema for the representation [11]. Metaphors therefore provide the user with increased familiarity with the interface and may provide them with the confidence and motivation to explore the interface.

### **Uniqueness of the Approach**

Current research on metaphors focuses on creating metaphors that are applicable across cultures, genders and ages. Researchers are also evaluating their impact on communication, their effectiveness and the process undertaken by designers in the creation of metaphors [12].

The intention here, however, was to focus on older novice users as a particular group to see if benefits might be possible for them. The hypotheses formulated for the current work were that, with an alternative interface metaphor, older users would carry out messaging tasks more successfully and more quickly and recall the series of steps more successfully; they would also rate their performance more highly on a Likert scale. It was also hypothesised that, when participants were asked which interface they would be more likely to use in the future, the majority would choose to use one with the alternative metaphor.

#### *The Experiment*

Twenty-six participants took part in the experiment: 14 males (aged 61 to 84 years (mean 74)) and 12 females (aged 61 to 82 years (mean 69)). All participants had at least three months of computer experience and were proficient with both keyboard and mouse. None had experience of IM.

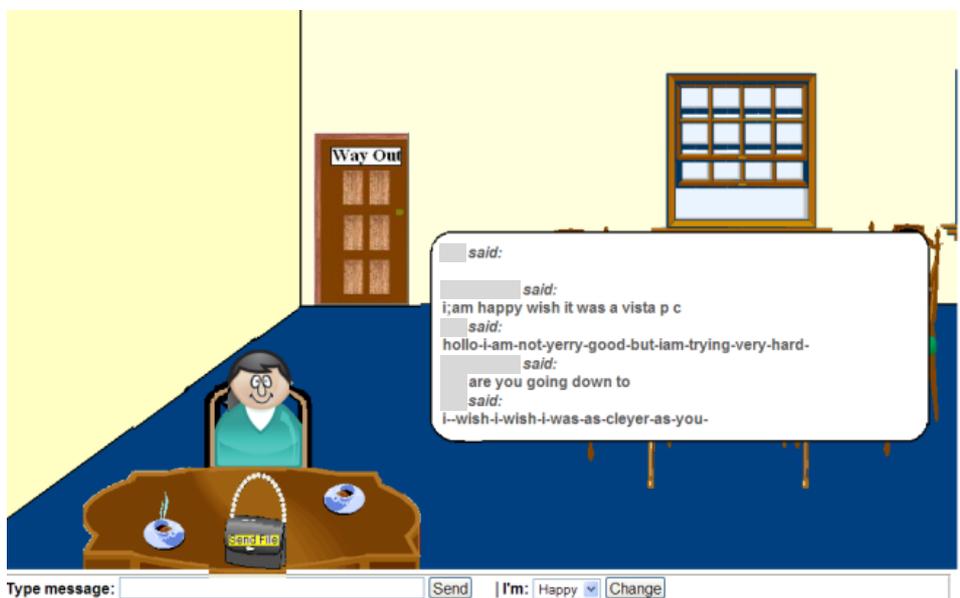
The experimental materials were two different IM user interfaces which operated with the same IM program. The underlying IM program was written in JavaServer Pages (JSP) and the two different user interfaces were written using HTML and Cascading Style Sheets (CSS). The use of one underlying IM program with both interfaces gave them a common basis for comparison. Both of the user interface designs allowed the user to send a message, send a file to the other user, use emoticons, select an avatar and exit from the system.

In the traditional interface the features were accessed using basic and traditional HTML form elements, with the design based on a conventional, typical Instant Messenger design (Figure 1). A "bespoke" interface was created incorporating features common to the main commercially-available IM systems, in order to avoid biasing the study through choice of one existing system over another.

*Instant messaging, older adults and interface metaphor*



**Figure 1** - Traditional Interface. The users were represented on the traditional interface by an avatar (a user specified image common in forums and chat programs). The mood of the user was conveyed using emoticons and a textual description.



**Figure 2** - Alternative Metaphor Interface. The users were represented on the alternative metaphor interface by more lifelike characters. The mood of the user was conveyed using the facial expression of the character.

The alternative metaphor (Figure 2) was based around a café scene with the chat text being displayed as a speech bubble, the file browser being accessed by clicking on an icon representing the participant's bag, and the mood of the participant being shown through a change of expression on the image that the participant had created to represent them. These were caricatures chosen by the participant that could share the facial features, hair style and skin-tone of the participant. The system was exited by clicking on the café door (on the alternative interface). Both of the interfaces used a minimum of 12-point Arial font for all textual information and were run on the Mozilla Firefox 2 browser version 2.0.06.

Participants used both interfaces (20 minutes on each one); the order in which they used the interfaces was pseudo-randomly assigned, with 50% of participants using the traditional interface first. The experiments were carried out within a laboratory setting with the participants separated by a screen to prevent direct communication between them. A facilitator was present throughout the session. Participants were asked to use the system to carry out a conversation with their partner. Success rates for the necessary tasks were recorded and timed with screen capture software. The extent to which participants explored additional options on the interface (e.g. changing an emoticon or sending a file) was also recorded. Individual participant interviews followed the experimental session; participants were asked to rate the interfaces on a 5-point Likert scale. Participants' attitudes to both systems were also recorded as were their intentions regarding whether or not to use IM in the future.

## **Results and Contributions**

### *Time to Log On*

On the traditional interface the mean time taken from logging-on to the system to sending the first message was 1 minute 35 seconds. Shorter times were recorded for the task of logging-on to the system on the alternative metaphor interface (mean time 45 seconds).

### *Sending a Message*

There was no significant difference between the interfaces for the time participants took to learn to send messages, but participants made significantly fewer errors on the alternative metaphor interface ( $t=-3.8$ ,  $df=25$ ,  $p<0.05$ ). In contrast to these results, however, participants reported that they found the traditional interface easier for this task, 34% reporting that they strongly agreed with the statement "It was easy to work out how to send a message" on the traditional interface, compared to 15% on the alternative metaphor interface. One participant strongly agreed with the statement "I became confused when trying to send a message" for the alternative interface.

### *Sending a File*

Using the alternative interface more participants successfully investigated the option of sending a file (11% on the alternative metaphor interface). None tried to send a file on the traditional interface, reporting that the button was off-putting. Participants recorded finding the sending of files easier on the alternative metaphor interface; this was shown to be statistically significant using Wilcoxon ( $Z = -2.156$ ,  $p<0.05$ ).

### *Changing an Emoticon*

Significant differences in favour of the alternative metaphor interface in the objective measurements were found for the task of changing the emoticon. In this task, those users who attempted it managed to complete the steps on average 3 minutes 10 seconds earlier on the alternative metaphor interface than on the traditional interface. Participants also reported finding the changing of their emoticon easier using the alternative metaphor ( $Z = -1.691$ ,  $p<0.05$ ).

### *Conversations*

Importantly, the nature of the conversations differed depending on the interface in use. Conversations using the traditional interface tended to be more formal and stilted. There were more lines of conversation guided by the facilitator. By comparison, non-guided, spontaneous conversation took place more often on the alternative interface ( $t=-2.53$ ,  $df=25$ ,  $p<0.05$ ). Spontaneous conversation was often personal, enquiring (for example) about the other participants' hobbies and families. This could indicate that the participants were more relaxed when using the alternative metaphor interface as they felt more able to ask more intimate and personal questions than they did when using the traditional interface.

### *Participants' Opinions*

Participants expressed a preference for the alternative metaphor: 61.5% preferred the alternative metaphor compared to 26.9% who preferred the traditional interface (the rest displayed no preference). 38% of the participants strongly agreed with the statement "The experience was enjoyable", compared to only 15% users on the traditional interface. Participants reported finding the alternative interface easy to navigate, with 92% of participants agreeing or strongly agreeing with the statement "The language on the links is clear and easy to understand"; 77% responded similarly for the traditional interface.

### *Future Use of IM by Participants*

The preference for the alternative metaphor was seen to be even stronger amongst those participants who wished to use an IM program again in the future. 17 of the 26 participants said they would use IM again and of these 14 said they would use the alternative metaphor interface.

### *IM and E-mail*

At the end of the study, most of the participants were recorded as now being aware of the benefits of IM and could see situations in which it would prove preferable to e-mail. At the beginning of the sessions 85% of the participants had been either unaware of IM or felt that they lacked the necessary skills or ability to use it correctly. Of those participants who did not express an interest in using the IM system again at the end of the session, the main reason given for this was a feeling that their typing skills were not good enough for synchronous communication. They felt under pressure to type quickly when they were aware that there was someone waiting for a response. These users tended to use e-mail already and preferred to take time to review their text and correct errors before sending it.

### *Discussion*

The hypothesis that the participants would prefer the interface with the alternative metaphor was supported, including that the majority would choose to use the alternative metaphor in the future. 14 of the 26 participants noted at the end of their session that they would be likely to use the software again with the alternative interface. The hypothesis that participants would carry out tasks more successfully and quickly with the alternative metaphor interface was supported for most tasks (logging-on, sending a file and changing emoticon were performed more easily with the alternative interface). The interface selected had an effect on the type of conversation that took place between participants. More formal, stilted and facilitator-directed conversation on the traditional system may have reflected participant lack of confidence with an unfamiliar interface; the increase in spontaneous conversation on the alternative interface is an encouraging finding and one that could be explored further in the future.

Preliminary discussions with the participants indicated that traditional IM interfaces are not the ideal platform for the older user to use when performing synchronous communication across the Internet. When first introduced to the system the participants became confused by many of the features of a traditional IM interface, such as the avatars. When participants were asked to describe the log-on and chat screens on the traditional interface many commented on the avatars available but noted that they were unsure what purpose they served and how they should be used. The concept of a picture representing them or their fellow participants confused many and the majority reported failing to see the point behind these images. This was not reflected with the alternative metaphor interface, where the images of a person created by the participants were recognizable to participants as being the person they were talking to. The participants were also more likely to make use of the features of the IM client with the metaphor interface when these features were linked to items they could relate to, such as finding a photograph in their on-screen bag to send to the other participant, or leaving IM by exiting through a door.

#### *Future Work*

The results of this study indicate that the use of alternative metaphors can be of value when designing user interfaces for older, less experienced and unconfident computer users. It may help them to learn more rapidly how to use IM and similar technologies. The outcomes would also suggest that the use of “fun” and “friendly” metaphors may encourage such users to continue to use the technology after the initial learning period. As the number of older computer users continues to increase there is a need for further research in the field if they are to make full use of the communication technologies available on the Internet. Further investigation of the features which older adults feel are required in an IM client, and the extent to which the multitude of features available on most modern commercial and freely available IM clients helps or hinders older adults in their attempts to grasp this technology, would be of benefit to designers attempting to create new software for these users.

#### *Conclusion*

An investigation has been conducted into the use of Instant Messaging by older computer novices comparing two messenger user interfaces (a traditional one and an experimental alternative) using interface metaphor to try to produce a more usable and acceptable solution for older adults. Outcomes show that the alternative metaphor interface performed better overall and that the majority of the participants preferred it for future use. Continued research in this area is needed if older adults are to benefit fully from Internet-based communication services.

### **Acknowledgments**

The author acknowledges the guidance of her supervisors Prof John Arnott and Dr Anna Dickinson. She also thanks the participants who took part in this research and Dr Paula Forbes for her assistance during the project. The research was supported by the UK Nuffield Foundation under Nuffield Science Bursary URB/34531.

### **References**

- [1] Microsoft Press Centre. MSN Messenger Breaks The 10 Million User Barrier. 2006 [cited 31st March 2009]; available from: <http://www.microsoft.com/uk/press/content/presscentre/releases/2006/02/pr03592.mspx>
- [2] ICM. IT, Internet and older people. 2002 [cited 1st March 2009]; available from: [http://www.ageconcern.org.uk/AgeConcern/Documents/Quant\\_exec\\_report\\_ext.pdf](http://www.ageconcern.org.uk/AgeConcern/Documents/Quant_exec_report_ext.pdf)

*Instant messaging, older adults and interface metaphor*

- [3] Victor C, Scambler S, Bond J, Bowling A. Being alone in later life: loneliness, social isolation and living alone. *Reviews in Clinical Gerontology*. 2000; 10(04):407-17.
- [4] Richards E. *The Communications Market 2007, Nations and Regions, United Kingdom*. UK: Ofcom, Office of Communications 2007. [cited 1st March 2009]; available from: <http://www.ofcom.org.uk/research/cm/cm07/uk/>
- [5] Jomhari N. Facilitating the Communication between Malaysian Grandparents and Grandchildren Living Abroad through Computer-Mediated Communication. *Proceedings of the HCI 2007 Conference on People and Computers XXI, Lancaster UK, 2007*; 73.
- [6] Yau M. *Tangible Instant Messaging – Accessible Technology for the Elderly*. 2002 [cited 31st March 2009]; available from: [http://research.berkeley.edu/haas\\_scholars/scholars/2003-2004/scholars/yau.html](http://research.berkeley.edu/haas_scholars/scholars/2003-2004/scholars/yau.html)
- [7] *Compact Oxford English Dictionary, Edition 3*. Oxford: Oxford University Press 2005. [cited 31st March 2009]; available from: <http://www.askoxford.com/>
- [8] Lakoff G, Johnson M. *Metaphors We Live By*. Chicago and London: The University of Chicago Press 1980.
- [9] Love T. Philosophy of design: a meta-theoretical structure for design theory. *Design Studies*. 2000; 21(3):293-313.
- [10] Sharp H, Rogers Y, Preece J. *Interaction Design: beyond human-computer interaction*. Chichester: John Wiley & Sons Ltd 2007.
- [11] Simpson H, Pellegrino J. Descriptive models in learning command languages. *Journal of Educational Psychology*. 1993; 85(3):539-50.
- [12] Madsen KH. A guide to metaphorical design. *Communications of the ACM*. 1994; 37(12):57-62.