The Non Browser: helping older novice computer users to access the web

Anna Dickinson, Peter Gregor, Louise McIver, Robin Hill and Scott Milne
Applied Computing, University of Dundee, Dundee, UK
adickinson@computing.dundee.ac.uk

The difficulties that older adults encounter browsing the web have been reported by a number of researchers. Hitherto, research has focused on improving content with little attention being given to the effects that the browser itself may have on the difficulties people encounter. We report on the development of an alternative browser which was designed to ameliorate many of the barriers that this group encounter to web use. The Non Browser was designed as far as possible from first principles, questioning the various metaphors currently used in accessing the web. A qualitative evaluation process illustrated that the Non Browser was both easier to understand and less off-putting than the standard application.

Older adults; browser; usability.

1. INTRODUCTION

Older adults encounter particular barriers when they browse the web [4], [8], [13]. Often the focus of attempts to remove these barriers is the improvement of web content, a notable example of this being the IBM Web Accessibility Service (WAS). Yet as Cockburn and Jones [3] point out, usability and accessibility flaws in the browser are among the most important aspects of the browsing experience, since the browser is present on every page accessed and so even relatively minor flaws can be exaggerated into serious usability problems by the frequency with which they are encountered. Despite this, little research has looked at the browser itself as a barrier to older adults’ web use, and what research there is tends to focus on people who cannot use conventional web browsers, e.g. Zajicek’s audio browser, BrookesTalk.

There is also evidence to suggest that the barriers which novice older people encounter as significant often represent irritations for more experienced users, and the “assistive” solutions to these barriers can usefully become part of mainstream design [14]. Given their near-ubiquitous position, investigation of web browsers for desktop computers has received surprisingly little attention in general research. Thus the design of a more appropriate web browser has potentially wider applicability than the specific audience for whom it is designed.

2. THE BROWSER

Browsing the Web represents a qualitatively different experience from most uses of a computer. During browsing the user is primarily accessing information, reading, navigating and exploring, but less frequently active, in the sense of entering text, for example. In their discussion of the redesign of the Microsoft keyboard, McLoone et al [12] distinguish between “consumption” activities, such as browsing the web, and “creation/composition” activities like editing documents. This distinction is relatively recent for most computer users, and is primarily associated with web use. Despite very positive evaluation results for keyboard redesign according to these principles, the browser remains as a conventional Windows interface: intrusive, information-rich and in a frame around the content. The standard browser occupies 20% of the screen (when screen resolution is 1024x768). While this design certainly has claims to familiarity, this should not prevent its value being questioned. There is considerable justification for research to explore whether an interface designed for “creation/composition” is equally appropriate for “consumption” tasks.
2.1 Conceptual Barriers

The standard browser also demands the understanding of various metaphors, which may appear to contradict each other. For example, the “back” button operates according to a stack model and an understanding of this model is necessary in order to understand its behaviour. In addition, the frame metaphor, which Windows applications normally use, needs to be understood to comprehend issues like the use of the scroll bar (does the scroll bar arrow move everything on the screen, or the content, or the frame?) [7]. Understanding of the frame is also necessary to understand where content ends: it is relatively common for users to disregard any information beneath the “fold”, and in part this stems from a lack of cues about how much information there is. As well as these basic barriers to access, however, there are layered metaphors which also complicate interaction. The user uses an often unfamiliar piece of technology (a computer), to interact with a WIMP (Windows, Icons, Menus, Pointing device) interface, to access a hypertext interface. The difficulties of distinguishing where one interface ends and the other begins are illustrated by the success of web advertisements appearing to be Windows dialog boxes, where even clicking on the “close” will open the advertisement.

Disentangling these three levels of interface is complicated enough, but increasingly functionality is duplicated between the applications. One example of this is the ability to change text size, which research shows is likely to be an option used by older adults [4]. Although the browser allows the user to change text size, users have found this option difficult to access [8] and, as a result, many web pages now offer the user the option to alter text size through controls in the content (see, for example, http://www.guidedogs.org.uk). Another example of this duplication of functionality between browser and content is the replication of navigation controls within content; sometimes designers also disable the browser’s navigation controls (for example: www.smile.co.uk).

2.2 Ageing and Barriers

The difficulties posed by these conceptual barriers are added to by the various changes that occur with ageing, which can include changes in visual perception [1], [10], manual dexterity [15], memory and speed of processing [16], [17]. The effects of these changes on the overall usability of the web may be dramatic: barriers may be encountered again and again because the user fails to encode the problem correctly in memory; small alterations to details on the periphery of the screen (the scroll bar, for example) are unlikely to be noticed; small targets will be difficult to click on, and closely placed targets may lead to accidental clicks, leading to confusion and disorientation (see [13] for a survey of the research).

There is also reason to believe that the current design of browsers will be especially detrimental to the ease with which older adults “consume” web information. A decline in the ability to ignore irrelevant information [11] is part of normal ageing, and this suggests that cluttered interfaces will distract the user from the process of accessing and understanding the content. Complicated interfaces are also likely to be problematic because of the decline in visuospatial ability, which makes it more difficult to make sense of displays. Chadwick-Dias et al. have even shown that very complicated displays can become an insurmountable barrier for older users [2].

Hawthorn [10] notes that ageing is associated with a narrowing of the visual field, and Young [20] suggests that interfaces designed for older adults should take into account their tendency to concentrate on one area of the screen. Thus conventionally designed browsers, with controls arranged in a frame around the content, and in peripheral vision, are likely to create additional problems for older users.

It is vital to remove as many of the barriers as possible in order to:

- address the imbalance in web use between younger groups and those over 65 (of whom less than 20% use the internet)

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1 In fact it moves the frame – clicking on the “up” button on the scroll bar non-intuitively moves content down.
• provide positive early experiences for older adults, which, research demonstrates, is likely to lead to continued use.

3. DESIGNING A ‘BROWSER’ FOR OLDER ADULTS

A multidisciplinary team, consisting of developers, designers, usability engineers and psychologists set out to develop a more suitable way of accessing the web for older adults.

The first step was to remove the frame around content and to seek a way to make it clear that the controls were not part of the content, but were a distinct part of the display. The approach chosen was to present the controls as buttons emerging from the bottom of the screen, encased in a semi-transparent surround to make it clear that they were associated with each other, and to limit them to the bottom centre of the screen. That is, the buttons were overlaid upon content, and did not obscure content at either side, but only where they were. This disruption of the content was intended to give a cue to the user that more existed further down the screen, unlike the Windows status bar which draws a straight line across the bottom of the screen.

The positioning of the browser controls at the bottom of the screen was intended to support the recognition of them as controls; most “real world” objects have controls beneath the object of interest, for example, televisions, cars. In addition, positioning the controls at the bottom of the screen gave users an “edge” [19] to control the mouse against. The position of the button hard against the edge of the screen was also intended to associate them with the physical surround of the screen, rather than with the content, and make their identity as controls more explicit.

This approach, and the need to reduce interface complexity, dictated a strict reduction of obvious functionality. The Non Browser was limited to 5 buttons, which had functionality loosely associated with that on conventional browsers: back, home, scroll, magnify and a “simplify” button that conducted a variety of alterations on the content, including removing backgrounds and making all text black on a white background.

As well as designing “negatively” to remove barriers that older adults encounter, the design team tried to design “positively” by utilising metaphors and concepts that would be more familiar than computer metaphors currently are. To this end, the design team brainstormed the conceptual issues of browsing the web and decided that a more appropriate metaphor was that of exploration. As a result, an interface was designed with a “base” (home), a map (showing the user where they had been and allowing them to return there, functionality similar to “back”). Initial evaluations with older users indicated that this metaphor was also confusing, however.

The failure of the explore metaphor led the design team to examine ways of communicating the functionality of the buttons as directly as possible, rather in the sense of a removal of metaphor. Previous research has shown that an interface which contains instructions on possible actions can significantly help older novice users [6]. The Non Browser buttons were re-designed to be text-based and to describe their own functions. Hence, “base” (home) became “Start again”, and the back button became “Go back a page”.

The Non Browser interface occupied only 6% of the screen, each button was labelled in text with a simple icon [9], and each was a different colour to support immediate differentiation.

![FIGURE 2: Structure of the Non Browser](image-url)
4. EVALUATIONS

The prototype browser was evaluated with twelve older adults (4 men and 8 women, mean age= 77.5 years; age range 70-93) who had little or no experience of computer use, and no experience of using the web. Following the signing of an informed consent form and a lab-based eye-movement experiment [5] qualitative evaluations took place as semi structured interviews where users were asked to respond subjectively to screens with the different browsers (but identical content) and to guess what various buttons did.

Strong preference was displayed for the Non Browser. Examining the results revealed two commonly repeated themes (indeed, these comments were found in all but one interview):

1. That the Non Browser offered more information than Internet Explorer
2. That Internet Explorer was not easy to understand

Of the twelve participants, eleven expressed a preference for the Non Browser over Internet Explorer; the other had no preference. Those preferring the Non Browser explained this in terms of the information that the Non Browser offered, e.g. “seems more, kind of, information, like, on that one” and “that one’s giving more information – it was bigger and more definite, with less long words, if you know what I mean – you knew right away when you looked at it, oh [it does] that! But the other one you had to read if you were wanting information.”

Often, when asked to distinguish between the two screens, participants expressed the difference in terms of the appearance, or not, of the Non Browser. For example, “well, that one’s got that (gesturing at Non Browser) on the bottom and that one hasn’t.” Indeed, in one case, the participant did not seem to have noticed the Internet Explorer interface, and made no reference to it during the discussion.

Participants tended to report that Internet Explorer’s toolbars did not make sense to them. One participant explained his preference for the Non Browser:

“because all this (gesturing to the toolbars on Internet Explorer) is just… you know, it’s it’s (shrugs to indicate lack of understanding) as far as I’m concerned…”

By comparison, he felt that the Non Browser offered:

“…information of some kind: “go back to the start” “go back a page” if you want to sort of go back previously or something like that. It seems to have some meaning but that (indicates IE interface) it’s just (laughs) nope.”

One participant commented that the information on the Internet Explorer screen seemed to be “cut off at the bottom”.

Participants, despite their lack of knowledge of how a computer worked, were remarkably accurate in their estimates of what the Non Browser buttons would do. Indeed, in their explanations they appeared to be creating mental models on the fly, reverse engineering them from the button descriptions.

The buttons most clearly understood, however, were those that had immediate relevance to the screen under discussion. This was particularly true for the “magnify” button, which all participants confidently identified as a way of changing what was on the screen to make it “bigger” or “clearer”. The “make black and white” button was not so confidently identified, but most participants managed to associate it with altering the colours on the screen, or, again “make things clearer”. “Look down” was also apparently quite self explanatory, with participants responding with comments like “I’d imagine you’re looking down – for the rest of the information” (indicating an awareness that there was more information) and “look down because there’s more information might come up on the screen.” It was harder to tell whether participants had understood the actual meaning of “Go back a page”, although they seemed confident that it was clear, one responding to the facilitator’s question about what the button meant “it tells you there – it’s self-explanatory, isn’t it?”. In some cases, responses to “Start again” betrayed participants’ inexperience with computers, since the range of applications was not familiar to them. One participant, with a little more experience, guessed “that goes back to the start of the program”.

5. DISCUSSION

The common perception that the Non Browser displayed more information than Internet Explorer is, at first glance, somewhat puzzling. Internet Explorer, after all, has significantly more functionality on offer, and presents a rather more cluttered appearance than the Non Browser. It is likely that this response could be in part explained by reference to the greater amount of information available on the browser buttons, and also to the accessibility of the information. The Non Browser offered information in a form that made sense to the participants (essentially, in textual form) and was recognisable as information, whereas Internet Explorer presented information that they did not have the background knowledge to decipher.

The use of metaphor to support users in developing mental models is well established in current interface design. Without knowledge of the metaphors being used, older novice users can find they present a barrier to comprehension and use. The search for appropriate metaphors is itself a complicated process but the removal,
where possible, of metaphor and concentration on providing meaningful information in familiar forms (i.e. text) may be one avenue to investigate.

The most significant problems that people encountered in comprehending the interface was the question of what “Start again” meant. This reflected a lack of understanding of the Windows operating system and what precisely “the computer” constituted. It is clear that in order to provide a genuinely usable system for this group it is necessary to reconsider the Windows approach.

6. CONCLUSION

The question of whether an interface based on those designed for “creation/ composition” is equally appropriate for “consumption” tasks is worthy of investigation. Initial results from the Non Browser evaluations suggest that an alternative design in which functionality is both restricted and presented differently is strongly preferred by older novice users to the conventional web browser interface. This result is in part owing to the explanatory nature of the interface, in which minimal computer knowledge is assumed, but may also be because of the natural flow of reading. Western readers tend to proceed through pages from the top left, particularly if the page contains text [18]. The positioning of system controls at the reader’s “entry point” may, therefore, have a detrimental effect on readers’ access to the content of web pages, especially when they are inexperienced computer users. By comparison, the positioning of controls in a familiar place, well removed from the entry point, and only likely to be investigated once the cognitive work of understanding the page is completed, may both enhance access to unique page content and also allow enhanced access to the information provided on the buttons themselves.

REFERENCES.


