DESS HANDI

Nouvelles Technologies et Handicaps Sensori-moteurs

« Evaluations of WebbIE, a web navigator for blind people; Symbol Evaluations »

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Abstract

Two main areas of work were undertaken for this placement: the first concerned the WebbIE web browser; the second strand involved evaluations of symbols.

Web browsing for people with visual impairments is difficult, given the large number of inaccessible websites and content. WebbIE is a dedicated web browser for blind people developed at the University of Manchester. It presents web pages in a linear text format and allows users to utilise their familiar screen reader. During the course of the placement:

- WebbIE was localised to French.

- Qualitative and quantitative tests were replicated using a large number of random and selected French sites. Sites were examined for conformance to accessibility guidelines, the presence of accessibility features and potential accessibility problems. The browser was evaluated for usability against real sites.

- User evaluations were carried out with both existing English users and French first-time users, to explore browsing habits, user appreciation and the perceived usefulness of WebbIE functions.

The work concludes that:

- From a pragmatic point of view, sites that breached guidelines were still found to be usable with the WebbIE tool, which is successful in allowing blind users to access the majority of web pages. Difficulties remain with accessing sites that rely heavily on JavaScript functions.

- The browser does not go far enough to support visually impaired users with some functional vision.

Symbols are used in Augmentative and Alternative Communication to support literacy and communication. Standard methods to assess symbol perception by users include translucency, guessability and iconicity test instruments. During the placement:

- An existing iconicity test was replicated and methods used to evaluate iconicity refined.

- Translucency and guessability tests were carried out for comparison of results and to explore their usefulness in measuring symbol perceptions.

- Further iconicity tests were conducted, with groups from different ethnic backgrounds.

Evaluations aimed to identify which kind of test instrument was most effective. Translucency tests proved to be fairly valueless for segmenting groups, as an objective measure of how groups perceive symbols. Guessability tests were found to be problematic, in that people did not know how far to interpret a symbol. Iconicity tests were concluded to be the most appropriate method to determine objectively how people and groups perceive symbols.

Acknowledgements

Sincere thanks to Jaime Lopez Krahe, director of the DESS for which I am enrolled in at Paris 8 (DESS Handi, 2005), for allowing me to write this paper in English. Using my native language, albeit somewhat estranged from prolonged years of living in France, has speeded my work. My still fumbling French would have been painful for everyone. I can only hope that all those who wish to or must read this paper in the adjudication process have the necessary time and patience to read it. If there is genuine interest in the subject matter presented, and any confusion, I will of course be available for discussion and translations. Thank you generally to all the teachers I have been privileged to know this academic year at Paris 8.

My thanks to various colleagues at CNERTA[1] and ENESAD[2] whose administrative, professional and personal support allowed me to initiate this year of study leave. In the current French climate of severe budget cuts to governmental administrative services it was a lot to ask. In a similar vein my gratitude to a tolerant Bank Manager who thankfully believes in the contribution of expatriates to France. He will be repaid in the obvious way.

Thanks to Alasdair King for his time and VB Scripts, to Antonella Di Angeli for her advice on statistics and to Nathan Lance for sharing his office with me, for lugging my computer, for his DJ talents and for being permanently Zen.

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Special thanks to Judith, whose heart is definitely in the right place, for Manchester (or rather Todmorden) moments and for the RHS[3] flower show.

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Particular thanks to Gareth Evans. Gareth, you are almost single-handedly responsible for setting my very rusty brain cells into motion. Well, twinges. Thank you for your enormous patience and the considerable time spent with me.

Finally my grateful thanks to Damien, who made this year possible: by persuading me to try and for always being there to check my French and my morale.

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[1] CNERTA: Centre National d'Etudes et de Ressources en Technologie Avancée

[2] ENESAD: Etablissement National d'Enseignement Supérieur Agronomique de Dijon

[3] RHS: Royal Horticultural Society

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1. Framework of placement

1.1. The University of Manchester

Course requirements for the DESS at Paris 8 University include a 5-month placement, in an association, business or academic institution involved in assistive technology. During the July, 2004 "Computers Helping People with Special Needs" International Conference in Paris (ICCHP, 2004), I had heard Professor Paul Blenkhorn from Manchester University speak with impressive clarity and obvious experience in the field. I asked him if there was a possibility of working in some way with him, should I be accepted onto the DESS course. Eventually this was organised and the subsequent placement with Paul and his colleague Gareth Evans at Manchester University is the subject of this paper.

There has been a recent fusion of the two major Manchester Universities, UMIST[4] and VUM[5]. Since October 2004 they have been united under the general name and administration of Manchester University (Manchester University, 2005). Paul Blenkhorn and Gareth Evans worked in the former UMIST Department of Computation. With the fusion, two separate schools of Computer Science and Informatics were created, Paul Blenkhorn and Gareth Evans transferring to the School of Informatics. The merger, involving considerable departmental reorganisation, has resulted in some slowing of administrative procedures and has not without been without polemic, none of which appeared to have effected the placement. The School of Informatics has been assigned to the Faculty of Humanities, alongside the School of Languages, Linguistics and Cultures, and the School of Social Sciences, rather than to the Faculty of Engineering and Physical Sciences, as has the School of Computer Science. The decision reflects current perceptions of the role of IT[6] and computing in the multi-disciplinary domains of humanities. Computer Science is said to address the science and technology of computing and Informatics the design and organisational impact of information systems. Some of the interests and activities of the two schools nevertheless overlap.

Manchester University, the largest single-site university in the UK and with around 30,000 students, can claim to be among the world's top universities, with a

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[4] UMIST: University of Manchester Institute of Science and Technology

[5] VUM: Victoria University of Manchester

[6] IT: Internet Technology

growing international reputation for high standards in teaching and research and for general academic excellence.

I was given an office in the Maths and Social Sciences building, home to the School of Informatics, and a computer operating under Windows XP, with administrative rights to the computer and access to the internal network facilities, including a Manchester University email account and online (and offline) access to library facilities; notably, the John Rylands University Library. A phone line was available, though without international access. Much of the time I chose to work with my personal laptop, also operating under Windows XP, for the purposes of writing with an *AZERTY* keyboard and French spell checker, for its speed and more importantly for testing French applications and websites. This became indispensable when the work computer broke down and became unavailable for a month.

1.2. Placement Supervisors

1.2.1. Paul Blenkhorn

Professor Blenkhorn is a professor of Assistive Technology at the School of Informatics, where he holds a part-time position. Professor Blenkhorn has been involved in the field of Assistive Technology for over twenty years as a software developer, concentrating his skills on computer-based systems to support people with disabilities, particularly visual impairments, in daily life, education, communication and in access to computer systems. He is actively involved in research into speech and sight engineering needs for people with disabilities and participates in numerous International Conferences, often as a keynote speaker. He has been technical advisor for diverse associations such as the British Royal National Institute for the Blind's (RNIB) and the Guide Dogs for the Blind Association. He is also active in several software companies, parallel to his part-time university position. He was one of the founders of the assistive technology company Dolphin Systems (Dolphin, 2005), as well as Sensory Software (Sensory, 2005) and more recently has established the company Claro Software (Claro, 2005). Paul, in collaboration with Microsoft, developed the Narrator screen reader that is supplied with Windows 2000 on. One current area of interest of Professor Blenkhorn concerns exploring how computer systems can support fully sighted people who have difficulty reading print, such as dyslexic people.

1.2.2. Gareth Evans

Dr (David) Gareth Evans is a senior lecturer at the School of Informatics, with demanding teaching and supervision responsibilities. He works closely with Paul Blenkhorn; both will be members of the scientific programme committee of the 2006 ICCHP Conference (ICCHP, 2006). A very active researcher and software developer, Dr Evans has contributed widely over many years to the body of academic and practical research in the field of Assistive Technology. He is published regularly and often participates in International Conferences.

Generally Dr Evans researches into software and computer based systems for people with disabilities. Some areas he is particularly interested in include speech technology and the development of multi-lingual speech synthesizers; orientation and mobility systems for blind people; improving document production for blind people; alternative interface technology; and multimedia sensory stimulation involving signal and sound processing, gesture recognition and computer graphics.

Projects, publications, assistive devices and software Dr Evans has been involved in, frequently in association with Paul Blenkhorn and other colleagues, include the TeDUB system, providing blind people with access to technical diagrams (King *et al.*, 2004c, Hortsman *et al.*, 2004, TeDUB, 2005); Format Layout (Evans *et al.*, 2003); EdWord and EdWeb, a talking Word Processor and a talking Web Browser (Evans *et al.*, 2004); the Six-In Braille Input system, allowing users to 'Braille' on a QWERTY Keyboard (Blenkhorn *et al.*, 2004); a Java-Powered Braille Slate Talker (Arato *et al.*, 2004); and a joystick-operated full-screen magnifier (Kurniawan *et al.*, 2003). Among the hand-held and head-control systems he and Paul Blenkhorn have been involved in developing, a head-operated mouse won the Innovation in Education award at the UK Education Show 2000. Many of the products are commercially available: the Department of Informatics has a practical real world approach, maintaining partnerships with industrial and commercial IT users. A priority is the provision of assistive technology solutions at no, or low, cost.

1.3. Placement Goals

1.3.1. General

Two major strands of work were proposed for the placement, after preliminary discussion by email, and a face-to-face interview requiring a visit to Manchester. For a French translation of the placement goals, both original and modified, refer to Annexes 1: Work plan.

1.3.2. Part One – WebbIE

The first strand of work outlined involved the evaluation of web browsers for blind people. The WebbIE web browser was being developed at Manchester University. The work was to be concerned with conducting qualitative and, possibly, quantitative evaluations of WebbIE and its derivatives with blind and other users. It was to involve interviewing users, observing users, and designing and collecting questionnaire results. The work was to carry out further evaluation of the tool and its derivatives by quantifying its success in accessing websites and services. There was a possibility of investigating the use of WebbIE by people with some functional vision; with the intention of developing requirements for later versions of WebbIE that would directly address the needs of such users.

1.3.3. Part Two (original) – Speech Synthesis

The second strand of work was to involve the evaluation of speech synthesisers in the context of assistive technology. This was to involve the qualitative and quantitative evaluation of commercially available speech synthesisers for use in assistive technology that support people with a wide range of print impairments. The work proposed involved assessing speech synthesisers according to specific criteria and organising a series of trials whereby the accuracy of speech synthesisers would be tested with a variety of users.

Although some minor preliminary work was done for this, the project was quickly abandoned. Data for analysis was to be provided by an external person and changes in the role and circumstances of this person prevented her being able to furnish the data. Without the data, this second strand was abandoned and replaced by the following proposal.

1.3.4. Part Two (replacement) – Symbols

The proposed work here was to involve an investigation into the evaluation measures and testing techniques used to characterise symbol sets used in AAC[7]. The work was to involve the use of a set of well-established symbol test instruments (translucency, transparency, iconicity and guessability) with ethnically diverse groups, focusing on the ability of the instruments to characterise and classify the groups' usage of the symbols. The work was also to contribute to knowledge in an ongoing project to support communication between health professional and patient in a medical consultation.

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[7] AAC : Augmentative and Alternative Communication

2. Part One – WebbIE

2.1. Origin of project, theory base

The WebbIE Web browser was originally developed as a student project at the University of Manchester (the old UMIST) under the supervision of Paul Blenkhorn and Gareth Evans. It became a more complete and effective tool with development by Alasdair King, who took over the project as part of his work towards a doctoral thesis.

The project was born out of the frustration experienced by blind people attempting to access web pages. Technical solutions were sought to problems encountered, in consultation with blind users of the Web.

The web is primarily a visual medium. Non text content is often embedded into a webpage. Semantic mark-up is used for presentation (visual layout) rather than to communicate content; a table is frequently used for layout rather than for tabular data and a header to determine font size rather than to indicate a title on a page, as part of a meaningful hierarchical structure. Images frequently have no or meaningless text alternatives and are often used for presentational reasons, rather than to communicate content. When viewed in a linear form, web pages often lack the semantic information required to enable blind users to quickly identify useful structural information – titles, navigation and main content areas, advertising. Pages often contain large numbers of (navigational) links at the top of a page and finding the main content area is a laborious and frustrating process. Increasing use on websites of dynamic content such as JavaScript driven menus activated by mouse events and embedded multimedia content such as Flash animations complicate consultation for blind users, faced with increasingly complex pages and inaccessible content. Although website developers are increasing encouraged to produce sites conforming to accessibility guidelines determined by the World-Wide-Web Consortium (W3C, 2005), the majority of websites do not yet conform to these standards. Even compliant sites may not in reality be accessible or usable.

Some existing solutions for web browsing by users with little or no functional vision are the use of a standard browser with a screen magnifier and /or a screen reader of the user's choice; using the accessibility features of HTML[8] and existing web clients, allowing users for example to turn off images, define their own colour settings or to turn on a caret; relying on transcoding proxy servers to convert webpage HTML into a

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[8] HTML: HyperText Mark-up Language

more accessible format; or using a dedicated browser such as the IBM Homepage Reader self-voicing browser which provides an audio interface to web pages.

These solutions often fail to address problems of inaccessibility of content, over-complex interfaces and the needs of users without any degree of functional vision (King *et al.*, 2004). WebbIE is a dedicated web browser, the most flexible solution of the above choices. The design philosophy underpinning WebbIE is one of "allowing users to access standard applications, in this case Windows Internet Explorer, through an interface that simplifies and represents the content without losing information or being too complicated for non-expert users" (King *et al.*, 2004). WebbIE is not self-voicing; it allows screen reader users to continue to use their familiar environment and provides support for partially-sighted users. "Interfaces that rely on hearing must comply with a principle of maximum output in minimum speech" (King *et al.*, 2004b). WebbIE supports this principle.

WebbIE processes web pages into an accessible text-only format, translating web content into 'screen reader-friendly' format. This text, re-presented in a linear form, can be navigated with a caret as a normal text field. The application is completely keyboard controllable. Features such as an integrated search function for the page or web searching with Google, the ability to skip links to non-link text, to go directly to forms on the page, or to crop pages of links, forms and other elements allow users to rapidly examine and understand the content of a page and speed navigation within a site. Large navigation sections at the top of a page can for example be skipped. In previous versions, WebbIE attempted to identify the section of the page containing the main content text, and the section of the page containing navigation links, signalling these sections to the user and allowing them to navigate directly to them. The poor use of standard mark-up which these features depended on caused them to be removed; the gain in terms of usability was not thought significant enough to be consistent with the design philosophy.

Technically, WebbIE is based on the Internet Explorer browser and operates under Windows. It uses the Microsoft MSIE[9] control object (WebBrowser), giving the program its own internal Internet Explorer, fetching a web page and parsing the HTML into a standard W3C document format, the Document Object Model (DOM), which can then be queried by WebbIE for information on the web page.

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[9] MSIE: Microsoft Internet Explorer
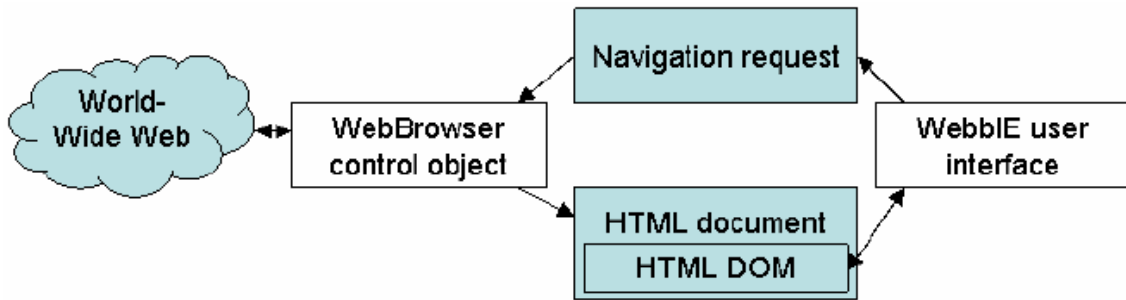
Screenshot 1: The WebbIE architecture
(from 'WebbIE: a Web Browser for Visually Impaired People' King *et al.*, 2004)

When WebbIE navigates the DOM, it collects active components such as hypertext links and forms and builds a plain text representation of the content to present to the user. Superfluous information like decorative images and table-based visual formatting are removed in the processing of a page by WebbIE to produce a simpler navigable document (King *et al.*, 2005). The simplified WebbIE interface allows for two views of a webpage; in text or graphic mode, presented in the following screenshots.

Screenshot 2: WebbIE graphic view of a webpage
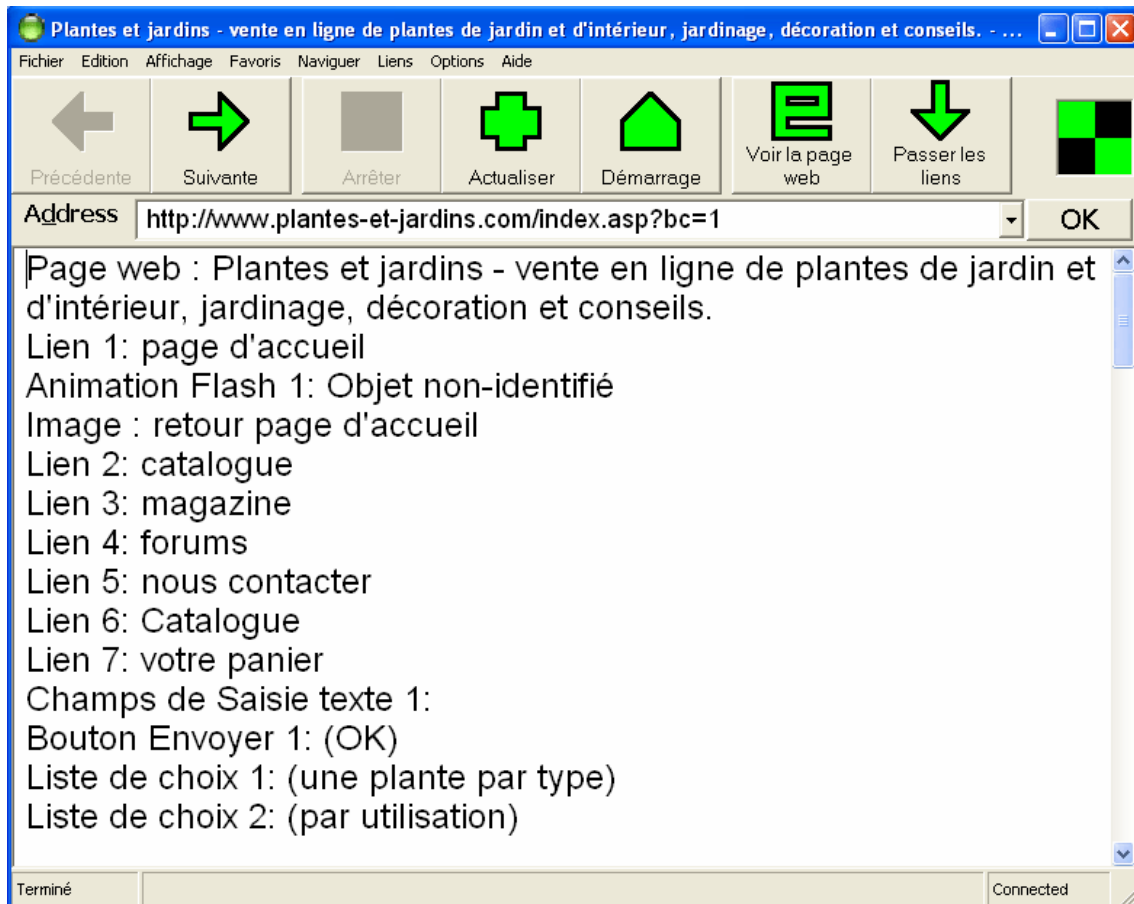
Screenshot 3: Text view of the same webpage in WebbIE

The text view presents components such as links and forms on new lines, labelled with distinguishing titles like 'Link' for a hypertext link or 'Submit button' for a form. Users press the return key to activate the function (in these examples navigation to the target page and form submitting) when positioned on the line. The form filling process is facilitated for users. When an element such as a text input box or a select form is indicated and users press the return key, WebbIE pops up an input box or list of the select items for the user to enter information or to select choices. The page is updated with the user's choice and is available for review, before the form is submitted.

A user initiated action such as clicking on a link or submitting a form results in WebbIE passing the action back to the WebBrowser object, which processes it as a normal user-generated event. The page is obtained or the form submitted and WebbIE is updated, returning the result to the user. The "user therefore enjoys a fully-functional text-only web browser" (King *et al.*, 2004b).

WebbIE supports existing MSIE bookmarks, frames, the great majority of HTML 4, forms, tables, and display of embedded multimedia (King *et al.*, 2004). If plug-ins or support applications are installed, the WebBrowser will trigger their action

automatically when their content type is encountered, so that for example streaming audio from news or radio sites can be accessed (King *et al.*, 2004b).

The presence of Multimedia objects like Flash animations are signalled to the user but not treated by WebbIE. They can be opened in another window. This allows a screen reader to use any accessibility features provided by Internet Explorer and the screen reader, although it is likely there will be none present.

Users can choose to download images or not. These are ignored by WebbIE if not ALT text is available, otherwise this is presented. When images are used as links, the destination of the link is presented.

Frames are presented by WebbIE as one combined page. Successive versions of WebbIE have handled frames with increasing success. Each of the frame content is searched for separately but the browser does not wait until all frames are loaded to begin processing the content, allowing more rapid treatment. Resulting pages may contain large numbers of, for example, navigational links, increasing time required for reading, but content is available. An exception is when websites use JavaScript to prevent users from accessing frame content directly, forcibly reinstating the frames, denying WebbIE access to their content.

WebbIE allows access to the most common JavaScript triggers through the DOM and MSIE control object. WebbIE attempts to support as many JavaScript triggers as possible by presenting them to the user for selection. When they are selected, WebbIE will either update the DOM, which causes appropriate changes in the display of the page, or if it cannot be sent through the DOM will interact directly with the mouse pointer on the webpage, moving it to the appropriate position and completing the action.

Not all JavaScript events can be successfully dealt with. For example Mouseover events often cause a temporary change in the display of a page. This can be displayed in WebbIE, but as soon as the user moves the caret away from the line that triggers the Mouseover event from WebbIE the effects cannot been seen, because when the user places the caret elsewhere, the effect is removed.

 If a page relies heavily on JavaScript and mouse-related events then WebbIE has problems supporting the functionality. The user can switch to a view of the Internet Explorer browser displaying the page, but this may not itself be accessible. JavaScript is a problem that can be insurmountable for an accessible client (King *et al.*, 2004).

When JavaScript is used to replace functions normally reserved for HTML, such as submitting a form or linking to another web page WebbIE can have difficulty in identifying and following the link or returning to pages previously viewed.

That some content is inaccessible to WebbIE is due to the failure of developers to address accessibility issues (examples being no alternative content in Java applets, Flash animations or PDF files).
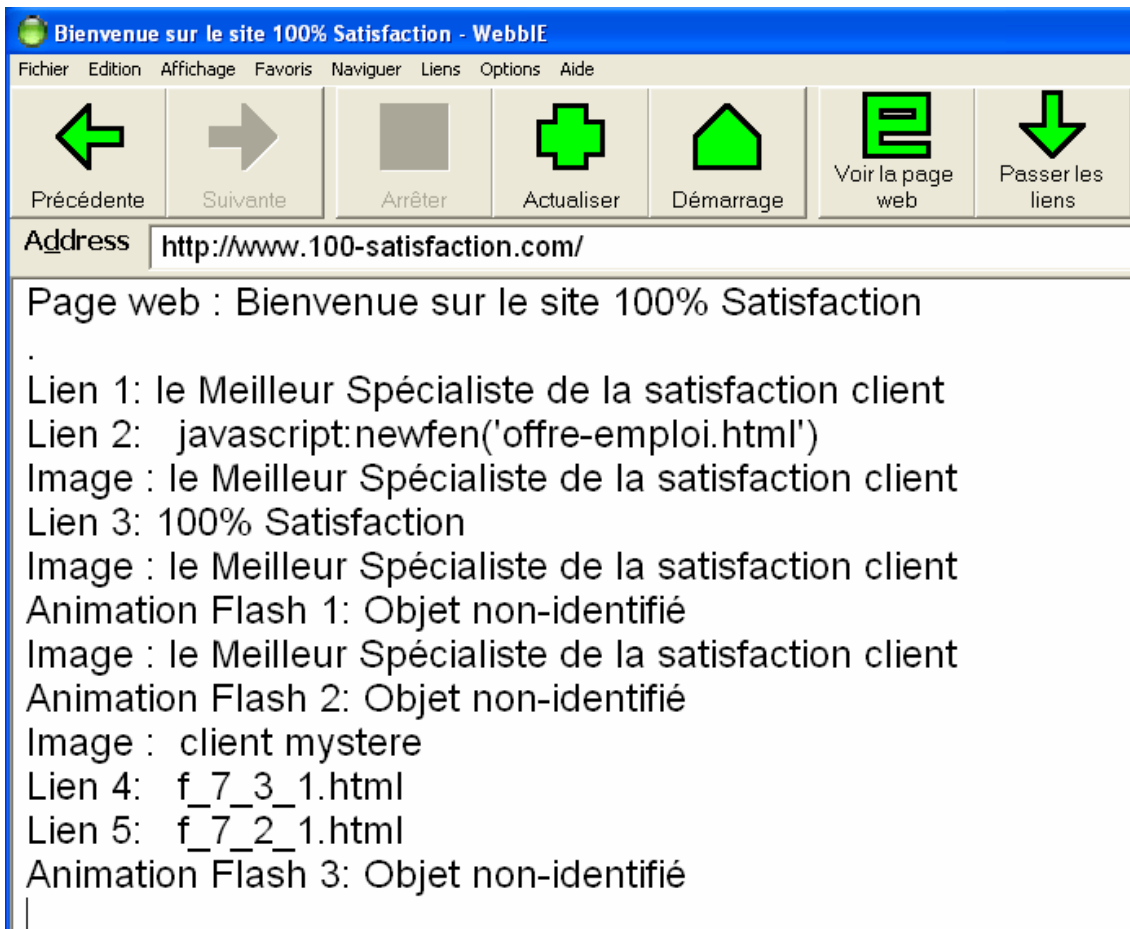
Screenshot 4: Inaccessible features on websites, a developer issue.

WebbIE, as a dedicated web browser, nonetheless attempts to address such accessibility issues as complex web pages, direct access to content, frame based websites, interactive features and other concerns described above.

2.2. Familiarisation with the Application

A version of WebbIE under development was installed on my computer. I was to become familiar with the application by beginning the translation of it, the first task requested.

2.3. French Translation

2.3.1. Original request and procedure

The task preliminary to further work on WebbIE involved translating the interface of the application into French, from which a French version of WebbIE could be compiled by the developer using Visual Basic. Some translations of WebbIE into other languages (Spanish, Polish and Czech) had been partially made in previous years. These other language versions remain incomplete or outdated, and though some corresponding older versions of WebbIE are available to users of these languages, they do not seem to be maintained or updated.

English data for the French translation was provided in the form of three simple text files: uiLanguage.txt, uiMessages.txt and popupHelp.txt. The first file, uiLanguage.txt, comprised the plain text for the principal menus and other interface features including ToolTip text; the second file, uiMessages.txt, contained the phrases used to display system or error messages and labels for lines in the text view of WebbIE; and the final file, popupHelp.txt, consisted of explanatory sentences appearing to the user when the F1 key was activated.

To these main files, comprising the bulk of the application were added the files for two arguably important components, the help files and manual accompanying the application. Finally, some html pages were to be translated or created, such as welcome.htm, the default page displayed when the application opens and the html version of the manual for online consultation from the WebbIE website. French html pages for introductory explanations of the browser and providing links for downloading the application from the website were also to be created. Translations were needed for messages during the setup (installation) process and for minor files such as the readme.txt (lisezmoi.txt). These last needed to be in place with the release of the browser to French users, who would be downloading the browser for evaluation, though not for the building of the French browser version.

Work began with the three text files, comprising language for the core application. Extracts of uiLanguage.txt, for menu items and other interface features follow, with accompanying explanations.

Extract 1: uiLanguage.txt

```
frmMain.mnuLinks.Caption
&Links
frmMain.mnuSkiplinks.Caption
&Skip Links Down  Ctrl+Down
frmMain.mnuNextLink.Caption
&Next Link Ctrl+Tab
frmMain.mnuLinksSkipup.Caption
Skip Links &Up   Ctrl+Up
frmMain.mnuPreviousLink.Caption
&Previous Link   Ctrl+Shift+Tab
frmMain.mnuViewLinks.Caption
&View Links
frmMain.mnuLinemarker.Caption
Line &Markers
frmMain.mnuLinemarkerSet.Caption
&Set line marker
frmMain.mnuLinemarkerClear.Caption
&Clear line marker
frmMain.mnuLinemarkersGotocontent.Caption
Goto &Content
frmMain.mnuLinemarkersGotonavigation.Caption
Goto &Navigation
frmMain.mnuLinemarkersGotoheadline.Caption
Goto &Headline
frmMain.mnuOptions.Caption
```

Each paired line contained the text for translation, and frequently the Access Key (hotkey) associated with the menu option, indicated by the preceding ampersand character (&), for keyboard control. After pressing the alt key, the user accesses the menu and associated menu sub-items by tabbing to the menu option desired with the arrow keys and / or selecting the indicated hotkey for the top-level menu item (example L for Links), keying up or down with the arrow keys to the desired sub-menu item (example S for Skip links down) and pressing the hotkey or enter key to activate the selection.

Keyboard shortcuts to menu functions associated in the application were also indicated in the files next to the active items by for example, Ctrl+Shift+Tab. Thus a user consulting a page can activate these keyboard combinations to go directly to the previous link, without returning to the menu.

Components for translation were then the text (menu headings and interface elements) itself, the Access Keys and the keyboard shortcuts, all contained in the first line of each pair in uiLanguage.txt. The first line of the pair was not to be modified, relating to the Visual Basic code identifying the interface object. The following sample of the file (English and French translation) indicates the attention that needed to be given to these deceptively simple translations.

Extract 2: uiLanguage.txt

```
&Navigate
frmMain.mnuBack.Caption
&Back Alt+Left
frmMain.mnuStop.Caption
&Stop Escape
frmMain.mnuHome.Caption
&Home Alt+Home
frmMain.mnuRefresh.Caption
&Refresh
frmMain.mnuForward.Caption
&Forward    Alt+Right
frmMain.mnuLinks.Caption

&Naviguer
frmMain.mnuBack.Caption
&Précédente      Alt+Flèche Gauche
frmMain.mnuStop.Caption
A&rrêter    Échap
frmMain.mnuHome.Caption
&Démarrage Alt+Origine
frmMain.mnuRefresh.Caption
&Actualiser
frmMain.mnuForward.Caption
&Suivante   Alt+Flèche Droite
```

Firstly, the text itself needed to be translated accurately. Complications surrounding this are discussed in the following section 2.3.2: Translation skills and limitations.

Secondly, the shortcut keys needed to adhere to existing conventions for the French language. This was a simple translation of keyboard names, for example Ctrl+Maj+Tab for Ctrl+Shift+Tab (Previous link/Lien Précédent) or Alt+Flèche Droite for Alt+Right (Forward/Suivante) or again Alt+Origine for Alt+Home (Home/Démarrage). Because these could not be associated with functions independently of the original English version, there is some argument for saying that the French version is less intuitive than the English one. Examples would be Ctrl+F for the Find function (Rechercher), Ctrl+R for Reload (Actualiser) or Ctrl+K for Crop Page (Abréger la Page), which offer no memory clues for French users as do the letters determined by the English alphabet corresponding to the word used. This adds some cognitive load to the French user.

Finally, the Access Keys for the menu needed to be altered to correspond to available letters in the French translation of the word, an example being Fa<u>v</u>oris for F<u>a</u>vorites, F having already been used for <u>F</u>ichier (File) and A for <u>A</u>ide (Help). No Access key could be used twice in the top level menu or in each of the sub-menu levels. Where possible, those used in the standard French version of Internet Explorer were selected, WebbIE being based on this browser. This is why the v in Fa<u>v</u>oris is used, for

example. An exception to this is A for <u>A</u>ide (Help), rather than for Affi<u>c</u>hage (View). The standard French version of IE uses the question mark symbol (?) for Aide (Help) but it was thought to be preferable to explicitly label this menu item. Other choices (not having Access Keys associated in the standard version of IE) were chosen based on logic (easy to remember key word) and visual clarity (normally the first or second capitalised letter) for users with some vision or on the Access Keys used in the French version of JAWS, thought to be a likely screen reader to be used with WebbIE (Freedom Scientific, 2005). JAWS labels and Access Keys influenced the decision to use <u>A</u>ide rather than the question mark symbol for Help and <u>Q</u>uitter rather than Fermer for Close.

Screenshot 5: Translated Menu options

Essentially a compromise was reached between available letters, existing IE and JAWS conventions, visual clarity and logic. An overview of the menu options was necessary before attributing these keys and from study of the WebbIE application and extracting the lines where an ampersand (&) was present, a chart was drawn up to identify menu entries and to select Access Keys, once the text was translated. Last minute modifications to this carefully worked out grid, with several menu items eliminated in version 3 of WebbIE, explain why some obvious letters were not chosen for Access Keys. One glaring mistake is that '<u>A</u>utoriser les fenêtres popup' (Allow Popup Windows) and '<u>A</u>utoriser les messages' (Allow messages) in the Options menu have both been attributed the Access Key <u>A</u>, though this is illegal in the same sub-menu. It was possibly the result of last minute modifications.

There was also some confusion over what controlled some of the translations, the text files, the Visual Basic application being used to build the browser or the French installer. When trial versions of the new French browser were built, some elements duly translated continued to display in English: 'Autoriser les messages' (Allow Messages) being one of these, 'Afficher les images' (Show images) and 'Configurer comment WebbIE affiche les pages web' (Configure how WebbIE displays web pages) other examples not included in version 3 of WebbIE. System messages, buttons or elements of the browser interface, like messages in the status bar, such as 'Rechercher' (Search) 'Aperçu' (Preview) 'Annuler' (Cancel) or 'Vide' (Blank) were in this group of problem

words, sometimes appearing in English, sometimes in French, along with such phrases as 'Choisir la page de démarrage' (Set Home page). Fruitless searches began for the trailing English versions in the text files. Ultimately this was a problem for the developer who needed to manually design button features and attribute them the French label, rather than using the otherwise automated features of Visual Basic program for inserting cancel and other system related buttons. One or two were simply not translated due to the additional work involved for the developer. Others, such as the preview message, were removed. Last minute checks before the launch deadline mainly concerned these phrases. The most obvious remaining English term (in version 3) is the word 'Address' still in English rather than the French 'Adresse' next to the address bar, a focal interface feature.
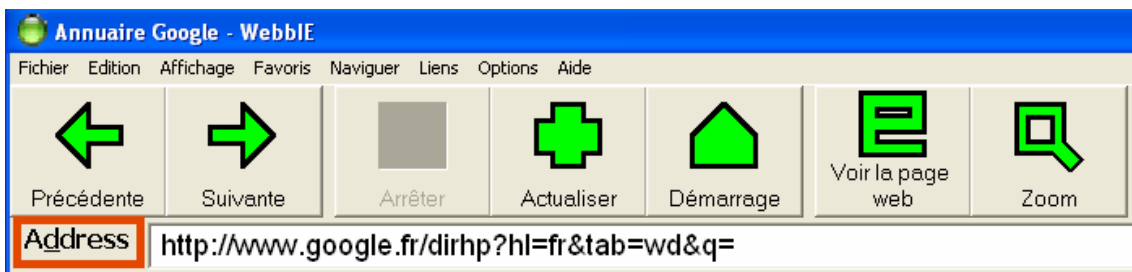
Screenshot 6: Translation of 'Address' has not shown in the French version
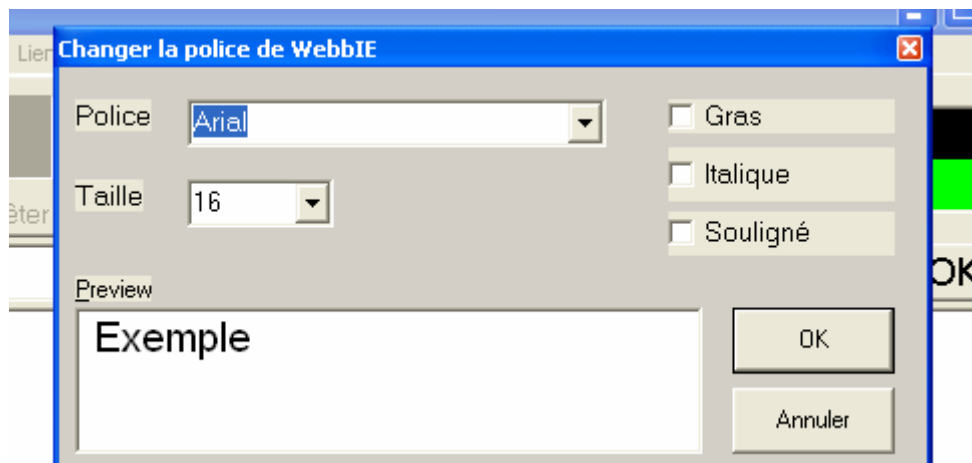
Screenshot 7: Translated message 'Preview' still appearing in English (removed in the final version)

Screenshot 8: Testing for language display on system items
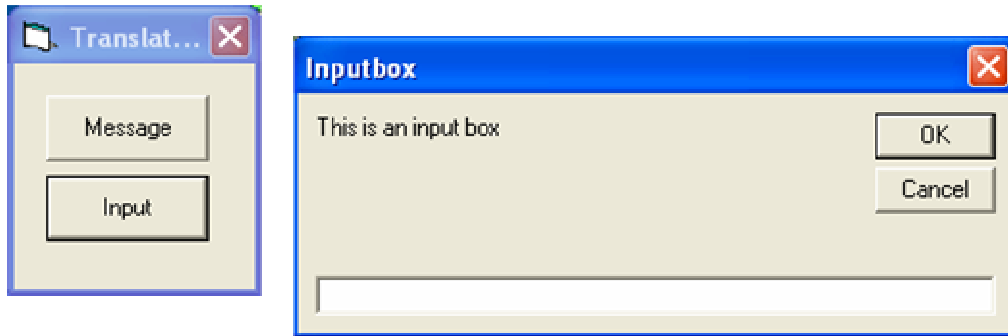
Screenshot 9: Testing for language display on system items

Understanding the code references such as frmMain.mnuLinks.Caption or frmMain.cmdHome.Caption was necessary to translate correctly according to where items occurred in the interface (menu, button, tooltip...). Items were dispersed throughout the files.

Extract 3: uiLanguage.txt
```
frmMain.mnuHome.Caption
&Home Alt+Home
....
frmMain.mnuSethome.Caption
Set &Home Page...    Ctrl+Alt+Home
....
frmMain.cmdHome.Caption
Home
frmMain.cmdHome.ToolTipText
 Home
```

For some phrases the French wording changed according to the context in which it appeared; 'Search' can be translated 'Chercher', 'Recherche' or 'Rechercher', for example.
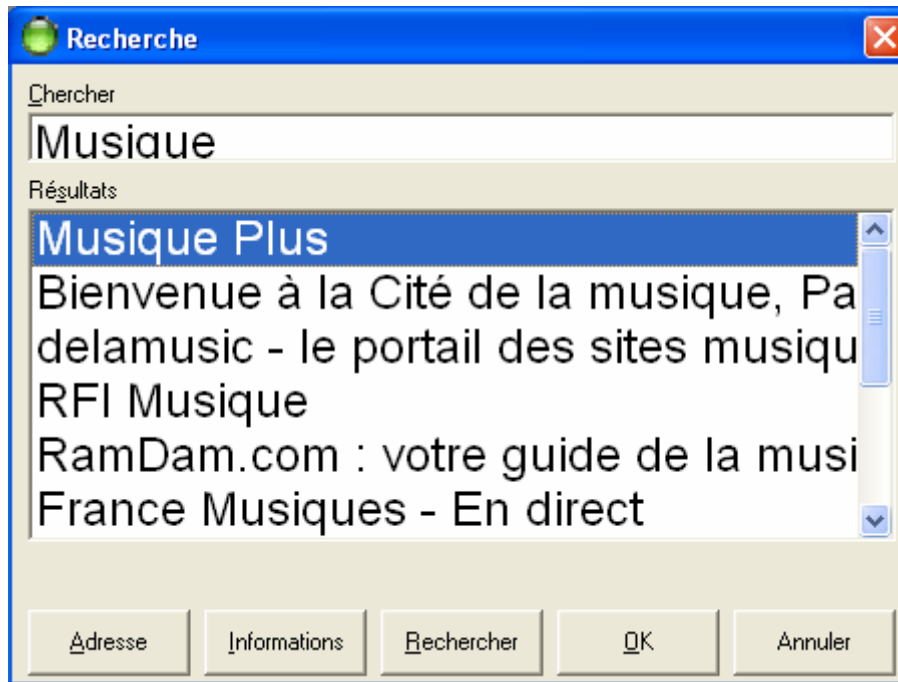
Screenshot 10: Message box

White space needed to be respected, with a space before and after each tooltip text. The amount of white space required to display buttons and to align the shortcut keys displayed next to the menu sub-items varied according to the length of the word, differing from English to French and was difficult to control in the text file.

Extract 4: uiLanguage.txt
```
frmMain.cmdBack.Caption
        Back
```

One example of this difficulty was for the 'Masquer / Afficher la page Web' (Show / Hide Webpage) button, discussed in section 2.3.4: Vocabulary and Interface issues.

Bugs included the double display of Access Keys. Multiple instances of these in the text files or the Visual Basic application caused this and were resolved by the developer. The two following screenshots illustrate menu options with simultaneous display of French and English Access Keys.
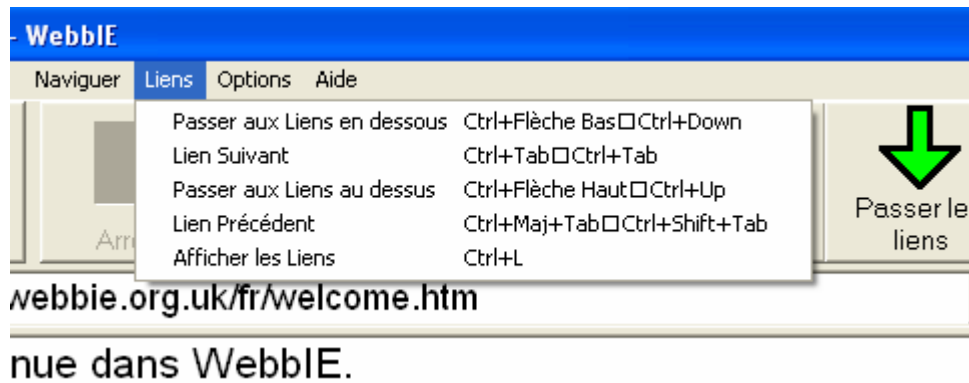
Screenshot 11: WebbIE Link Menu
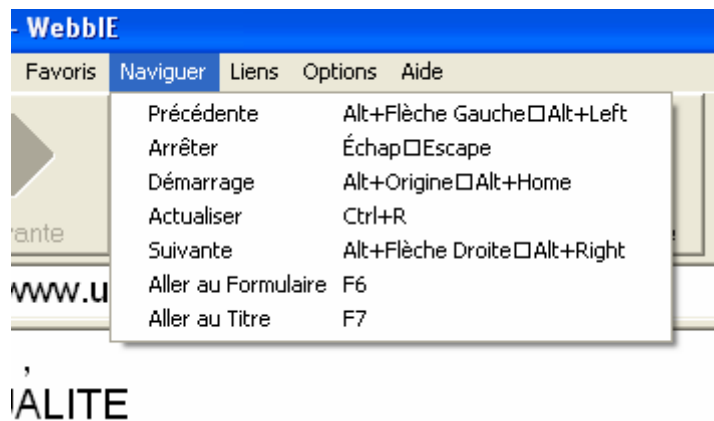
Screenshot 12: WebbIE Navigation Menu

Text in the following extract from the uiMessages.txt file was destined to be presented in the text view of a web page in WebbIE, to indicate the status of the browser during the re-processing phase, or to give feedback to a user. It was a second type of paired line file. The second line of text was simply to be replaced with the other language version.

Extract 5: uiMessages.txt

```
Busy
Occupé
Downloading
Téléchargement
Navigating...
Navigation...
Internet Explorer wants to launch a pop-up window. Would you
like WebbIE to do so?
Internet Explorer tente d'ouvrir une fenêtre popup. Est-ce que
voulez vous que WebbIE l'ouvre ?
Thank-you for reporting a problem with this page. We will
examine it as soon as possible and if you have provided your
email address we will contact you with our findings.
Merci d'avoir signalé un problème avec cette page. Nous allons
l'étudier dès que possible et si vous avez donné votre adresse
mél nous vous contacterons avec les résultats.
New browser window
Nouvelle fenêtre de navigateur
&Launch IE
&Démarrer IE
CONTENT SECTION
Section de Contenu
NAVIGATION SECTION
Section de Navigation
PAGE HEADLINE
Titre de la page
LINK
Lien
SELECT ITEM
Liste de choix
INPUT BUTTON
Bouton Actif
CHECKBOX
Case à cocher
RADIO BUTTON
Bouton radio
TEXT INPUT BOX
Champs de Saisie texte
PASSWORD INPUT
Champs de Mot de Passe
SUBMIT BUTTON
Bouton Envoyer
FILE SELECT
Liste de fichiers
RESET BUTTON
Bouton Recommencer
```

Another extract of this file can be found in Annexes 2: WebbIE Browser translation, Text files.

The following screenshots show the text view in (the French) WebbIE interface after re-processing, with some html elements and browser objects indicated.
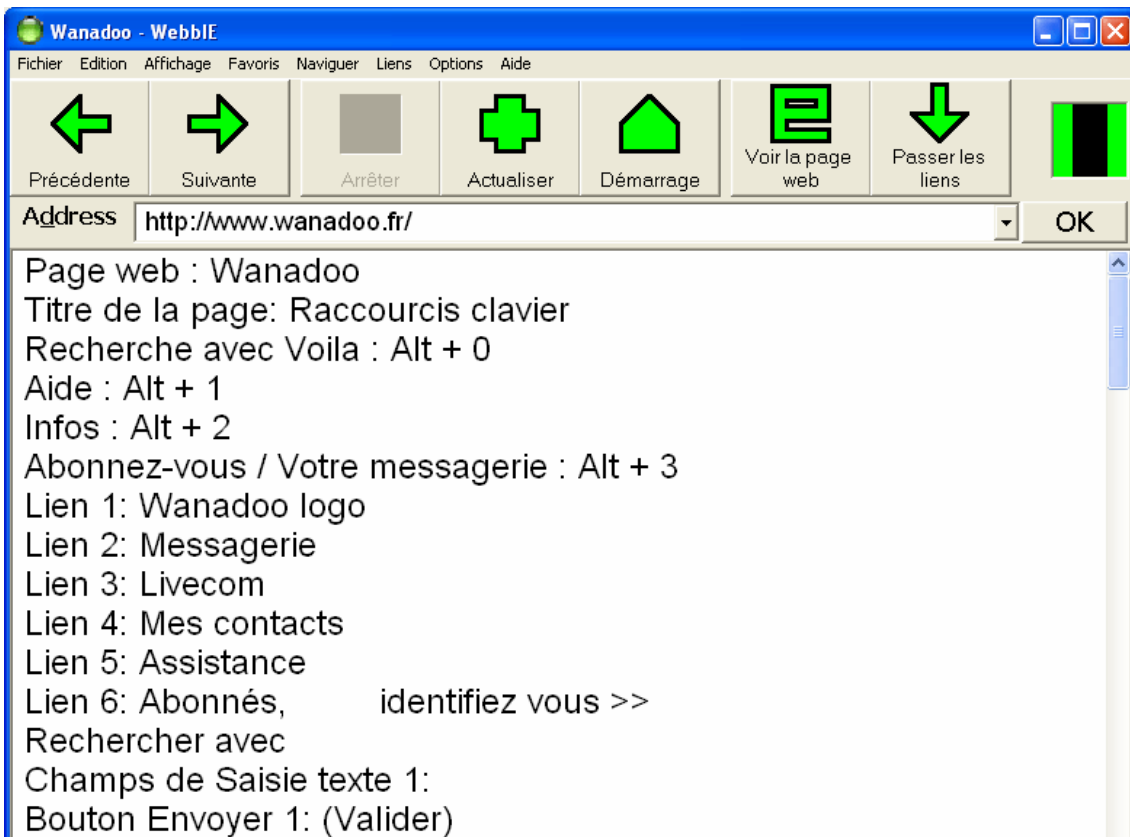
Screenshot 13: Text presentation in WebbIE including HTML elements
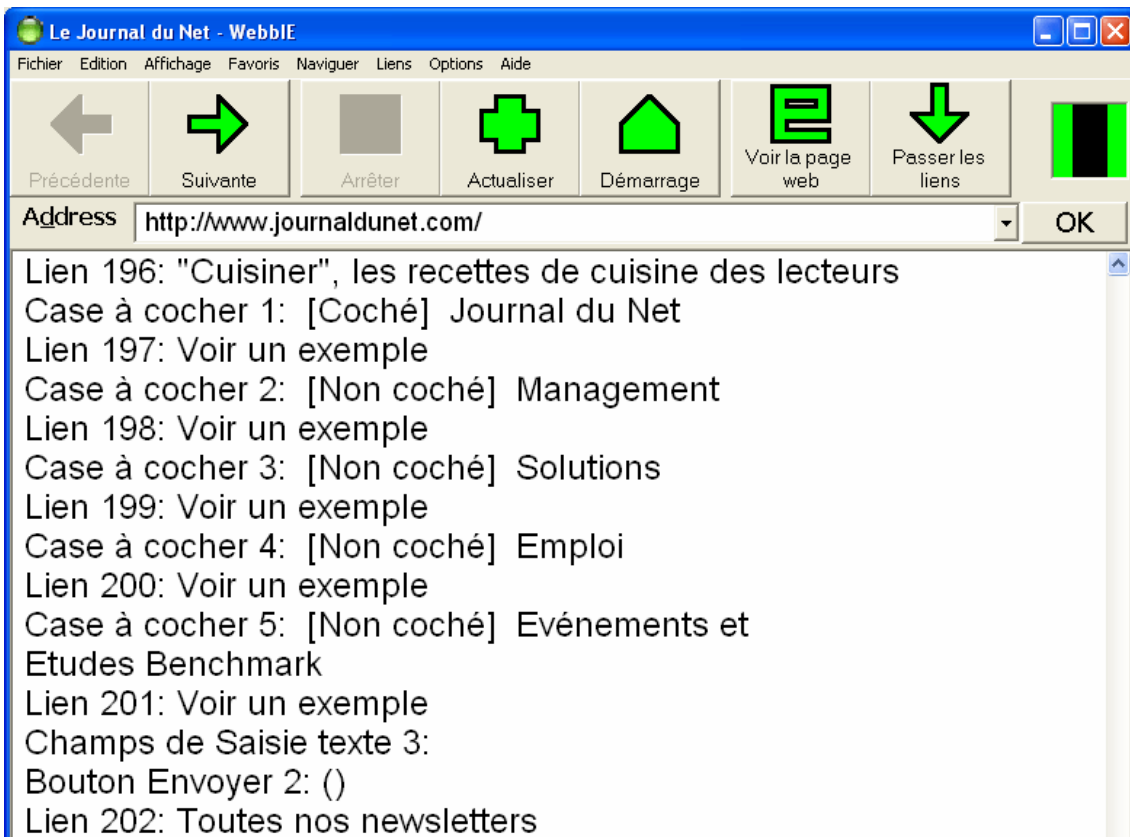
Screenshot 14: Text presentation in WebbIE including HTML elements

Screenshot 15: HTML elements and browser objects

Below is an extract of the popupHelp text file, containing messages to display when the F1 key is pressed. With the release of WebbIE version 3.0.0 many of the functions were simplified or removed and the content of this file much reduced. Of the following extract few of the items remain.

Extract 6: popupHelp.txt

```
frmIEOptions.chkUseStyle
If you select this option, you can make other choices here which
affect how webpages you view directly in WebbIE appear. Unselect
this and you will see the page as Internet Explorer would
naturally present it. Press Escape to exit without making any
changes and Return to make changes. None of these changes affect
web pages that use frames.
frmIEOptions.lstFontSize
This controls the minimum size that WebbIE will use for text in
web pages. No text will be allowed to be smaller than this.
frmFont.lstFontCol
This controls the colour used for text in WebbIE. If you make
web pages use WebbIE colours, you can also make web pages use
this font colour – see Configure Web Page View under the Options
menu.
frmGoogle.txtSearch
Enter words or a phrase to search for in your search engine and
press return.
frmGoogle.lstResults
This list shows any results of your search. Press return to go
to one of the results in WebbIE. Press Escape to cancel and go
back to WebbIE. Follow the Next Results Page at the bottom for
more results. You can also press ALT and A for the address of
the current link and ALT and I for information on the result.
```

There is some evidence from user evaluations that this function is not used.

2.3.2. Translation skills and limitations

Acquiring a second language as an adult means it can never fully be mastered. Although I communicate in French on a daily basis and can be said to have achieved an

advanced level of the language, I am not a native speaker. Although I frequently translate from French to English, I had never before agreed to translate from English to French for formal documents. I consider translation a skilled profession and am generally opposed to translations carried out by people who are not native speakers of the target language. For this placement, for my supervisors and most importantly in order to make WebbIE available to French users I was prepared to break this firm rule.

2.3.3. Validation Process

All translations however needed to be validated by a native French speaker, with a good level of French and an understanding of computer applications, specifically web browsers. This seemed particularly important for WebbIE: any additional load required by a user to filter out incorrect French, particularly if processed through a speech synthesiser, would have compromised the simplicity of the application. A friend agreed to check all documents, to be provided in Word format. The process of checking a considerable amount of translation work was carried out periodically and slowed the translation process (time between production and delivery) considerably. Numerous modifications with the switch from version 2.7.2 and version 3.0.0 increased the work.

In addition to the application itself, the questionnaire destined for evaluations by French users and some important emails, for example to request participation in the evaluations, were also checked for faults. These lessened as my written French improved throughout the exercise.

Coordination of planned French user evaluations was agreed to be organised by a person in France, in exchange for the urgent and lengthy translation (French to English) of an important document. Although this seemed a firm engagement, it was never respected by the other person, with consequences for my credibility.

2.3.4. Vocabulary and Interface issues

Translation of typical and atypical vocabulary used in the English browser interface, descriptive of WebbIE functions, required careful thought. Although much progress has been made in recent years in accessible web design, there are very few sites employing techniques such as 'Go to content' or 'Skip navigation links' and there is even less consensus about French language equivalents. Computing terms are frequently sprinkled with adopted English terminology and inaccurate or multiple translations (as in the case of form elements on web pages). This provokes heated and official debate and rulings, applicable to public websites. An early example would be the word 'email' which has been subject to diverse rulings such as 'mèl', 'mél' or 'courriel'

and remains largely unresolved. Problems for usability result, with people unsure of the meaning of a term.

The English language is more concise than French. The words 'Toggle', 'Skip' and 'Crop' for example are succinct and evocative in English. 'Basculer' or 'Sauter' in French would be meaningless or ambiguous on their own. 'Popup' is another example: it is officially translated as 'Fenêtre publicitaire intempestive', slightly inaccurate.

A compromise needed to be reached between conventions where they existed, clarity and brevity necessarily determined by the physical browser interface space available. The overall length of the toolbar was difficult to control. At large resolutions some buttons were obscured by other interface elements. Messages designed to display in predetermined spaces such as the status bar were too long. 'Voir / Masquer la page web' is the smallest translation of 'View / Hide webpage' possible but still created an ugly button requiring too much space and of unequal lengths when toggled, as the following screenshots illustrate.
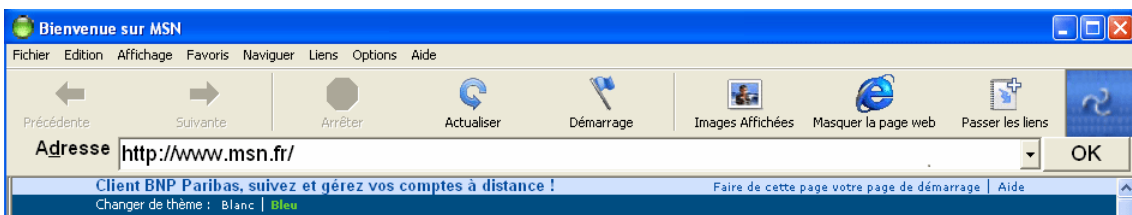
Screenshot 16: Problematic length of WebbIE Interface buttons (version 2.7.2)
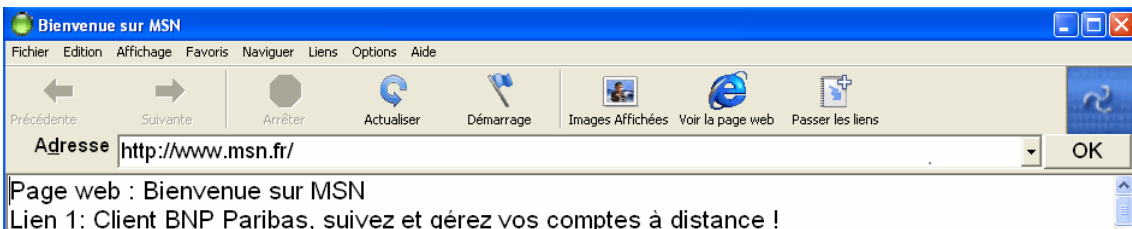
Screenshot 17: Buttons jumping when toggled because of unequal word length
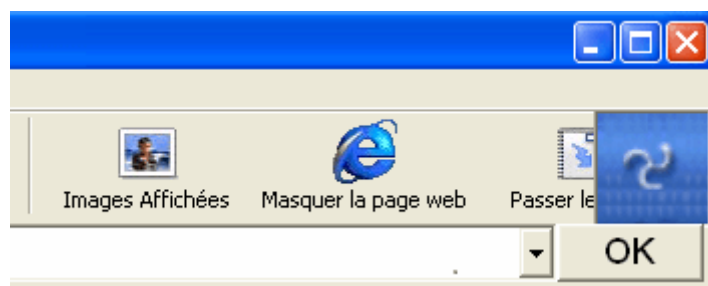
Screenshot 18: Resizing the browser window cuts button elements

Screenshot 19: Space in the status bar insufficient for French translation

'Skip Links' became 'Passer les liens'; 'Skip Links Down / Up' became 'Passer aux Liens en dessous / au dessus'. This last translation is problematic, seeming to suggest the opposite of what really happens when choosing this option: in French it really reads 'Skip up/down <u>to</u> the Links' but this was what French advisors recommended. The French 'Go to Form' easy translates as 'Aller au Formulaire' but 'Go to title' and 'Go to Heading' are problematic, both translating as 'Aller au Titre' in French. To distinguish 'Go to Heading' by adding "Aller au Titre au Niveau 1" would have required the user to have an understanding of the structure of web pages. The tooltip message behind the 'View/Hide webpage' toggle button 'Toggle view of page as webpage or text' 'Basculer entre la vue de la page - web ou texte' required all my translation skills and long discussions for French validation, terminated by my own judgement. Some of these issues were resolved with the simplification of the interface in version 3 of WebbIE, where these and many other functions were removed.

2.3.5. Automated Tools

At a late stage in the translation process, several small applications written in VB Script were provided by the developer to automate translation processes. The text files were converted to one large XML[10] file, making it possible to incorporate multiple language translations. Extracts of the XML file can be found in Annexes 2: XML file. This file could be further modified by one of the applications named Language Editor, Help Editor or Popup help Editor. These applications seemed to be written simply because I had once "attempted to provide a comment" inserted in a text file (Line 242), breaking the key/value pair structure and causing the browser to crash. The extra work of installing, using and ultimately translating these small applications (in case these were ever passed to someone French taking over updates) when the translations were in the very final stages of completion and launch was imminent was unnecessarily time-consuming. They will no doubt be of help for future translators. The creation of an XML file was a judicious addition, although such a file can only ever be coordinated by the developer and not released per se to the public, for permanent modification. It came too late to be useful in the translation process.

---

[10] XML: Extensible Markup Language

The Language Editor allows selection of the language and edition of items from lists. The application automatically detects items needing to be updated.
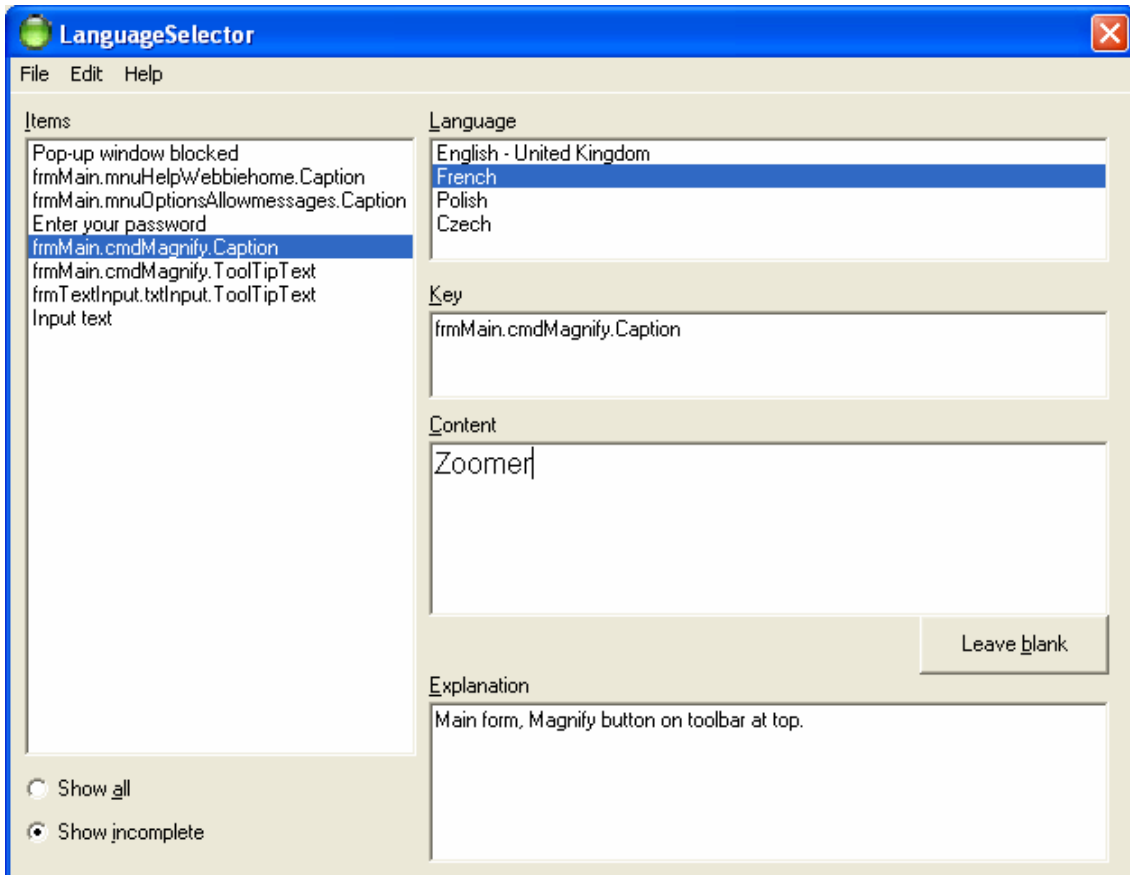
Screenshot 20: Interface of the Language Editor

The Popup help Editor allows modification of popup content; the Help Editor allows modification of the help topics in WebbIE.

One helpful application provided allowed me to switch rapidly between French and English versions of WebbIE when installed to the same directory.

2.3.6. Version Updates

The version of WebbIE to be translated originally corresponded to the English WebbIE 2.7.2. Concurrent work by the developer on Version 3.0.0, considerably altered, led to the decision to release this version directly to the French public and delayed the launch. It was judged to be too confusing to release version 2.7.2 for testing, rapidly followed by version 3, although this would have meant the release date could have been earlier. Little value would have been gained by making available an older version of WebbIE when the improved version 3 was imminent. All translations needed to be subsequently reworked, including the application, the web pages and the manual. Additional translation needed to be completed for the IE Appearance Editor,

an application installed with Version 3. System messages for the French installer were also translated.

Intermediate stages to the versions 2.7.2 and version 3.0.0 involved minor modifications, with checks for bugs and new or improved features. At least a dozen versions were installed on two computers, towards the end a new version arriving daily and requiring renewed checks for language coherency.

The following screenshots show WebbIE graphic interface changes with different versions. Before version 3.0.0 it resembled the standard Internet Explorer browser. The visual interface of version 3 is clearer (larger, more distinct user-friendly buttons) and less cluttered, reflecting the streamlined application. In terms of functionality, a zoom feature was added to the IE view.

Screenshot 21: WebbIE visual interface (buttons), version 2.7.2 translated
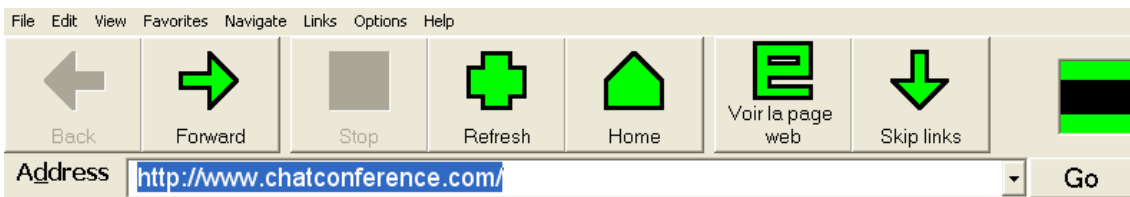
Screenshot 22: WebbIE visual interface (buttons), version 3.0.0
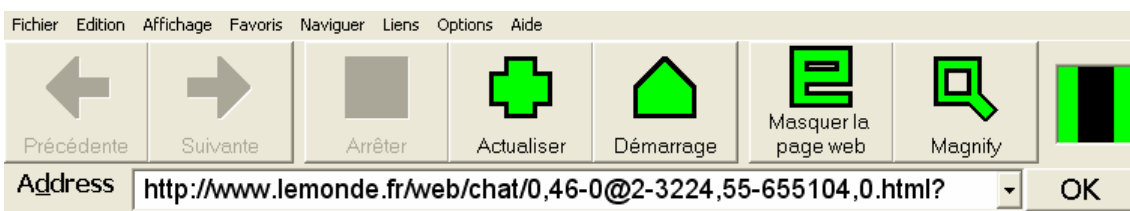
Screenshot 23: Version 3 interface before translation of the magnify button

The different functions were also simplified. Menu options were pruned. Some extraneous features removed from menus included those offering the possibility of:

- indicating or not the structure of a page (example: content and navigation sections) according to lines or to HTML;

- indicating or not H1 titles;

- inverting colours (example: black text on white background to the opposite);

- inserting line markers;

- presenting tables over multiple lines (one line per cell);

- working offline;

- searching within the site (rather than just the page or the web);

- indicating or not horizontal lines.

Many features were retained and integrated as default behaviour of the browser; an example being H1 titles present as a heading on the page. Others are no longer available. The 'Go to Content' or 'Go to Navigation' features, dependant on good mark-up, were considered to difficult to determine and not reliable enough to be usable.

Eliminated from the manual and help files were instructions for translating WebbIE, based on the old text file method.

Many options to change the visual presentation of a page (examples being increasing line spacing or word spacing, setting minimum text sizes, aligning text to the left, using WebbIE default colours and using an easy to read font - Verdana) were removed and replaced with a separate application. Refer to section 2.3.7: IE Appearance Editor. A button allowing users to show or hide images was removed.
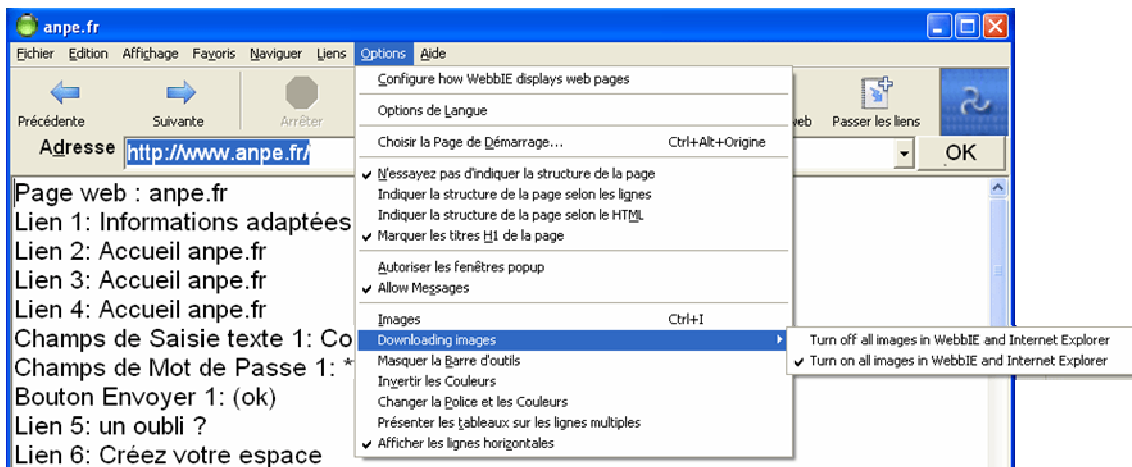
**Screenshot 24: Menu options in WebbIE version 2.7.2**
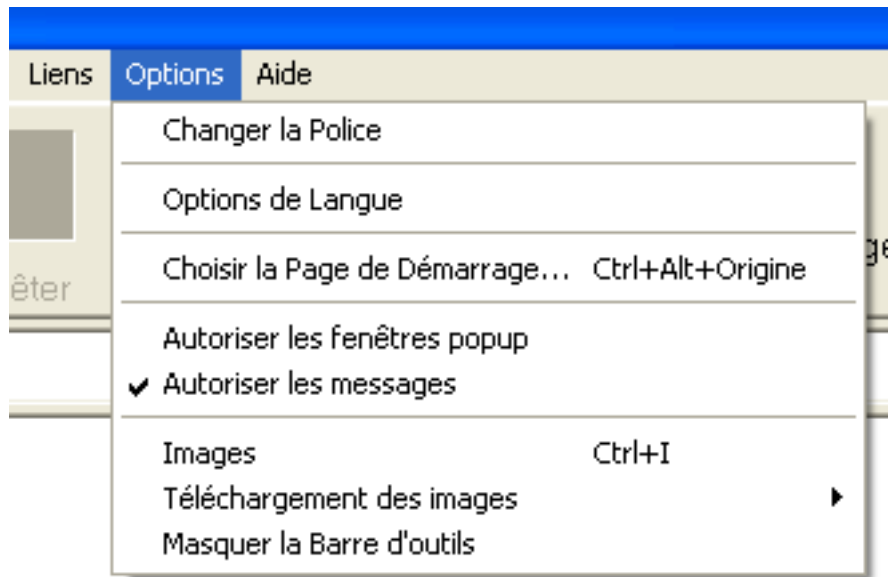
Screenshot 25: Reduced options menu in WebbIE 3.0.0

Technically, version 3.0.0 handles frames and script better than older versions of WebbIE. Rather than waiting until all frames were loaded and then getting the frame contents, which caused many incidences of JavaScript to break and often did not work, WebbIE 3.0.0 now gets the frames as they arrive. This appears to make it faster and more script should work.

2.3.7. IE Appearance Editor

This small application installs with version 3.0.0 and is accessible from the start menu alongside WebbIE. It allows users to modify default settings for the display of all web pages by Internet Explorer, including within WebbIE; to change page sizes (permanent zoom), font sizes and colours of text, background and links and use of images. Released at version 1.0 this application may contain some bugs.
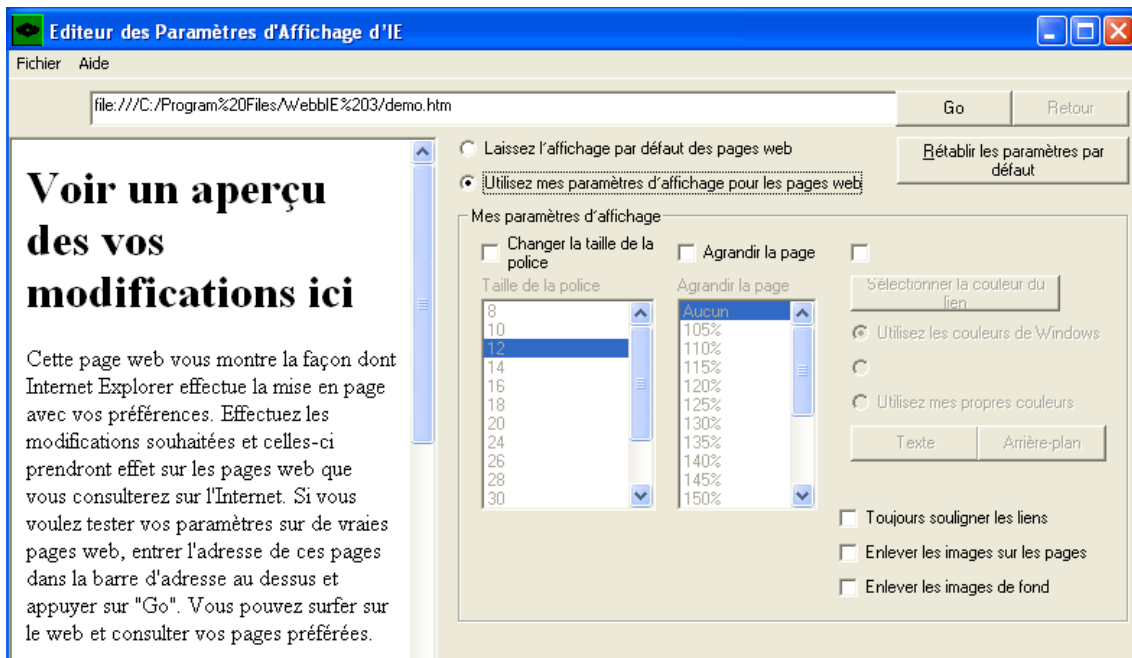
Screenshot 26: Interface of the IE Appearance Editor (French translation)

2.3.8. Future French and International Participation

The question needs to be asked. Will this work be used? Factors include the success of the launch to the French public over and above appreciation of the browser.

The French version of WebbIE will need to be introduced on a formal level, with publicity and advocacy directed at key, national organisations, in order to reach people on a wider level. This is generally a long process in France, often operating according to rigid protocols. Ultimately the browser can be presented through existing on and offline resources (mailing lists, forums, associative groups) and to smaller, locally based organisations. Some key groups are working towards other browser solutions, such as the adding a layer to the Mozilla engine, which though complimentary, may be a priority for them.

2.3.8.1. Testing and Feedback

French user evaluations were to target a small number of people in a controlled environment, but the coordination of these tests by selected people did not happen, or in not significant enough numbers and with incomplete feedback. The appeal for testers became more widespread and some key associations were contacted for help in finding people willing to participate in evaluations. For further discussion of this, refer to section 2.6.1.1: Contacts (User Evaluations).

This did mean the involvement of other actors, participants referred by associations who are extremely active on a national and international level, including

with contacts to the European branch of the W3C. The initial phase of making WebbIE known to the francophone community has then been initiated. Follow-up will depend on my availability and motivation and the reaction of some of these groups.

2.3.8.2. Other countries

Some of the automated tools developed during the French translation could be provided to countries who wish to update or complete their versions. An example would be for the relatively complete Polish version.

2.3.8.3. Updates and support.

Continued development of the English version is uncertain. The academic position of the principal developer at the University of Manchester has not been renewed and he is now working in the private sector. How and with what funding work will continue, even on a limited maintenance level remains to be seen. Indications are that arrangements are being made and a commitment to the application is solid.

The English package is more advanced: WebbIE is bundled with an accessible RSS feed reader called 'AccessibleRSS' and an Accessible Podcatcher (for Podcasts), developed concurrently. I have offered to translate at least the RSS tool at a later date, on a voluntary basis, if there is developer cooperation and interest from France.

Support in terms of replying to French online bug reports is a similar problem. I have committed to helping with translation of these if they occur.

The success of introducing WebbIE will partly determine the outcome. If it is adopted, support for its use can be organised through French forums and mailing lists.

2.4. Report: Web Browsing and Screen Reading in France

This report is attached as a separate document at the end of this paper. Requested as a summary document to outline French solutions it became a major piece of work, requiring familiarisation with technologies and services that were known to me only on a cursory level.

2.5. Website Testing with WebbIE

2.5.1. Initial WebbIE testing: Versions 2 and 3

An initial period of testing WebbIE with French websites was undertaken, corresponding to the period of familiarisation with the application. These tests were completely informal in nature and centred mostly on discovering the structure and

functions of the browser with the existing English version 2. Some tests were carried out with the French version of the screen reader JAWS, using speech synthesis, others with the browser as a stand alone tool.

At this point in the continuing development of WebbIE, diverse updates to the English version were installed. Ultimately, as the translation progressed, the first French version was built, and then increasingly rich French versions were provided and used for testing. Numerous versions in two languages cohabited (rather badly) on two computers and complicated any coherent testing. System crashes occurred. Some effort was made to compare the English and French versions, but this was a multi-task approach, searching for translation faults and language bugs, functional differences (including ability to process given popular web sites) and improvements. As application bugs were ironed out and new features introduced, problems that were noted for any given site, such as the presence of frames, were resolved and many results were subsequently discarded.

As a concurrent task was to provide a report on "Web browsing and Screen Reading in France", discussed in section 2.4, many of the web sites used for informal testing related to research for this document. Some of the initial sites tested were later evaluated more formally as selected sites for final testing and results relevant to the latest French version, corresponding to the English Version 3.0.0 Alpha, were incorporated. Most of the sites tested simply gave me some experience in using WebbIE and were not considered appropriate for final selection.

2.5.2. Extended WebbIE testing: Version 3

2.5.2.1. Aims: limited replication of English tests

With a finalised and relatively stable French version of WebbIE available, incorporating most translation modifications, the request and methodology for testing French web sites with a French version of WebbIE became more formalised.

The aim was to replicate in a limited way the English tests carried out by the principal developer, in the autumn of 2004, for the 2.7.3 version of WebbIE. The aim of these original tests was to evaluate the re-presentation of the visual content of web pages by WebbIE (King, 2005). They had consisted of four essential investigations:

- the accessibility of a set of web pages (two subsets, random and selected web sites, had been chosen for evaluation);

- how well WebbIE could handle these pages;

- user responses to using WebbIE;

- and finally identifying further evaluation work to determine whether the visual content could be used to better identify the content of interest on a web page.

This model needed to be adapted for several reasons. Firstly, the base web pages chosen for evaluation of accessibility criteria would obviously be French. More importantly, the method to select them needed to correspond to tools available in French or adapted for the automated selection of random French sites. A discussion of the method used, as well as other possible methods that were not adopted, is detailed in the following section 2.5.2.2: Random Sites. Again, the original manually selected sites were perhaps specific to the country of testing, the English language and the person selecting them. Their pertinence for selection of French sites was problematic. A more detailed discussion of choices and compromises made in the selection process, including implications for the results, can also be found in the section Selected Sites. Efforts were made to adhere as closely as possible to methods used in the original tests.

The accessibility criteria that web pages were to be tested against were retained, namely the W3C (W3C, 2005) WCAG 1.0 criteria (WCAG, 2005). Pages were also tested against Section 508 recommendations (Section 508, 2005). The appropriateness of these tests to the French established methodology and tools for accessibility evaluation was considered; refer to section 2.5.2.3: WCAG and Section 508 Accessibility Criteria for results.

Sites were tested for the presence of 'Accessibility Features', such as the presence of H1 Headers, Access keys and Skip navigation links. They were also examined for 'Potential Accessibility Problems' such as the presence of tables, frames, JavaScripts or java applets. For a full discussion of these and results, refer to the sections Accessibility Features and Potential Accessibility Problems.

The model needed to allow for WebbIE version changes. Some data could not be directly compared; the version of WebbIE used in the initial evaluation was an older one than that being used for French site testing. Some results from the initial testing, for example testing pages against known html and tests for speed of operation, were not considered statistically significant and it was not thought useful to replicate them. Current English tests, for example comparing site performance using WebbIE or HomePage Reader were however added; refer to the section Evaluation against real sites (HomePage Reader & JAWS).

Finally WebbIE was to be evaluated with real users. This last included interviews with existing English WebbIE users and French users newly introduced to WebbIE. Section 2.6 of this paper, entitled '

WebbIE User Evaluations: Questionnaires, Interviews' describe these evaluations.

2.5.2.2. Web Site evaluation: choice of sites

A large number of websites were chosen in the original study for the purpose of evaluating the re-presentation of the visual content of web pages by WebbIE. The first step to evaluating French websites was to build similar lists of random and selected sites, for automated and manual testing.

Random Sites

The English list of 214 random sites was obtained from the online Yahoo! random page service (Yahoo! 2003). A Visual Basic programme had been used to extract the URL list, the service offering one URL at a time. These pages are drawn from the Yahoo directory database, estimated to contain between one and two million indexed pages at the time of testing (Sullivan, 2003). Though the sample of pages obtained was perhaps not strictly representative of all available web content, the range of page designs permitted meaningful conclusions to be drawn (King, 2005).

Since a similar service for French (language) sites was not available, a method needed to be found to generate an equivalent random site list. The Yahoo random link finder was unusable because of the overwhelming predominance of English sites it returns. No equivalent French tool drawing on Yahoo's regional databases was found.

The Canadian service 'Mangle' was the base of the final method adopted. This random website generator is available online at http://www.mangle.ca/ (Mangle, 2005). The service, primarily designed for random surfing, draws on the Google database and finds pages through a number of options, including a regional tool restricting Mangle to certain countries and languages. While there is some evidence to suggest that Yahoo indexes more pages for French than Google, an estimated 1.3 times more (Véronis, 2005), the still significant database size was thought to be more than adequate for the purpose; it is now larger than that used in the 2003 study.

Few other options exist. The FavoriWeb directory website is one example with a random selection tool taking pages from their relatively small number of listed sites (around 2000). It is available online at http://favoriweb.free.fr/hasard.php (FavoriWeb, 2005). Another is the Chronolien website, found at http://chronolien.free.fr/ offering random sites (link of the second, minute, hour…) drawn from a small number of sites (Chronolien, 2005). These types of tools generally are not maintained and have very small numbers of sites stored in a database of links chosen by individual moderators or submitted to the site. Around ten sites were

selected from these two sites. Others such as The Lycos random site selector (Lycos, 2005) were rejected for the above reasons.

Mangle uses the Google web API[11] (Google, 2005) and a database of random words to select a random website from what it claims to be over 3 billion web pages, displaying the page that is ranked highest in that Google search with a random selection of words. Restricting searches to pages from France or in French supposedly with language detection algorithms or by domain names reduces the potential Google database size.

The Mangle database of 7111 random words (multiplying possible results returned with two and three word searches) was nonetheless in English and still needed to be adapted. Using the default English term returned web pages that tended to be academic, or that discussed international commerce or computing. Although Mangle provides a 'Language Option', restricting the results to pages predominately in that language, using an English keyword returns similarly biased results and this solution was rejected.

For this exercise only one keyword was used for searching, the word used by Mangle to query Google translated into French and resubmitted to Mangle. This process is akin to opening google.fr, entering any French word and restricting the search to 'Pages francophones' or 'Pages: France'. Sponsored links needed to be excluded from this method and it would have required a random list of French words, difficult to find. What was available seemed too restrictive (thematic) or outdated.

Some investigation was made into available tools generating words or listing frequently used search words, before rejecting this solution and deciding to use Mangle for the ease of interface, with some additional methods. One of the options was to use real keywords and phrases entered by users, captured live with tools such as Lycos Voyeur, the live service available online at http://www.recherche.lycos.fr/voyeur/ (Lycos, 2005a). Indeed a selection of these words was used with the basic list (*Climatisation Aquitaine, U2, mongolfière, Hôtel économique à paris, music rai, broderie, crazy frog, foire art contemporain, manga…*). Although the final list may not reflect user choice in web browsing, using relatively neutral words from Mangle, the point was to find random, not selected sites. Some words and links from the Lycos Voyeur site were used to complete categories for the selected site list.

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[11] API: Application Program Interface

Screenshot 27: Words used for searching displayed in real-time on the Lycos Voyeur website

Using Mangle's 'Country Option' causes a website to be randomly chosen from the country selected, based on Google's regional grouping of websites. Multiple country selection is not an option. France was selected when this tool was occasionally used, although a sampling from Belgium, Africa (Morocco, Senegal…), Canada, Switzerland, Luxembourg, the DOM TOM[12] (Guadeloupe, Martinique, French Guyana, the Reunion Islands, Mayotte, Wallis & Futuna, St Pierre & Miquelon, New Caledonia, Tahiti) etc. was also incorporated.

Complications with using Mangle included that it displays internal pages only of framesets. It is not always possible to return to the homepage from an individual frame and the base URL was needed. Around five pages were excluded in this way; the equivalent numbers of sites with frames were reincorporated into the list later.

Translating the keywords brought up by the Mangle was a simple though time-consuming process, for the 215 sites finally selected.

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[12] DOM: Département d'Outre Mer, TOM : Territoire d'Outre Mer

Table 1: Example keywords from the Mangle tool used to find random sites

English word	French translation	Site
Keystrokes	frappes	http://aikido.dojothionville.com/
Aiming	viser	http://annuaire-compositeurs.fr/
Migration	migration	http://champagne-ardenne.lpo.fr/
Competitive	compétitive	http://cimintelligence.free.fr/
Informal	informel	http://discipline.free.fr/
Clan	clan	http://frenchfragfactory.net/
Truce	trêve	http://groupejazz.free.fr/
Ordering	commander	http://ikarios.com/
Casual	décontracté	http://management.journaldunet.com/
Manipulation	manipulation	http://manipulation.ifrance.com/
Exploring	exploration	http://marsrover3d.free.fr/
Accepts	accepte	http://nseo.com/
Expelled	expulsé	http://pajol.eu.org/
Paint	peinture	http://peinturefle.free.fr/
Meaning	sens	http://perso.wanadoo.fr/5sens/oeil/
Quantum	quantum	http://perso.wanadoo.fr/cql/
Sentence	phrase	http://phrasedujour.free.fr/
Occur	se produire	http://spectable.com/
Interpreter	interprète	http://surdite.lsf.free.fr/
satisfaction	satisfaction	http://www.100-satisfaction.com/

Sometimes the Altavista Babel Fish automatic translation tool was used (Babel Fish, 2005). Little concern was given to the accuracy of the translations. That the translation of 'keystrokes' as 'frappes' when used as a query returned a site concerning martial arts was unimportant.

Screenshot 28: The Mangle Interface after selection of a site

An alternative method was used by Barry McMullin of RINCE, Dublin City University, Ireland in a comparative study of Web accessibility guidelines and HTML standards conformance for selected websites from Ireland, the United Kingdom, France and Germany (McMullin and Marincu, 2004). The study was carried out in May 2003 and presented in January, 2005 in Paris at the 'Policies and Legislations in favour of e-

accessibility in Europe' Workshop, organised by the Braillenet Association (Policies & Legislations Workshop, 2005). It took selected URLS from the dmoz Open Directory Project, online at http://dmoz.org/ which provides a directory type list of sites (domz, 2005). Sites were chosen from the World/Français/Régional/Europe/France category and sub-categories. 5% of the category total was used; 1,545 sites were chosen from the sub-categories of Arts and Entertainment, Business and Economy, Education, Government, Health, News and Media, Recreation and Sports, Science and Environment, Society and Culture and Transportation. These sites were captured using the Web content mirroring robot Pavuk (Pavuk, 2005) and were subject to sampling to ensure a minimum content was secured. McMullin *et al.* assessed the sites for conformance to the WCAG standards, finding that 98% of French sites failed to satisfy even priority 1 checkpoints.

Though this method is suitable for large-scale website conformance testing, the aim of this study was to replicate the method used in the English research, where websites were chosen either entirely on a random basis or selected individually. The goals were to evaluate WebbIE performance with websites.

The completed list of random sites chosen for evaluation can be found in Annexes 2: Random site list.

Selected Sites

Selected sites in the original English study were individually selected by the researcher to include representative "popular, important and influential websites" in a number of categories; "computer sites were included because they represent important sites for users… and because working with software is a relatively common profession for blind people" (King, 2005). A category ('Blind') was included to cover sites of particular importance to blind users of the web.

The 135 sites were chosen by two means; consultation of lists of popular sites provided by the Alexa website (Alexa, 2005) and selection according to "subjective grounds of importance and experience" (King, 2005), including feedback from blind people. These selections are summarised in Table 2.

Table 2: Categories of sites selected for the English study

Category	Contents	Examples	Number
Search	Search engines	www.google.com	5
Media	Newspapers, television, radio	www.guardian.co.uk www.bbc.co.uk	36
Banking	Banks	www.barclays.co.uk	5

Blind	Sites for blind people	www.rnib.org.uk	17
Commerce	Shopping	www.amazon.co.uk	11
Communication	Weblogs and communication	www.metafilter.com	6
Computing	Software and programming	www.microsoft.com	10
Education	Educational establishments	www.man.ac.uk www.mgs.org	4
Entertainment	Hobbies and pastimes	www.rhs.org.uk www.familysearch.org	9
Government	State and utilities	www.nhs.uk www.bt.com	13
Reference	Dictionaries and encyclopaedia	www.dictionary.com	8
Travel	Information and services	www.nationalrail.co.uk	11
TOTAL			135

The choice of French sites to evaluate adhered as closely as possible to this model. For popular, frequently consulted French or French mirror sites a range of websites were consulted, the most important being the YooVi website, online at http://www.yoovi.com/ (YooVi, 2005). The YooVi site lists the top 50 French sites (http://www.yoovi.com/top50.php) calculated from the major French search engines (Google.fr, Yahoo France, Voilà France, Msn and AOL) queried with the 50 000 most searched for keywords (obtained from Lycos Voyeur). More technical details on their methods are available from their website, cited above. A maximum number of the top 50 sites were placed in the selected list, categories permitting.

Additional sites consulted included Google Zeitgeist for popular search terms, online at http://www.google.fr/intl/fr/press/zeitgeist.html (Zeitgeist, 2005); Yakeo, a French search engine portal site, online at http://www.yakeo.com/ (Yakeo, 2005); the Yahoo! Buzz Index, online at http://buzz.yahoo.com/ (Yahoo! Buzz, 2005); Lycos top keywords, online at http://www.recherche.lycos.fr/lycos100/ (Lycos, 2005b); AOL top searches, online at http://www.recherche.aol.fr/top.htm (AOL, 2005); Voila France top keywords, online at http://top.ke.voila.fr/ (Voila, 2005); the Weborama site for top daily sites consulted, online at http://www.weborama.fr (Weborama, 2005); and diverse guides and directories such as the bonWeb website, http://www.bonweb.com/ (bonWeb, 2005); the Ahalia search directory, http://www.ahalia.com/index.php

(Ahalia, 2005); the Favori Web site, http://favoriweb.free.fr/home.php (FavoriWeb, 2005b) and the recommended link pages of some major computing sites.

For the category of sites concerning blind people particularly, sites such as the Yanous website, online at http://www.yanous.com/tribus/liens.html#HV (Yanous, 2005) and the VoirPlus website http://www.voirplus.net/assoc/assosite.php (Voir+, 2005) were consulted for their lists of recommended links. In addition to this several people were asked for their bookmarks or lists of favourites.

The YooVi website provides a search function for the page visibility rank of any given site. The page rank of all selected sites were noted, partly to ensure they were highly ranked enough to be considered popular sites or for eventual comparison of ranking and accessibility conformance or WebbIE performance.

The French selected sites contain one additional category to the original study 'Diverse'. Placed here were sites of interest for evaluation (popularity, claims to conformance to web standards) when they could not be classified in one of the categories. Some additional sites were included in individual categories, the major additions being for the Government category. These sites were considered important for evaluation with WebbIE, given current French legislation requiring them to conform to accessibility standards and the potential usefulness of access to the information and services they offer. To eventually test for their usability with WebbIE was thought to be important.

One site was added to the 'Search' category, three to the 'Blind' category and ten to the 'Government' category. With the eleven additional sites in the 'Diverse' category, a total of 160 sites were chosen. For each of the evaluations, the total 160 sites were analysed, then the additional sites removed for separate analysis. The base or core number of 140 sites is comparable to numbers used in the English study.

French site selections are summarised in Table 3. The complete list of selected sites, classified by category and with their corresponding page ranks, can be found in Annexes 2: Selected site list.

Table 3: Categories of French sites selected.

Category	Examples	Base Number	Added	Total Number
Search	www.google.fr	5	1	6
Media	www.lemonde.fr www.radiofrance.fr	36		36
Banking	www.credit-agricole.fr	5		5
Blind	www.voirplus.net	17	3	20
Commerce	www.amazon.fr	11		11

Communication	www.20six.fr	6		6
Computing	www.microsoft.com/france	10		10
Education	www.onisep.fr examens.lebac.com	4		4
Entertainment	www.gamekult.com www.plantes-et-jardins.com	9		9
Government	www.service-public.fr www.francetelecom.com/fr	13	10	23
Reference	www.dicofr.com	8		8
Travel	www.sncf.fr	11		11
Diverse	www.doctissimo.fr		11	11
TOTAL		135	25	160

In the original study evaluation of the sites was limited to one or two pages from each site. Three classifications of pages were made; *splash*, index and content pages. *Splash* pages, commonly consisting of a Flash animation or large image and containing few links whose only purpose is to direct visitors to the actual pages of content, were not included for evaluation, although it was noted if their presence blocked access to further site content. Index pages are the real front pages of the website; they commonly contain many links and little content but have a similar structure to following content pages. No statistical difference was found between these two types of pages ($\chi2 < 95\%$) for the measurements taken (King, 2005). Index and content pages were therefore used indifferently for evaluations. This procedure was followed for the evaluation of French sites.

2.5.2.3. Web Site evaluation: procedure

WCAG and Section 508 Accessibility Criteria

In the original English study websites were tested for conformance against the W3C WCAG 1.0 accessibility criteria (WCAG, 2005) using the automated evaluation tool 'Bobby'. French websites were subjected to the same tests with this service, available online under the name of 'WebXACT' (Watchfire, 2005). In addition, all sites were tested for conformance to recommendations set out in Section 508 of the US Rehabilitation Act (Section 508, 2005).

The Bobby tool scans pages to see if they meet accessibility requirements and produces a report giving an overall pass, fail or warning status for the site. This is broken down into three categories, level A, AA and AAA. The report details individual

criteria which cause failure for the checkpoints which can be tested automatically. For example many sites fail to obtain Level One (Category A) validation because they do not pass the checkpoint requirement '1.1: Provide alternative text for all images'. In addition, pages are flagged with a warning status indicating the presence of elements which require manual evaluation. For example '5.1: If this is a data table (not used for layout only), identify headers for the table rows and columns.'

Manual checks were not performed, and as with the English study, results may indicate a higher success rate than would have been obtained if these had been carried out. This would be particularly relevant for sites which use JavaScript, needing manual checks to ensure that these meet the requirement to work without the scripts.

Results from the English study, presented in Table 4, show most sites fail even the simple automated tests. Selected sites, however score significantly higher ($\chi 2 > 99.9\%$) than the random sites (King, 2005). Analysis of results after removing the category of sites specifically concerning blind people showed no overall statistical difference, indicating that the presence of this category did not influence overall results. Sites in this category did however score higher ($\chi 2 > 99\%$).than the rest of the selected sites (King, 2005).

Table 4: Web Accessibility (WCAG) scores from automated Bobby tool (British study)

	WCAG A	WCAG AA	WCAG AAA	Fail
Random sites	22 (10.3%)	1 (0.5%)	1 (0.5%)	190 (88.8%)
Selected sites	46 (34.3%)	2 (1.5%)	1 (0.7%)	85 (63.4%)
Totals	68 (19.5%)	3 (0.9%)	2 (0.6%)	268 (79.0%)

French results show the same trends, with an overall majority of sites failing even level 1 (Category A) automated tests. The overall failure rate was 79.9% for the French study, compared to 79.0% for the British study. This is consistent with results from the McMullin *et al.* study discussed earlier in the random site selection process, which found that 98.6% of French sites failed priority 1 (Category A) checkpoints (McMullin *et al.*, 2004). The McMullin *et al.* study does report a significantly higher overall failure rate, which might be explained by the different methodology used to select sites for testing. McMullin *et al.* also found that French sites scored slightly higher failure rates than U.K. sites (98.6% against 94.6%).

As with the British study (King, 2005), selected French sites in this study scored higher than French random sites. However French selected sites obtained a lower success rate than selected sites in the British study (68.1% failure against 63.4%). Results are detailed below in Table 5.

Table 5: Web Accessibility (WCAG) scores from automated Bobby tool

(Complete French sites)

	WCAG A	WCAG AA	WCAG AAA	Fail
Random sites	22 (10.2%)	2 (0.9%)	1 (0.5%)	190 (88.4%)
Selected sites	38 (23.8%)	11 (6.9%)	2 (1.3%)	109 (68.1%)
Totals	60 (16.0%)	13 (3.5%)	3 (0.8%)	299 (79.7%)

There is a generally higher incidence of conformance to WCAG standards in the categories of sites for blind people and governmental sites than the rest of the selected sites. The diverse sites were also chosen in part for their claim to conformance according to these accessibility criteria. For this reason, a second calculation was carried out adhering more strictly to the number of sites chosen in the British study, excluding the sites added to these 3 categories above the base numbers of sites selected in the British study. The additional search site was only excluded to retain the same number of overall sites, its influence on results being statistically insignificant. All sites were analysed twice for the subsequent tests of accessibility features, potential accessibility problems and when used with WebbIE.

Results when examining only the core selected sites (without additional sites in the categories of blind, government and diverse) are detailed in table 6 below.

Table 6: Web Accessibility (WCAG) scores from automated Bobby tool

(Core French sites)

	WCAG A	WCAG AA	WCAG AAA	Fail
Random sites	22 (10.2%)	2 (0.9%)	1 (0.5%)	190 (88.4%)
Selected sites	33 (24.4%)	7 (5.2%)	2 (1.5%)	93 (68.9%)
Totals	57 (15.7%)	9 (2.6%)	3 (0.9%)	283 (80.9%)

Overall failure rates rise slightly with the removal of these additional sites (80.9% French against 79.0% British) but differences remain insignificant.

For the British study further results were obtained by removing the category of sites relevant to blind users. These showed no overall statistical difference, although sites in this category did score higher (conformance to WCAG criteria) than the rest of the selected sites (King, 2005). Core French sites were also analysed after the removal of this category. Results, detailed in Table 7 below, show that overall failure rates for WCAG accessibility criteria rose again, to 83.8% from 80.9 with their removal. Sites in this category also scored higher than the rest of selected sites.

Table 7: Web Accessibility (WCAG) scores from automated Bobby tool

(Core French sites without the Bind category, 118 selected sites)

	WCAG A	WCAG AA	WCAG AAA	Fail
Random sites	22 (10.2%)	2 (0.9%)	1 (0.5%)	190 (88.4%)
Selected sites	24 (20.3%)	4 (3.4%)	1 (0.8%)	89 (65.9%)
Totals	46 (13.8%)	6 (1.8%)	2 (0.6%)	279 (83.8%)

Testing for conformance to Section 508 recommendations results in sites obtaining a similar pass or fail status, with manual checkpoint warnings flagged, but limited to a single category (Section 508, 2005). Sites can therefore be said to pass or fail Section 508 requirements. French sites were tested for Section 508 conformance because these criteria form part of the standard French procedure for accessibility testing. For example the French tool and audit service OCAWA[13], developed by Urbilog and France Telecom R & D (OCAWA, 2005), tests according to criteria largely determined by the W3C WCAG guidelines, but produces audits cross referenced to their own (France Telecom) and other rule sets, including Section 508, AccessiWeb (AccessiWeb,2005) and ADAE[14], (ADAE, 2005).

Results of testing the French random and selected sites against Section 508 criteria are summarized in the following table 8.

Table 8: Web Accessibility (Section 508) scores from automated Bobby tool

	Pass Section 508	Fail Section 508
Random sites	13 (6.0%)	202 (94.0%)
Selected sites (complete)	34 (21.3%)	126 (78.8%)
Totals (random and complete sites)	47 (12.5%)	328 (87.5%)
Selected sites (core)	25 (18.5%)	110 (81.5%)
Totals (random and core sites)	38 (10.9%)	312 (89.1%)
Core selected sites without the Blind Category	16 (13.6%)	102 (86.4%)
Totals (random and core sites without the Blind category)	29 (8.7%)	304 (91.3%)

Results again show low numbers of sites passing accessibility recommendations (87.5% overall failure), although the pass rate is significantly higher for selected sites than for random sites (21.3% against 6.0%). The removal of the additional sites, chosen

[13] OCAWA: Audit d'accessibilité de site Web

[14] ADAE: Agence pour le Développement de l'Administration Electronique

in part because of their claim to conformance, but also largely to classify popular sites not belonging to any of the other categories makes some difference (81.9% failure rate against 87.5%) but are not particularly useful for comparison. However the removal of the category concerning Blind people gives a significant and expected drop in the numbers passing (91.3% failure rate against 81.9% for random and core sites) showing that sites in this category conform more to accessibility criteria than sites in other categories.

As with testing against WCAG criteria, the Bobby tool gives an indication of reasons for failure of Section 508 compliance. The most frequently cited reason for failure, often in conjunction with other factors, related to 'Paragraph a - Provide alternative text for all images'. The huge numbers of images present on websites is indeed a potential accessibility problem, as will be seen in following evaluations. If images are not labelled with alternative text, or badly labelled, blind users have no access to the content information they may contain. Other reasons for failure frequently cited related to Section 508 requiring pages to:

- provide alternative text for all images map hot-spot (AREAs);
- explicitly associate form controls and their labels with the LABEL element;
- make sure there is a link to download accessible plug-ins;
- give each frame a title;
- provide alternative text for all image-type buttons in forms;
- and to provide alternative content for each OBJECT.

Accessibility Features

Pages in the British study were tested for the presence of a number of HTML features thought to favour access to content for visually impaired people and which correspond to current standards-based web design techniques. Using semantic mark-up, for example, to indicate headings can communicate structural information about a page, providing meaningful information about the relative importance of content. That H1 and other of the six level heading HTML tags are frequently omitted is indicative of a site that fails to provide structural clues useful to blind users examining page content. If present, these features might suggest that a webpage has been constructed according to standard-based design methods, aiming to separate content from presentation. However tags like H1 and H2 may be wrongly used, to control graphic presentation such as font size rather than to communicate structure with mark-up, leaving

presentation to be controlled by stylesheets. When mark-up is used in this way, to convey visual information, it is useless to the blind user.

Similarly the presence of table information such as captions, summaries and headers is useful to visually impaired users. When a table is linearised these features allow users to identify the general content it contains; to differentiate between ordinary cells and headers (often though not always found at the top of a column or the beginning of a row); and to associate content information described in cells with their descriptive headers.

Access keys provide keyboard shortcuts to elements on a page.

The 'label' element, used to associate text with form elements, helps users to correctly associate text explaining the purpose of a form with the form element itself when a page is linearised. This feature helps to avoid confusion for example over which radio button corresponds to any given option or which information (first name, last name…) is required for text input.

One important accessibility feature is the inclusion of a 'Skip to content' or 'Skip navigation' link at the top of a webpage. This mechanism allows people to immediately find the content of interest on a page, without having to read frequently long navigational menus, often repeated on subsequent pages.

Where accessibility features are present on a page WebbIE can exploit them, allowing users for example to go directly the H1 heading. If a text alternative to an image or multimedia element such as a Flash object is provided, by using the 'longdesc' attribute of the image tag, for example, then WebbIE can give the user access to the text. WebbIE makes use of these features when the developer has considered that they are widely enough employed to be helpful to users (King, 2005). Their use by WebbIE could be further developed as more significant numbers of websites are developed using them. The 'accesskey' attribute can be applied to form elements and to links and WebbIE supports their use with links but not form elements. WebbIE can identify the 'label' element, adding it before the form element on the relevant line.

A selection of French pages from each website was examined to detect the presence of these accessibility features. Because this study aimed to replicate the English one, other possible accessibility features were not searched for. For example, it may have been useful to identify if the language of the document was specified, frame titles provided or links given to download accessible plug-ins. WebbIE handles issues around language detection, frames and embedded elements in ways that do not depend uniquely on the HTML components of any given page.

Sometimes the AIS[15] Web Accessibility Toolbar developed by NILS[16] was used to rapidly identify the presence or not of the HTML features in question (NILS AIS, 2005). This toolbar for website developers and consultants can, for example, detect the presence of access keys or form labels and provide information on table structure.

More often than not the code source of the page was consulted and if necessary a rapid search made for the presence of the beginning of HTML tags or attributes: <a, <h1, <h, <th, accesskey, caption, summary, label, longdesc. Although designed to occur at the beginning of a page, skip link features can occur further down in a page where frames are combined into one page. There is little standard terminology for this feature in the French language, but the more common expressions such as "Passer" (la navigation) and "Aller" (au contenu) were searched for.

Results from the English and French studies are detailed in Tables 9 and 10, which follow.

Table 9: The use of HTML accessibility features and the use of skip navigation (British study)

Feature	Selected sites	Random sites
H1 header	26 (19.4%)	23 (10.7%)
Any header	70 (52.2%)	49 (22.8%)
Accesskey	16 (11.9%)	0 (0.0%)
Table caption	0 (0.0%)	0 (0.0%)
Table header	7 (5.2%)	9 (4.2%)
Table summary	11 (8.2%)	0 (0.0%)
Form element labels	22 (16.4%)	2 (0.9%)
Longdesc	4 (3.0%)	0 (0.0%)
Skip navigation	21 (15.7%)	1 (0.5%)

Table 10: The use of HTML accessibility features and the use of skip navigation (French sites)

Feature	Selected sites (complete)	Selected sites (core)	Random sites
H1 header	50 (31.3%)	42 (31.1%)	27 (12.6%)
Any header	57 (35.6%)	47 (34.8%)	35 (16.3%)
Accesskey	26 (16.3%)	20 (14.8%)	3 (1.4%)

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[15] AIS: Accessible Information Solutions

[16] NILS: National Information and Library Service, Australia.

Table caption	2 (1.3%)	2 (1.5%)	0 (0.0%)
Table header	11 (6.9%)	11 (8.1%)	8 (3.7%)
Table summary	20 (12.5%)	16 (11.9%)	3 (1.4%)
Form element labels	40 (25.0%)	32 (23.7%)	7 (3.3%)
Longdesc	1 (0.6%)	1 (0.7%)	1 (0.5%)
Skip navigation	25 (15.6%)	16 (11.9%)	1 (0.5%)

Generally it can be noted that the selected and random pages for both studies are significantly different (with the exception of the 'longdesc' attribute in the French study of which only one example was found in each subtype of sites selected). The English study noted as the most important observation the low rate of adoption of HTML accessibility features and the skip navigation function (King, 2005). This observation can be extended to the results for French sites.

Comparing the two studies it can be seen that for French sites, H1 headers are used more frequently, particularly in the selected sites and H2 tags are used less. This may not however be a sign of the real use of H1 or H2 tags to convey semantically meaningful information. It is more likely that both H1 and H2 tags are used to convey visual meaning. Their presence in roughly equal numbers on French sites cannot be analysed meaningfully with the statistics alone. If they were being used to convey information about page structure it would be expected that there would be more H2 tags than H1 in accordance with a descending hierarchical pattern but the information only tells us that H2 or below tags were present at least once on the page. Sites such as www.algeriatenders.com/ and www.inria.fr/ use H2 and lower level tags without ever having used an H1 tag. This is the case in 18 random sites (8.4%) and 16 selected sites (10.0%). This is a common designer 'technique' in France, where H2 or lower tags are used to define the main page heading, as developers, fearing the large default font display should associated stylesheets fail to be recognised, avoid using H1. Examples of sites using only an H6 header were seen.
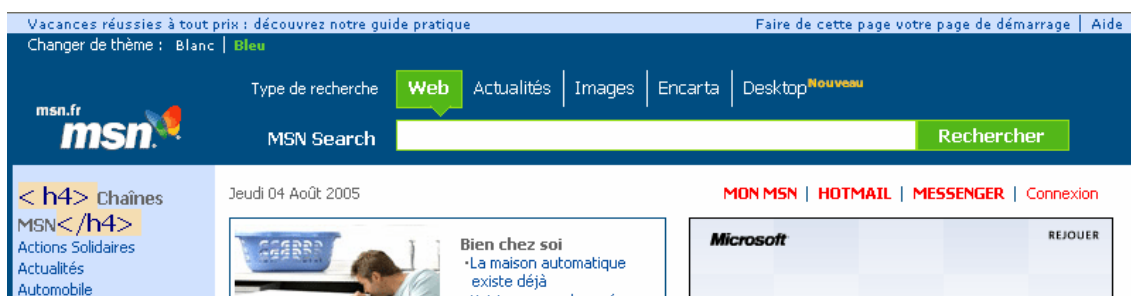
Screenshot 29: H4 tags appear first on the www.msn.fr website.
H1, H2 and H3 tags are not present in the page source code.

Only 17 random sites (7.9%) used H1 tags in combination with H2 or other lower level tags although a significantly greater number of selected sites used both (41 sites or 25.6%). 8 random sites (3.7%) and 9 selected sites (5.6%) used an H1 tag with no other header on the page.

Some bizarre coding showed the misconception of the role of header tags and their use (or not) purely for visual effects: for example, the website www.neteconomie.com/perl/navig.pl/neteconomie/accueil uses a style attached to a non-header tag `.h1 {font-family: Arial, Helvetica, sans-serif;font-size: 11px;font-weight:` etc. as if this could define it as a header for anything other than visual effect. Table headers were misconstrued in a similar way on the www.la-croix.com/ website which contains the code <td class="header">, using the stylesheet probably only to convey visual information. Generally, table features such as captions, summaries and headers were rarely used on random sites and figured slightly more on selected sites. Where summaries were found, they were often empty tags, as the table was constructed purely for presentational purposes rather than to contain tabular data. The www.premier-ministre.gouv.fr/fr/ website provides a table summary as follows: 'Tableau de mise en forme des chefs de gouvernement' (Layout table of heads of government), seeming to hedge its bets.

Part of the difficulty with WebbIE's potential to exploit what should be accessibility features are these incidences where they are misunderstood or wrongly used. As is the case for the English study, there is nonetheless wider use of these features on French selected than on random sites. This an encouraging sign of developer moves towards standard-based design which WebbIE will be able to make use of.

The one incidence of the 'Skip navigation' feature found in the random sites was in fact on a governmental site, www.equipement.gouv.fr/, subject to more pressure to include accessibility features. The greater representation of governmental sites in the selected subset in this study accounts for some of the divergence between numbers in the French and English studies for these evaluations. Sites were sometimes selected for the study of French sites because of their claim to conformance and could be expected to include such accessibility features as form element labels, present more often on French sites than on the English sites. There may be a general trend towards incorporating more such features into websites. This study was carried out one year later than the original one.

Extra site features that could be considered useful to visually impaired people were noted but not analysed in any way. These included designing pages, often using stylesheet techniques, so that content presented before navigation bars in the code; the

positioning of search tools among the first items on a page (a usability feature for everyone) or where a site offered text only versions of content or services relying on proxy servers to allow users to set their own preferences such as colours and font sizes.

Potential Accessibility Problems

Sites were then tested for pages containing non-text elements that can be considered potential accessibility problems and that may pose problems for WebbIE. The kinds of elements examined in this evaluation (images, tables, frames, embedded objects like Java, popups windows, JavaScripts and forms) are likely to affect usability. WebbIE can have problems re presenting the information they contain.

The presence of such elements on web pages can cause particular difficulty for visually impaired users. Some content is by nature inaccessible, often the case with embedded flash objects designed for visual enjoyment. Whether attempts are made to provide accessible text alternatives for them that WebbIE can exploit is a designer issue and depends on their commitment to creating accessible web pages. Sometimes the process of rendering, for example, a flash animation accessible by providing a lengthy description for it will not be useful and indeed can hinder site usability for the visually impaired person, resulting in increased consultation time for little gain. When the animation contains information of interest or even access to vital functions, usability issues are more serious. A site constructed of entirely inaccessible Flash content is of course useless to the blind user.

Popup windows are another case in point. Large numbers of popular sites use popup windows for advertising or to collect information about the user and these popups are usually considered undesirable by people consulting web sites who consider them unwelcome distractions or a threat to security. Tools can be used to block or temporarily allow them to open. When they occur, a sighted user can rapidly assess the nature of their content and chose to close the window for continued consultation of the site. This is not possible for blind users who must make take the time needed to examine their content. That sites frequently use popup windows to allow users to access their personal accounts, enter password information, send forms to request information and services, purchase online, subscribe to a newsletter, provide feedback about site satisfaction or to be notified of latest news, the final date for sending tax returns or the closing days of a sale, means that WebbIE must address their problematic behaviour. WebbIE may be unable to help users correctly manage multiple browser windows or to return to the principle page after consultation of a popup.

JavaScript functions are sometimes difficult for WebbIE to execute. Sites can use a combination of elements likely to cause accessibility and usability problems, an

exaggerated example being JavaScript generated popups with flash content containing a form, complicating the task further for WebbIE and the user. DHTML[17] generated fly-out or drop-down menus, often using JavaScript techniques to manipulate layers or the DOM, are not uncommon on major sites for dynamic display and updating of information.

Image maps are frequently used to present menu items or are in fact actual maps allowing users to select regionally specific information. They are frequently not attributed alternative text content and WebbIE may not be able to access the link information they contain.

Problematic elements are likely to be present on large, popular websites seeking to offer rich multimedia experiences and visual content and drawing on recent coding techniques to, for example, dynamically update a menu, extract from or send information to a database or to achieve complex layout designed primarily for visual impact. They can be expected to be found more often on the selected sites than on the random sites, which include older or small personal sites using relatively unsophisticated layout techniques and containing less content. These sites may not, for example, offer onsite search tools, flash animations and multimedia experiences. On the other hand legacy sites do tend to contain features that were designer trends of their epoch, such as frames, now not favoured in current design techniques. Selected sites in the category for blind users generally do not include content or features that are inaccessible although they may be constructed with framesets, still considered practical by some blind users, primarily to avoid repetitive menu information.

180 of the total 216 French random sites were tested and all of the selected sites. For these evaluations the AIS Web Accessibility Toolbar was used to examine document structure (NILS AIS, 2005). Manual inspection of the code was also necessary. The AIS toolbar can provide information on document structure; embedded multimedia elements; and detects the presence of frames, tables, image maps, applets and scripts.

Using the tool requires deactivation of any popup blocking mechanisms; some functions are not available on sites containing framesets. Pages were manually inspected; incidences of code such as `applet, object, element, embed, script, popup, window, window.open, openBrWindow, area, usemap, table, swf,` and `flash` were searched for.

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[17] DHTML: Dynamic HTML.
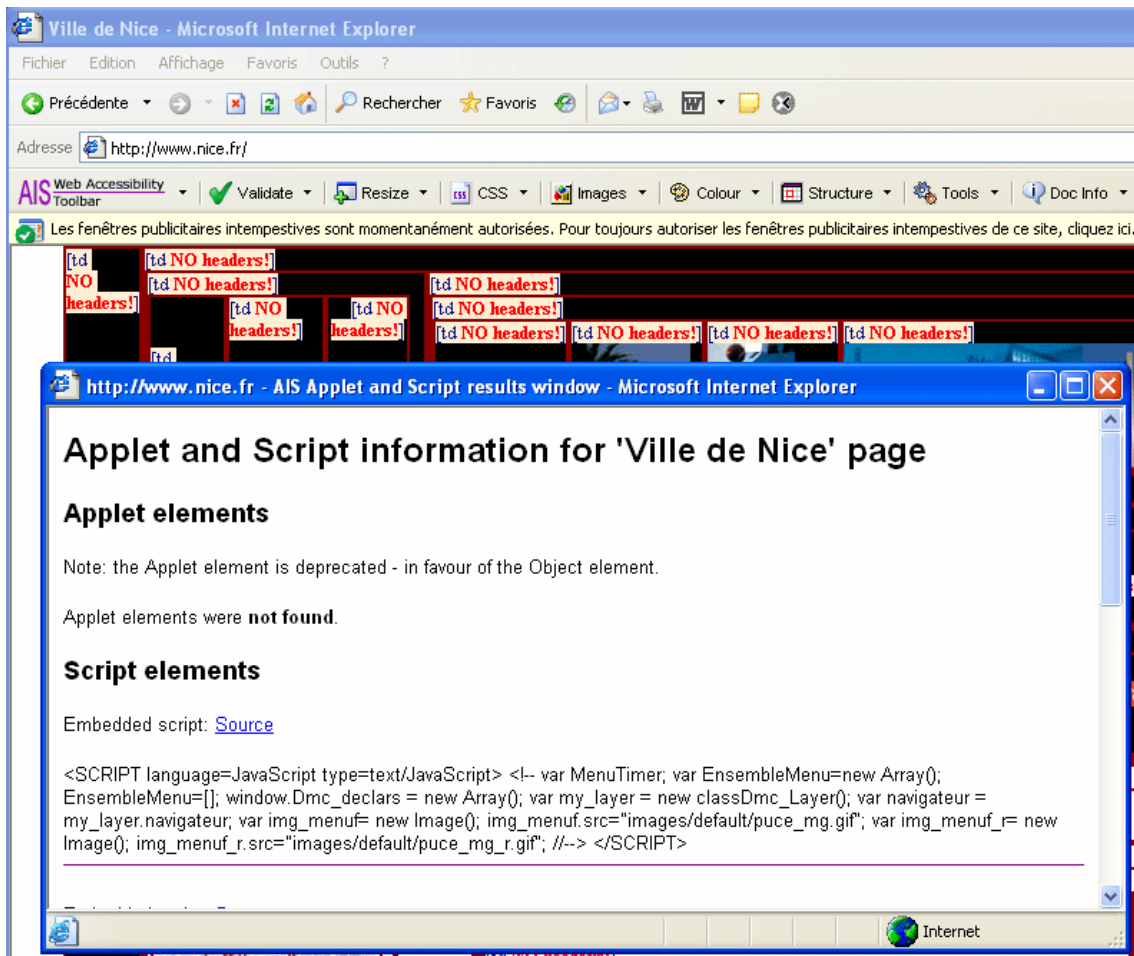
Screenshot 30: The AIS toolbar provides information on elements present

The above screenshot shows a page from the www.nice.fr/ website examined using the AIS toolbar: tables are revealed, no applets are found and details of JavaScripts used are displayed.

A summary of results from the British study follows in Table 11.

Table 11: Potential accessibility problems (British study)

Content	Selected sites	Random sites
Object/Applet	31 (23.1%)	24 (11.1%)
Table	113 (84.3%)	164 (76.3%)
Image	127 (94.8%)	171 (79.5%)
Frames	7 (5.2%)	40 (18.6%)
Pop-up windows	34 (25.4%)	11 (5.2%)
JavaScript	89 (66.4%)	64 (29.8%)
Forms	101 (75.4%)	46 (21.4%)

French results are presented with some additional information, reflecting a slight different approach to the testing. The object/Applet category is broken down into several subcategories, to determine if the embedded object was in fact an applet, a Flash animation or another type of multimedia object. This last category included the presence of simple links to a multimedia file. The presence of image maps is indicated as a subcategory of Images. IFrames, often containing JavaScript and flash animations, are a subset of Frames, to distinguish them from those sites using actual framesets.

The results are summarised in Table 12 below.

Table 12: Potential accessibility problems (French sites)

Content		Selected sites (complete, 160)	Selected sites (core, 135)	Random sites (sample 180 sites)
Object/Applet		69 (43.1%)	58 (43.0%)	66 (36.7%)
	Applet	2 (1.3%)	1 (0.7%)	0 (0.0%)
	Flash	64 (40.0%)	54 (40.0%)	57 (31.7%)
	Multimedia	3 (1.9%)	3 (2.2%)	9 (5.0%)
Table		144 (90.0%)	125 (92.6%)	168 (93.3%)
Image		155 (96.9%)	132 (97.8%)	179 (99.4%)
	Image Map	37 (23.1%)	30 (22.2%)	33 (18.3%)
Frames		10 (6.3%)	4 (3.0%)	38 (21.1%)
	IFrames	42 (26.3%)	41 (30.4%)	34 (18.9%)
Pop-up windows		71 (44.4%)	60 (44.4%)	79 (43.9%)
JavaScript		146 (91.3%)	123 (91.1%)	156 (86.7%)
Forms		140 (87.5%)	117 (86.7%)	118 (65.6%)

As with the English study there are some significant differences between the different sets of web pages. Random sites contained (slightly more) tables and more frames, for example. What is more interesting to observe from this evaluation is the high incidence on French sites, whether random or selected, of scripts, predominately JavaScripts, embedded Flash animations and tables. Applets are barely present on the French sites, perhaps reflecting current developer techniques. Frames are found in 21.1% of French random sites; in 18.6% of English random sites. Although most Flash content is of an advertising nature some sites are entirely in designed in Flash. Other sites present key menu items using Flash as animations or as still images, frequently on the front page. The web has become a richly visual medium and the consistent presence of images is not surprising, however the number of Image Maps (present on 23.1% of total selected sites) is relatively high.
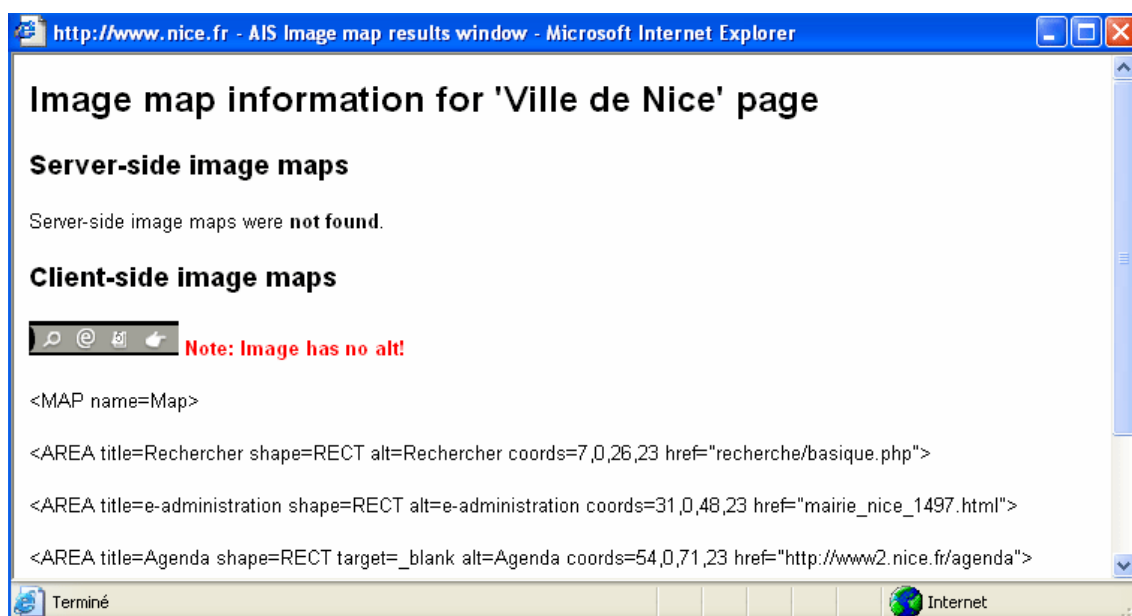
Screenshot 31: A typical image map detected on the www.nice.fr website.

More tables, almost exclusively used to control visual layout, were found on French sites than in the English study (93.3% against 76.3% for random sites). Numbers are significantly higher for selected sites also. This may be caused by the delay in adoption of new standards based techniques, such as tableless design, by French developers following the dominant American trends.

There was perhaps some evaluator divergence in determining objects and embed elements or indeed in the methodology used to select sites for evaluation. Popups were sometimes counted for the French study not where they opened on loading a page, but when present anywhere on the page, including when new windows could be opened with a simple target=_blank, rather than a JavaScript function. Some of these could arguably not be counted as popups; this was not a strict exercise. When new windows needed to be opened to access content judged to be important, they were noted as popups.

Forms are present in significantly higher numbers on French compared to English sites (87.5% against 75.4% of selected sites and 65.6% against 21.4% of random sites). The same is true for JavaScripts, which were found on 91.3% against 66.4% of selected sites and a massive 86.7% against 29.8% of random sites. Forms and JavaScripts are also present on sites of particular relevance to visually impaired users. Again it must be noted that this study was carried out a year later than the original one and this may account for some of the differences.

Governmental sites contained large amounts of PDF content, although this was not a criterion for evaluation here; it remains a potential accessibility problem.

Evaluation against real sites (WebbIE)

Finally, WebbIE was tested against all selected and random websites chosen for the study. The aim was to determine whether WebbIE worked, and how effectively it worked. Subjective criteria were used to evaluate WebbIE's performance and evaluations in both the English and French study were carried out by sighted users. The French version tested corresponds to version 3.0.0.; the older version 2.7.2.was used in the English study.

Alasdair R. King, WebbIE's principle developer and evaluator in the English study notes in his thesis: "It is difficult to define objective criteria for success and failure that really reflects whether WebbIE will be of use to blind people. Usefulness will not be binary in general, but some point on a continuum depending on the web page, the task to be completed and the skill and determination of the user" (King, 2005). Nevertheless, a pass or fail note was given for each site. The issues here are ones of usability and, as has been noted, usefulness. To the simple question of "Will WebbIE work with this website?" a yes / no answer needed to found. The question might have been asked differently, of course: "Will a visually impaired user find WebbIE useful to consult this website?" This last can really only be addressed by testing with real users.

There was no formal testing procedure to follow in order to replicate the English study for these evaluations, but some basic guidelines had been established.

Criteria for success were as follows:

1. The page loads and content of interest is visually rendered.
2. Navigation to descending pages is possible. These pages should also load and display correctly.
3. Forms on the page should be functional, or another alternative provided (the example being where a "jump-to" form fails to work, correctly-presented menu items allow the user to access the destinations anyway).

Likely navigation paths to descending pages were to be chosen to represent site content likely to be typical or containing principal content, such as the product range of a commercial site.

Implicit in this procedure is the expectation that for any given site, the user should be able to arrive at content of interest. How content of interest is determined is again a subjective judgement, but one can assume that it is unlikely to be minor pages containing legal credits, a site plan or links to the website developer's company. Even if some sites allow access to more substantial amounts of content through a secondary navigation menu, or through links from the content body, it can be considered insufficient if the main navigation menu is non-functional. Pages accessed only through this primary navigation tool are likely to be where content of most interest can be

found; the site developer, the client and the user would generally concur on this point. A user might arrive at the same content through a search tool available on the site or by links from other pages, but this would assume they know what they are looking for or can identify a link, in the absence of clues such as those signalled by the top level of a menu, as leading to major sections of the site.

Again, if the search tool is inoperative, this can be considered a major block to usability for visually impaired users, who frequently favour this method of navigation for the rapidity it can offer.

Forms may be present on the front page or first descending pages in the site hierarchy, to allow users to subscribe to a newsletter, for example, but the form allowing a user to enter credit card details for a purchase is frequently towards the end of a longer series of pages. Whether a user can complete the process is vital to them arriving at the 'content of interest'.

For these reasons and because of the complexity of many sites, the pass or failure notation for a site, as determined in the original study, was extended in this study to include a 'partial' category. By this is meant sites where some content of interest can be accessed, but not all. For reasons of coherency with the original study these partial successes are totalled with straight passes to obtain overall pass and fail notes.

Results of the original study are summarised in the following Table 13.

Table 13: Testing WebbIE against real websites, English study

	Pass	Fail	Pass %	Fail %
Selected	128	4	98.5%	1.5%
Random	193	21	90.2%	9.8%
Total	321	25	92.8%	7.2%

Results of this study are presented in Table 14, which follows.

Table 14: Testing WebbIE against real websites, French study

	Pass	Partial	Pass and Partial	Fail
Selected (total)	89 (55.6%)	60 (37.5%)	149 (93.1%)	11 (6.9%)
Selected (core)	76 (56.3%)	51 (37.8%)	127 (94.1 %)	8 (5.9%)
Random	133 (61.9%)	51 (23.7%)	184 (85.6%)	28 (13.0%)
Total core and random	209 (59.7 %)	102 (29.1%)	311 (88.9%)	36 (10.3%)

Overall pass rates (pass and partial) for French sites (88.9%) compared to those in the English study 92.8% are lower. This is consistent with results of tests for WCAG accessibility conformance which show French sites to fail slightly more often than English sites. It may be explained by the delayed adoption in French website development of latest techniques which can be assumed to be moving towards increased accessibility and usability features. Differences in results are also, perhaps, attributable to the more strict methodology adopted for the French study, with probable inter-evaluator divergence.

The English version of WebbIE was evaluated for use with real sites by a software application programmer and computer expert, the developer of WebbIE itself. His extensive knowledge of the programme meant he could often determine precisely why a page or feature failed to function in WebbIE and attribute causal factors to WebbIE, coding on a webpage, the interrelationship of the two, or to other technical areas. Nevertheless testing of the French sites by a less informed user was a useful exercise. Considerations of why there were problems (and the pressure to find solutions should a fault be detected with WebbIE) did not interfere with assessing the usability potential of the browser.

A more detailed breakdown of where real problems with French sites were encountered is presented in the following Table 15. This is based on the established criteria for this set of evaluations, but includes an additional category of 'Arrive at content'. It seems more pertinent to explore these findings than to continue French / English site comparisons Real accessibility, usability and usefulness issues can be inferred from problem areas they identify.

Table 15: Breakdown of success or failure criteria for French sites

	Selected (total sites)	Selected (core sites)	Random
Page loads and displays	160 (100 %)	135 (100 %)	207 (96.3%)
Descending pages display	154 (96.3%)	132 (97.8%)	187 (87.0%)
Navigation - menus	122 (76.3%)	106 (78.5%)	159 (74.0%)
Navigation –content links	148 (92.5%)	127 (94.1%)	181 (84.2%)
Forms functional	115 (76.2%)	99 (77.3%)	124 (88.6%)
Arrive at content:			
yes	109 (68.1%)	94 (69.6%)	139 (64.7%)
no	17 (10.6%)	13 (9.6%)	31 (14.4%)
mixed	34 (21.3%)	28 (20.7%)	45 (20.9%)

WebbIE succeeded fully in loading and displaying the front page of all selected sites. Some problems were noted where WebbIE failed to function correctly after repeated consultation of sites. Closing and reopening the application was needed when this happened. When navigating to descending pages, a failure was attributed when content was completely inaccessible; no links were available or functional or the page failed to display in the text view. The original study examined the visually-rendered web page in Internet Explorer; for both the front page and for descending pages. For this study however criteria for success depended on whether content was correctly presented in the text mode. When examining French sites the text view of WebbIE was prioritised and checks back to the visual display used for speed and comparison. Keyboard functions and access keys were used. Popup windows were allowed.

Examples of the 9 random sites that failed to load and display the front page include http://phrasedujour.free.fr/, which attempts to resize the browser window, contains Flash elements and embedded multimedia audio files, www.alsace-usa.com/, and www.matissepicasso.org/ which also attempts to resize the browser windows, and forcibly removes the WebbIE toolbar.

Content was successfully presented for descending pages in 97.8% of core selected and 87.0% of random sites. Failure to display is usually the result of encountering a site constructed entirely of inaccessible Flash objects, as is the case on the www.lebonmarche.fr/, www.killingmonkey.com/, www.cdn-orleans.com/, www.foret-aventure.com/ and www.cercle-recyclage.asso.fr/ websites; WebbIE signals the presence of the Flash object. Content also failed to display in the WebbIE text view for the www.jumeau.org/ website, a possible problem with a frame, although WebbIE handled most sites with framesets successfully.

The main content of the homepage at www.utc.fr/~tthomass/index.html displays in the WebbIE text view but no descending pages are available if navigation is attempted in text mode. This site fails for this reason. The user may (or may not) switch to the IE view where links are active. The problem is caused by the use of one large image map containing all links to content. The same problem occurs on the www.pere-lachaise.com/ site, where the splash page has an image map allowing the user to enter the English or French version of the site. French sites often have this kind of language entry page to cater for the predominately English-speaking community. Helpfully WebbIE provides the link destination (page name) where no text alternative is provided but in this case both pages are called 'detect.php' and the links, should the user decide to follow them, are inactive.

On the ironically named www.100-satisfaction.com/ website, an image map provides a link to open a JavaScript generated popup window containing offers of

employment. This fails to function in WebbIE. When selected the link simply returns the cursor to the top of the page. Remaining content consists of embedded flash elements, including a news scroller and the entire navigation bar. It is understandable that the user would have difficulty choosing from options presented by this site, in the WebbIE text mode.
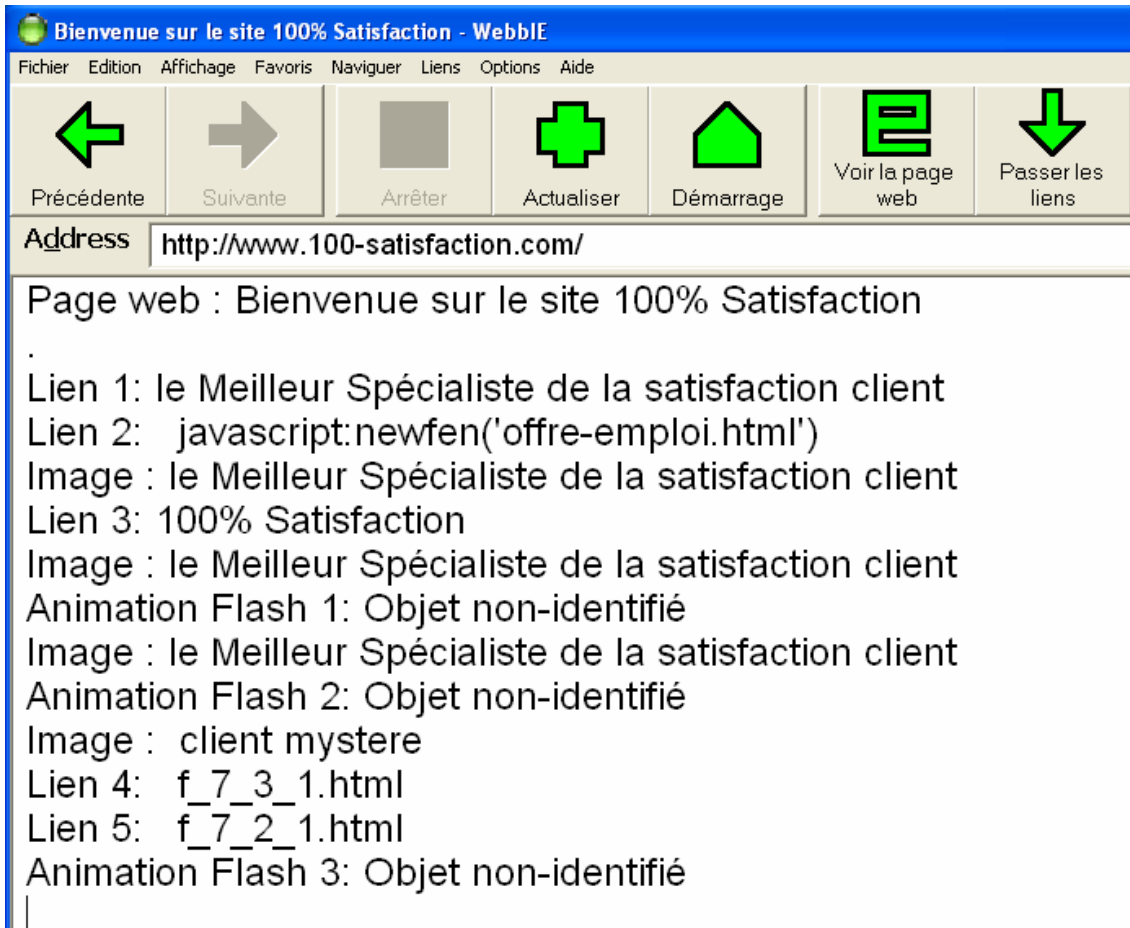
Screenshot 32: WebbIE text view of largely inaccessible content

Again some content is accessible through the site map, the first and only functional link available from the front page (other than a redundant link to the same homepage). The link is badly named "le Meilleur Spécialiste de la satisfaction client". ("Best specialist in client satisfaction"). WebbIE will provide text alternative for an image where it has been given, but cannot solve the problem of inappropriate labelling. This is a case where the destination of the page would have been more helpful (map.html) to users, provided of course they can speak English, but for WebbIE to provide extra information would not be considered worth the gain for cases of this type.

The page source with complete code for this and adjacent images (small spacers) suggest that the developer has used techniques thought to increase the

accessibility of a page, providing links, not visible on the visually rendered page, to principal content.

```
<td><a href="map.html"><img src="images/spacer.gif" alt="le
Meilleur Spécialiste de la satisfaction client" border=0
height="1" width="10"><img src="images/spacer.gif" border=0
height="1" width="10"  alt="Etude de la satisfaction"><img
src="images/spacer.gif" border=0 height="1" width="10"
alt="Enquete de satisfaction client"><img
src="images/spacer.gif" border=0 height="1" width="10" alt="le
baromètre satisfaction"></a></td>
```

WebbIE does its best: unfortunately the above coding is dubious (four images are contained in one link tag) and WebbIE can only pick up the alt text of the first image. This page is a small example of the challenges facing the WebbIE developer and that content is accessible at all is a small victory. The site itself received a partial pass grade for this evaluation, with a mixed 'arrive at content' status.

Navigational success to descending pages was broken down into two categories of possible problem areas: navigation by menus or navigation by links from content body. This last is shortened to navigation by links for easy reference, although menus are in fact also link functions. The majority of sites succeed in the 'navigation by links' (94.1% of core selected sites); significantly more problems occur when 'navigating by menus' (78.5% of core selected sites).

An example of a site which is attributed only partial success is www.tramway.paris.fr/. The first page loads and displays as do descending pages. If one major section (arguably the most important) of the site "Suivez la ligne" ("Follow the line") is navigated the user quickly arrives at an image map of the projected tram lines: www.tramway.paris.fr/tram.asp?section=B&lapage=suivez/B1_1.asp. Links to pages with details of the future stations, metro links, nearby buildings or facilities etc. are inactive in WebbIE. Nonetheless it receives an overall pass mark, but the user has failed to arrive at content of interest by the most logical (menu) path. The site itself cannot be described as completely inaccessible; this content can in fact be reached by following links from the plan of the site, available from every page. Indeed it has received a Bronze Label after accessibility evaluation by Accessiweb (AccessiWeb, 2005). All initial criteria for this set of tests were met; including navigation to descending pages. But one step further in this descent the user is blocked by an image map and must seek an alternative route. Many users may abandon at his point. Some will consult accessory pages, detailing potential benefit of the service to the city and inhabitants or the people involved in its creation. These pages may or may not be of interest to them. It is possible that users fail to remark that the most important information has been bypassed. For the 'Arrive at content' category it was classified as

'mixed'. Whether the problem is a website developer issue or a WebbIE dysfunction is irrelevant to this classification. For the www.mappy.fr/ website the user arrives quite simply at an image when searching for a map or itinerary, the primary reason for consulting this site, with no available text alternative. Clearly a developer issue, the site also receives a partial success mark and mixed arrival at content classification.

Navigational menus presented in Flash (for visual attractiveness) were unable to be exploited by WebbIE and usually resulted in sites receiving partial passes.
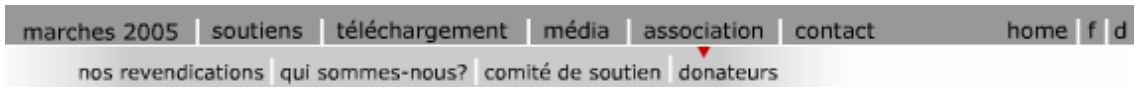
Screenshot 33: Flash menu on www.marche-blanche.ch/index.php?langage=fr

Sometimes Flash content, frequently found in IFrames, contains navigation (by content) links. These may certainly contain marketing (advertising) content but the www.sfr.fr/ website has a Flash object with information about latest offers and products that is probably of interest to someone consulting the site. The navigation bar for this site is also in Flash.

Screenshot 34: Latest offers and product information on the www.sfr.fr website

The first link WebbIE offers for this site (unable to access the Flash menu and content) is to pages reserved for people who have visual impairments, made available from within the website. These pages link to the 'Confort de lecture' (Handicapzéro) proxy service which enables people to change their settings for more comfortable visual display and offers alternatively presented site content (Confort de Lecture, 2005). A solution is available from within the site. Following these links in WebbIE on a first trial opened popup windows, on a second they did not.

Similarly the www.cite-sciences.fr/ website offers a 'light version' of their site, designed to offer easier access to people with disabilities. WebbIE hangs on loading the (essentially Flash) front page from which the 'light version' can be accessed, although pressing the escape button will sometimes allow WebbIE to display it. Menu links are not functional on the site, including for the light version and searches fail to complete.

The www.bnf.fr/ website sometimes hangs on opening and fails to display. When WebbIE can present site content, there are problems with the menus and search functions. Menus are inactive links even in the 'light version' this site also offers.

The principal menu, created with an image map, on the www.insee.fr/fr/home/home_page.asp web page displays, but links are not active in the text view of WebbIE.

The recurring problem of DHTML generated drop-down and flyout menus was the most significant cause of WebbIE sites failing to meet the navigation by menu category. When parsed in WebbIE, these can produce long lists of inactive links. Other scripts used to change navigation bar tabs also fail to display or to produce active links in WebbIE. Examples are the www.amazon.fr/, www.fnac.com/ and http://www.rueducommerce.fr/ websites.

Sites which use JavaScript to dynamically generate menus include www.adobe.fr/, http://www.cru.fr/, www.fdjeux.com/ and www.pmu.fr/. These last three sites fail completely, sometimes failing to display in the IE view of WebbIE, signalling JavaScript errors and repeatedly seeking to open popup windows.

The www.cru.fr/ website displays top level menu links that go nowhere and submenus as repeated lines of text.

Sometimes menu items are simply not displayed and the user has no way of knowing they are missing information.

The www.rqge.qc.ca/ website presents a dynamic dropdown menu which fails to display correctly in the WebbIE text view.

Screenshot 35: Dropdown menu on the www.rqge.qc.ca/ website

The text view of WebbIE does not display the top level menu item and entries are presented as repeated lines of inactive text. WebbIE cannot detect the links.
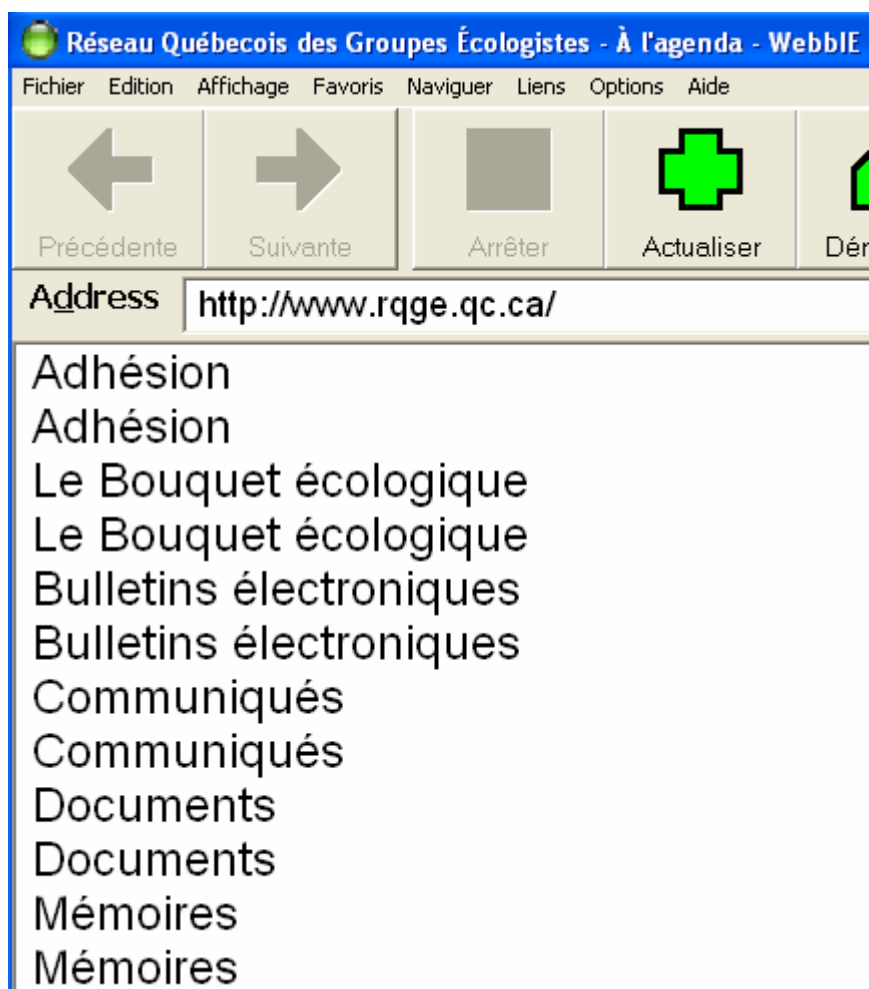
Screenshot 36: Menu on the www.rqge.qc.ca/ website in WebbIE text view

Some of these types of menus can display fully or partially in WebbIE and function correctly, depending on the type of script encountered.

On the www.credit-agricole.fr/ website the menu is presented as a list of active links in WebbIE which succeed in allowing the user to access the destination pages. Top-level menu links however are not labelled correctly (there is no text alternative available for WebbIE to present) and when activated these top level links produce variable behaviours. Frequently the back button returns the user to the previous site consulted. This site signals a JavaScript error on loading and sometimes hangs.
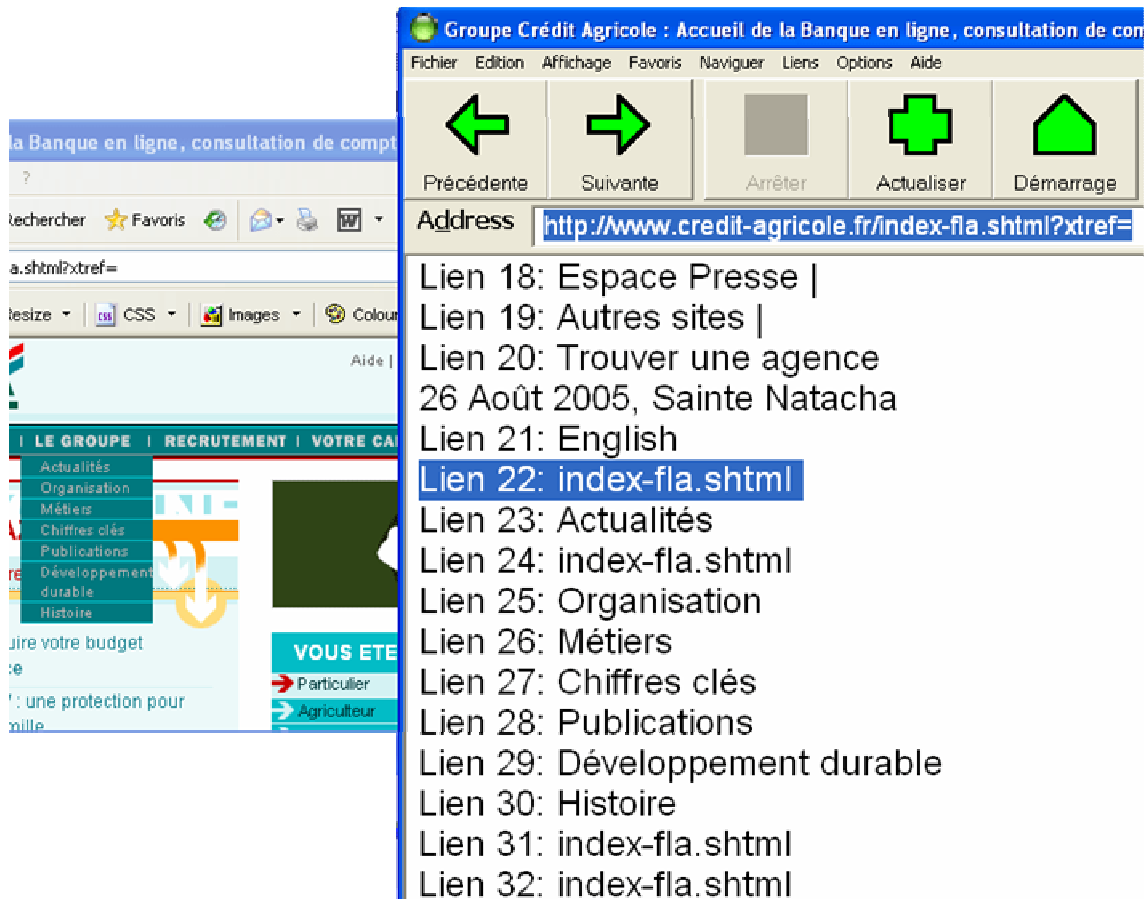
Screenshot 37: Flyout menu on the www.credit-agricole.fr website

An image map is again a problem on the www.cnam.fr/ website, which uses DHTML techniques, complicating the presentation. Information about regional educational centres is available firstly by selecting from a menu option which reveals a map of France linking to multiple destinations. The page repeats the same information in the form of a Flash animation which finishes by displaying the same map. Other dynamic menus are present on the page and popup windows open from some links. In the text view of WebbIE links from the maps are displayed twice and are not functional.
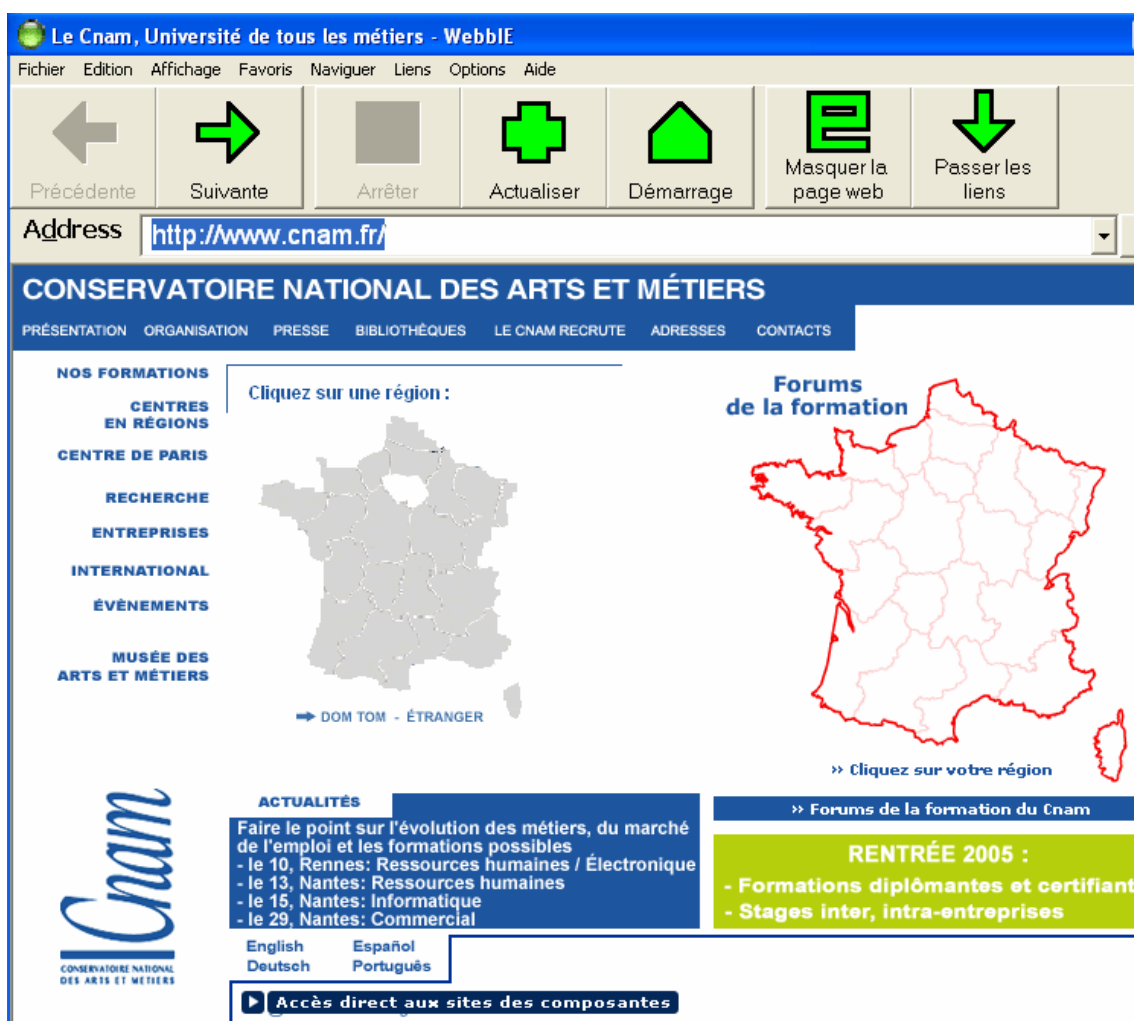
Screenshot 38: DHTML and Flash techniques with Image maps on the www.cnam.fr/ website

The reality of many websites is that they use combinations of techniques to achieve desired effects or functionality, one or all of which can pose problems for WebbIE.

Mixed success with forms was another typical cause of marking a site as only partially succeeding. WebbIE generally handled forms well; 77.3% of forms on core selected sites were found to be functional and 88.6% of those on random sites. That selected results were poorer than random sites is largely due to the complexity of forms offered on selected sites, associated with advanced search functions, information requested from or updating a database and online purchasing procedures.

Where forms were found an attempt was made to go to the end of the processes they initiated. This raised issues of accessibility, usability and usefulness, closely associated, which extended beyond the strict evaluations of WebbIE functioning.

If the final result of a lengthy academic document search leads to an inaccessible PDF file, can the user be said to have arrived at content of interest?

On the http://fr.dir.yahoo.com/ Yahoo! directory website basic search functions were successful, but the user could not select the search web or directory options (radio buttons failed to display in WebbIE). The interface of this website has since changed.

On the Voila France website, www.voila.fr/, links from a search result page failed to function in WebbIE, unless the user opened a list of links (Ctrl+L). Later attempts succeeded and opened the destination site in a popup window, defaulting to the graphic rendering of a page. If WebbIE behaves differently on successive attempts to use the same site, the user may lose confidence. It may be the shifting nature of web page code and content and this is yet another issue. Sometimes WebbIE hung on opening a site (www.voila.fr/ again) and sometimes a site crashed the application.

The www.aol.fr/ website does not present the search button for a general search, nor can users logon to their accounts. The latter is also true for the www.orange.fr/ website. On the www.promovacances.com/ website the main search form is not available. Search results may open in another window and block WebbIE (www.routard.com/); entering search criteria may send you to top of the page or open a popup window (www.apec.fr/). On the www.latribune.fr/ website constant page refreshing leaves the user little time to perform a search; the caret returns to the top of the page.

A WebbIE user must often choose whether to open a popup window or allow the execution of scripts on a page in order to proceed, particularly when attempting to interact dynamically with a page, as when filling out a form. Numerous login or password protected access to pages were presented in popup windows on the French sites. This caused repeated problems with finalising form procedures. WebbIE frequently closes completely when a popup window is allowed, information entered into it and then closed (often automatically when the form is sent), causing frustration at the final stages of detailed procedures. This may be a bug in WebbIE. Help pages are often presented in a new window (as on the http://fr.mail.yahoo.com/ site where a user cannot access their account). On the www.sncf.fr/ website (voyages) a user can, with great difficulty, search for train timetables but cannot purchase a ticket.

On the www.concession-bot.com/ website if a user allows the popup on page load, aggressive attempts to take over the browser window result in the removal of WebbIE buttons and eventual crash. For other sites popups are a vital interface to completing interactive tasks. The www.liberation.fr/ website contains navigational links in a Flash popup. The top menu on the www.societegenerale.fr/ website consists entirely of popups, inaccessible to WebbIE.

On the www.meteofrance.com/FR/index.jsp website, the popup site plan doesn't work (double display of text and IE view) blocks the back button. Search results for this site, presented as JavaScript links, don't work.

On the www.orange.fr/ website a link for visually impaired users opens a popup window which again causes double display of information in the WebbIE text view and the graphically rendered IE view.
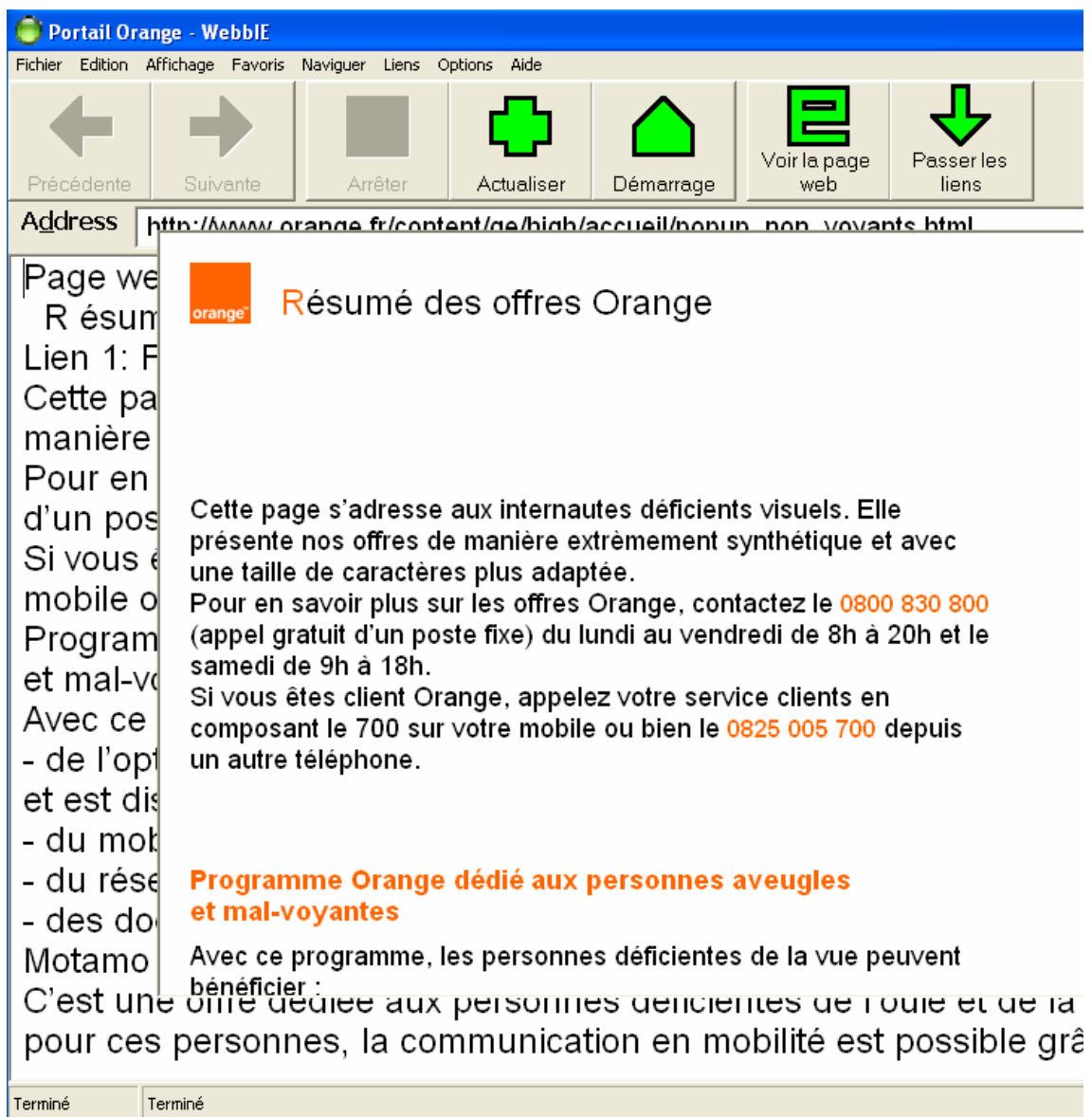
Screenshot 39: Double popup display on the www.orange.fr website

Default text in form fields which is not automatically removed when a user enters information (usually a JavaScript function) can inexplicably return false search results. Examples are on the www.lemonde.fr/ and www.lesechos.fr/ websites.

Screenshot 40: Search word entered with trailing default text remaining

These and many other examples indicate the complexity of websites and the multiple factors WebbIE must handle to allow user access to pages on them. Problems are often where the site is failing, not WebbIE.

Numerous successes were recorded, including online banking and purchasing with WebbIE. The https://www.creditmutuel.fr/cmcee/fr/ website allows users to access and manage their bank accounts online.
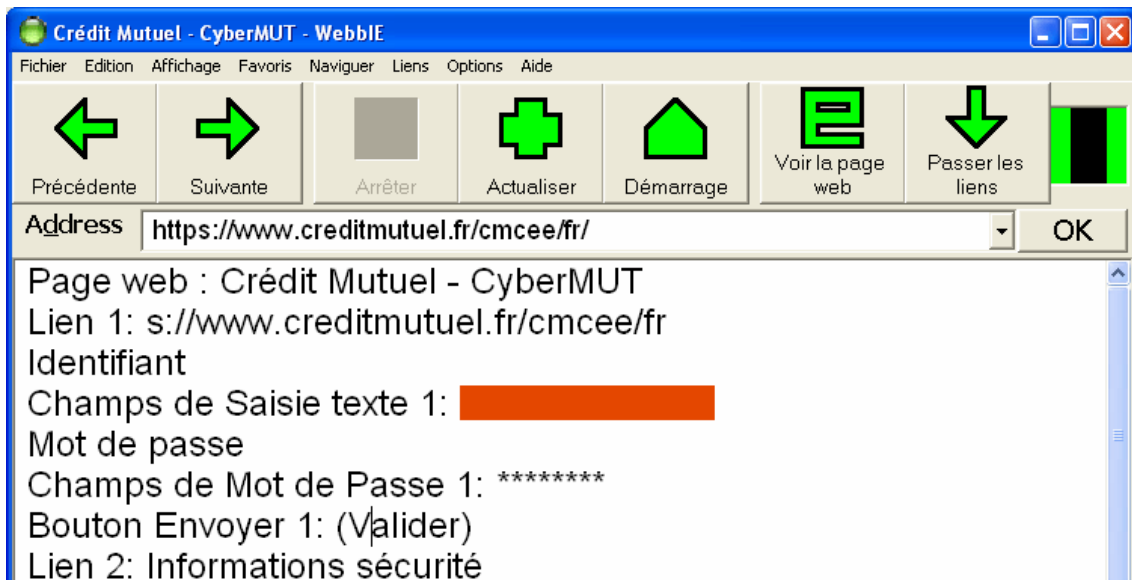
Screenshot 41: Banking online with the secure www.creditmutuel.fr website
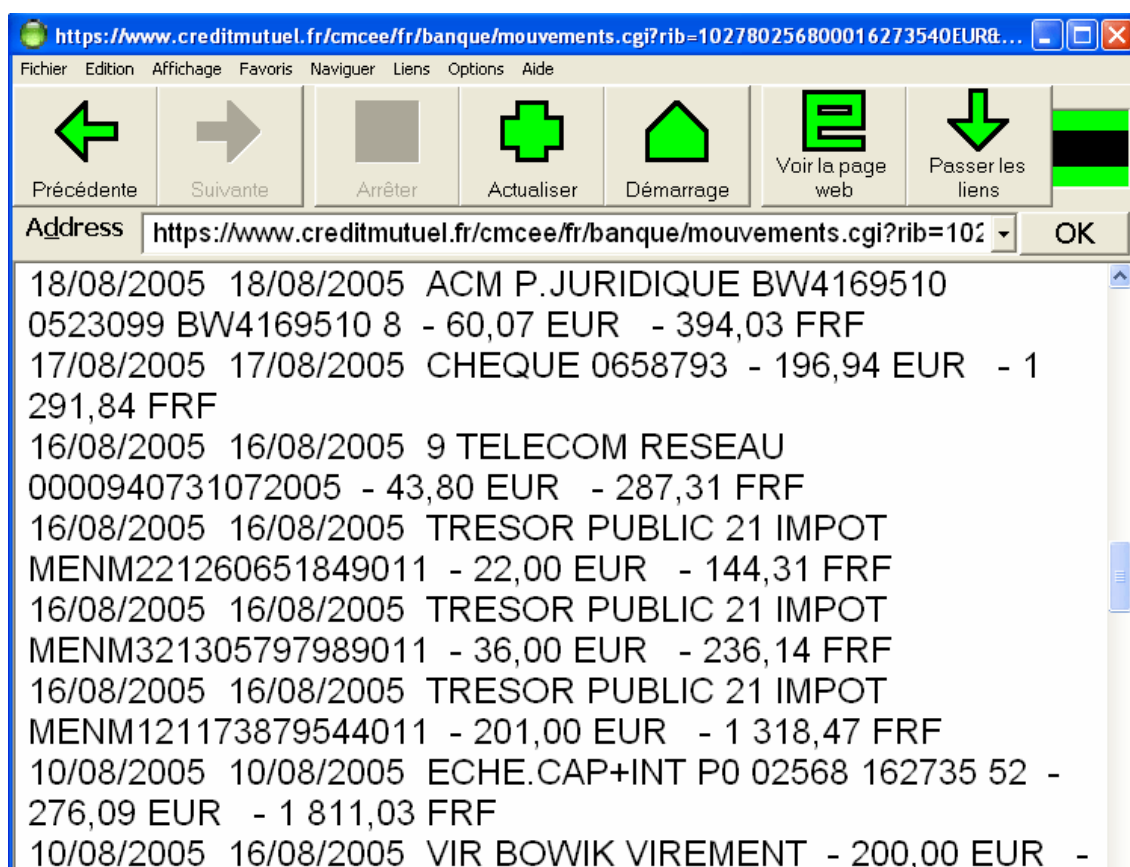
Screenshot 42: Successful online banking with WebbIE

Sites with claims to accessibility conformance tended to perform better in WebbIE; as did sites of particular interest to blind users, although some problems were encountered with these sites. On the www.inja.fr/ website (which fails to meet the WCAG Level 1 criteria) some problems were experienced with frames in WebbIE. On the www.avh.asso.fr/ website, access keys provided in the site seemed to conflict with WebbIE and search functions did not work.

For very many sites which failed to meet WCAG accessibility criteria, WebbIE successfully re-presented them, indicated by results of this practical evaluation. The Credit Mutuel site discussed above is a concrete example, breaching WCAG Level 1 guidelines and yet passing WebbIE evaluations. WebbIE can be said to offer to blind people a usable tool for web consultation.

Evaluation against real sites (HomePage Reader & JAWS)

Tests were planned to compare WebbIE performance with another low cost web browsing solution, the IBM Homepage Reader self-voicing browser, but there was insufficient time to complete these. A set of evaluations are currently being done with English sites to compare WebbIE performance with site consultation using both Homepage Reader and JAWS.

2.6. WebbIE User Evaluations: Questionnaires, Interviews

Two types of user evaluations for the version 3 of WebbIE were carried out, seeking two different, although related, kinds of information and requiring two different approaches.

For France, the browser had presumably not been used before, certainly not in the newly launched French version of WebbIE 3.0.0. Without the possibility of returning to France for even limited introductory or training sessions, a "walk up and use" approach to evaluations was necessary, in the form of a written questionnaire. The questionnaire was primarily designed to collect information about the performance of WebbIE when consulting different websites and its perceived usefulness to users. It was hoped that sites chosen for evaluation would identify some principal websites of particular interest to French visually impaired users.

For Britain, where there were people already using WebbIE, initial user evaluations had already been carried out for earlier English versions. Since significant changes to the browser had been made with the release of version 3, it was decided to extend these evaluations to reassess user appreciation and the perceived usefulness of WebbIE functions. Interviews, primarily by telephone, were planned.

2.6.1. France

2.6.1.1. Contacts

Potential WebbIE testers were identified in May, 2005. Two subgroups were organised; five people from the Paris region, recommended by a colleague, agreed to participate and one person in Lyon agreed to test WebbIE himself and to coordinate further tests with at least five members of an association for visually impaired people where he worked. This was a firm commitment, in exchange for substantial translation work.

These two groups were sent the questionnaire immediately the French version of WebbIE was launched at the end of June, 2005. Unfortunately the launch coincided with the beginning of the extended July and August French holiday period.

Whilst some small feedback was received for the first group and renewal of agreements to test affirmed, no completed questionnaires had been received by the end of August. The organiser of the second group was unable to coordinate tests and no feedback was ever received from him or members of his association.

When it became apparent that renewed appeals for testers needed to be made, contacts were initiated with key members of national associations in France. Two of

these responded; BrailleNet (BrailleNet, 2005) and AccessiWeb (AccessiWeb, 2005). Both work to further Internet accessibility for visually impaired people and are involved in large scale training and advocacy. Although a more structured, formal introduction of the browser to these groups had been planned after initial controlled tests, it was decided to begin this process prematurely. The aim was to quickly reach potential evaluators. Personal contacts resulted in a further four potential testers.

2.6.1.2. Questionnaire

The questionnaire for French users was designed, translated and validated. It was distributed by email and included an explanatory introduction to WebbIE and instructions for downloading the browser from the newly online French pages of the website at http://www.webbie.org.uk/fr/ (WebbIE, 2005).

Both the French and the English versions of this questionnaire can be found in Annexes 2: French users questionnaire (in French) and Annexes 2: French users questionnaire (in English).

The questionnaire, in three-parts, asked users to test a small number of websites of their choice, and to evaluate how WebbIE handled them. Some demographic details were requested; questions concerning use of computers, Internet and assistive technologies were asked. The final part of the questionnaire requested details on specific functions used in the testing and asked testers to comment on their general appreciation of the browser.

2.6.1.3. User Feedback

Three complete questionnaires were returned towards the end of August and partial feedback was received from a further five users by this date. Results extrapolated from such a small sample size can only be anecdotal. Nonetheless the detailed evaluation carried out by real users, testing on French sites, is useful and preliminary conclusions can be drawn from their comments.

Levels of visual impairment varied amongst testers. Computer and Internet skills also varied; ranging from complete beginners to experienced users, even experts. Most were men, aged from 38 years; the majority were in their 50's. Those who volunteered information about their computer setup stated that they were on a Windows platform (usually with XP).

Assistive technology used detailed by three users included:

- (Screen reader and magnifier) JAWS 4.5, ZoomText and the SuperNova package, (Braille display) EL-40 from Alphabraille;

- (Screen reader) JAWS;

- (Magnifiers) Virtual Magnifying Glass and Zoomax.

Users of Speech synthesisers were asked to name which one was being used; the reason it was chosen; possible reasons that would cause them to change it; and to describe good and bad points of the synthesiser.

- Eloquence Speech Synthesis (the default synthesiser of JAWS) was described as rapid and easily understandable with little practise. This user would not change it with another; the alternative given was SayItPro, described as certainly more audible, but much too long for web navigation.

- Kali (from Electrel) was found to be fast, with good pronunciation. The person was also happy with this choice. He found Kali better for working then for reading, though functional for reading documents.

One person, who has some functional vision and is also deaf, is currently being tested for compatibility of speech synthesisers with his hearing aid.

Tasks computers were used for included:

- Word processing;

- Exchanging documents;

- Web browsing / searching;

- Email, Webmail;

- Forums / Discussion lists;

- Programming (WinDev) , creation of websites (HTML /PHP/MySQL);

- Teaching word processing to visually impaired people.

Hours spent on the Internet ranged from an average 15 to 50 hours a week (expert user). All currently used Internet Explorer as their web browser, although one person regretted that IE did not "respect standards" and used it only because it was compatible with JAWS.

All used Google (fr) as their primary (sometimes exclusive) search engine; one also used Lycos and Yahoo! Replies to the question 'How do you go to a new website for which you have the address?' showed that diverse techniques were used:

- Searching Google with a name or part of a name and selecting from the result list;

- Entering the address manually;

- Copy / pasting URLs provided by others.

Using favourites from IE was also mentioned for sites already visited. Entering the address manually was noted as a difficult exercise for people with low vision not using screen readers who could not see the small address bar to verify spelling.

For the question "Do you use any web pages that require you to interact with them (fill out forms etc.) or do you just read pages?" users stated that they used the two modes.

None of the people evaluating had ever heard of WebbIE before. Response to WebbIE can be considered very positive, particularly for blind users using speech synthesisers. Those with some degree of functional vision, using the IE view with graphic rendering of web pages, reported considerable difficulty in changing their colour and font settings with the attendant application, IE Appearance Editor, but greatly appreciated the zoom function in WebbIE. All agreed to participate in further tests if re-contacted.

When asked "After having tried WebbIE do you think you might continue to use it?" some reservations were expressed: yes, for certain sites; yes, if able to master the functions and application allowing font and colour settings to be changed. This question was perhaps premature for new users; one person preferred to continue comparisons with IE, another felt he needed more time to fully understand and exploit functions. Compared to other navigators it was found to be more accessible and easy to learn to use, but slower.

Sites chosen for evaluation included:

- http://www.pagesjaunes.fr/
- http://www.eurotv.com/4atf1.htm
- http://asct.toulouse.free.fr/
- http://www.bibliothequedetoulouse.fr/
- http://Perso.wanadoo.fr/cecitix/
- http://www.amazon.fr/
- http://www.culture.gouv.fr/
- http://www.accessiweb.org/
- http://pfef.free.fr/Index.htm
- http://www.vial.jean.free.fr/new_npi/enter.htm
- http://www.drapeaux.org/
- http://www.sweetsingles.com/
- http://www.orange.fr
- http://www.voyages.sncf.fr/

They were samples of sites regularly visited by the testers, along with www.google.fr/. Reasons given for consulting these sites included being the webmaster

of one of them; for job related activities; for scientific and practical research (phone numbers) and for personal enjoyment.

Sometimes certain sites were chosen specifically to test WebbIE performance with elements typical on many websites. The www.eurotv.com/4atf1.htm web page was chosen as being representative of pages containing large number of links. The WebbIE function allowing users to open a list of links was found to be useful for this site. The www.pagesjaunes.fr website (chosen by several users) was chosen by one person to test WebbIE's performance with complex forms and distracting flash animations. WebbIE was reported to handle the form completion and search process successfully and presented results correctly. Points were scored for the way WebbIE handled the Flash animation, allowing the user unimpeded access to his search results. The http://asct.toulouse.free.fr website was chosen to test a dropdown menu, immediately and well presented by WebbIE. The www.bibliothequedetoulouse.fr website, also tested for a dynamic dropdown menu, failed to display menu items in WebbIE. For this site, the tester noted that the technique used to create the menu could not be accessed by WebbIE. On the www.orange.fr website the user was unable to access the client page after having entered her password details; WebbIE hung.

Overall, users reported no difficulties navigating websites using WebbIE with these sites. Pages loaded and displayed correctly, people were mostly, though not always able to find content of interest to them, and a number of functions WebbIE offers were considered useful.

Users were asked specifically if they had used a number of WebbIE functions. Answers are reported in the following Table 16.

Table 16: Features used in WebbIE during testing with real users

Functions	User 1	User 2	User 3
Forms	yes	yes	yes
Search	no	no, because common to JAWS	no
Skip links	yes	yes	yes
Crop / uncrop page	no	yes	yes
Magnification	no, blind	no, not enough vision	yes
Display settings (changing font etc.)	no, blind	no, not enough vision	yes
Copy / paste	yes	no, because common to JAWS	yes

Features or functions particularly appreciated included:

- Standard menus and keyboard shortcuts;

- Simplicity of use;

- Navigation from link to link with after opening a list of links (Ctrl+L), found to be very practical;

- The fact that it offers a text view (specifically for sites when images have no text alternative or are badly described);

- Skipping links with the keyboard shortcut Ctrl+arrow keys;

- The crop / uncrop page function with the keyboard shortcut Ctrl+K (one user among several appreciating this function found it useful for rapid content consultation without danger of inadvertently following a link);

- Preservation of essential information in the text view, while removing the interference of Flash animations;

- Toolbar simplification and ergonomy.

Less appreciated for one user were the functions for filling out forms. This user would have liked to be able to use the Tab key to move from one form element to the following. WebbIE reserves this function for swapping from the text panel to the address bar. He found WebbIE confusing when it "jumped from the first form field to the ok button". Some clarification of search functions and keyboard shortcuts was communicated to this user by email. There was some possible confusion and conflict with keyboard shortcuts used in JAWS. There are also forms that linearise badly in WebbIE, depending on how they are coded. JAWS users are sometimes frustrated with having to press the return key to confirm each form field.

Another user reported that WebbIE lacked a shortcut key to place the cursor on the first form element of a page. This function exists (F6) and is described in the help files; the user was notified of it. One person noted that the 'Goto form' function (F7) does not pass from heading to heading, but remains always at the level 1 heading. This is a deliberate developer choice; inconsistent or incorrect use of HTML mark-up on pages making the usability benefits of this potential feature unlikely.

One person, citing the example of a table found on the web page http://www.msa.fr/front/id/msafr/S1096461900197/S1098192456447/S10981924598 53/publi_P1117785081568 and tested with WebbIE, would like to see a separation marker indicating change of columns and rows. When a table is linearised, he believed this would be helpful, in cases where cell content extends beyond one line, and users have difficulty determining where they are in the table structure.

Criticisms came from one user with some functional vision, using WebbIE in both modes (visual display and text view), without a screen reader. These involved:

- The WebbIE Manual. Although described as clear and precise, frustration was expressed at the ordering of information. Instructions on how to return pages to normal size after using the zoom is in the last section of the manual, rather than in the section on toolbar functions. The user remarked that many people with some vision prefer to consult documents by printing them out and then using magnification devices. When consulting the document with screen magnification software and testing the WebbIE zoom function, before knowing how to restore the page to the normal level of zoom, there is a risk of the user's machine crashing. The vital information needs to appear sooner in the manual.

- The 'Find on Google' function, Ctrl + Shift + W. Although this evaluator found this search function useful and efficient, it was thought to be slow, particularly in the text mode of WebbIE.

- IE Appearance Editor. This application which installs alongside WebbIE was not found to be effective, "although it should have been *the* strong point" with "bugs, recurring loops and a general weakness of handling". It was suggested that the manual include some choice swearwords for use when a user only succeeds in altering pages to display black text on a black background. Attempts to use the editor were unsuccessful and regrettably abandoned.

This tester used WebbIE to consult a number of sites, described below.

The http://pfef.free.fr website was reported to be difficult to consult: it contains changing colours, navigation in certain parts of the site, faults in the site structure. The zoom function in WebbIE was much appreciated, allowing the user to identify colour and other details of an image (edging on a regimental saddle) for research.

WebbIE was also found helpful with the www.vial.jean.free.fr website to select page fragments with or without images, although it was not always found easy to "get hold of certain sections of text".

On the www.drapeaux.org website an attempt was made to alter colours, as the user cannot distinguish the links. Changing background or link colours would have been welcome, but this attempt failed.

On the www.sweetsingles.com website, the user again tried to harmonise colours, font types and sizes with WebbIE and the IE Appearance Editor. He concluded that he had not mastered WebbIE sufficiently to have succeeded.

One user who has yet to return the complete questionnaire has requested details on WebbIE's ability to handle frames and JavaScripts. He tested WebbIE on the www.voyages.sncf.fr/ website and failed to consult train timetables and complete booking operations. This site opens multiple popup windows allowing users to input information.

For the final question "Who do you think might use WebbIE?" replies included:

- Internet novices;

- All users, for consultation of websites overcharged with images;

- People with some vision, on the condition that features are made easier to use and that bugs are ironed out.

With the end of summer holidays in France, more completed questionnaires are expected to arrive.

2.6.2. England

2.6.2.1. Contacts

Useful information could hoped to be gained from further interviews with English users of WebbIE, to supplement data obtained from the small numbers originally interviewed and to asses appreciation and reported usefulness of latest developments. It was hoped to learn more about web usage patterns and reasons for choosing to use WebbIE over other options. For users with some sight it was thought interesting to explore what browser accessibility features they used in WebbIE or elsewhere. A more random distribution of users was to be targeted. All those who had been interviewed were users of screen readers (specifically LookOUT) and all associated with a company that distributes WebbIE and offers training (LookOUT, 2005). It was through this company that initial contacts were to be arranged. Twenty telephone interviews were planned and a possible five face-to face interviews scheduled. Contact with real users consulting websites of their choice with WebbIE would also inform the concurrent test procedures and subsequent analysis.

Contacts for these numbers of people were never fully established. A total of five people were ultimately interviewed, four contacted through the same company, including founding members and referrals, and one further evaluator, also involved in training. Tests had earlier been envisaged with people living in an English educational facility centre for Blind people and a preliminary day visit to this school made with a view to setting up evaluations, but plans for this were not finalised.

One difficulty in finding people to interview lay with the fact that WebbIE is a freely available application, downloadable from the Internet. No records are available as to who users may be, outside of associations who are involved in training visually impaired people in IT skills and who recommend and train people in WebbIE use. Contact with one such group indicated that most such training concerns beginners. These people could not yet be termed existing WebbIE users Trainers themselves were sometimes familiar with WebbIE only on a basic level, as an available solution to recommend and explore according to interest expressed. Companies distributing WebbIE (available for low cost on a CD) have few client records, as might be expected with more costly software, where support services are packaged with sales. There is no dedicated forum or discussion group for WebbIE users. The stated role of application developers involved in WebbIE's design was production of such software, not distribution or training, and while user evaluations are valued for feedback, this is not pursued on a large scale.

2.6.2.2. Questionnaire and Interviews

Without any networking possibilities in England and having fully exploited any available contacts, feedback from the few people available for interview needed to be maximised. The telephone interviews planned were extended to requests for face-to-face interviews and included both a detailed questionnaire and a series of task-based exercises asking people to connect to a number of websites, with predetermined goals to achieve. Interviews were recorded.

The questionnaire itself sought to gather information on users' computer experience; Internet use and habits; assistive technology used; WebbIE appreciation and use, including comparisons with other available options; and contained detailed questions on different WebbIE functions exploited. A minor part of the evaluation was to determine whether and how often updates were installed by users and to asses the value of the help files and manual.

The practical exercises (four in total) allowed for observations on techniques or tactics employed by users carrying out goal-based tasks on real websites, familiar or not to them, using WebbIE. Each user was asked to attempt a number of these exercises, according to their skill level and the time available. A range of tasks was available, with varying degrees of difficulty and including optional exercises which might be carried out by skilled users or involving challenges commonly encountered on websites.

Results for the numbers of interviewees visited are insufficient for objective analysis, and are subject to the same potential bias as the original tests, but offer rich

and detailed feedback. An exhaustive week of tests was carried out, visiting users living in different parts of England.

The questionnaire and accompanying tasks can be found in Annexes 2: English users questionnaire. The questionnaire used in the original study can also be found in Annexes 2: Original English questionnaire.

2.6.2.3. User Feedback

Four men and one woman were interviewed, ranging in age from their mid-thirties to mid-sixties, with a predominant number of older people. Levels of visual impairment varied a little amongst the five testers; two users had some very limited vision. Two users had experienced visual impairments dating from 5 years, one suddenly and one on a more evolving basis. The remaining people had vision impairments dating from birth or for over 35 years.

Computers had been used by these people for between 4 and 20 years, for an average length of 12 years. All were screen reader users; four using LookOUT and one JAWS. Three were Braille users. Two used combined screen reader and magnification software, very rarely. One user spent between 2 and 3 hours on a computer a week; the remaining people spent from 15 to 30 hours a week on computers. Some users were familiar with computers before experiencing vision difficulties.

Three users connected to the Internet between 10 and 20 hours a week, two for only ½ -1 hour; and all considered themselves intermediate or expert users, with some reservations (none were programmers). One user had been using Internet for only a year; the others had an average 5 years Internet experience. Three worked in computing and websites were consulted for professional use between 60 and 90% of the time for these people. The number of websites visited a week were estimated to be between 2-5 for two users and 30-50 for the three others. Three users visited a wide variety of sites and surfed the Internet extensively, all followed links out of known sites.

A breakdown by participant of some results is detailed in the following Table 17.

Table 17: Internet use by people interviewed

Internet use	P1	P2	P3	P4	P5
Years using	5	1	8	4	3
Hours a week	10-15	½-1	10	½-1	15-20
Websites visited a week	30-50	2-3	30+	3-5	50
Skill level	expert	intermediate	expert	intermediate	intermediate
Variety of sites consulted	wide	small	wide	small	wide
Surfs	a lot	a little	a lot	a little	a lot
Interactive features	yes	a little	yes	search only	yes
Experience of the web	indispensable	practical / enjoyable	indispensable	necessary evil	practical / enjoyable

Regular sites visited were for news and information, shopping, banking, web mail, travel, computing and because they were of particular interest to visually impaired people. They included:

- www.bbc.co.uk (sometimes through the WebbIE RSS feed)
- www.answers.com
- www.rnib.org.uk
- www.screenreader.co.uk
- www.tesco.com/access
- www.waitrose.com
- www.traintimes.org.uk
- www.jfwlite.com
- www.easyjet.com
- banking (unspecified),
- web mail online (unspecified),
- www.google.co.uk
- www.modern-world-data.com
- www.downloads.com
- www.majorgeeks.com
- www.argos.co.uk

The numbers of sites bookmarked by these users were between zero and 20; participants stated that though they frequently bookmarked sites, they only used a small number of them, rarely returning to a site by this means. All used the Google search engine exclusively, often as a preferred method for connecting to or retrieving a site. Four out of five people interviewed used service sites requiring interaction (shopping, banking etc.), one (other than using web mail or for searches) only read pages, due to strong concerns over security and financial issues (connection time).

Participants had been using WebbIE for between one and three years; one person was extensively involved in consultations concerning its creation and evolution. Some had began Internet browsing with WebbIE and used it exclusively; two out of three people who had used another browser before then used WebbIE and IE interchangeably.

Table 18: Browser use and appreciation

Browser use	**P1**	**P2**	**P3**	**P4**	**P5**
Years using WebbIE	3+	1	1	3	3
Browser used before	CompuServe, IE	no	IE	IE	no
Current browser use	WebbIE exclusively	WebbIE exclusively	WebbIE and IE	WebbIE and IE	WebbIE exclusively
Appreciation of WebbIE	excellent	excellent	good	functional	excellent

Appreciation for the browser was generally very positive; three people described it as "the best thing since sliced bread", one as "good" and one as "not great, but better than nothing". Some claimed they "couldn't manage without it". Most people had begun to use it because it had been recommended (on or offline) as a user-friendly tool, by networks of associations or companies distributing software for visually impaired people. One person had been introduced to WebbIE during their initiation into Internet.

Reasons stated for choosing to switch over to WebbIE use or for using WebbIE in preference to another browser included:

- WebbIE was good for "sorting out a site, problem solving and negotiating your way around a site more quickly than with IE";

- printing out without images found to be easier to manage and more successful than with IE;

- for particular sites, for example newspaper sites, or if page was too cluttered, laborious or inaccessible elements were present.

Choice of browser often depended on the site; sometimes depending on how a screen reader read it. Where there was a text only version or an accessible site available, some users felt comfortable using IE. Some sites were found to be better consulted in IE, when WebbIE failed to allow access to content for example. One user preferred managing favourites and downloading PDF files from IE.

Three of the five people interviewed had not heard of any similar tools available for web browsing or had never used them. Of the other two people, one was able to discuss comparative merits in detail and had chosen to use WebbIE exclusively, with the LookOUT screen reader. The other person knew only vaguely of other possibilities and was more familiar with using IE and JAWS; he believed his preference for using this combination, with WebbIE only as an additional tool, was a result of having learnt with them first and having developed familiar strategies for use. He needed to consult WebbIE menus again with each use, forgetting the hotkey combinations which are different from those used with JAWS and IE to navigate. He feared he might be "missing something" by using WebbIE, with its particular method of reprocessing and re-presenting pages, removing some elements.

Strong points of WebbIE listed by users, including comments on interface, features and specific functions, were as follows:

- the interface: "it's how a blind person wants it";

- page rendering in a text format;

- linear presentation, predictability, control: "it's our dream to have it how we want it", "is like going back to accessing the DOS[18]", "everything in a list";

- all keyboard controllable / accessible, built in shortcuts;

- simplicity and ease of use: "usable just with arrow and enter keys", "either get what you want or soon know when you don't get what you want";

- easy to learn: "don't need much technical knowledge", "allows you to get up speed as you learn what you want to do";

- direct access to content: "ability to take clutter out of a page", "de-clutter device", "gets rid of all screen clutter", "tend to get to bits you need really

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[18] DOS: Disk Operating System

quickly", "it gets you where you want to go", "more content information presented than if you remove images etc. with Windows accessibility features";

- tool for understanding site structure: "good for sorting out a site, problem solving and negotiating way around a site" ;

- skip links functions: Control arrow down, up keys

- crop page function: allowing direct access to content for reading / listening;

- copy / paste function: easy to use and useful "once info gathered";

- form filling functions: preferable to JAWS and Supernova modes;

- Go to page heading function

WebbIE functions found to be particularly useful varied for each individual:

- (P1) crop page, forms;

- (P2) not really familiar with functions

- (P3) goto links, goto forms;

- (P4) printing;

- (P5) skip links, goto heading, copy / paste.

Weak points of WebbIE described were:

- time taken to load a website;

- buggy behaviour with favourites, including loss of them: "from time to time favourites list just drops out", users reported needing to reinstall WebbIE to recuperate favourites or to copy / paste them from IE to WebbIE and some lack of clarity concerning how this synchronises with IE was noted;

- links not signalled in the crop page mode: this is a deliberate WebbIE function, but users sometimes found they missed "the vital clue" when a link was removed from a block of text (having sought only to remove navigational links);

- non HTML content:

    1. PDF files could not be downloaded from WebbIE in text mode;

    2. users reported not knowing where audio or other multimedia files were downloaded to and would like to be able to better

> control this from within the WebbIE interface or be explicitly told where they had been saved to;

- repeated lines sometimes presented in the text mode were found to be a minor irritant;

- edit areas are sometimes missed;

- possibility of getting lost: because "WebbIE plays around with the coding, a website doesn't always work the way the designer expected it to work and you can get lost";

- uses different hotkeys to navigate than Jaws: additional load to learn;

- numbering of links found to annoying, too simplistic;

- maximising WebbIE window: one user was unable to set preferences for WebbIE to maximise by default on start-up (the problem was resolved by installing a later version) and another user would like to be able to from WebbIE menus;

- search boxes: unclear how to use, to move on to the next process after having entered data;

- manual: could have better manuals "for people like me... something that tells you exactly what to do, what you need to do".

Some participants were new users of WebbIE version 3 and/or still considered themselves in a learning mode, not using the browser to its full potential. These users felt unable to compare different versions or describe any possible weak points. One person could find absolutely no fault with WebbIE.

Issues arose when discussing the WebbIE help files and manual, noted by some as weak points. These will be discussed separately. One user felt that a weak point of WebbIE was that it would always need to "play catch up" relating to its ability to handle new techniques employed on web pages, such as Java technology or Flash. Associated with this were (new technology) issues as they arrive for particular sites. This was felt to be a reality rather than a true weak point.

Feedback about form filling functions was mixed. While one user did not understand how to use them and avoided them where possible, two expert users disagreed over their usefulness. For one, WebbIE form filling functions were described as "streets ahead" of the JAWS forms mode (wobbly technology, complicated to learn, can't go back and know how you filled in a form so easily) and better than Supernova modes (very difficult to learn and to use, not robust, misses vital interface elements like buttons). For another power user, the WebbIE process was experienced as long and

irritating, delaying speedy data entry. This last user did not hesitate to recommend WebbIE for beginners.

Tabbing is a basic conflict with JAWS shortcut keys. The tab key in WebbIE takes you from the text pane to the address bar. Tab is the 'jump to links' hotkey in Jaws; WebbIE uses Control-Tab for this function. F6 in WebbIE is used to jump to forms; this key is used elsewhere to repeat the screen reader. F7 is used for spell check in JAWS and 'Goto Headline' in WebbIE. The insert key in JAWS brings up a list of links; this is done in WebbIE with Control+L. Power users report many benefits from using WebbIE but may experience interference, including the need to learn another set of keys, preventing them from fully utilising it, depending on their screen user. It should be noted that there is no general agreement for hotkeys for screen readers. Much depends on how initial browsing was learnt.

This study did not permit feedback from users with some functional vision, and no conclusions can be drawn about the usefulness of browser accessibility features such as changing font colours and sizes.

Suggestions for improvements to WebbIE, in conjunction to dealing with issues raised in reported weak points included:

- handling sites with large volumes and complexity: WebbIE could possibly help to better structure or manage an approach to these sites;

- improved ability to handle PDF files, Flash and Java objects;

- extending WebbIE to meet the needs of people with other disabilities (e.g. dyslexia, by allowing sharp control over colours and contrast): compatibility with the existing WebbIE was raised as a concern here, worries were expressed that this would "spoil it for blind people" by overcomplicating the browser;

- favourites: a create folders option from within the WebbIE interface would be found helpful;

- introducing an option to remove numbers on links and forms: this was considered unnecessary, as was being informed of location on a link;

- revisiting keys:

  1. another alternative to the forward (Alt+right arrow) keyboard shortcut, difficult to manipulate with one hand would be helpful;

  2. replicating normal windows hotkeys: Alt+D for jump to links;

  3. F6 to repeat screen reader rather than for goto form;

- the addition of a full screen option from the View menu of WebbIE;

Again some of these suggestions are from power users who would either like more options (as are available in other browsers and to personalise the application) or less (features found too simplistic, as with information given on links, and too lengthy, as with form filling). It is a developer decision to keep the interface as minimal as possible, while retaining maximum functionality and to facilitate use of the browser by inexperienced users. Favourites, for example, can be managed more fully by opening IE from WebbIE. One user who generally prefers IE for his own use believes WebbIE is the only option for beginners: "WebbIE creates the lowest common denominator".

No users had received any formal training for using WebbIE. There are no dedicated support groups for users, on or offline. A number of organisations currently offer training. WebbIE had been recommended to many others by all people interviewed, through formal and informal networks, but there was little idea how many people are using it.

Answers to questions about training, versions used, updating habits and consultation of help files, the manual and tooltips are summarized in the following Table 19.

Table 19: User version use, updating and consultation of help items

Versions	P1	P2	P3	P4	P5
Training	n/a	informal	no	no	3
How often seek updates	advised by developer	never	infrequently	never	frequently
Ever updated	frequently	yes x 3	yes x 1	no	yes, x 3
Current version	3, 2.7, 2.6	3	3	0.10.2	3, 2.6
Help files consulted	no	a little	no	no	no
Manual ever consulted	yes	yes		a little	a little
Recent manual consulted	no	no	no	a little	no
F1 tooltips used	no	no	no	no	no

One person relied on someone else to update WebbIE versions on their computer. For those using version three, 3 out of 4 had installed it recently because they had been contacted for interviewing. The person using an old version updated subsequent to the interview. Two people were using WebbIE 3 in conjunction with the RSS Feeder.

For those users who had consulted the help files or manual, they did so to find specific answers to specific difficulties encountered (e.g. how to maximise the window, how to use forms, why menu links were repeated at the beginning of each new page in a site). Though finding them moderately helpful, they generally did not wish to consult a simple list of keystrokes: "I use some and that's enough". Comments about the manual included "It doesn't tell me how to use it" and "It's not user-friendly".

A different kind of manual was suggested, describing pragmatic approaches to using WebbIE, and available in Braille, natural-voice audio recordings or text formats.

People, mostly self-taught, had developed strategies for using WebbIE and believed these might be helpful to others. Examples given:

- when encountering a table that linearised badly in WebbIE text mode, a user switched back to the IE view and had their screen reader read it;

- searches for words like 'text input' can rapidly find form elements on a page.

It was thought that an addition to the website might be helpful in the form of short introductory ("starting off with WebbIE") and task oriented demonstrations (examples: searching for a particular site and how to approach it, filling in a form with WebbIE, dealing with multimedia files and associated software packages). An idea discussed with people from the software company distributing WebbIE was to produce a small number of captioned videos, with text versions available, of possible interest to beginners, current users and people involved in training.

Issues and solutions described above were considered training issues that did not need to be addressed by application developers, concerned with production not follow-up of software and no resources for the project were made available. This does not lessen their relevance for usability design.

Observation exercises

Each person interviewed carried out between two and four of the task-based exercises completing the interviews. Tasks were designed to be achievable, but incorporated areas of difficulty that would motivate the user to fully exploit all known strategies for website consultation. The first task was planned for its complexity on an otherwise familiar and frequently used British website, www.bbc.co.uk., where users could be expected to be familiar with the site, but not necessarily know how to access the details requested of them during the exercise. Most tasks involved connecting to sites that were not known to be particularly popular or accessible.

The aim was to observe strategies for using WebbIE on unfamiliar sites or on more complex parts of a known site. It was hoped that despite the circumstances, users

would not find the tasks daunting and might even enjoy the exercises. The list of tasks can be found in Annexes 2: Observation exercises.

All tasks involved some degree of difficulty:

- task 1 (searching for a local weather forecast) presented multiple ways to access the information requested and had lengthy menus on each page;

- task 2, (searching for ingredients of a recipe), included navigational 'traps' in the presentation of search results (presenting external search engine site links before internal site pages) and some problematic vocabulary, including for speech synthesisers, as well as presentation of final content in distracting double lines;

- task 3, for intermediate and advanced users, required form filling on a mainstream travel site (to find train timetable information), with some complications, including missing alternative text on images, non-specified date formats and minutes of a projected journey time to enter, without explanatory labels and a requirement to register before accessing price information;

- task 4, for expert users, (shopping for a product) was on a site where secondary menus of store categories providing easy access to the product did not present correctly in WebbIE and needed the user to employ search strategies to succeed.

Times varied for completion of the tasks, from 5 minutes to over an hour, most taking around 15 minutes. Power users were generally faster, as could be expected, although not always.

Navigation strategies on sites varied; expert users favoured search functions followed by rapid perusal of links, less experienced users tended to use link by link consultation of page content and repeated viewing of options, punctuated by periodic searches. This is behaviour that does not essentially differ from that of sighted users: the difference lies in computer and web use experience.

That less experienced users took a more methodical approach, systematically explored redundant options and listened to more words per line, than expert users, before skipping to the next item, did not necessarily prejudice their efficiency. Sometimes these users arrived at results in roughly equal times to expert users. Expert users tended to make rapid decisions based on the first few choices offered and sometimes missed the solution offered by links situated further down the page. Using goal oriented search techniques they could miss simple navigation links listed towards the top of a page. An example would be not following links like 'soup' or 'vegetarian' on

the recipe page, searching for 'Borsht' and following the first link offered on the result page, taking them to further searches on external sites ('Borsht' on Lycos, Ebay...). They were diverted to other pages or sites, but tended to retain a notion of where they were located in or out of the site structure and could return successfully. Less experienced users dealt with a site on a page by page basis and sometimes had difficulty keeping an overall view of the site structure and where they were in it. Naming of the page by WebbIE was remarked as being helpful by all users. Again, more experienced users tended to listen to fewer words (between 1 and 5) presented on a line and were focused on the keyword they had chosen to search for. In this way a phrase like 'Summer Borsht' was skipped, whereas if the line began with the word 'Borsht' it would be immediately chosen. Details needed to complete the task where not always heard on first listening and sometimes the whole process was repeated to complete the task.

Less experienced users were less confident in dealing with distractions like system messages (e.g. Cookies enabled?) and did not always manage form filling well, entering information above the text input line for example.

When people experienced difficulties, including with their computers, some assistance and guidance was offered. Some exercises became more training sessions than observation of independently performed tasks.

Strategies observed included:

- quick appraisal of the home page – reading of links to get an idea of page content and further content available;
- going directly to forms with the WebbIE hotkey;
- skipping links;
- search for keywords followed by tabbing up and down links;
- search for form elements to enter text using words like 'input' or 'text' or searching for site search form using 'search' keyword;
- searching with both internal site search functions and WebbIE page search;
- cropping pages when arriving at a page judged to contain principal content for rapid perusal;
- opening link lists within WebbIE.

No user chose to follow the link to the text only version of the site available on the BBC site; some however used the skip to content link provided. Users did not switch back and forth from the text mode to the IE view. WebbIE functions favoured confirmed the preferences expressed by each user. The problematic Tab or

Control+Tab conflicting functions were indeed observed with the JAWS user and this interfered with his efficiency. All users entered URLs manually even if the site was bookmarked or even their homepage; one could not delete the existing URL to replace it with a new site address. Abbreviated words like 'max', 'min' and 'deg' posed some difficulty for rapid understanding of site content.

Participants who completed tasks rapidly and with the least number of diversions used a combination of searches, link-based navigation strategies and content sampling, taking time to reflect on options before acting. They exploited a larger combination of WebbIE features and functions to achieve goals.

3. Part Two – Speech Synthesis

This work, part of the original placement proposal, involved assessing speech synthesisers according to specific criteria. The project, involving a series of trials to test the accuracy of speech synthesisers with a variety of users, was abandoned, due to the lack of raw data which was to be provided by an external project partner.

The only work undertaken involved was a preliminary listening exercise, in two parts, to augment tests done by two other researchers. Both involved evaluating four different female English speech synthesisers: Jane and Audrey, supposedly the highest quality British speech synthesisers; Mary, the American free synthesiser; and Victoria, also American but for MacIntosh users), according to essentially subjective criteria.

The first exercise consisted of audio recordings of a set of single words (a, able, about, above, accommodation, accompany, across, act, action, active, actual, add, advertisement...): the task was to listen to these (over 700 words) and determine for each synthesiser which words were fully correct, acceptable in context but slightly dubious or incorrect. The criteria, particularly "Acceptable in context..." were not defined precisely; the task demanded a simple judgement call.

The second task was to score in the same way a set of homophones.

Example sentences would be:

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"Sentences Double stress: He wore a red overall. The overall effect
was stunning."
"Stress homographs: I had to console him. He had broken his
computer console."
"He was really content. The content of the document was excellent."
"This is a wind up. You wind up the clock and the wind blows. It
puts the wind up you."
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Results were entered into two blank spreadsheets; that of the homophone exercise can be found in Annexe 4.

The tasks were simply the beginning of a larger set of evaluations aimed at classifying speech synthesisers in their usability for dyslexics, primarily in a proof-reading situation. Speech synthesisers are used quite extensively with dyslexic people. Little however is known about their accuracy. Questions include: "What sort of speech synthesiser should they use?" "Is speech synthesis appropriate for the purpose?" "When is speech synthesis likely to break down?" One issue is whether it's better to have a more mechanical voice than a more natural voice. Intuitive arguments seem to say that the more natural the voice the better. Experimental arguments and experience with blind people tends to indicate the opposite. Understandability of speech is not

necessarily better if it is more natural. It can actually be worse, and there are some studies that show this, in terms of pure understandability.

Homographs are a well-known potential problem, because one of the things that dyslexics have problems with is homographs and homophones. If the speech synthesiser is unable to determine the correct pronunciation of a word in context there is a potential problem. The initial evaluations were intended to get a feel for their performance with single words (right/wrong) and with a variety of fairly common homographs (degree of accuracy in context).

One possible conclusion to this incomplete research work is that there is no difference between speech synthesisers, another that some speech synthesisers are better than others. If differences are found researchers will attempt to isolate what the characteristics are.

4. Part Two (Modified) – Symbols

4.1. Symbols as Assistive Technology: AAC[19]

Symbols are used as part of Augmentative and Alternative Communication strategies, to support people with complex communication needs. A number of language systems exist as materials or devices to enhance communication and language skills; picture symbol sets include PCS (Picture Communication Symbols); WR (Widgit Rebus); Blissymbolics; Makaton; Picsyms and DynaSyms.

4.2. Standard methods of assessing symbols

Standard assessment methodologies designed to determine the capacity of symbol sets to aid the matching of a picture to its referent or to name a picture before using it as a symbol for communication, as well as their appropriateness for certain groups, are used in AAC and public safety pictogram research. These include transparency, translucency, guessability and iconicity test techniques and instruments. They aid in understanding how people interpret pictographic symbols.

4.2.1. Transparency

Individual pictographic symbols can be assessed by evaluating how easily they can be identified from a small number (4-6) of alternative symbols to match a spoken label. No other contextual information (printed labels or verbal hints) is provided. A symbol said to be highly transparent is easily identified from the other choices.

4.2.2. Translucency

Translucency tests assess the extent to which a pictographic symbol looks like its given meaning, determined by a 5 to 7 point rating scale. Results on the higher end of the scale indicate that a strong relationship is perceived between the symbol and its meaning.

4.2.3. Guessability

Guessability tests ask participants to guess the meaning of a symbol, with no contextual information provided. Written or spoken responses are recorded.

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[19] AAC: Augmentative and Alternative Communication

Sometimes known as 'Comprehension' tests, they are used in pharmaceutical and safety research.

4.2.4. Iconicity

Iconicity describes the relationship perceived between a symbol and its meaning. Iconicity was defined by Blischak *et al.* as the degree to which an individual perceives visual similarity between a symbol and its referent, as demonstrated by the three dimensions of transparency, translucency and opaqueness (Blischak *et al.*, 1997). Classic iconicity tests assess how accurately participants can identify individual symbols from a group of 36 symbols presented thematically on a single communication board, in response to spoken word labels (Johnson, 2004). Iconicity assessments include a degree of contextual information.

4.2.5. Cultural considerations

Recent research has investigated how symbol perception varies between people with different cultural and linguistic backgrounds (Nakamura *et al.* 1998, Huer, 2000, Worah, 2001, Haupt & Alant, 2003). There is a relative dearth of research on how participants from a range of cultures perceive the symbol-referent relationship and on how factors of illiteracy levels alter these perceptions (Johnson, 2004).

Noted as problematic areas are the use in testing instruments and symbols of rating scales, physical representations (an example being cartons to represent milk), arrows, exclamation marks, plus signs and culturally specific gestures (for example head movements to indicate yes/no). These have divergent use and interpretation amongst different ethnic groups. To this may be added symbols based on sign languages, specific to ASL[20] or BSL[21] for example. General exposure to symbols and familiarity with written communication may differ with different cultural groups. Illiteracy levels are thought to be high amongst immigrant populations; associating labels with common symbols may be less easily acquired in a general learning environment, written clues on symbols may fail. Faces depicting people, family groups and emotions are another complex area; skin colour has been predominately white and interrelationships depicted based on Western European cultural norms. The capacity to recognise and interpret emotions also varies with individuals.

Culturally appropriate test instruments and procedures are desirable.

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[20] ASL: American Sign Language

[21] BSL: British Sign Language

4.3. Project outline

For this second stage of the placement, a series of evaluations using a number of symbol test mechanisms (translucency, guessability and iconicity) were carried out with ethnically diverse groups. One goal was to gain some practical experience in using a range of test methods. Research goals focused on investigating how well these established measures and testing techniques succeeded in characterising and classifying the groups' usage of the symbols. It was hoped to identify which methods worked best. Work carried out during the placement was also to contribute to knowledge in an ongoing project, described below.

4.3.1. Wider research context

There was a wider context to the work carried out. Manchester University is conducting an ongoing research project (hereafter called the ESRC project) to support communication between health care providers and patients, with limited or no English, in medical consultations. This work involved assessing the use of pictographic symbols to improve cross-cultural communication in face-to-face medical consultations, specifically with Somali asthma sufferers living in England.

4.3.1.1. Preliminary findings

A pilot study was conducted for the ESRC project (Johnson, 2004) to establish whether standardised symbol assessments and symbol sets are appropriate for use with both Somalis with limited English and English nursing students. Literacy levels varied amongst the Somali population, both in English and Somali. The students were representative of the westernised, literate English-speaking population for which symbol assessments were originally designed. The guessability and translucency of individual pictographic symbols, both PCS (Picture Communication Symbols) and WR (Widgit Rebus), were tested with both populations, from the Manchester area.

PCS and Widgit Rebus symbol sets were used for translucency and guessability tests this study; research had shown that these sets were easiest to learn for new or illiterate users (Musselwhite & Ruscello, 1984; Mizuko, 1987; Mizuko & Reichle, 1989) and they were considered the more appropriate for study with different cultures. One study aim was also to establish whether there were any differences in the interpretation of PCS and WR symbols. Translucency and guessability instruments were chosen for their capacity to assess different aspects of how people interpret pictographic symbols, with and without their given label (Johnson, 2004).

The research report on the pilot study concluded that neither type of test in their current standardised form seemed appropriate for Somali participants and would not be used in the next stage of the study.

The 7-point rating scale, in particular, used in translucency tests was found to be inappropriate. Some Somali participants, unfamiliar with the concept and use of rating scales may, for example, have used the highest point on the scale to show they understood rather than to indicate strong agreement. The Somali group assigned higher translucency ratings than the English group to both PCS and WR symbols and their referents. The possibility of using a pictorial version of a rating scale was suggested for further research, to avoid problems due to low literacy levels. It was thought that rating scales as a scoring system were perhaps a culturally inappropriate method altogether for Somali participants.

Results revealed difficulties in testing for comprehension of symbols in the absence of context, such as other symbols to choose from. It was felt that more contextual information would have resulted in fewer errors (Johnson, 2004). The report recommended testing in real-life communication interactions.

Somali participants scored poorly in guessability tests in comparison to English nursing students. This had been expected, with different educational levels between the groups. Literacy difficulties meant many Somali participants were unable to complete tests. Again it was found that lack of contextual information and assessment of individual symbols in isolation did not reflect actual use.

Overall results of the translucency and guessability tests were not found to be particularly useful. The same PCS and WR symbols that the Somali group had achieved very low guessability scores for were rated very highly in the translucency tests (Johnson, 2004).

Different, more appropriate, testing techniques were recommended for future testing. It was thought that testing symbol comprehension by choosing from a number of alternatives would result in higher levels of comprehension. Iconicity tests have this contextual component.

The reference for iconicity in the ESRC study was a research paper presenting an iconicity test conducted with Zulu children (Haupt & Alant, 2003). High illiteracy rates in this South African population made information presented in the study about the iconicity of symbols especially relevant. The Haupt & Alant study assessed iconicity by how accurately participants could identify different symbols from a group of 36 symbols presented thematically on a single communication grid, in response to spoken word labels. The study concluded that the symbols were not particularly good for Zulu children. It was thought it might be interesting to explore the study further.

4.4. Point of entry to placement project

A decision was then made to replicate the Haupt & Alant study, on a much smaller scale and with a different population group; (adult) participants from an Anglocentric background who were literate and University educated. This was the starting point for the placement project.

4.5. Phase 1: Iconicity Testing – Manchester University

4.5.1. Research aims

The aim of the first tests scheduled was simply to replicate the Haupt & Alant iconicity study, for a different population, and to compare results. Broadly speaking, it was an investigation into how iconicity worked and the potential of iconicity test instruments to characterise different ethnic groups.

It was thought that symbols may not be easy to recognise and interpret, even for educated literate Europeans.

Some informal research questions to explore included:

- To what extent are symbols easier to interpret for educated, literate, Anglocentric people than for other population groups with little or no education and literacy skills?

- Are problems with symbol recognition related to ethnicity or educational background or does the difficulty lie with using symbols cold (without prior learning or in a particular context)?

- Are symbol sets actually so difficult that they are effectively unusable for any population, when used cold?

- How much does introducing contextual information assist symbol recognition?

The essential question was:

- "Can iconicity test instruments be used to segment groups?"

4.5.2. Method

4.5.2.1. Participants

Participants were all University educated, literate and Anglocentric, though not necessarily native English speakers. Almost all were staff or students from Manchester

University. Testing took place on the University campus over the period of a week. No participants presented indications of hearing loss or uncorrected sight problems.

A total of 12 adults were selected for testing. Participants were asked if they were familiar with the use of symbols as communication aids for people who may not have linguistic ability. Two participants were ultimately excluded from the study because of their stated familiarity with symbols, either the precise symbols used in the study or general exposure to British Sign Language and / or familiarity with the wider context of the project. Conclusions were then based on results for the remaining ten participants. It may be relevant to note that these two participants, who did complete the tests, scored significantly higher than the mean average for the 10 naïve participants (64% and 72% correct responses, compared to 50%), strongly indicating that prior knowledge of symbols may increase the correct response rate. The results from a total of 4 women and 6 men were analysed.

4.5.2.2. Procedure

Efforts were made to duplicate as closely as possible the procedure and test protocol used in the Haupt & Alant study, although the much smaller scale of this study and the adult population tested made for some differences, including simplified preparation and administrative procedures. There was no need for consistency checking measures of test procedure instructions; no test-retest reliability was established with a second set of tests on the same people. Tests were conducted in English, whereas the South African study used a Zulu translation of the English words and phrases, suitable to their target group. Participants were tested individually or in one group of two and one group of three. There was no fixed time limit to the duration of the tests and no instruction given to make choices as rapidly as possible. Tests generally took around 30 minutes to complete.

Participants were asked if they were familiar with symbols used as a communication aid and questioned further if the response was positive. It was explained that they would be looking at sets of overlay grids used for communication for people who may not have linguistic ability and that the test involved simply looking at grids and selecting which symbol they believed to be the best match to a word or phrase given them. It was explained that the tests were usually for a younger population. Participants were asked again at this stage if they agreed to participate. All agreed.

It was then explained that they would be given two sets of symbols, the first set to enable them to become familiar with the procedure and symbol sets and a second longer set, with a different grid. For the first set they would be choosing one symbol for

one word said but for the second set they would hear phrases, rather than just nouns. The phrases would be in a context associated with routine bedroom activities or actions, such as making a bed, and general interaction associated with speech.

Participants were presented with the first symbol set and four single words (randomly generated) were read out to them.

An example, from Test 1, would be:

- Rabbit;

- New clothes;

- Octopus;

- Half pint.

They were asked to mark their response for each word on one page and then use a new page for the following choice. Pages were identical copies of the communication overlay. The same procedure was then used to choose a symbol from the second set for each phrase spoken, 36 in all. For all words and phrases they were to choose one symbol only, that which they thought best matched what had been said. They were told that the symbols probably did not repeat; although not explicitly that there was one symbol and one alone for each phrase. The resulting uncertainty a participant may have experienced was felt to be useful. The 36 phrases were presented in lists of randomly generated order, different for each participant. This was in order to preclude effects resulting from a realization of prior selection and is consistent with the procedure used in the Haupt & Alant study.

If a participant did not understand a word it was explained to them in English, without gestures. For example "Crooked is the opposite of straight." Three vocabulary items, 'tangerine', 'crooked' and 'puff', posed this problem, for participants who were non-native speakers. Explanations on the purpose of the study were given to participants as a short debriefing after the second grid was completed.

The procedure was not timed.

4.5.2.3. Symbol sets

The Symbol Grids used in this phase of tests used can be found in Annexes 3: Pre-test Symbol Grid and Main Test Symbol Grid (Iconicity, Manchester University). Definitions of the symbols, both those words and phrases used in the study and their standard meanings, are detailed in Annexes 3: Labels of symbols used in the communication overlays.

The overlay grids were high quality colour copies, without gloss (associated text). Where possible the symbols used were the same as those used in the Haupt &

Alant study, although the PCS set available (U.K.) was slightly different for some symbols. These differences are detailed in Annexes 3: Differences in PCS symbols.

4.5.3. Results and Interpretation

No participant experienced difficulty with the first symbol set, a familiarisation exercise, matching the appropriate symbol to each word read. 100% of the results were correct, though not included for data analysis. Results were complete for the second symbol set, with no missing data.

Total "correct" scores (where the symbol was matched to its referent) ranged from 42% to 56%, with an average of 50.40% and a standard deviation of 4.12. Average scores are much higher than those obtained by the Zulu children in the Haupt & Alant study (17.75% average correct responses). The standard deviation is much lower in the current study, 4.12 compared to 20.17 in the Haupt & Alant study. The tightly clustered data produced in the current study suggests a measure of certainty which is not apparent from the widely dispersed data collected in the Haupt & Alant study.

Table 20: Manchester University subjects outperformed Zulu children

	Total "correct" score average	Standard Deviation
Manchester study	50.40%	4.12
Haupt & Alant study	17.75%	20.17

4.5.3.1. Iconicity values

The iconicity value, representing the number of participants that chose a symbol in response to its target label, was calculated for the Manchester study using the same initial criteria of strict (≥ 75%) and lenient (≥ 50%) as that of the Haupt & Alant study, based on the Doherty *et al* (1985) criteria for interpreting the transparency scores of Amer-Ind gestures. Applying the strict criteria, 10 symbols (27.78%) were found to be iconic (numbers 3; 10; 11; 14; 16; 17; 22; 24; 27; 32). Of these, 3 symbols obtained an iconicity value of 100% (numbers 11; 14; 17). An additional 10 symbols were found to be iconic (numbers 5; 7; 8; 15; 18; 20; 23; 29; 35; 36) when the lenient criteria was applied, making a total of 20 of the 36 symbols (55.56%) classified as iconic according to the lenient criteria. These results are much higher than the Haupt & Alant study which found 2.8% (strict criteria) and 11.1% (lenient criteria) of symbols to be iconic.

Table 21: Iconic symbols according to strict and lenient criteria

Strict Iconicity (10 = 27.78%) (H&A 1 = 2.8%) *Defined as ≥ 75%*	Lenient Iconicity (20 = 55.56%) (H&A 4 = 11.1%) *Defined as ≥50%*
3. No	3. No
10. It is crooked	5. Whoops
11. You need to pull (as H&A)	7. What do you think
14. Let us make the bed	8. It is nice and clean
16. The blanket	10. It is crooked
17. Let us put on	11. You need to pull (as H&A)
22. It is dirty	14. Let us make the bed (as H&A)
24. Help me please	15. Thank you
27. It looks like a bomb went off	16. The blanket
32. The pillow case	17. Let us put on
	18. The sheets
	20. Look at this
	22. It is dirty
	23. Fold it back
	24. Help me please
	27. It looks like a bomb went off
	29. Yes
	32. The pillow case
	35. Hold this please
	36. It looks good

The Haupt & Alant study also found Symbols 12 'Put it in the tub' and 25 'Puff it up' to be iconic (lenient criteria); for the Manchester study the iconicity score for these two symbols was zero.

Symbols which achieved iconicity values corresponding to the strict criteria in the Manchester study were largely pictorial, either highly descriptive concrete objects (blankets, pillowcases...) or full body figures (the one exception being symbol 3 "No" depicting just a head). Number 22 "It is dirty" was more abstract in nature; only two (symbols 3 and 10) contained arrows. Symbol 10 "It is crooked" was a representation of three sticks, one of which leant to an angle (and was indicated by an arrow).

Of the two symbols that both groups found to be iconic (11 and 14), symbol 14 'Let us make the bed' is most closely associated with the generic thematic context presented to the participants (bedrooms and associated activities, such as bed-making). Although the contextual framework may explain why this symbol was a popular choice for its target referent as well as for non-target referents, is a clearly an unambiguous choice for the target label, as a direct physical representation of a bed and a whole human figure actively (implied motion) leaning over it, busy with the bed-linen.

4.5.3.2. Notion of Distinctiveness

Haupt & Alant found that "when the highest frequency responses were studied for each symbol, it became clear that for some symbols many participants agreed on a single specific label, be it the target label or a non-target label. For other symbols either many possible labels, or none of the labels, were indicated" (Haupt & Alant, 2003). Haupt & Alant then coined the term *distinctiveness* to "describe how well defined or specific were the evoked meanings triggered by a symbol in the mind of a viewer" (Haupt & Alant, 2003). This notion of *distinctiveness* referred to the **specificity** of visual similarity perceived and is different to iconicity, which pertains to the **degree** of visual similarity perceived. Results were analysed further to explore these complimentary notions and to categorise responses according to four groupings:

- distinctive and more iconic (many participants chose a certain symbol in response to its target label only) = md;

- indistinctive and more iconic (many participants chose a certain symbol in response to its target label, but also often chose that symbol in response to one or more other labels) = mi;

- distinctive and less iconic (few participants chose a certain symbol in response to its target label, but many of them chose that symbol in response to non-target labels) = ld;

- indistinctive and less iconic (few participants chose a certain symbol in response to its target label, but that symbol was often chosen in response to one or more other labels) = li.

For the correlation, very lenient iconicity values ($\geq 25\%$) were used.

To determine the variable *distinctiveness*, response frequencies $\geq 20\%$ were included in calculations. A symbol was classified as *indistinctive* if there was more than one response over 20% or no response over 20%.

Results from the Manchester study were classified according to these criteria; these are presented in the following Table 22.

Table 22: Distinctive and Iconic (as Haupt & Alant)

	More Iconic (Iconicity values ≥ 25%)	Less Iconic (Iconicity values < 25%)
Distinctive (only one response over 20%)	(md) 2, 3, 4, <mark>5</mark>, 8, 10, 11, 18, 19, 20, 22, 23, <mark>27</mark>, 28, 29, 32, 34	(ld) 9, 12
Indistinctive (more than one response over 20% or no response over 20%)	(mi) 6, 7, <mark>14</mark>, 15, 16, 17, 24, 33, 35, 36	(li) <mark>1</mark>, 13, <mark>21</mark>, 25, 26, <mark>30</mark>, 31
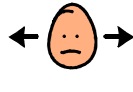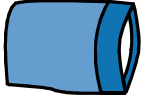
<mark>Highlighting</mark> indicates agreement with Haupt & Alant (5, 27, 14, 1, 21, 30).

md : more iconic, distinctive
ld : less iconic, distinctive
mi : more iconic, indistinctive
li : less iconic, indistinctive

Because very lenient criteria were used to establish iconicity (≥ 25%) a total of 27 symbols from the Manchester study fell into the *more iconic* classification, seven more than with the original lenient criteria (≥ 50%). Only 8 symbols had been found to be *more iconic* in the Haupt & Alant study, where total correct responses were much lower. Ten of these *more iconic* symbols from the Manchester study were found to be *indistinctive* using Haupt & Alant's *distinctiveness* criteria. For example, of the 10 symbols found to be iconic according to strict criteria, 4 were removed to the *indistinctive* category: symbol numbers 14 ('Let us make the bed'), 16 ('The blanket'), 17 ('Let us put on') and 24 ('Help me please') became *more iconic and indistinctive*. The visual similarity of these symbols was not found to be **specific** to target labels. Symbol 14 ('Let us make the bed') was attributed to the target referent but also to non-target labels such as 'Tuck it in' or 'Fold it back'. Symbol 16 ('The blanket') was associated with the non-target referent 'It is nice and soft', symbol 17 ('Let us put on') with the non-target referent 'Let us take it off' and symbol 24 ('Help me please') to the non-target label 'Let me'. The lack of specificity can be ascribed to the context in which they were presented or similarities in physical motion (put on / take off) or to the abstract interpretation of physical objects (blanket = soft), for example.
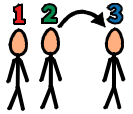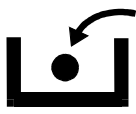
Of the symbols found to be *more iconic and distinctive* in the Manchester study, we can examine those which were originally classified as iconic according to the strict criteria. These are symbols number 3 'No', 10 'It is crooked', 11 'You need to pull', 22 'It is dirty', 27 'It looks like a bomb went off' and 32 'The pillow case'. Of these, only symbol 11 'You need to pull' had achieved an iconicity score of 100% and had never been chosen for a non-target referent. This symbol had been found to be *more iconic* but *indistinctive* in the Haupt & Alant study. The lack of distinctiveness was ascribed to other non-target referents also depicting physical motion.

Table 23: Subset of the 17 more iconic and distinctive symbols, Manchester study

3	10	11	22	27	32
No	It is crooked	You need to pull	It is dirty	It looks like a bomb went off	The pillow case
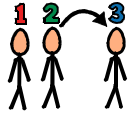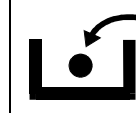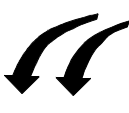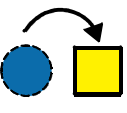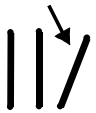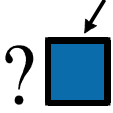
Two of the above symbols (3, 11) included arrows (there were a total of 7 in the *more iconic and distinctive* group); none of the symbols found to be iconic in the Haupt & Alant study contained arrows. This may confirm observations that arrows are more easily interpreted by western cultures familiar with these conventional clues. However, six of all symbols containing arrows were classified as either *more iconic and indistinctive* (15), *less iconic* and *distinctive* (9) or *less iconic* and *indistinctive* (1, 13, 21 and 31). Results do not seem to be conclusive for examining differences between the groups through analysis of the *distinctiveness* criteria alone.

Table 24: Subset of less iconic and indistinctive symbols, Manchester study

1	13	21	25	26	30	31
What is next?	It is finished	Tuck it in	Puff it up	What a mess	Put it here	You are welcome

It may be that, for example, symbols indicating motion with postural clues, rather than with arrows, are generally easier to interpret. Arrows can be used to indicate motion (movement), direction, position, change, or repetition.

Table 25: Examples of arrows in symbols

1	13	21	28	4	10	19
What is next?	It is finished	Tuck it in	Let us do it again	You need to change them	It is crooked	Where is it?
movement	movement, direction	position	repetition	change	position	position

In the Manchester study symbol 21 'Tuck it in' (a geometric abstract with a positioning arrow) was associated 80% of the time with symbol 14 'Let us make the bed', which depicts a whole human figure in implied motion. Of the two symbols (9 and 12) found to be less iconic and distinctive in the Manchester study, one contains an arrow indicating physical motion.
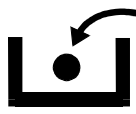
Table 26: Less iconic and distinctive symbols, Manchester study

9	12
Let us take it off	Put it in the tub

In the Haupt & Alant study, the symbol 9 referent 'Let us take it off' was frequently confused with symbol 11 for which the target referent is 'You need to pull'. In the Manchester study 'Let us take it off' was frequently confused with symbol 17 "Let us put on". The same confusion of inferred physical motion noted in the Haupt & Alant study may be the causal factor, and the arrow clue in symbol 9 is not correctly interpreted, at least as an indication of direction. Symbol 12 'Put it in the tub' was associated 80% of the time with 21 'Tuck it in'.

In the context of other possibilities, this was the preferred choice, although it is a geometric design with an arrow. In the absence of a clear choice for symbol 13 'It is finished', which may have required some knowledge of sign language to interpret correctly, half of the group chose 36 'It looks good'.

Table 27: Choice of symbols in context, physical motion and arrows

11	17	21	13	36
You need to pull	Let us put on	Tuck it in	It is finished	It looks good

Results offered rich grounds for discussion of the multiple and interrelating interpretations of symbols presented in context; the individual examples discussed above, mainly for arrows, could be extended to others based on sign language, to those depicting faces, or to those containing exclamation or question marks, for example. A

larger population sampled would give greater insight into meanings evoked by symbols and the process of selection.

The concern was to hone a method which could clarify symbol perception by analysing multiple dimensions. Factors to be measured included how much a symbol corresponded to one referent (for individuals and for the whole group), how frequently symbols were selected, for how many referents, and with what degree of correctness.

4.5.3.3. Frequency of selected symbols

Participants often chose certain symbols several times; the procedure allowed a choice from the total 36 symbols for each spoken label. The frequency with which each participant chose each symbol was calculated. Haupt & Alant hypothesised that the more a symbol was selected, the higher the frequency of correct responses would be (Haupt & Alant, 2003). They calculated the frequency of correct responses per symbol and the total frequency of selection per symbol, plotting results on the same chart.

Haupt & Alant found no evidence to support their hypothesis; no relationship existed between the two sets of data. They concluded that the frequency of correct responses was not a function of total frequency of selection of symbols.

The same procedure was carried out for the Manchester study; results are presented in Figure 1 below.
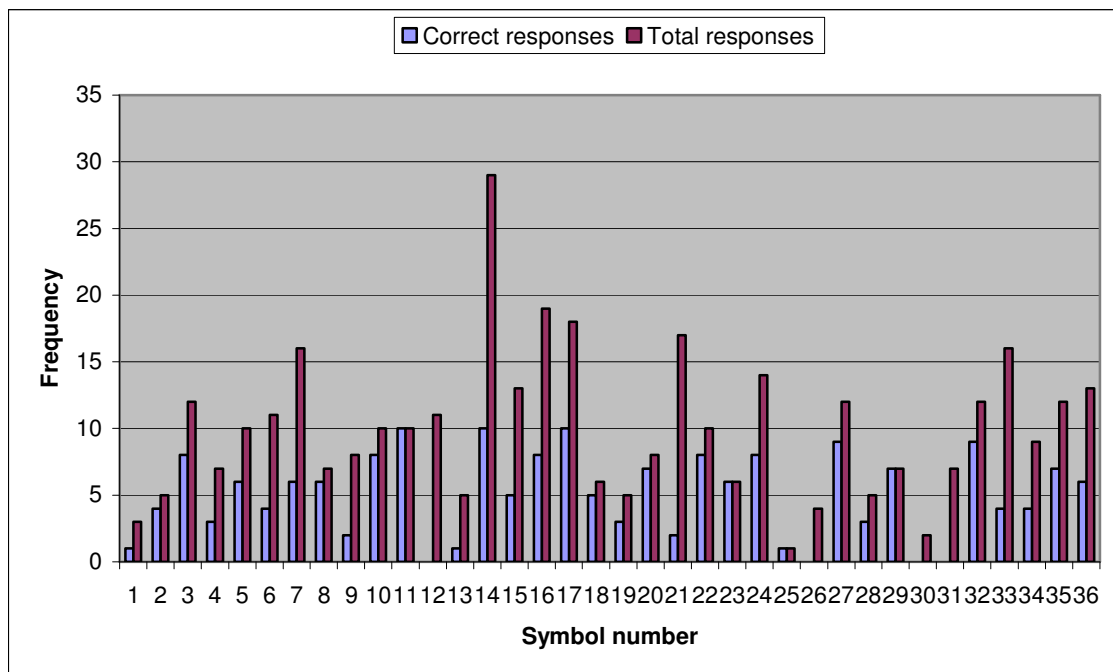
Figure 1: Frequency of selected symbols, Manchester study

Results in the Manchester study, shown in Figure 1 above, differed to some extent. A closer relationship existed between the two sets of data: frequency of correct responses and total frequency of symbol selection.

A further chart is presented in Figure 2 below that shows the ratio between the number of correct selections against number of selections, for the Manchester study.
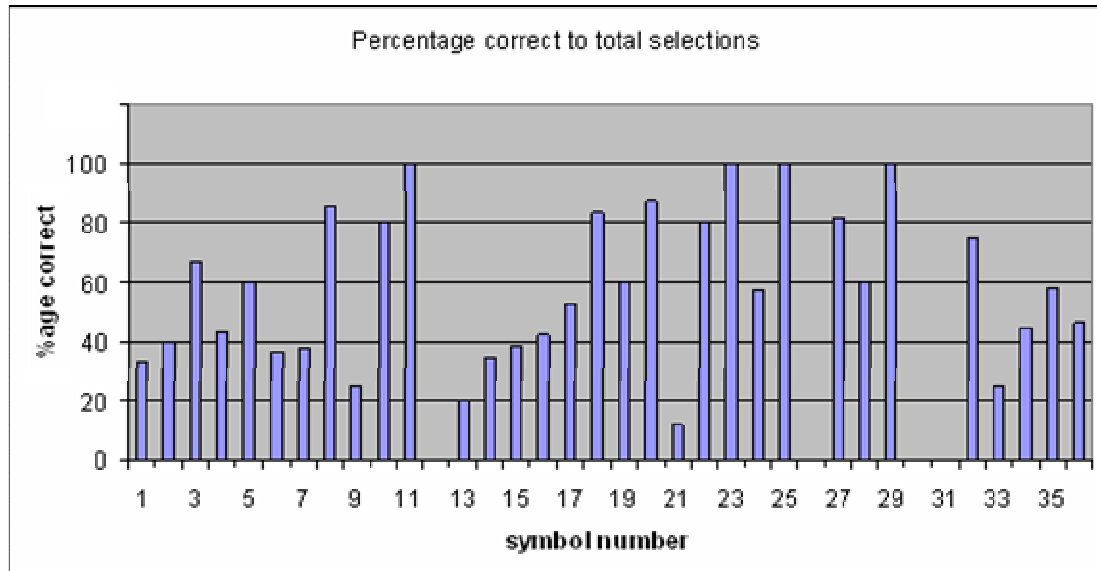
Figure 2: Number of correct selections against number of selections

These dimensions of *frequency* and *correctness* were found to be useful and were incorporated into the Manchester study. For further discussion, refer to 4.5.3.5. Distinctiveness and Iconicity Refined.

4.5.3.4. Position of Symbols, Frequency of selection

36 symbols were arranged on the communication overlay in four rows and 9 columns. Haupt & Alant examined the position of each symbol on the grid against frequency of selection to determine whether their position influenced whether or not they were chosen. They hypothesised that symbols in key positions would be chosen more often: those on the periphery, with less competing stimuli surrounding them; symbols in the centre of the overlay where the eye focuses first; and symbols in the top left quadrant. Frequency of selection for each symbol was analysed twice: once for total frequency of selection and once for frequency of correct responses.

The (qualitative) analysis revealed that symbols placed on the periphery, the centre and the top left quadrant of the overlay were not selected more often in total, nor more often in response to the correct label (Haupt & Alant, 2003). Haupt & Alant concluded that physical placement did not influence selection.

The following Tables 28, 29 and 30 show the frequency of symbol selections for the Manchester study.

Table 28: Total selections

3	5	12	7	10	11	16	7	8
10	10	11	5	29	13	19	19	6
5	8	17	10	6	14	1	4	11
5	7	2	7	12	16	9	12	13

Table 29: Total Correct

1	4	8	3	6	4	6	6	2
8	10	0	1	10	5	8	10	5
3	7	2	8	6	8	1	0	9
3	7	0	0	9	4	4	7	6

Table 30: Correct as percentage of total

33	80	67	43	60	36	38	86	25
80	100	0	20	34	38	42	53	83
60	88	12	80	100	57	100	0	82
100	0	0	75	25	44	58	46	0

Average scores were calculated for symbols placed in the six 'centre' cells, on the periphery and in the top left quadrant. These were compared to averages for the remaining cells of the grid. Results (more or less symbols were selected according to grid position) were somewhat conflicting and not felt to be particularly useful. These are presented in the following Table 31.

Table 31: Comparative symbol selection based on grid position

	Total selections		Total correct		Correct as %age of total	
	Average	Selected	Average	Selected	Average	Selected
Total centre	12,83	more	6,33	more	55,01	more
Remaining cells	9,43		4,77		50,52	
Total periphery	8,82	less	4,77	less	50,98	less
Remaining cells	11,86		5,43		51,72	
Total left quadrant	7,00	less	5,75	more	73,33	more
Remaining cells	10,38		4,94		48,51	

Whilst symbols in the centre position and the top left quadrant of the grid were generally selected more often than surrounding symbols, those on the periphery were selected less often. Haupt & Alant reported that literate individuals preferred the top left quadrant of a page (Haupt & Alant, 2003); it must be noted that participants in the Manchester study were all literate. Other factors, however, must be included in this calculation in order to draw meaningful conclusions.

Haupt & Alant noted that symbols on communication overlays are commonly grouped according to grammatical categories, in roughly five columns from left to right as follows: Social (pronouns, *wh*-words, exclamation words and negative words), Verbs, Descriptors (adjectives and adverbs), Prepositions and Nouns (Haupt & Alant, 2003). The layout of symbols in the communication overlays used in the studies did not conform strictly to these common category patterns. Some ambiguity in classification was possible; categories were determined by the key concept of the symbol's labels. The symbol 'Let us make the bed / make bed', for example, could be classed as a verb or a noun and 'Tuck it in / in or inside' as a verb or a preposition. Nevertheless the Haupt & Alant study described results of an informal data analysis of symbol choice based on grammatical category. Nouns were found to be identified correctly more often and were considered the most iconic symbols.

For the Manchester study, symbols were classed into grammatical categories, according to standard meanings, presented in Tables 32 and 33 below.

Table 32: Symbol labels (standard meaning)

next	soft	no	change	surprised	forget	think	clean	take off
crooked	pull	clothes basket	finish(ed)	make bed	thank you	blanket	put on	sheets
it	look	in or inside	dirty	fold	help	fat	mess	explosion
again	yes	here	welcome	pillow	me	bad	hold	okay

Table 33: Grammatical classification of symbol labels

D	D	D	V	D	V	V	D	V
D	V	N	V	V	S	N	V	N
S	V	P	D	V	V	D	N	N
D	D	D	S	N	S	D	V	S

S = Social (pronouns, wh-words, exclamation words and negative words)
V = Verbs
D = Descriptors (adjectives and adverbs)
P = Prepositions
N = Nouns

From this classification it was found that verbs were on average identified correctly more often than other categories (Verbs 6.17; Nouns 5.17, Descriptors 4.67,

Social 3.60 and Prepositions 2.00). Generally verbs were selected more often than nouns and other categories (Verbs 12.08; Social 10.80, Nouns 10.50, Descriptors 6.75). The uneven representation of grammar categories on the grid makes this data fairly unhelpful for determining iconicity.

Other factors which might have influenced symbol selection included the proximity of one symbol to another; symbol numbers 21 and 30 'Put it here / here' and 'Let us tuck it in / in or inside' were placed in vertical proximity and were observed to cause some hesitation during selection. The order in which phrases were presented can influence choices, but this was randomised in order to prevent bias.

It was considered more useful to further explore and refine the measure of iconicity by establishing a method which incorporated the notions of *distinctiveness*, *frequency* and *correctness*.

4.5.3.5. Distinctiveness and Iconicity Refined

Distinctiveness and Iconicity, Frequency and Correctness

It was felt to be worth revisiting Haupt and Alant's speculation on what is meant by distinctiveness and iconicity. One might suggest the following. A symbol is iconic when there is good agreement between the perception of the symbol and the referent (i.e. given the referent the symbol is likely to be selected). A symbol is *distinctive* when it is ascribed a single meaning by most of the population – even if this meaning is incorrect. This allowed for symbols 9 and 12 ('let us take it off' and 'put it in the tub') to be classified as *distinctive and less iconic* because they were frequently used with other referents; for example 4 people (50% of its selections) matched 9 with 'you are welcome' and 9 people (82% of its selections) matched 12 with 'what a mess'.

Another way of looking at it (which is related to *distinctiveness*) is to examine the percentage of times that a symbol is correctly used. A symbol may be iconic in the sense that it is almost always selected for its referent, but will be of little use if its meaning is so general that it is selected for other reasons. This is related to the *distinctiveness* as proposed by Haupt and Alant because it is an alternative measure of how much the symbol corresponds to one referent.

The process can be redefined in two dimensions:

- **Frequency**. This is a measure of the number of times which a symbol is selected (irrespective of whether the selection is correct or incorrect). There were 3,600 trails and each symbol should have been selected 10 times. Constructing an arbitrary classification with low frequency ≤ 5 selections (half the number of times a symbol should be selected), high frequency ≥ 15 (50% more than the number of times it should be

selected) and a mid frequency band allowed for a rough classification of the popularity of selection.

- **Correctness**. We should be able to report the correctness as the percentage of selections that are correct. Correctness can be classed into three bands: incorrect (0-50%), partially correct (50-75%) and correct (75% and above); although somewhat arbitrary, the figures are chosen to reflect strict and lenient iconicity.

A classification of responses from the Manchester study after correlation of frequency and correctness scores is presented in the following Table 34.

Table 34: Symbol selection classed by frequency and correctness

	High Frequency ≥15 selection	Mid Frequency >5 selections <15	Low Frequency selections < 5
Correct (75% and above)	(hc)	(mc) 10, 11, 20, 22, 27, 32	(lc) 2, 8, 18, 23, 25,
Partially Correct (50-74%)	(hp) 17	(mp) 3, 5, 24, 35	(lp) 19, 28,
Incorrect (<50%)	(hi) 7, 14, 16, 21, 33	(mi) 6, 9, 12, 15, 34, 36	(li) 1, 4, 13, 26, 30, 31,

h=high frequency, m = mid frequency, l = low frequency
c=correct, p = partially correct, i = incorrect

hc = high frequency, correct
mc = mid frequency, correct
lc= low frequency, correct
hp = high frequency, partially correct
mp = mid frequency, partially correct
lp = low frequency, partially correct
hi = high frequency, incorrect
mi = mid frequency, incorrect
li = low frequency, incorrect
Note that it is impossible to have high frequency and correct.

This honed classification method appeared to identify the 'best' symbols more clearly. **Those falling into the mid frequency and correct category can be said to be truly iconic**. Compared with iconicity results, this method seems to be more insightful and it offered a potential means to segment groups.
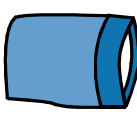
The new method to determine iconicity became known as the "Manchester Method".

The individual symbols identified as more iconic according to this method are in fact a subset of those found to be more iconic and distinctive in the first iconicity analysis, following the procedure of the Haupt & Alant study.

Table 35: Mid frequency and correct symbols, Manchester study

Symbol number	Contextual phrase	Standard meaning	Grammatical category
10	It is crooked	crooked	Descriptor
11	You need to pull	pull	Verb
20	Look at this	look	Verb
22	It is dirty	dirty	Descriptor
27	It looks like a bomb went off	explosion	Noun
32	The pillow case	pillow	Noun
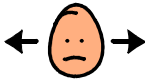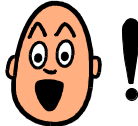
Table 36: Iconic symbols, Manchester method

10	11	20	22	27	32
It is crooked	You need to pull	Look at this	It is dirty	It looks like a bomb went off	The pillow case

These symbols are selected around the expected number of times and are most often chosen for the correct referent.

Using the Manchester method symbol number 3 'No', for example, was classified in the *mid frequency, partially correct* category. Previous calculations using the *distinctiveness* criteria had placed this symbol in the *more iconic and distinctive* category. Using the Manchester method, it is revealed to be slightly less iconic. Whilst symbols in this category were selected close to the expected number of times, they were fairly often chosen for a non-target referent. Symbols in this category are shown in Table 37.
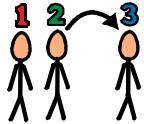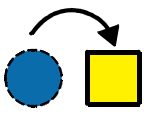
Table 37: Mid frequency, partially correct symbols

3	5	24	35
No	Whoops	Help me please	Hold this please

Other symbols found to be *more iconic and distinctive* according to the Haupt & Alant method were reclassified among diverse categories according to their popularity of selection and correctness.
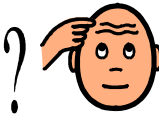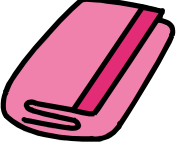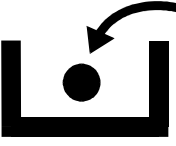
With this new classification system, symbol number 4, previously in the *more iconic and distinctive* category is placed in the *low frequency, incorrect* category. Note the number of arrows in this category, which includes some of the least iconic symbols.

Table 38: Low frequency, incorrect symbols

1	4	13	26	30	31
What is next?	You need to change them	It is finished	What a mess!	Put it here	You are welcome

The following popular (frequently selected) symbols including 14 'Let us make the bed' and 21 'Tuck it in' were selected for non-target referents more than half the time. They cannot be said to be iconic.

Table 39: High frequency, incorrect symbols

7	14	16	21	33
What do you think?	Let us make the bed	The blanket	Tuck it in	Let me…

Using the "Manchester method" the perception of individual symbols can be studied with finesse. This is a bonus to the capacity it demonstrates to segment groups. Two completely disparate groups were compared and different results were obtained.

4.6. Evolution of Project (1)

In the first phase of research, the Haupt & Alant South African study had been to some measure duplicated, with a completely disparate group. Results were compared and methodology refined; a new system of classification of symbols was established, the 'Manchester method', to explore iconicity. The type of test used was thought to be successful in segmenting the groups, to show a clear difference between them. In addition, there were indications were that this type of test could possibly have some sensitivity to the symbols. Certainly the hypothesis could be argued from the data gathered.

In the context of the ESRC research, symbol tests had been carried out with a group of Somalis and a group of English speaking Nurses. These groups had a significant difference in not only their ethnic background but also their educational background. More complex considerations than one-to-one comparatives, where ethnicity was the only variable, were involved. The types of tests used were translucency and guessability; literature in multi cultural symbol evaluation had relied on translucency tests in the past; the choice was informed by the existing body of research. The aims had been to establish whether these test instruments were appropriate to use with Somalis.

The tests had shown that translucency results were difficult to interpret, notably because of the rating scales. Translucency scores did not necessarily indicate the success of using the symbols. Translucency can be said to be property of the symbol set and not a property of the users. They may give varying results on a per symbol basis, but do not seem useful in drawing conclusions about differences for groups using them. Guessability tests had shown that the English speakers outperformed the Somalis, as was expected. An analysis of the correlation between translucency and guessability scores had been carried out. The supposition was that if translucency proved to be meaningful, it could be expected that low translucency scores would correspond to low guessability scores. Although the correlation was slightly more pronounced for the English speakers, it was not close enough to confirm the supposition. Marks given for symbols in the translucency tests did not seem to bear any regard to their guessability.

Translucency tests proved to be fairly valueless for segmenting groups. Guessability tests seemed problematic, in that people did not know how far to interpret a symbol. When asked, for example, to make a guess about the meaning of a symbol picturing a traffic light people were unsure whether to reply 'traffic light' or 'go'. For the type of communication that researchers were hoping to facilitate, guessability did not seem a very helpful criterion for choosing symbols.

Three instruments were available for further evaluations to confirm these preliminary findings: iconicity, guessability and translucency tests. Up until this point there were two sets of tests that had been done with one user group (translucency and guessability with Somalis and English nurses) and one set of tests done with another user group (iconicity with people from Manchester University). It was decided to replicate the ESRC studies that had used guessability and translucency instruments to use iconicity and similarly to replicate the iconicity tests carried out in phase one of this study to use guessability and translucency. These tests are described in the following section 4.7 Phase 2: Translucency & Guessability Tests Man. Uni. and the section 4.9 Phase 3: Iconicity Tests – Somalis & English nurses.

The supposition was that iconicity would prove to be the best approach and that the new method devised to analyse symbols would be more decisive than ways hitherto tried.

4.7. Phase 2: Translucency & Guessability Tests Man. Uni.

4.7.1. Method

4.7.1.1. Participants

The iconicity tests done needed to be translated into translucency and guessability instruments for testing with people of a similar distribution to those already completed. Translucency and guessability tests were then designed for a population of staff and students from Manchester University, different from those individuals tested in the iconicity study, but having similar cultural backgrounds and educational levels. Ten post graduate students and staff members agreed to participate, for each of the translucency and guessability studies. An even distribution of ages and gender was ensured, reflecting participant details from the studies already carried out. Again, students having a stated familiarity with symbols or sign languages were excluded from the studies.

4.7.1.2. Procedure

For both tests, participants were given a brief introduction and were presented with a written page of instructions giving an example of the procedure to follow. An extract from the guessability test follows:

For example:

If you think this symbol represents a rabbit, write the word 'rabbit' on the dotted line, as below:
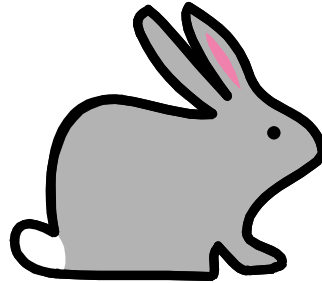
rabbit
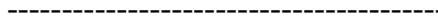
For the translucency test instructions included the following:

"You will see a series of symbols and their corresponding word meanings. Please rate how closely the symbol and its word meaning are related. A rating of 1 indicates there is no relationship between the symbol and its meaning. A rating of 7 indicates a very strong relationship. The numbers 2-6 indicate some degree of relationship between 'none' and 'very strong'. There is no correct or incorrect response.

For example, if you think there is a very strong relationship between the following symbol and word label, circle 7 on the scale, as below:

No   **Very Strong**
Relationship   **Relationship**
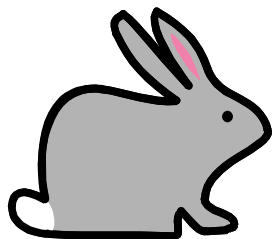
rabbit   1   2   3   4   5   6   7

Participants were instructed to follow these procedures for symbols depicted on the following pages and encouraged to leave no blanks. Six practice symbols, disregarded for analysis, followed and 40 symbols were presented in total for the main test. Participants were not allowed to refer back to earlier pages that had been completed. Demographic details were collected at the end of the tests and participants received a quick debriefing.

4.7.1.3. Materials

The PCS symbol set was chosen for both the translucency and guessability tests and the same symbols as those used in the grid for the iconicity tests were used. Some thought was given about whether or not to use the direct description of the symbols or the phrases that had been associated with the communication overlay; the direct meaning was chosen.

The 36 symbols and words (standard meaning) used on the iconicity grid were supplemented with 4 repeats, to allow for calculation of intra-subject reliability. These were symbol numbers 17, 32, 33 and 34 ('Put on', 'Pillow, 'Me' and 'Bad'). Words and symbols were ordered by iconicity (results from the initial tests) rather than by grammatical category and randomised within these categories for each test: a three tiered iconicity classification was used, corresponding to > 60%, 40-60% and < 40% iconicity. Repeats were introduced randomly. Symbols in the higher iconicity categories were presented first on word or symbol lists. Each participant was then presented with a unique symbol or word list.

The translucency tests used in the ESRC study had used a classic seven-point rating scale and so this design was replicated.

An extract of the Translucency Tests created can be found in Annexes 3: Translucency Test (Man. Uni. Staff and Students).

An extract of the Guessability Tests created can be found in Annexes 3: Guessability Test (Man. Uni. Staff and Students).

4.7.2. Results and Interpretation

All results were complete. Repeats were not found to be statistically significant from first ratings in either of the tests and were removed from the final analysis.

4.7.2.1. Translucency Tests

Translucency test results allowed for calculation of participant ratings (1-7 scale) for each symbol. The following graphs and Table 40 present the average ratings given by participants for each symbol. The maximum score possible is 7.
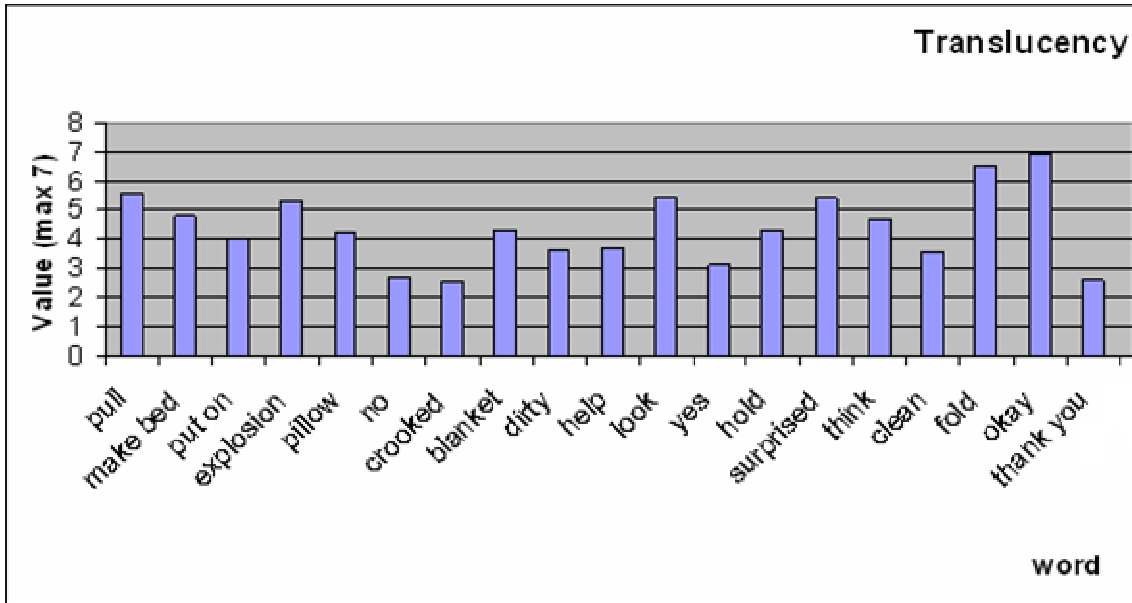
Figure 3: Translucency Scores
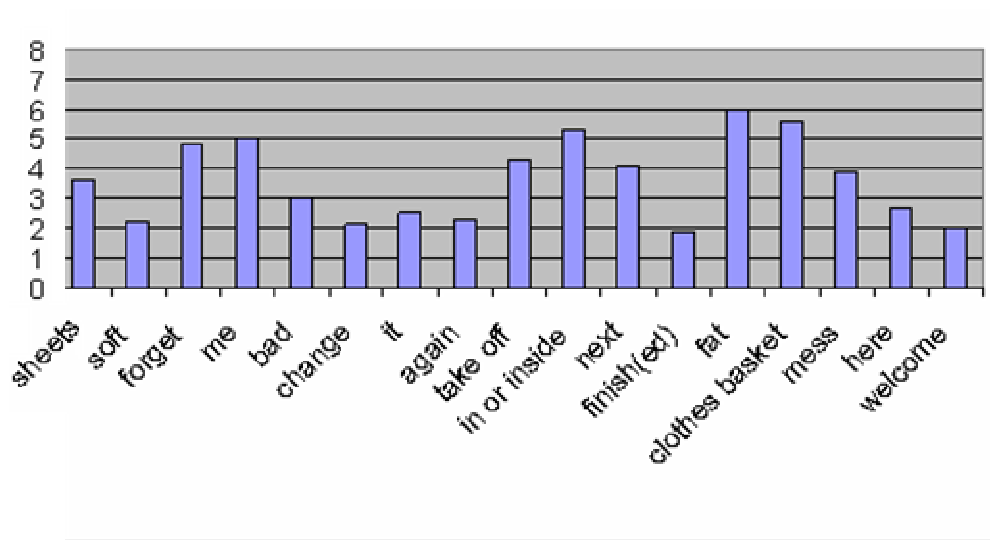
Figure 4: Translucency Scores (continued)

The following Table 40 presents a list of the symbols ordered by group average ratings. In addition the iconicity classification from the three categories established to order the symbols are noted.

Table 40: Translucency scores - group average ratings

Symbol nb	Symbol meaning	Group average rating	Iconicity group
20	okay	6,9	40-60
19	fold	6,5	40-60
36	fat	6.0	< 40
1	pull	5,6	> 60
37	clothes basket	5,6	< 40
13	look	5,4	> 60
16	surprised	5,4	40-60
5	explosion	5,3	> 60
33	in or inside	5,3	< 40
25	me	5.0	40-60
2	make bed	4,8	> 60
24	forget	4,8	40-60
17	think	4,7	40-60
10	blanket	4,3	> 60
15	hold	4,3	> 60
32	take off	4,3	< 40
6	pillow	4,2	> 60
34	next	4,1	< 40
3	put on	4.0	> 60
38	mess	3,9	< 40
12	help	3,7	> 60
11	dirty	3,6	> 60
22	sheets	3,6	40-60
18	clean	3,5	40-60
14	yes	3,1	> 60
27	bad	3.0	40-60
8	no	2,7	> 60
39	here	2,7	< 40
21	thank you	2,6	40-60
9	crooked	2,5	> 60
30	it	2,5	< 40
31	again	2,3	< 40
23	soft	2,2	40-60
29	change	2,1	< 40
40	welcome	2.0	< 40
35	finish(ed)	1,9	< 40

Colour codes indicate general iconicity classification, for comparison.

A preliminary observation of results obtained is that no relationship seems to exist between the iconicity values determined in the very first stage of testing and the ratings given by participants in this test; symbols found to be iconic in the very first phase of testing were not necessarily rated more highly on the translucency scale.
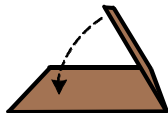
Translucency tests carried out with an educated Anglocentric group such as that chosen for this part of the study could be expected to be free of any problems related to the use of numeric rating scales. Observation during tests and subsequent discussion with participants nonetheless pointed to some level of divergence in the way they are

understood and used. People reported experiencing less or more general certitude as tests progressed and adjusted their overall scoring for symbols as a result. Many could not explain why they had chosen a 5 rather than a 6, for example, on the scale. Alternatives to rating scales could be used to indicate the level of certainty felt in the decision-making process; computer detected response times, for example, could be used to associate rapidity of response with certainty. Alternatively, a more ethnological approach could be used, asking people how confident they were in their judgement.

Translucency scores may have little value for being able to segment groups, as the ESRC study indicated, but these ratings offer some potential for evaluating how symbols are perceived on an individual basis.

Symbols rated most highly in the translucency tests were symbols 20 'okay, 19 'fold', 36 'fat', 1 'pull', 37 'clothes basket', 13 'look', 16 'surprised', 5 'explosion', 33 'in or inside' and 25 'me'. Among this top ten, three symbols had been found to be iconic in the first set of tests (Manchester method). These were 'pull', 'look' and 'explosion'.

Table 41: Highly rated symbols, translucency test
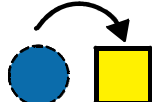
20	19	36	1	37	13
okay	fold	fat	pull	clothes basket	look

These symbols can be said to look strongly like their given meanings.

As the iconicity tests showed, a number of symbols may be popular for the target label (given here) but they may also prove to be popular for other words which are not presented. An example would be number 19 'fold' which may or may not have received a high translucency rating for the word 'close', had it been given.

Symbols which scored lowest on the translucency test were 30 'it', 31 'again', 23 'soft', 29 'change', 40 'welcome' and 35 'finish(ed)'. Again, a high occurrence of arrows and symbols based on sign language can be noted, as well as more abstract ideas.

Table 42: Poorly rated symbols, translucency test

30	31	23	29	40	35
it	again	soft	change	welcome	finish(ed)

4.7.2.2. Guessability Tests

Similar problems noted with guessability tests in the ESRC project were found when analysing results from the guessability tests in this stage of testing. When asked to guess the meaning of the symbol for 'dirty', for example, responses included: 'window'; 'art'; 'Matisse'; 'map'; 'Ordinance Survey map'; 'overshadow'; and 'paramecium'. For the 'change' symbol guesses included: 'shape change', 'on top', 'wrong', 'across', 'to pack', 'put into', 'transform' and 'the circle doesn't fit in the square'. While guesses were sometimes completely incorrect, errors varied: sometimes a partial understanding of the symbol could be inferred from the guess, sometimes interpretations were taken too far.

The ESRC project had used a classification system of wrong responses to attempt to clarify the nature of these errors and to offer a more detailed view of symbol interpretations. Error categories devised were:

- DPD (Direct Physical Description);

- IPD (Incorrect Physical Description);

- WIM (Wrong Inferred Meaning).

The given example of a DPD error was guessing 'traffic light' for the 'go' symbol. This kind of error was fairly common for words that were not nouns. More abstract symbol meanings were frequently reduced to a more concrete representation. Examples of IPD errors were giving the word 'balloons' for the 'sweets' symbol or 'head' for 'happy'. The example for WIM errors was the response 'do not want to listen' for the 'no' symbol (Johnson, 2004).

Error responses from the Manchester staff and student guessability test were classified once according to this system, but some errors did not fall naturally into one or other classification. Analysis of responses was then reworked to classify all responses according to four categories:

- S (Strict) - corresponding exactly to the given meaning, including grammatical variations such as 'pull' and 'pulling' for the 'pull' symbol;

- I (Incorrect) – example 'cut hand' for the 'welcome' symbol;

- T (Thesaurus) - for example 'drag', 'heave' and 'strain' for 'pull' and 'not straight' for 'crooked';

- L (Lenient) – accurate synonyms or similar meanings given the symbol, examples being 'dress' for 'put on', 'fold' for 'close' or 'helping someone stand' for 'help'.

These categories were further reworked and finally six classifications were proposed, permitting a finer analysis of symbol interpretations:

- (S) Strict – as above

- (I) Incorrect – as above

- (T) Thesaurus (synonyms) – as above

- (L) Lenient

- (O) Over-specified

- (V) Very lenient

Error responses that had been generally classified in the *Lenient* category could be further separated into either the *Lenient*, *Over-Specified* or *Very Lenient* categories. In this way 'helping someone stand' for the 'help' symbol, 'man pulling stone' for 'pull', 'pillow case' for 'pillow' and 'holding page' for 'hold' were classified as *Over-Specified* rather than *Lenient*. In a similar way 'sheets' for 'bed', 'hat off' for 'take off', 'spill' for 'mess' and 'pleading' for 'help' were classified in the *Very Lenient* rather than the *Lenient* category.

For the subsequent correlation of translucency and guessability results, calculations took into account the various error categories.

4.7.2.3. Correlation of translucency & guessability scores

Scatter plots presenting the correlation between translucency and guessability scores, with guessability selected according to the different criteria established above, are shown in the following Figures 5, 6, 7 and 8.
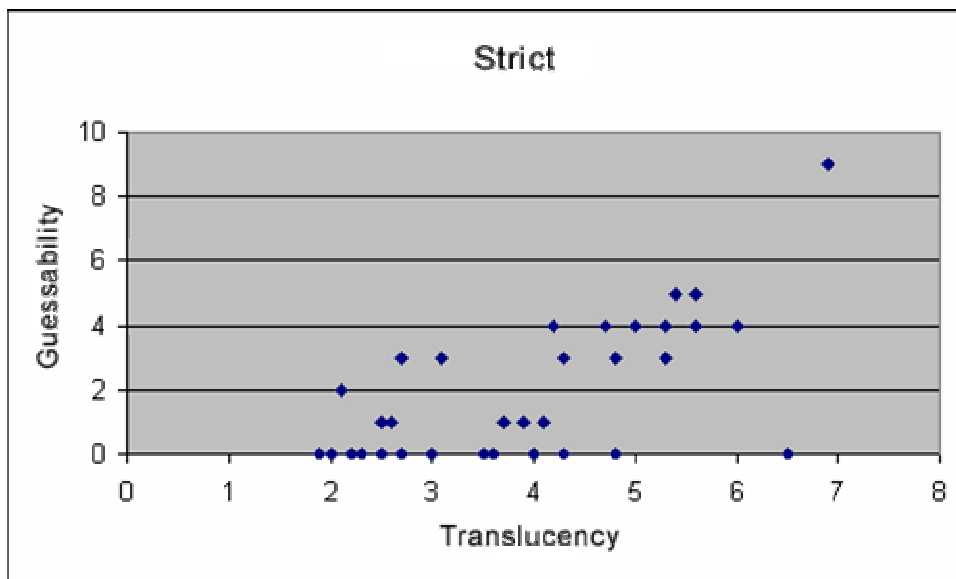
Figure 5: Translucency vs. Guessability (Strict)

Correlations between translucency and guessability scores test the supposition that if translucency is meaningful, low translucency scores would be likely to correspond to low guessability scores. The correlation is somewhat evident when only responses corresponding to the '*Strict*' criteria of guessability are included; while a positive relationship exists between the two variables, this relationship cannot be said to be strong.
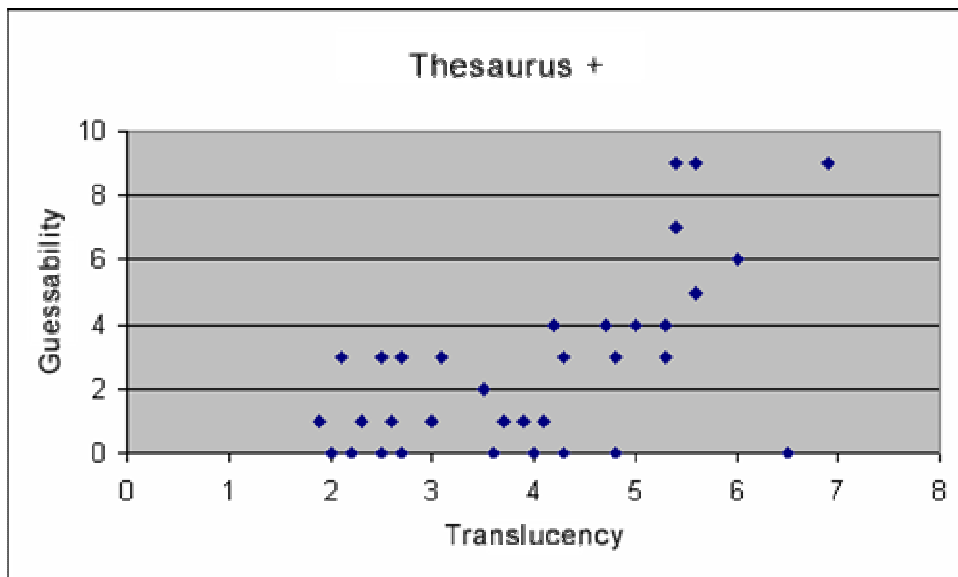
Figure 6: Translucency vs. Guessability (Thesaurus and better)

When the guessability variable includes criteria from error categories classed in the '*Thesaurus*' category, data points on the graph begin to be more widely dispersed and correlation is slightly weaker.
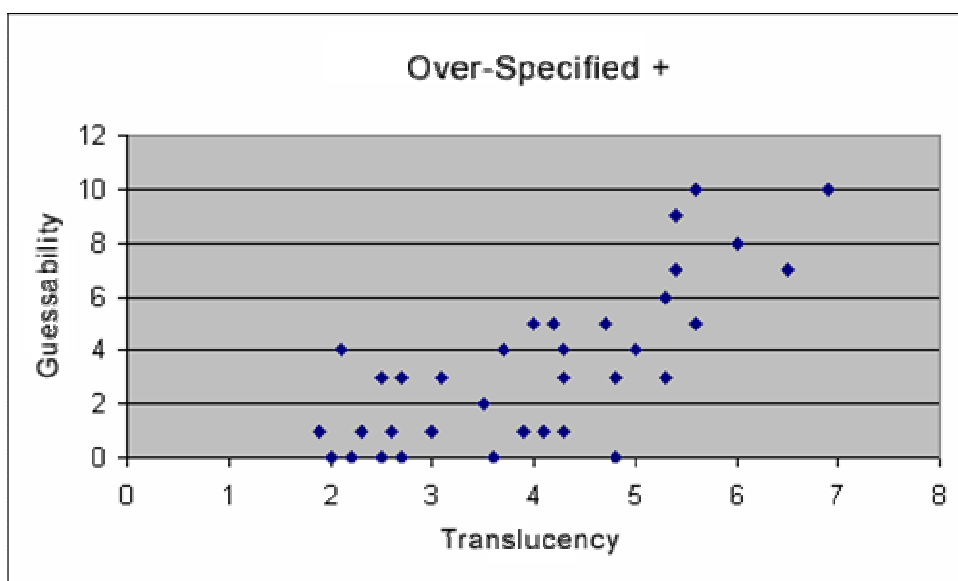
Figure 7: Translucency vs. Guessability (Over-specified and better)

With the inclusion of error responses from the '*Over-specified*' category, correlation again worsens. Although a broadly linear pattern can be observed the relationship is weaker again.
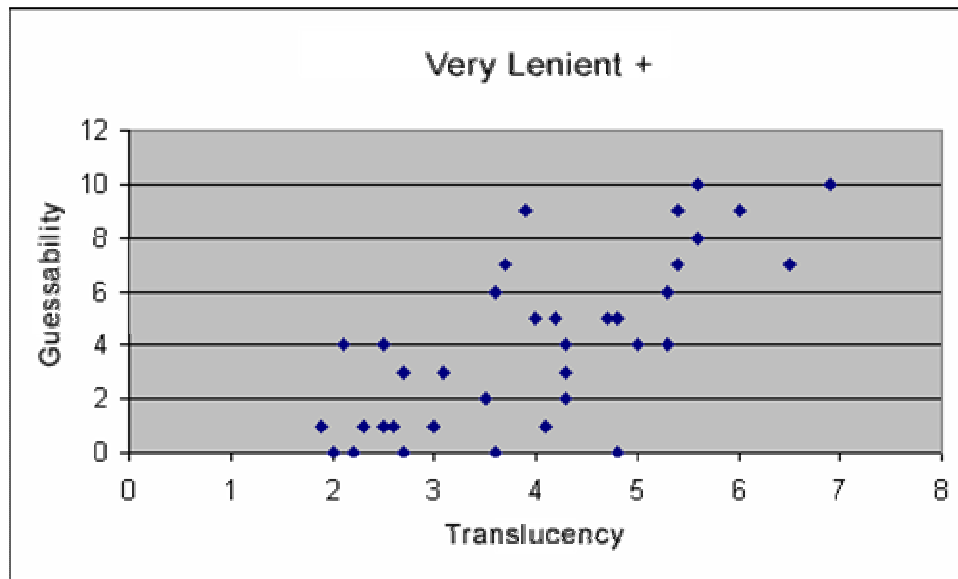
Figure 8: Translucency vs. Guessability (Very Lenient and better)

Finally, when error responses in the '*Very Lenient*' category are included correlation is worse than previously. The relationship between the two variables is not close enough to confirm the hypothesis. We can conclude that ratings given for symbols in translucency tests bear little relationship to their guessability.

4.8. Evolution of Project (2)

The iconicity tests carried out in phase one of the studies had been replicated using guessability and translucency instruments. Conclusions confirmed the doubt that translucency tests were useful in drawing conclusions about differences for groups using them. Guessability did not seem a very helpful criterion for choosing symbols; as a test instrument it was confirmed to be problematic because of participant uncertainty about how far to interpret symbols. Correlations between translucency and guessability scores showed a poor relationship between the two variables. It was thought neither type of test would help to choose symbols for the type of communication researchers were hoping to facilitate.

The third and final stage of this project, designed to translate the guessability and translucency tests, carried out in the ESRC project with the Somali and English populations, to iconicity instruments could now begin. Indications were that iconicity testing would prove a good method to analyse symbols, particularly using the refined "Manchester method" for analysing iconicity.

4.9. Phase 3: Iconicity Tests – Somalis & English nurses

4.9.1. Method

4.9.1.1. Participants

Guessability and translucency tests carried out during the ERSC study had involved the participation of two groups: nursing students enrolled at Manchester University and members of the Manchester Somali Community. These same groups were solicited for the final iconicity tests, though individual participants differed. Formal permission was granted to establish contact with nursing students; an official protocol needed to be followed for this stage of testing (ethics approval), to allow results to be incorporated into the overall ERSC study and to request the involvement of a Somali researcher who is working on the larger ERSC project. This person set up contacts with and carried out the tests prepared for the Somali group, in a local Community Centre, and was able to translate all instructions and words presented. Participants had varying levels of education, English language skills and literacy, in either Somali or English. Participants from the nursing school were all literate, British and undertaking higher education.

Twenty people agreed to be tested: 10 students and staff from the Manchester School of Nursing and 10 people from the Manchester Somali community. Efforts were made to ensure an even gender and age distribution among participants, corresponding to the original tests. People familiar with symbols and sign language were again excluded. Tests were carried out at the end of July.

4.9.1.2. Procedure

Apart from extra administrative procedure (participant consent forms) and translation for the Somali group the same basic procedure was followed as for iconicity tests conducted in stage one: refer to section 4.5.2.2: Procedure. Because these iconicity tests aimed to transfer the guessability and translucency tests already carried out, words chosen for presentation were those used in the ERSC study. Contextual phrases were not used. There was no fixed time limit to the tests.

Participants then were presented with a first grid containing practice symbols: 4 words were presented and participants asked to circle the symbol they thought best matched the word, from the choices on the grid. Then 40 words corresponding to the main grid were read out. Participants marked each response on a separate page.

4.9.1.3. Communication overlays

The original guessability and translucency tests had used both PCS and Widgit Rebus (WR) symbols and it was thought important to present communication overlays using both these symbol sets, for coherency with the original tests and for eventual study of symbol perception specific to sets used.

Four grids were designed: each pre-test grid and main communication overlay was constructed using either PCS or Widgit Rebus symbols. Half of the participants were tested with the PCS grids and half with WR grids. Words used were identical for the PCS and Widgit Rebus grids. The overlay grids were high quality colour copies, without gloss.

The Symbol Grids used in this phase of tests used can be found in Annexes 3: Pre-test Symbol Grid – PCS, Pre-test Symbol Grid – WR, Main Test Symbol Grid – PCS and Main Test Symbol Grid – WR. Word labels of symbols used can also be found in Annexes 3: Labels of symbols used in the communication overlays.

4.9.2. Results and Interpretation

Results from the two tests were analysed for information about iconicity using both the Haupt & Alant method and the Manchester Method, for both the Somali and the English groups. A further breakdown of results according to the symbol set used was calculated for analysis. Raw data results from the pre-tests, where symbols were largely chosen for their possible relevance to asthma related conditions (cat, exercise, flowers, Doctor, tell, home…) were transmitted to researchers without further analysis.

4.9.2.1. Somali Population
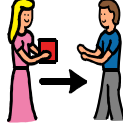
PCS Symbols

Table 43: Haupt Alant method, Somali group, PCS symbols

	Distinct	Indistinct
More Iconic	1, 2, 4, 6, 7, 8, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 24, 25, 26, 28, 29, 30, 31, 34, 35, 37, 38, 39, 40	5, 9, 19, 32, 33, 36
Less Iconic		3, 12, 23, 27

Using the Haupt & Alant method, a large number of symbols (30 out of 40) were classified as *more iconic and distinctive*. These symbols were often selected and were ascribed a single meaning by most of the population. Of those symbols not falling into this category, all were found to be *indistinct* (symbols were often chosen in

response to one or more other labels). Symbols 5, 9, 19, 32, 33 and 36 ('frightened', 'eat', 'funny', 'give', 'ill' and 'me') were classified as *more iconic and indistinctive* because many participants chose a certain symbol in response to its target label, but also often chose that symbol in response to one or more other labels: for example 'frightened' was matched with 'no' and 'sad', 'funny' with 'happy' and 'ill' with 'sleep'.

5	9	19	32	33	36
frightened	eat	funny	give	ill	me

Table 44: Manchester Method, Somali group, PCS symbols

	High Frequency	Mid Frequency	Low Frequency
Correct	-----	1, 2, 8, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 25, 28, 29, 30, 31, 34, 37, 38, 39	24
Partial	19, 36,	4, 5, 6, 7, 9, 26, 33, 35, 40	
Incorrect	32		3, 12, 23, 27

Note that it is impossible to have high frequency and correct.
Highlighting corresponds to symbols pictured above and discussed below.
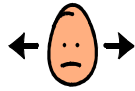
From the symbols considered *more iconic and indistinctive* under the Haupt & Alant and pictured above, symbols 5, 9 and 33 are classified under the Manchester method in the *mid frequency and partially correct* category, symbols 19 and 36 in the *high frequency and partially correct* category and symbol 32 in the *high frequency and incorrect* category. These symbols cannot be considered truly iconic: they are selected about than the expected number of times or more often, but often or only for non-target referents. It is possible to see clearly exactly why each symbol fails to be iconic.

Using the Manchester method, symbols classified in the *mid frequency and correct* category (and which can be said to be truly iconic) were a subset of the *more iconic and distinctive* symbols determined using the Haupt & Alant classification system. This is similar to what was found in the first iconicity tests. Most of the remaining symbols were classified in the *mid frequency and partially correct* category because they were sometimes chosen for non-target referents.

The Manchester method permits a finer analysis of how these symbols are used: most are selected around the expected number of times, but some are most often chosen for the correct referent and others often chosen for a non-target referent. One
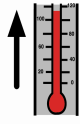
symbol from the group (number 24, 'want') was classified as *low frequency and correct*. Although it was generally chosen for its target reference, it was selected less than the expected number of times.

Results concurred with the Haupt & Alant classification, in as much as exactly the same *indistinct and less iconic* symbols were found to be in the *low frequency and incorrect* category using the Manchester method. These symbols can be said to be among the least iconic, they were not chosen often and when they were it was usually for the wrong target label. The two categories are not directly comparable however: a symbol may be found to be lacking iconicity for other reasons, as discussed above. Another example would be symbol number 32 'give' which was often selected for its target referent, but equally often for non-target referents, making it *high frequency and incorrect*.

3	12	23	27
food	go	happy	no

Two out of four of these extremely non-iconic symbols (*low frequency and incorrect* category) are faces. None of the 5 symbols depicting faces were classified in a *correct* category. An interesting symbol to note here is number 23, 'happy'. Somali participants always chose the more broadly smiling face (19, 'funny') for the word 'happy'. The 'no' symbol 27 was only selected twice, once for the word 'frightened', and symbols chosen for the word 'no' included 'frightened', 'ball', 'give' and 'big'. The 'go' (traffic light) symbol was never chosen: 80% of participants preferred symbol 36 'me' for this word even though this same symbol was also chosen for the word 'me' (100% of the time, explaining why 36 'me' is classified in the *high frequency and partially correct* category).

Some of the iconic symbols (*mid frequency, correct* category) are shown below.

1	2	13	14	20	21	39
come	small	wash	make	hot	sleep	milk

Six symbols contained arrows: three of these - 1 'come', 20 'hot' and 31 'cold' - were nonetheless found to be iconic.

Widgit Rebus Symbols

Table 45: Haupt Alant method, Somali group, WR symbols

	Distinct	Indistinct
More Iconic	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 18, 19, 20, 22, 23, 25, 26, 27, 28, 29, 31, 36, 37, 38, 39 ,40	1, 15, 21, 30, 32, 34
Less Iconic	14, 24, 33	2, 16, 35

Again, using the Haupt & Alant method places most Widgit Rebus symbols (28 out of 40) in the *more iconic and distinctive* category. There are considerable differences between individual PCS and Widgit Rebus symbol classifications however. Numbers 2 'small', 16 'open' and 35 'big' were found to be *more iconic and distinctive* for PCS symbols and *less iconic and indistinct* for Widgit Rebus symbols. Numbers 1 'come', 15 'read', 21 'sleep', 30 'dirty' and 34 'drink' were found to be *more iconic and distinctive* for PCS symbols and *more iconic and indistinct* for Widgit Rebus symbols. Numbers 14 'make' and 24 'want' were found to be *more iconic and distinctive* for PCS symbols and *less iconic and distinct* for Widgit Rebus symbols. Numbers 3 'food', 12 'go', 23 'happy' and 27 'no' were found to be *less iconic and indistinct* for PCS symbols and *more iconic and distinctive* for Widgit Rebus symbols. One can observe a kind of reshuffling of classifications.

Symbols classified as *more iconic and indistinct* are shown below (1, 15, 21, 30, 32 and 34).

1	15	21	30	32	34
come	read	sleep	dirty	give	drink

In analysis using the Manchester method, a more detailed look at these and other less iconic symbols is possible. 16 symbols are classified in the *mid frequency and correct* category and 12 symbols in the *mid frequency and partially correct* category. 5 symbols are classified as *mid frequency and incorrect*. The 7 remaining symbols are divided between the other categories, except for the *low frequency and incorrect* category, for which there are no occurrences. The 16 *mid frequency and correct* category symbols were selected around the expected number of times and were most often chosen for the correct referent (over 75% of the time); they can be said to be truly iconic. Again these symbols are predominately a subset of those found to be *iconic and*
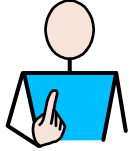
distinctive according to the Haupt & Alant classification. The 12 *mid frequency and partially correct* category symbols were also selected the expected number of times, but were chosen for their target reference between only 50 and 75% of the time. The *mid frequency and incorrect* category symbols were again selected around the expected number of times but mostly for non-target referents.

Table 46: Manchester Method, Somali group, WR symbols

	High Frequency	Mid Frequency	Low Frequency
Correct	-----	3, 4, 5, 7, 8, 11, 19, 20, 23, 25, 28, 29, 36, 37, 38, 39	30, 35
Partial	1, 34	6, 9, 10, 13, 15, 17, 18, 22, 26, 27, 31, 40	16
Incorrect	21, 32	2, 12, 14, 24, 33	

Symbols found to be truly iconic include Widgit Rebus numbers 3 'food', 23 'happy', 19 'funny' and 36 'me'. The corresponding PCS symbols were found to be either *low frequency and incorrect* (3 and 23) or *high frequency and partially correct* (19 and 36.
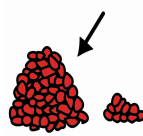
	3	23	19	36
WR (iconic)				
PCS (not iconic)				
	food	happy	funny	me

Two factors can be considered here: the perceived clarity of any given symbol and the context in which it is presented, which corresponds to other symbol choices available. As was discussed earlier, the PCS 'funny' symbol was chosen in preference to the 'happy' symbol for the word 'happy', with the result that neither symbol was ultimately iconic. In contrast, the Widgit Rebus 'happy' symbol was chosen for its target referent 80% of the time and both this and the 'funny' symbol were found to be iconic. It is here that the details of a symbol are revealed to be important: participants may have found the graphic clues of the stars in the 'funny' symbol helpful or the broadness of the smile decisive.
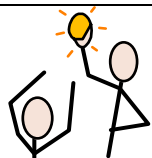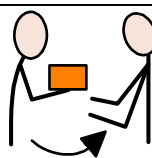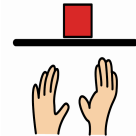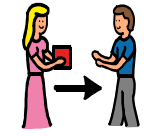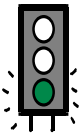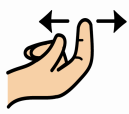
The PCS 'food' symbol was never chosen for the target label by the Somali participants. While it may have been selected in the absence of another choice, three

other symbols were chosen in preference: 9 'eat', 7 'biscuit' and 40 'more'. The context of the other symbols reveals the true iconicity of any given symbol, how it is perceived by the user. The presence of an arrow in symbol 40 to indicate quantitative difference fails to be interpreted as a distinguishing clue. What was seen was a "pile of beans" and this was more representative of food to the participant than a knife and fork, which oddly abstracts the idea of food to a concrete symbol.

3	9	7	40
food	eat	biscuit	more

Another interesting example is that of the multiple confusions induced by the 'want', ''give' and 'help' symbols, both for PCS and Widgit Rebus grids.

	24	32	6	12	1
WR					
PCS					
	want	give	help	go	come

- For the target referent 'want' the symbols 'go', 'come' and 'give' were selected from the WR grid; 'want', 'give' and 'help' for the PCS grid.
- For the target referent 'give' the symbols 'give' and 'help' were selected for both grids.
- For the target referent 'help' the symbols 'help', 'want' and 'give' were selected from the WR grid; only the help symbol was selected from the PCS grid.

The only symbol found to be iconic in this example is the PCS 'come' symbol which was selected over 75% of the time for its target referent and incidentally includes an arrow.

Again, details such as the presence of an oval shaped form in the WR 'want' symbol led to its association with the word 'ball'; the diagonal stripe on the 'ball' symbol led to its association with the 'no' referent. The thermometer and medicine container in the 'ill' symbol were not picked up as clues either, particularly in the WR set: it was for this reason that this symbol was sometimes chosen for the word 'sleep' and vice-versa; both symbols depict someone lying in bed. What was also disregarded or wrongly interpreted was the down-turned mouth in the WR 'ill' symbol: one participant who chose this symbol for 'sleep' remarked that the person must be feeling tired / bad and so needed to sleep. The 'sleep' symbol was also chosen for the target word 'cold'; logically if one was cold, getting into bed could help to warm up. It should be noted that the WR symbol for 'cold' is a snowflake and it does not snow in Somalia. The WR 'big' and 'small' symbols (35 and 2) draw on the idea of comparison, with two squares of contrasting sizes, side by side. The appropriate square is block coloured to draw attention to it. This geometric representation largely failed as diverse other symbols were attributed to the words.

The WR 'eat' symbol was not found to be particularly clear (it was said to resemble someone singing and became known as "the Karaoke symbol"). The 'drink' symbol was often chosen in its place.

The 'go' symbol was equally problematic ; it was variously associated with 'me', 'come' (PCS) and 'give', 'fall' and 'more' (WR).

4.9.2.2. English population

PCS Symbols

The two following Tables 47 and 48 present an analysis by category of English participant responses, using the Haupt & Alant and the Manchester methods, for PCS symbol grids.

Table 47: Haupt Alant method, English group, PCS symbols
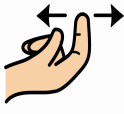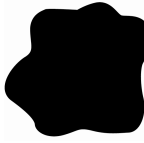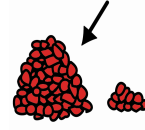
	Distinct	Indistinct
More Iconic	1, 2, 4, 5, 6, 8, 9, 10, 11, 12 ,13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39	7, 40
Less Iconic		3

It is immediately obvious that the **English participants outperformed the Somali participants**. Only 3 symbols were not found to be in the *more iconic and*

distinctive (3, 7 and 40) category; these and a further 3 symbols (1, 35 and 36) fell outside the *mid frequency and correct* category, representing the most iconic symbols.

Table 48: Manchester Method, English group, PCS symbols

	High Frequency	Mid Frequency	Low Frequency
Correct	-----	2, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 37, 38, 39	35
Partial	7	1, 36, 40	
Incorrect			3

1	3	7	35	36	40
come	food	biscuit	big	me	more

Four out five of these symbols had presented difficulties to the Somali group, the exception being number 1 'come'. For the English population, the word 'come' was associated frequently enough with the symbols 'no' and 'go' to place it in the *mid frequency and partially correct* category. While the symbol 'more' was chosen correctly for its target referent it was also frequently associated with the word 'big'. The 'me' symbol was associated with the word 'come'. The 'biscuit' symbol was always chosen for its target referent, but 80% of the time it was also associated with the non-target referent 'food'. The way these individual symbols were perceived by the two groups, English and Somali participants, varied somewhat, but overall some symbols simply proved difficult to interpret by either group. The English literate and well-educated group clearly had more success in interpreting greater numbers of symbols.

Widgit Rebus Symbols

The two following Tables 49 and 50 present an analysis by category of English participant responses, using the Haupt & Alant and the Manchester methods, for Widgit Rebus symbol grids.

Using the Haupt & Alant method only one symbol falls outside the *more iconic and distinctive* (13, 'wash') category. A further 4 symbols (1 'come', 12 'go', 24 'want' and 30 'dirty') fell outside the *mid frequency and correct* category, representing the most iconic symbols.

Again, **English participants outperformed the Somali participants**.
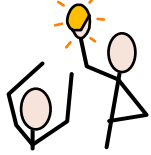
Table 49: Haupt Alant method, English group, WR symbols

	Distinct	Indistinct
More Iconic	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 40	13
Less Iconic		

Table 50: Manchester Method, English group, WR symbols

	High Frequency	Mid Frequency	Low Frequency
Correct	-----	2, 3,4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20,21, 22, 23, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	30
Partial	13	1, 12, 24	
Incorrect			

Symbols found to be non-iconic (1, 12, 13, 24 and 30) are depicted below.

1	12	13	24	30
come	go	wash	want	dirty

All of these symbols posed problems for the Somali group also. Indications are that interpretation of them is difficult across cultures. For English participants the word 'come' was associated with the symbols 'want' and 'more', placing it in the *mid frequency and partially correct* category, along with the 'go' and 'wash' symbols. The symbol 'go' was associated with 'want', 'no' and 'more'. The 'wash' symbol was selected 60% of the time for the word 'dirty', although it was chosen 100% of the time for its target referent. This resulted in a *high frequency and partially correct* classification for 'wash'. The 'dirty' symbol was not often selected, although when it was it was matched to its correct referent: it was classified as *low frequency and correct*.

These results are fairly similar to those found with the Somali population for individual symbols, although there were differences in symbol and referent confusions. The Somali group however perceived a great many less symbols as having a good relationship to their target referents.

4.10.   Segmenting groups

What is absolutely clear from these user evaluations is the capacity iconicity demonstrates to segment group; different results were obtained from two groups of different ethnic origins, education and literacy levels. In addition, using the techniques refined in the first stages of iconicity testing, exactly how symbols are perceived in relationship to target and non-target referents can be detailed and considerable detail for any given symbol examined.

4.11.   Continuation of Project

The ERSC project continues to advance. Further testing has been carried out with members of the Somali community using an electronic communication overlay (designed with Clicker software from Crick Software) and symbols related to asthma. Initial results are encouraging: this type of contextual presentation seems to positively facilitate the kind of communication sought, between medical providers and asthma sufferers with limited English.

4.12.   Future Work

Results from this work and the larger project are to be written up into several papers for presentation to international conferences: C-Sun (C-Sun, 2006) and ICCHP (ICCHP, 2006). I will have the privilege to be named as a co-author on these papers.

5. Conclusions

5.1. WebbIE

WebbIE is available to French users as a result of this placement.

Tests replicating the previous English study with French sites show similar poor results for accessibility conformance, a general lack of accessibility features on pages and a high incidence of elements likely to pose accessibility problems. Despite this, WebbIE proves to be a browser which allows blind users access to a great deal of web page content. Some sites failing guideline conformance can therefore be consulted successfully with a usable tool such as WebbIE. Usability rather than accessibility is the key issue; WebbIE supports user goals and tasks. The handling of JavaScripts could be improved. The help files and manual could be more user-friendly and include known strategies for best using WebbIE.

WebbIE best addresses the needs of blind users, particularly those using screen readers. User evaluations were not extensive enough to establish objective conclusions, but some evidence was found that those people who have some functional vision could be better served. The IE Appearance Editor delivered with WebbIE version 3.0.0 is buggy. It seems a priority to resolve this issue. WebbIE may remain a dedicated tool for blind users or may be extended to support other users.

Further work is hoped to be carried out to make the RSS feed bundled with the English version of WebbIE available to French users and to make the browser more widely known in France.

5.2. Symbols

Symbols used in AAC to aid communication can be evaluated in a number of ways. Established instruments used to assess symbols for different users include translucency, guessability and iconicity tests. As a contribution to a wider study exploring the use of symbols in a context of medical service provision, each of these methods was compared. The aim was to establish which instrument was the most appropriate way to assess symbol use and perception. Results from existing studies had not been thought conclusive.

Studies carried out during the placement with different ethnic groups permitted the conclusion that iconicity instruments, particularly when using a new method of symbol classification refined during the evaluations, can be successfully used to show

differences between groups using symbols. In addition, iconicity tests showed considerable sensitivity to individual symbol perception. This type of evaluation, compared to using translucency and guessability instruments, was considered the most appropriate method to facilitate the kind of communication researchers are aiming for. Work done can be said to have contributed to the body of knowledge available to the AAC community and to those working in the field of Assistive Technology.

5.3. Personal development and experiences

5.3.1. Academic environment, age, health problems

It is not simple to live as a native English speaker in France. Nor is it problem free to undertake academic studies past the age of forty. It is somewhat complicated reintegrating into an English speaking culture after a long period of absence. The re-adaptation time was longer than imagined.

The unavailability (or cost) of medication needed to control the threat of Glaucoma related eye injury was an immediate problem during my placement. Temporary and recurring vision problems made spending the long hours on a computer needed to fully complete the work problematic. When it could be done, it was, but not without considerable discomfort. Choices needed to be made. The greatest regret I have for this year is that of having free access to one of the world's finest academic libraries and being unable to consult it.

5.3.2. Internet Access problems

The nature of the tasks asked of me (repeated testing of websites) required an operational Internet connection at my home location. With an eventual 375 websites to determine and to repeatedly test according to different criteria, a fully functional and reliable Internet connection was needed outside of work hours. The initial Internet connection took an astonishing 10 week connection period and hindered early productivity. This problem (and successive interruptions) extended to email communications establishing testing procedures, validations of translation prototypes and to management of personal and professional affairs and was an unwelcome and costly distraction, indeed a serious time-waster, to carrying out otherwise straightforward daily tasks.

Even with Internet access, the British banking system does not authorise foreigners to manage their financial affairs online, requiring a 3 year residential status before being able to access relevant services. With adult financial responsibilities to assume in France, valuable (online or offline) time during work hours was eaten into.

These issues do not even begin to address the administrative requirements of doing an overseas placement, as a foreign (non-European) and adult student, in the context of a year's leave from work, with the additional requirement of translating and returning every minor official document that is required of one in these circumstances.

Responsibly managing financial affairs requires terminating such matters as direct debit engagements with an advance notice of one month before departure. Doing this resulted in the inadvertent and immediate termination of my Internet connection. This occurred at a time of critical consultation by email of French testers for the WebbIE application and also the writing of this paper. Resolving the problem caused the loss of many work hours.

5.3.3. Deaf Awareness Class

Unable to continue the course in French Sign Language available to students completing their placements in Paris, I sought to enrol in British / Irish Sign Language Courses available in Manchester. Of these classes, generally available from September to September, the course available to me was the Level One 'Deaf Awareness and Communication Tactics' Class, carried out by teachers at the Greenheys Adult Learning Centre, affiliated to Manchester City Council and the CACDP[22] (CACDP, 2005). I completed and successfully passed this course during the placement.

This class provided interesting content material (handouts, videos…) which I hope to take back, translate and offer as ideas for incorporation into similar French educational networks, currently offering only Sign Language classes.

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[22] CACDP : Council for the Advancement of Communication with Deaf People.

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All website addresses given in this paper were valid for consultation in August, 2005. The large number of sites consulted means that, even throughout the phases of testing, some URLs and site content have changed.

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"Yakeo." Available online at: http://www.yakeo.com/. Viewed August 2005.

Yanous (2005)

"Yanous Liens." Available online at:

http://www.yanous.com/tribus/liens.html#HV . Viewed August 2005.

YooVi (2005)

"L'Indice de Visibilité YooVi." Available online at: http://www.yoovi.com/.

Viewed August 2005.

Zeitgeist (2005)

"Google Zeitgeist." Available online at

http://www.google.fr/intl/fr/press/zeitgeist.html. Viewed August 2005.

Annexes 1: Work plan (in French)

Sujet de stage (Plan de Travail) d'Origine

Il y a deux axes principaux au travail à effectuer :

a) L'évaluation des navigateurs Web pour les personnes aveugles. Ce travail concerne la conduite des évaluations qualitatives et, peut-être, quantitatives du WebbIE, un navigateur Web existant, ainsi que ses applications associés, avec des personnes aveugles et d'autres utilisateurs. Le travail consiste à mener des entretiens avec des utilisateurs, à les observer, et à concevoir et rassembler des résultats des questionnaires. Le travail impliquera également l'évaluation étendue de l'outil et de ses applications associées en mesurant quantitativement sa réussit en terme d'accès aux sites et aux services Web. Le travail pourrait également étudier l'utilisation de WebbIE par des personnes ayant une faible vision fonctionnelle. Ceci permettra de développer des versions ultérieures de WebbIE, dont les fonctionnalités s'adresseraient directement aux besoins de tels utilisateurs.

WebbIE - voir www.webbie.org.uk

WebbIE a été conçu par Alasdair King, qui travaille comme chercheur - professeur à l'Université de Manchester, dans l'équipe de Dr Blenkhorn et Dr Evans.

b) L'évaluation des synthèses vocales dans le contexte des aides techniques. Ce travail comprendra l'évaluation qualitative et quantitative des synthèses vocales disponibles dans le commerce pour leur utilisation dans les aides techniques. Ces dispositifs seront destinés à aider les personnes ayant de grandes difficultés à lire des textes imprimés [print impairments]. Le travail consiste à évaluer des synthèses vocales selon des critères spécifiques et à organiser une série d'essais pour tester leur fiabilité, avec différentes d'utilisateurs.

Mise à jour du Sujet de stage (Plan de Travail)

La partie (a) reste inchangée.

Quelques travaux ont été effectués par Lisa sur la deuxième partie (b), mais celle-ci a dû être abandonnée, suite à des modifications dans le rôle et les conditions de travail d'une tierce personne qui devait fournir les données nécessaires, et qu'a pu le faire. La partie (b) est donc remplacée par la partie (c).

c)   Ce travail consiste en une recherche sur les critères d'évaluation et techniques de tests utilisés pour caractériser les séries de symboles employés dans le domaine de CAA (Communication Améliorée et Alternative). Le travail concernera l'usage d'une série d'instruments de tests de symboles bien établis (translucence, transparence, iconicité, et 'guessability') avec des groupes d'origines ethniques différentes, et se concentrera sur la capacité de ces instruments à caractériser et classifier l'usage de ces symboles par ces groupes. Le travail permettra également d'approfondir les connaissances d'un projet en cours, qui cherche à favoriser la communication entre les professionnels de santé et les patients au cours d'une consultation médicale.

Annexes 2: WebbIE

Browser translation

Text files (extracts from uiMessages.txt)

You must be online to report an inaccessible webpage
Vous devez être en ligne pour envoyer un rapport au sujet d'une
page web inaccessible
Do you want to provide details of the problem and your contact
details? Select No to simply send a report and continue using
WebbIE
Est-ce que vous voulez fournir des détails sur le problème ainsi
que les informations pour vous contacter ? Sélectionner Non pour
envoyer simplement un rapport (vos commentaires) et continuer
d'utiliser WebbIE.
Please enter a brief description of the problem:
Veuillez donner une brève description du problème :
Your Favourites will not work properly (Failed to call
SetWindowLong). Apologies.
Vos favoris ne fonctionnent pas correctement (Echec de l'appel
de la fonction SetWindowLong). Désolé.
Failed to restore normal command function. We advise you save
your work and restart your computer.
Echec de restauration de la fonction de commande standard. Nous
vous conseillons de sauvegarder votre travail et de redémarrer
votre ordinateur.
Loading untitled page...
Téléchargement d'une page sans titre...
Display changes will take effect when you restart WebbIE
Les modifications d'affichage seront prises en compte au
prochain démarrage de WebbIE
ADOBE ACROBAT FILE
Fichier PDF d'Adobe Acrobat
Select View webpage or press Control and W to see the file.
Sélectionner Afficher la page web ou appuyer sur Ctrl et W pour
voir le fichier.
No further occurrences found
Aucune autre occurrence n'a été trouvé
SUBMIT BUTTON
Bouton Envoyer
[DISABLED]
[Désactivé]
[READ-ONLY]
[Lecture seule]
[NOT CHECKED]
[Non coché]
(EMPTY)
(Vide)
: Unnamed object
Objet non-identifié

XML file (extracts)

```xml
            <item>
                <key>frmLanguage.fraLanguage.Caption</key>
                <explanation>
                </explanation>
                <content language="en-gb">Select correct
language</content>
                <content language="fr">Sélectionner la langue
appropriée</content>
                <content language="pl">Zaznacz odpowiedni
język</content>
                <content language="cz">Vybrat správný
jazyk</content>
            </item><item>
                <key>frmLanguage.fraLanguage.ToolTipText</key>
                <explanation>
                </explanation>
                <content language="en-gb"> Select your preferred
default display language. WebbIE uses this if it cannot work out
what the page should be, or if you tell WebbIE to always use
your default language. </content>
                <content language="fr"> Sélectionner la langue
d'affichage que vous préférez. WebbIE utilisera celle-ci s'il ne
peut pas déterminer comment afficher une page, ou si vous avez
choisi de toujours utiliser cette langue par défaut. </content>
                <content language="pl"></content>
                <content language="cz"></content>
            </item><item>
                <key>frmLanguage.lblSelect.Caption</key>
                <explanation>
                </explanation>
                <content language="en-gb">Select the default
language for WebbIE to use to display pages.</content>
                <content language="fr">Sélectionner la langue
par défaut pour l'affichage des pages.</content>
                <content language="pl">Zaznacz język, który jako
domyślny ma słułyć do wyświetlania stron</content>
                <content language="cz">Vybrat výchozí jazyk
zobrazování stránek.</content>
            </item>


            <item>
                <key>frmLinks.optSort(1).ToolTipText</key>
                <explanation>
                </explanation>
                <content language="en-gb"> Display this page's
links into alphabetical order. </content>
                <content language="fr"> Afficher les liens dans
cette page par ordre alphabétique </content>
                <content language="pl"></content>
                <content language="cz"></content>
            </item>
```

Website evaluation

Random site list

aikido.dojothionville.com/
annuaire-compositeurs.fr/
baboo.hautetfort.com/
champagne-ardenne.lpo.fr/
cimintelligence.free.fr/
discipline.free.fr/
frenchfragfactory.net/
groupejazz.free.fr/
ikarios.com/
management.journaldunet.com/
manipulation.ifrance.com/
marsrover3d.free.fr/
martinique.rfo.fr/
nseo.com/
pajol.eu.org/
peinturefle.free.fr/
perso.wanadoo.fr/5sens/oeil/
perso.wanadoo.fr/cql/
phrasedujour.free.fr/
pointdecroix.levillage.org/
reinsch.heliane.free.fr/
spectable.com/
surdite.lsf.free.fr/
tahitipresse.pf/
www.100-satisfaction.com/
www.1upgolf.com
www.acf-fr.org/
www.actustar.com/
www.aerospatial.enligne-fr.com/
www.afrik.com/
www.algeriatenders.com/
www.alsace-usa.com/
www.altibulle.com/
www.amnestyinternational.be/
www.animeland.com/index.php?rub=h
        ome
www.anti-scientologie.ch/
www.apce.com/
www.aphp.fr/
www.apparence.org/
www.appartement.org/
www.aquanaute.com/
www.artistes.net/
www.artmetz.com/
www.astrosurf.com/
www.atelierbd.com/
www.atterrissage.org
www.augmente-traffic.com/
www.autonomia.org/
www.banquemondiale-senegal.org/

www.bayel-cristal.com/
www.bbaa-bbav.be/
www.bm-grenoble.fr/
www.boiron.ca/
www.brises.org/
www.camembert-france.com/
www.cdn-orleans.com/
www.cercle-recyclage.asso.fr/
www.cesoirtv.com/
www.clicanoo.com/
www.climatisation-aquitaine.fr/
www.columbiatristar.fr/
www.commeunpro.com/
www.communication-
        crise.com/portail/
www.concession-bot.com/
www.conso-acteur.com/
www.construiresamaison.com/
www.coquilles.com/
www.corderie-royale.com/
www.counselingvih.org/
www.courrier-hybride.com/
www.covefi.fr/
www.creditfoncier.fr/
www.croqueurschocolat.com/
www.cru.fr/
www.csadmin.net/
www.cuisinesetvins.com/
www.defense.gouv.fr/sites/defense/
www.diplomatie.gouv.fr/fr/
www.divorce-famille.net/
www.drame.org/
www.ebm-journal.presse.fr/
www.ecoledelanegociation.com/
www.ecole-navale.fr/fr/index.php
www.edubourse.com/
www.electropolis.tm.fr/
www.eliminer-le-begaiement.net/
www.emploi.com/
www.endemia.nc/
www.ensembleinter.com/
www.enthousiasme.fr/
www.equipement.gouv.fr/
www.evb.ch/index.cfm?set_lang=3
www.evene.fr/
www.exclusive-tours.com/
www.facilement.com/
www.flashbac.com/
www.foret-aventure.com/
www.francophonie.org/

www.free-scores.com/
www.futura-sciences.com/
www.giga-presse.com/
www.goov.org/
www.grioo.com/
www.guidevacances.com/
www.gustaveparking.com/
www.handicap-relation.com/
www.hoaxbuster.com/
www.hotelformule1.com/
www.ifp.fr/
www.igp.public.lu/
www.ikea.com/ms/fr_FR/index.html
www.infogm.org/
www.inpi.fr/
www.interdits.net/
www.inventeursfous.com/
www.jepublie.com/
www.jetudie.com/
www.jimmy.fr/
www.jobpilot.fr/content/service/post_
    migration/homepage.html
www.jumeau.org/
www.killingmonkey.com/
www.kits-graphiques-deluxe.com/
www.la-botte.com/
www.lamine.com/
www.languesdefrance.com/
www.leboistordu.com/
www.lebonmarche.fr/
www.legrandsoir.info/
www.lejapon.org/info/
www.le-mariage.com/
www.lemasque.com/le_masque/index.j
    sp
www.lentreprise.com/
www.lepetitprince.com/fr/
www.lepoint.fr/sommaire.html
www.lesvagues.net/
www.lexpansion.com/
www.lhoroscope.com/
www.librecours.org/cgi-bin/main
www.lireetfairelire.qc.ca/
www.livre-rare-book.com/
www.location-vacances-bretagne.com/
www.locutio.net/
www.longueurdondes.com/
www.loue.fr/
www.lumiere.org/
www.magasin-cnac.org/index.php
www.magazine-litteraire.com/
www.mairie-stpierre.fr/

www.marche-
    blanche.ch/index.php?langage=fr
www.matissepicasso.org/
www.mayotte-online.com/
www.med.univ-rennes1.fr/
www.mesactions.com/
www.minorites.org/
www.miroirdegaladriel.net/
www.mjae.com/
www.monenfant.fr/
www.musee-moyenage.fr/
www.musiciens.biz/
www.netclub.com/index2.asp
www.nice.fr/
www.nihon-fr.com/manga/
www.normandie44lamemoire.com/
www.notre-planete.info/
www.nuits-sonores.com/
www.nxbp.fr/
www.oceaniecreations.fr/boutique/ho
    me.php
www.ojd.com/fr/
www.originepyrenees.com/
www.ouisocialiste.net/
www.paiementcic.com/
www.paris-art.com/
www.parishotelbercy.com/index.php
www.parisrhinrhone.com/
www.pcf.fr/accueil.php
www.pere-lachaise.com/
www.photos-animaux.com/
www.placedubienetre.com/
www.plcd.fr/
www.pointdecontact.net/
www.prisma-presse.com/
www.rare.asso.fr/
www.recherche-rapide.com/
www.redaction.be/
www.refmarketing.com/
www.renaultf1.com/fr/
www.retraites.gouv.fr/
www.rimbaudhtml.freesurf.fr/
www.rqge.qc.ca/
www.rsf.org/
www.saint-martin-online.com/
www.sciences-en-ligne.com/
www.scv.fr/
www.sos-extra.com/
www.sport-tambourin-ffjbt.com/
www.strasbourg.aeroport.fr/
www.super-secretaire.com/fr/
www.tavernes-maitre-kanter.com/
www.terresdeguyane.fr/

Selected site list classified by category

	Category and Site	url	Page Rank
	Search		
	Google	www.google.fr/	198
	Msn	www.msn.fr/	186
	Yahoo	fr.yahoo.com/	384
	Yahoo Directory	fr.dir.yahoo.com/	37
	Voila	www.voila.fr/	254
+	AOL	www.aol.fr/	809
	Media		
	Le Monde	www.lemonde.fr/	44
	Le Monde Diplomatique	www.monde-diplomatique.fr/	55
	La Libération	www.liberation.fr/	46
	Le Nouvel Observateur	permanent.nouvelobs.com/	77
	Le Figaro	www.lefigaro.fr/	115
	l'Humanité	www.humanite.presse.fr/	204
	L'Express	www.lexpress.fr/info/	264
	La Tribune	www.latribune.fr/	278
	Les Echos (economy)	www.lesechos.fr/	14
	Le Parisien (Paris)	www.leparisien.fr/	2 735
	L'Equipe (sports)	www.lequipe.fr/	153
	La Croix (religion)	www.la-croix.com/	1 106
	Le Bien Public (regional)	www.bienpublic.com/	5 996
	Liberté (Algeria)	www.liberte-algerie.com/	5 824
	Le Soir (Belgium)	www.lesoir.be/	5 490
	Corse-Matin (Corsica)	www.corsematin.com/	13 575
	canoë (Québec)	www2.canoe.com/	424
	NetEconomie (business and technology)	www.neteconomie.com/perl/navig.pl/neteconomie/accueil	97
	Boursier (stock exchange, trading)	www.boursier.com/	404
	Météo France (weather)	www.meteofrance.com/FR/index.jsp	319
	au Féminin (women's)	www.aufeminin.com/	26
	Radio (group France Inter, France Info, France Culture, France Bleu...)	www.radiofrance.fr/	116
	Radio RTL	www.rtl.fr/	206
	Radio Skyrock	www.skyrock.com/	332
	Television (TF1)	www.tf1.fr/	580
	Television (Canal plus)	www.canalplus.fr/	259
	Television (Arte)	www.arte-tv.com/fr/70.html	398
	Sortir à Paris	www.sortiraparis.com/	2 940

	Parissi	www.parissi.com/	3 225
	CineMovies	www.cinemovies.fr/	561
	Meetic (dating)	www.meetic.fr/	602
	L'Iinternaute magazine	www.linternaute.com/	8
	Le Journal du Net	www.journaldunet.com/	19
	InfoConcert	www.infoconcert.com/	213
	Wanadoo	www.wanadoo.fr/	477
	ZDNet (computing)	www.zdnet.fr/	7
	Banking		
	Crédit Lyonnais	www.creditlyonnais.com/servlet/Gcex?DEST=HOME	471
	Crédit Mutuel	https://www.creditmutuel.fr/accueil_national.cgi	927
	Crédit Agricole	www.credit-agricole.fr/	158
	BNP Paribas	www.bnpparibas.net/	185
	Société Générale	www.societegenerale.fr/	906
	Blind		
	INJA (Institut National des Jeunes Aveugles)	www.inja.fr/	75 830
	Voirplus	www.voirplus.net/	42 722
	Handicapzero	www.handicapzero.org/	1 055
	Handica	www.handica.com/	5 857
	Braillenet	www.braillenet.org/	18 958
	Accessiweb	www.accessiweb.org/	23 126
	AVH (Association Valentin Haüy)	www.avh.asso.fr/	4 682
	La Fédération des Aveugles et Handicapés Visuels de France	www.faf.asso.fr/	61 912
	Serveur Hélène	www.serveur-helene.org/	23 208
	Association Accès Culture (theatre)	www.accesculture.net/	92 729
	AWIPH (Agence Wallonne pour l'Intégration des Personnes Handicapées)	www.awiph.be/	49 225
	CRESAM (Centre de Ressource Expérimental pour enfants et adultes Sourds-Aveugles et sourds-Malvoyants)	www.cresam.org/	91 281
	CNPSAA (Comité National pour la Promotion Sociale des Aveugles et Amblyopes)	www.cnpsaa.fr/	559 492
	Yanous	www.yanous.com/	1 551
	Freedom Scientific	www.freedomsci.de/serv_fra.htm	163 763
	Ceciaa	www.ceciaa.com/	20 075
	CDH (Collectif des Démocrates Handicapés)	cdh-politique.org/	112 537
+	Handipole	www.handipole.org/index.asp	73 563
+	Handiweb	www.handiweb.fr/accueil/default.php	192 635
+	OPE	www.ope.org/	57 224

	Commerce		
	Amazon (culture, CD)	www.amazon.fr/	5
	LeGuide (directory)	www.leguide.com/	3
	Monsieur Prix (price comparison/sales, general)	www.monsieurprix.com/	9
	ciao! (price comparison/sales, general)	www.ciao.fr/	10
	FNAC (culture)	www.fnac.com/	59
	kelkoo (shopbot)	fr.kelkoo.com/	60
	Rue du Commerce (computing)	www.rueducommerce.fr/	36
	clubic (computing, multimedia)	www.clubic.com/	2
	Auchan (supermarket)	www.auchan.fr/	428
	keljob (employment)	www.keljob.com/	1 781
	Allociné (cinema)	www.allocine.fr/	15
	Communication		
	Openweb	openweb.eu.org/	8 744
	20six (weblog creation service)	www.20six.fr/	46
	Teemix (weblog creation service)	teemix.aufeminin.com/blog/	82
	Blog (Tristan Nitot)	standblog.org/	274
	Yahoo! Mail	fr.mail.yahoo.com/	7 984
	MSN Hotmail	www.msn.fr/	186
	Computing		
	ftpk	multimedia.ftpk.net/	47
	JDN développeurs	developpeur.journaldunet.com/	556
	Linux	www.linux.fr/	106 952
	Infos-du-Net	www.infos-du-net.com/	4
	IBM	www.ibm.com/fr/	5 389
	01 Net (telecharger.com)	www.01net.com/	6
	Microsoft	www.microsoft.com/france/	25
	MozillaZine	mozillazine-fr.org/	1 543
	Adobe	www.adobe.fr/	139
	Pompage	pompage.net/	10 000
	Education		
	ONISEP (Office national d'information sur les enseignements et les professions)	www.onisep.fr/	744
	Paris 8	www.univ-paris8.fr/	4 863
	CNAM	www.cnam.fr/	1 955
	le Bac	examens.lebac.com/	260 933
	Entertainment		
	Française des jeux (Loto, EuroMillions)	www.fdjeux.com/	244
	PMU (horse racing)	www.pmu.fr/	719
	Video Games	www.gamekult.com/	30
	Tour de France	www.letour.fr/	2 536
	Humour	www.rigoler.com/	834

	Trombi	www.trombi.com/	1 514
	Cooking	www.marmiton.org/general/home.cfm	320
	Gardening	www.plantes-et-jardins.com/index.asp?bc=1	1 431
	Planetarium	www.planetarium-galilee.com/	152 351
	Government		
	Service Public	www.service-public.fr/	129
	AGEFIPH (Association de gestion du fonds pour l'insertion professionnelle des personnes handicapées)	www.agefiph.asso.fr/	38 542
	Légifrance (Law)	www.legifrance.gouv.fr/	190
	ANPE	www.anpe.fr/	339
	CAF (Caisses d'Allocations Familiales)	www.caf.fr/	408
	France Telecom	www.francetelecom.com/fr/	253
	EDF	www.edf.fr/index.php4?coe_i_id=1	2 691
	La Poste	www.laposte.fr/	391
	Le Ministère de la Culture et de la Communication	www.culture.fr/	360
	Taxes	www.impots.gouv.fr/	340
	Disability	www.handicap.gouv.fr/	12 634
	Presidency (Elysée)	www.elysee.fr/	1 334
	Prime Minister	www.premier-ministre.gouv.fr/fr/	899
+	Employment	www.travail.gouv.fr/	284
+	Ministère de l'Outre-Mer	www.outre-mer.gouv.fr/outremer/front	7 784
+	Regional (Ile-de-France)	www.iledefrance.fr/	2 327
+	Regional (Languedoc Roussillon)	www.cr-languedocroussillon.fr/	13 749
+	Departmental (LeGrandChalon)	www.legrandchalon.fr/	20 515
+	Departmental (Isère)	www.isere.fr/pages/index/id/91	79 234
+	City (Mairie de Toulouse)	www.mairie-toulouse.fr/	5 557
+	Les PEP (Pupilles de l'enseignement public)	www.lespep.org/	102 943
+	INRIA (Institut National de Recherche en Informatique et en Automatique)	www.inria.fr/index.fr/	1 979
+	CNRS (Centre National de la Recherche Scientifique)	www.cnrs.fr/	878
	Reference		
	Wikipedia Encyclopaedia	fr.wikipedia.org/wiki/Accueil	1
	msn Encarta	fr.encarta.msn.com/	194
	CCM	www.commentcamarche.net/	20
	Translation	trans.voila.fr/	536
	Library (Bibliothèque nationale de France)	www.bnf.fr/	766
	Cité des sciences (médiathèque)	www.cite-sciences.fr/	354
	Internet and Computing	www.dicofr.com/	333
	Yellow Pages (Pages jaunes)	www.pagesjaunes.fr/	89
	Travel		

	SNCF	www.sncf.fr/	12 775
	RATP	www.ratp.fr/	616
	lastminute	www.fr.lastminute.com/	86
	promovacances	www.promovacances.com/	302
	opodo	www.opodo.fr/	191
	Expedia	www.expedia.fr/	120
	Tramway	www.tramway.paris.fr/	51 903
	Mappy	www.mappy.fr/	268
	ViaMichelin	www.viamichelin.fr/viamichelin/fra/tpl/hme/MaHomePage.htm	146
	Routard	www.routard.com/	38
	Hotels	www.hotels.fr/	2 200
	Diverse		
+	Health	www.doctissimo.fr/	24
+	Employment	www.apec.fr/	476
+	Business	www.eolas.fr/	5 205
+	Business	www.opquast.com/	3 665
+	IRCAM (music)	www.ircam.fr/	19 413
+	Se Loger (accommodation)	www.seloger.com/	90
+	SFR (mobile phones)	www.sfr.fr/do/Home	647
+	Orange (mobile phones)	www.orange.fr/0/visiteur/PV	236
+	INSEE (L'Institut national de la statistique et des études économiques)	www.insee.fr/fr/home/home_page.asp	557
+	Integrance (health insurance)	www.integrance.fr/	40 247
+	Le Louvre	www.louvre.fr/	2 755

+ Indicates sites added

User evaluations

French users questionnaire (in French)

L'évaluation de WebbIE:
Enquêtes et questionnaires « utilisateurs »

Questionnaire pour les utilisateurs français (premier emploi) – version française

Ce document est un questionnaire à propos du navigateur web WebbIE et qui vient d'être traduit en français.

WebbIE a été développé par une équipe de l'Université de Manchester, en Angleterre. C'est un navigateur web pour les personnes aveugles ou malvoyantes et particulièrement pour celles qui utilisent les lecteurs d'écran. WebbIE est gratuit. Il fonctionne avec Windows et Internet Explorer.

WebbIE est utilisé depuis quelques temps déjà. Actuellement à sa version 3, il est constamment en cours d'amélioration. WebbIE permet un accès à Internet Explorer à travers une interface qui simplifie et réaffiche le contenu en mode texte accessible, de manière linéaire. Quelques fonctionnalités offertes par WebbIE sont : sa capacité de passer des liens dans une page, d'aller directement au titre ou aux formulaires. Les formulaires sont accessibles dans une page à travers une interface textuelle simple, et les utilisateurs peuvent effectuer une recherche simple avec Google à l'intérieur de l'interface de WebbIE. Les utilisateurs peuvent basculer entre un affichage textuel des pages ou l'interface standard d'Internet Explorer, au sein de WebbIE. Les pages peuvent être agrandie grâce à la fonction zoom, et les paramètres d'affichage tels que le type et la taille de la police peuvent être modifiés. On peut copier et coller le texte dans d'autres applications. Plus d'informations sur les fonctionnalités de WebbIE peuvent être trouvées dans les fichiers d'aide, y compris les détails des raccourcis clavier utilisés pour un accès rapide aux fonctions.

Nous sollicitons l'opinion des utilisateurs du web aveugles ou malvoyants, francophones. Nous aimerions savoir si WebbIE fonctionne bien pour accéder aux sites web que vous aimez utiliser ou dont vous avez besoin. Merci d'avance de participer aux tests de WebbIE.

Le questionnaire comporte trois parties.
Dans la première partie vous choisirez environ 3 sites web à tester.
D'abord il vous sera demandé de nommer chaque site (veuillez donner l'adresse exacte du site).
Ensuite vous devrez évaluer WebbIE selon certains critères, par exemple pour vérifier si vous

réussissez une recherche d'informations ou si vous pouvez remplir un formulaire avec succès en utilisant WebbIE.

La deuxième partie consiste en quelques questions courtes sur vous (votre âge, votre sexe, votre expérience avec l'informatique et avec Internet, des questions sur les logiciels que vous utilisez...). Aucune information ne sera communiquée à de tierces personnes. Il est optionnel de fournir ou non ces informations ou toutes autres informations demandées.

La troisième partie du questionnaire vous demande votre avis général concernant votre expérience d'utilisateur de WebbIE et comprend des questions sur les fonctionnalités spécifiques de WebbIE que vous avez utilisées.

Avant de remplir le questionnaire vous devez installer WebbIE. Voici l'adresse de la page web où vous pouvez le télécharger : http://www.webbie.org.uk/fr/index.htm. Vous êtes libre de le conserver sur votre ordinateur par la suite. Il peut y avoir des mises à jour sur le site à l'avenir. Vous devez être sur une plateforme Windows pour que WebbIE fonctionne.

Le Questionnaire

Première partie (test des sites web avec WebbIE)

Veuillez choisir au moins 3 sites web à tester pour nous.

Voici quelques critères selon lesquels nous voudrions tester WebbIE :

1. Est-ce que les pages sont téléchargées et affichées dans WebbIE ?
2. Est-ce que vous pouvez trouver le contenu qui vous intéresse ?
3. Est-ce que vous pouvez utiliser WebbIE pour naviguer dans le site ?
4. Est-ce que les fonctions que WebbIE offre vous sont utiles ?

Si vous voulez tester WebbIE sur d'autres sites web, n'hésitez pas. Tous commentaires ou remarques sont les bienvenus.

Quels sites avez-vous choisis ? Veuillez donner leur adresse.

Sont-ils des sites que vous visitez régulièrement ?

Comment avez-vous trouvé l'utilisation de WebbIE avec ces sites ?

Veuillez décrire la nature de tout problème rencontré.

Deuxième partie (informations personnelles et usage d'Internet)

1. Vous êtes une femme ou un homme ?
2. Quel âge avez-vous ?
3. Comment décrirez-vous vos acquis au niveau de l'informatique (exemple - débutant, utilisateur moyen, expert) ?
4. Pour quelles tâches utilisez-vous un ordinateur ?
5. Quelles aides techniques utilisez-vous (lecteur d'écran, logiciel d'agrandissement d'écran, lecteur d'écran et loupe combinée) ? Lesquels ?
6. Utilisez-vous une plage Braille ? Laquelle ?

7. Utilisez-vous un synthétiseur vocal ? Si oui, lequel et pourquoi celui-là? Changez-vous souvent votre synthèse vocale ? Pour quelles raisons ? Quels sont les points forts et les points faibles de votre synthèse vocale actuelle ?

8. A quelle fréquence utilisez-vous Internet (nombre d'heures par semaine ou par mois) ?

9. Quel(s) navigateur(s) web utilisez-vous (exemple Internet Explorer, Mozilla Firefox, Lynx...) ?

10. Pouvez-vous nommer quelques sites web que vous visitez le plus souvent ? Pourquoi visitez-vous ces sites ? Vous connectez-vous toujours sur les mêmes sites ou aimez-vous suivre des liens vers d'autres sites et explorer le web ?

11. Utilisez-vous des moteurs de recherche ou annuaires (comme Google ou Yahoo) ? Lesquels ?

12. Comment vous connectez-vous sur un nouveau site web pour lequel vous avez l'adresse ? Est-ce que vous entrez l'adresse manuellement dans le navigateur ou utilisez-vous démarrer - exécuter ou utilisez-vous un moteur de recherche ?

13. Utilisez-vous des pages web qui vous demandent un niveau d'interactivité (par exemple de remplir un formulaire etc.) ou lisez-vous simplement des pages ?

14. Acceptez-vous de nous donner votre email, au cas où nous aurions d'autres questions à vous poser sur WebbIE ?

Troisième partie (retour sur WebbIE)

Avez-vous déjà entendu parler de WebbIE ?

Après avoir testé WebbIE, pensez-vous continuer à l'utiliser ?

Comment classeriez-vous WebbIE comparé aux autres navigateurs web que vous utilisez ?

Est-ce qu'il y a des fonctions de WebbIE que vous avez appréciées tout particulièrement ?

Des fonctions que vous avez moins appréciées ?

Est-ce que vous avez utilisé les fonctions suivantes ?

- l'outil pour remplir des formulaires
- le dispositif de recherche
- la fonction pour passer les liens
- la fonction pour abréger / rétablir une page
- la fonction zoom
- le changement des paramètres d'affichage (taille ou type de police etc.)
- la fonction copier / coller

Avez-vous des remarques sur l'utilité de ces fonctions ou autres ?

Qui selon vous risque d'utiliser WebbIE ?

Merci d'avoir pris le temps d'évaluer WebbIE. N'hésitez pas à nous contacter pour toute assistance ou pour avoir des informations complémentaires sur WebbIE.

Lisa Bowick,

Université de Manchester, 2005

Université de Paris 8, 2004-2005

French users questionnaire (in English)

WebbIE evaluation:
user interviews and questionnaires

Questionnaire for French (first-time) Users

This is a questionnaire about the browser called WebbIE which has just been translated into French.

WebbIE was developed by people at the Manchester University in England. It is a web browser for blind and visually-impaired people, especially those using screen readers. WebbIE is free. It works with Windows and Internet Explorer.

People have been using WebbIE for sometime already. It is now at version 3 and is constantly being improved. WebbIE allows access to Internet Explorer through an interface that simplifies and represents the content as accessible text, in a linear form. Some of the features WebbIE offers include the ability to skip links on a page, to go directly to titles or to forms. Forms are accessed in a page using a simple text interface, and users can perform a Google search from within WebbIE. Users can toggle between a text display of pages or the usual Internet Explorer interface, within WebbIE. Pages can be magnified; display settings such as the font type and size can be changed. Text can be cut and pasted to other applications. More information on WebbIE functions can be found in the help files, including details of the control keys WebbIE uses.

We are interested in the opinions of French-speaking blind or visually-impaired users of the web and if WebbIE works well to access websites you like or need to use. Thank you for agreeing to test WebbIE.

This questionnaire is in three parts.
Part one asks you to choose around 3 websites to test.
You will first be asked to name each site (please give us the exact site). Then you will be asked to rate WebbIE according to some criteria such as if you are able to find information you are looking for or if you can successfully fill out a form using WebbIE.

Then in part two there are some short questions on your personal details (age, gender, computer experience and Internet use, software you use…). This information will not be released to anyone else. It is optional to complete this, or any other information.

Part three asks you for some general feedback on your experience of using WebbIE and includes questions on what specific functions you used in WebbIE.

Before you complete the questionnaire you must install WebbIE. This is the web page where you can download WebbIE from: http://www.webbie.org.uk/fr/index.htm. You are free to leave it on your computer afterwards. There may be updates in the future available on the website. You must be on a Windows operating system for WebbIE to work.

The Questionnaire

Part One (testing websites with WebbIE)

Please choose at least 3 websites to test for us.

These are some of the criteria we hope to test WebbIE against:

1. Whether the pages load / are displayed in WebbIE;
2. Whether you can find the content that interests you;
3. Whether you can use WebbIE to navigate around the site;
4. Whether the functions WebbIE offers are useful to you.

If you would like to test WebbIE on other websites, please feel free to do so. Any comments or feedback would be appreciated.

Which sites did you choose? Please give their address. Are these sites you visit often?

How did you find using WebbIE with these websites?

Please try to explain the nature of any problems encountered.

Part Two (personal information and Internet use)

1. Your gender:
2. Your age:
3. How would you describe your computing skills (example – beginner, regular user, expert)?
4. What do you use a computer for?
5. What assistive technology do you use (screen reader, magnifier, combined screen reader and magnifier)? Which one(s)?
6. Do you use a Braille display? Which one?
7. Do you use a speech synthesiser? If so, which one and why? Do you often change your speech synthesiser? What would cause you to change it? What are the good and bad points of the one you use at the moment?
8. How often do you use Internet (number of hours per week or month)?
9. What browser or browsers do you use (example, Internet Explorer, Mozilla Firefox, Lynx...)?
10. Can you name some of the websites you visit most often? Why do you go there? Do you always visit the same websites or do you like to follow links to other sites and to explore the web?
11. Do you use search engines or directories (for example Google or Yahoo)? Which one(s)?
12. How do you go to a new website for which you have the address? Do you enter the address manually into the browser, use start - run, or use a search engine?

13. Do you use any web pages that require you to interact with them (fill out forms etc.) or do you just read pages?

14. Would you mind giving us your email, if we have any further questions to ask you about WebbIE?

Part Three (feedback on WebbIE)

Had you ever heard of WebbIE before?

After having tried WebbIE do you think you might continue to use it?

How do you think WebbIE compares to other browsers you use?

Are there any particular features you liked about WebbIE?

Disliked about it?

Did you use the following functions?

- forms
- search
- skip links
- crop / uncrop page
- magnification
- display settings (changing font etc.)
- copy / paste

Do you have any comments on how helpful you found these or other features to be?

Who do you think might use WebbIE?

Thank you for taking the time to evaluate WebbIE. Feel free to contact us at any time for help or information on WebbIE.

English users questionnaire and task sheets

WebbIE evaluation: user interviews and questionnaires

1. (Phone) questionnaire / face-to-face interviews - existing WebbIE users

Demographic info

Name:

M or F:

Age:

Could you tell me how long you have been visually impaired? _____

Computer experience

How many years have you been using a computer? _____

Around how many hours a week are you on a computer? _____

Do you work in computing?

Yes _____   No _____

Would you describe yourself as a

- a beginner,   _____
- an intermediate or _____
- an expert user?   _____

Assistive technology used

Are you a regular Braille user?

If yes: _____
Which of the following software do you use?

- Screen reader with Braille display
- Screen reader with speech

If no: _____
Which of the following software do you use?

- Screen reader with speech
- Screen magnifier
- Combined screen reader / magnifier

Which one(s)? / Can you name it/them?

Internet use

For how many years have you been using the Internet? _____

How many hours a week do you spend using the Internet? _____

How widely do you use the Internet?

For example,

Can you estimate how many websites a week you visit? _____

Do you go to these sites for professional reasons?

No _____

 Yes _____

(If yes) What percentage of sites do you estimate you visit for professional rather than private use? _____

Are there a set of websites that you visit regularly?

(If yes) Can you say which ones?

How many in all do you visit regularly?

Do you surf around at all / a little / a lot?

Recap if necessary

So you would say

you use a small number of websites

- regularly
- occasionally

you use a wide variety of sites

To note

Wide use ____

Small number of sites _____

If you need to find a website, do you use Google or another search engine? _____

If other(s), name... _____

Do you follow links starting from websites you know? _____

What is your homepage? _____

Do you have a lot of sites bookmarked as favourites? _____

_____

How do you generally experience using the web?

- It's a necessary evil

- It's quite practical / enjoyable

- You wouldn't know how to live without it any more

WebbIE appreciation

From these 4 choices, you'd say WebbIE is

1. adequate for the job
2. not great, but better than nothing
3. good
4. the best thing since sliced bread

Overall, what would you say are:

- WebbIE's strong points?

- WebbIE's weak points?

WebbIE use

How long have you been using WebbIE? _____

Why / how did you first start using it?

Were you using another browser before? If so, which one(s)? _____

Do you use WebbIE exclusively now, or do you also use another browser?

(If exclusive) What made you change over?

(If multiple browsers) Why do you choose to use WebbIE when you do, and not another browser?

Do you know of any tools for web browsing similar to WebbIE?

Have you ever used these?

- IE + a Screen reader

- IBM HomePage Reader

- BrookesTalk

(If others known) Can you discuss their relative merits, compared to WebbIE?

Did you receive any specific training for using WebbIE?

How often do you look for updates on the WebbIE website?

Have you ever updated it since installing it?

What version of WebbIE are you using?

Have you ever consulted the WebbIE help files?

Have you read the WebbIE manual?

Do you use the F1 tooltips?

If yes, how useful did you find it / them?

- Help files
- Manual
- Tooltips

Detailed WebbIE functions

Do you sometimes choose specifically to use WebbIE because you are visiting a particular website?

If yes, which sites and why?

Do you use any "service" web pages like Yahoo!, where you interact with the page?

For example: hotmail, ebay, Tesco's, banking sites...

> Or do you just read?

Are there any features of WebbIE that you find particularly useful?

(Examples: text only, search, forms, skip links, go to title/content/forms, copy and paste)

- Which ones?
- Why do you find these helpful?
- Have you explored all the menu options and functions of WebbIE?

Were there any features in older versions of WebbIE that you found helpful but are no longer available?

If so, which one(s)?

Do you skip back and forward between WebbIE and IE?

If so, why do you do this?

How do you think WebbIE could be improved?

Have you told other people abut WebbIE?

2. Observation exercises – existing WebbIE users

Task 1

Please go to the BBC website www.bbc.co.uk/ using WebbIE and find out the local weather forecast for the next five days – give the overall outlook and the min and max temperature forecasts for the day after tomorrow.

Task 2

(For beginners - navigation)

Please go to the Recipes 4 us website http://www.recipes4us.co.uk/.

Find a recipe for Borsht (Russian beetroot) soup.

What are the two things you need to garnish the soup?

(How distracting are the repeated lines?)

Task 3

(For medium skilled users – form filling, usability despite minor problems)

Please go to the trainline website http://www.thetrainline.com/.

Search for a return ticket from Liverpool to London for 2 adults, leaving on the morning of Friday 19th August and returning on the evening of Sunday 21st. You'll want a direct service, with no train changes.

How long is the journey?

Who is the service provider?

What London train station do you arrive in?

Option: How much would it cost?

Task 4

 (Complex exercise, for expert users)

Please go to the Argos website www.argos.co.uk/.

Locate your nearest store from the website. What time does it close on a Saturday?

Option: Can you find a phone number for the store?

Go to the area you think you might be able to buy items for a picnic.

Find out the price for the 'Hi Gear 4 Person Wheelie Picnic Pack'.

Option: Expert users can be asked to begin the purchase process.

Option: Find the product on another site and compare prices.

Original English questionnaire

WebbIE Questionnaire (July 2003)

Your name:

1 All about you...

5. How long have you been using computers?
6. Do you use Braille, speech, Magnifier, MS accessibility, none?
7. Did you browse web pages before you used WebbIE?
8. What browser did you use?
9. Which Browser are you using now?

2 ... and how you use the web

10. Which websites do you visit? Which ones do you visit at least once a week? Which ones do you visit nearly every day?
11. Which are the top five?
12. Do you use a search engine?
13. Which search engine?
14. Do you follow links?

3 How you use your browser

15. How do you keep a list of websites you like/use?
16. Do you have a home page? What is it?
17. Do you need to change your home page?
18. How do you go to a new website for which you have the address? manually into the browser, using run, using a search engine
19. Which specific shortcut keys do you use, if any? E.g. Ctrl + R
20. Do you save websites to your hard disk? How?
21. How do you go from one page to another? How do you go back a page? E.g. Alt + arrow
22. Do you print web pages?
23. Do you cut and paste information from your browser?

4 Using WebbIE

24. Do you use your other browser still? Do you pop up IE and use it within WebbIE? Do you go back to WebbIE if you do? When do you do this?
25. Do you use the toolbar?
26. Do you change the graphic options? Font?
27. Do you use the skip links function?
28. Do you access frames individually? Do you use load all frames?
29. How do you move around a page?
30. Are there any keys that are difficult / inappropriate?

5 Website content

31. Are there any sites you have found to be unusable? What are they?
32. Do you use any sites with sound, like the BBC?

33. Do you get your browser to show you information on images?
34. Do you use Java, JavaScript, Flash or anything other than standard web pages? Are you able to access it? If so, how?

6 General

35. What would you like WebbIE to do that it doesn't at present?
36. What would you like it to do better?
37. What is your favourite feature in WebbIE? Why?
38. What is your least favourite feature in WebbIE? Why?
39. What problems do you have using WebbIE to surf the web?
40. Who do you think might use WebbIE?

Annexes 3: Symbols

User testing Phase 1

Pre-test Symbol Grid (Iconicity, Manchester University)

Main Test Symbol Grid (Iconicity, Manchester University)
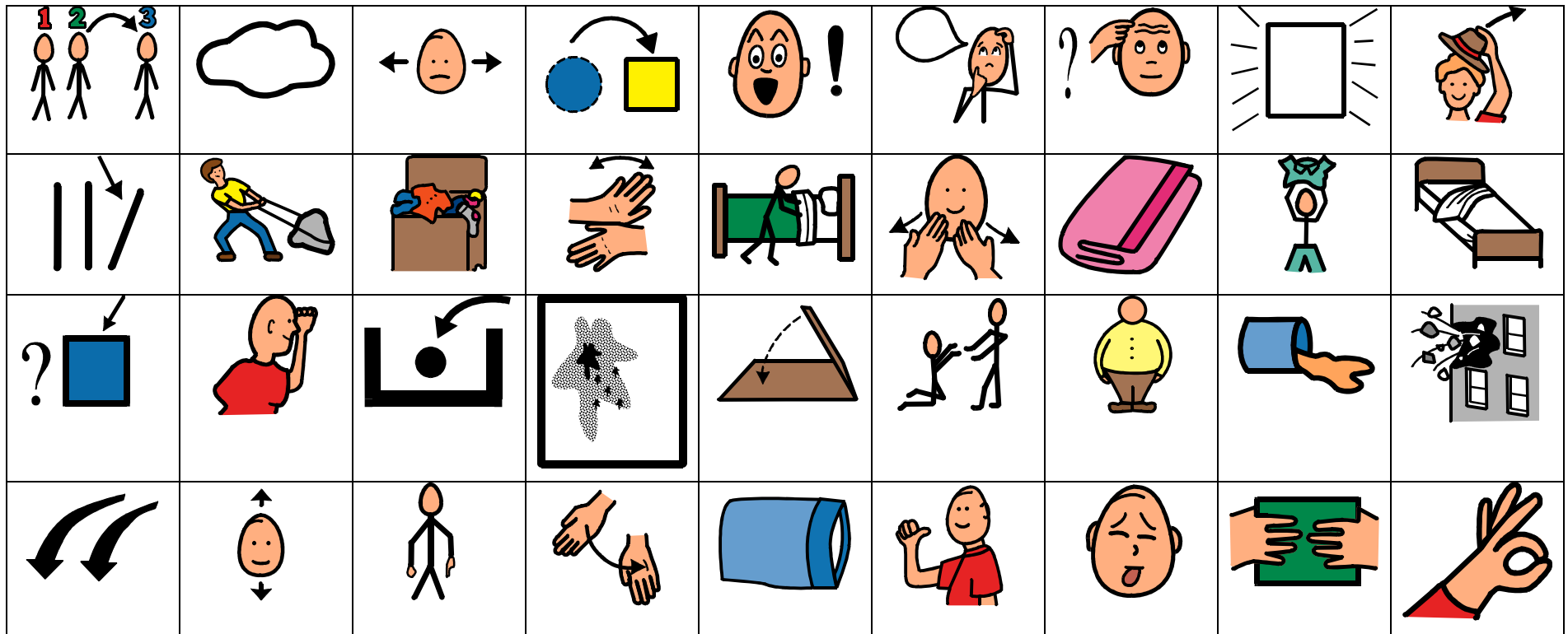
Labels of symbols used in the communication overlays

Grid order, left to right.

Num.	Pre test Symbol Grid	Num.	Main Test Symbol Grid	Standard definition
1	rabbit	1	**What is next?**	next
2	new clothes	2	**It is nice and soft**	soft
3	oh no!	3	**No**	no
4	half pint	4	**You need to change them**	change
5	insects	5	**Whoops**	surprised
6	tattoo	6	**We forgot**	forget
7	alligator	7	**What do you think?**	think
8	tangerine	8	**It is nice and clean**	clean
9	umbrella	9	**Let us take it off**	take off
10	scare(d)	10	**It is crooked**	crooked
11	absent	11	**You need to pull**	pull
12	kiss	12	**Put it in the tub**	clothes basket
13	vegetable soup	13	**It is finished**	finish(ed)
14	joke	14	**Let us make the bed**	make bed
15	you	15	**Thank you**	thank you
16	X-ray	16	**The blanket**	blanket
17	mad	17	**Let us put on**	put on
18	panda	18	**The sheets**	sheets
19	quiet	19	**Where is it?**	it
20	hedgehog	20	**Look at this**	look
21	unlock	21	**Tuck it in**	in or inside
22	walk the dog	22	**It is dirty**	dirty
23	goat	23	**Fold it back**	fold
24	calf	24	**Help me please**	help
25	zoo	25	**Puff it up**	fat
26	race	26	**What a mess**	mess
27	kick	27	**It looks like a bomb went off**	explosion
28	elephant	28	**Let us do it again**	again
29	juice	29	**Yes**	yes
30	fin	30	**Put it here**	here
31	baby animals	31	**You are welcome**	welcome
32	leopard	32	**The pillow case**	pillow
33	octopus	33	**Let me**	me
34	neighbours	34	**It looks bad**	bad
35	dog	35	**Hold this please**	hold
36	vacuum	36	**It looks good**	okay

Differences in PCS symbols used in the Haupt & Alant and the Manchester University studies

14 symbols had some differences: numbers 1, 4, 5, 7, 8, 11, 18, 19, 20, 22, 24, 27, 30 and 31.

Variations between individual symbols used may have produced some differences in results for the two studies. A clear example would be symbol number 27 "It looks like a bomb went off" which is very explicit in the symbol set for the Manchester study, but relatively unclear in the set used for the Haupt & Alant study. Corresponding results found this symbol to be 90% iconic in the Manchester study and not at all in the Haupt & Alant study, which may or may not be due to the difference. A similar problem could be seen for symbol number 18 "The sheets" which highlights the sheets on a bed in the Manchester study symbol set and is a simple bed in the Haupt & Alant study, with no additional clues. Again, this symbol achieved higher iconicity values in the Manchester study. Symbol 24 "Help me please" is very different, with full body figures, one in a more vulnerable position reaching out to the other person with outstretched arms (Manchester study) as opposed to two hands with fingertips touching (Haupt & Alant study). Correspondingly, iconicity was higher in the current study for this symbol.

Other differences which can be noted are:

- Symbol 31 "You are welcome" – the pictograms are of the same type (sign language based) but depict different gestures;

- Symbol 30 "Put it here" has no positioning cross (Manchester);

- Symbol 20 "Look at this" has no arrow in the Manchester study and has more body parts (human trunk and uplifted arm with hand shielding eyes in a classic focusing position).

Symbols 30 and 31 were not found to be iconic in either study. Symbol 20 had an iconicity value of 70% in the current study but was not found to be iconic in the Haupt & Alant study.

Other symbols varied in their use of arrows, exclamation marks or question marks (examples being numbers 1, 4, 5 7 and 19). These may or may not have been included, been of a different type (curved or straight, large or small...) or highlighted in different ways (boxed, crossed out...). An example is symbol 1 "What is next?" which has no question mark (positioned in a box) in the Manchester study. This symbol is also more figurative than the symbol used in the Haupt & Alant study, which uses geometric shapes. Though both symbols number 4 used geometric shapes, these were more

contrasted (round and square as opposed to two squares) in the Manchester study. This is a problematic area in symbol assessment for many reasons and analysis of results was regrettably complicated by the lack of complete consistency between the symbol sets available for (comparative) study. The issue may not have been important, both studies finding these symbols to be generally low on iconicity. Results of the Manchester study could of course be analysed on a completely independent basis.

User testing Phase 2
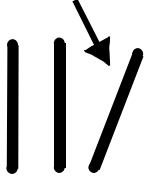
Translucency Test extract (Man. Uni. Staff and Students)

		No Relationship				Very Strong Relationship		

7)

look   1   2   3   4   5   6   7

8)

crooked   1   2   3   4   5   6   7

9)

help   1   2   3   4   5   6   7

10)

make bed   1   2   3   4   5   6   7

11)

pull   1   2   3   4   5   6   7

Guessability Test extract (Man. Uni. Staff and Students)

19)

----
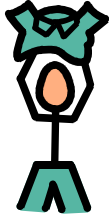
20)

----
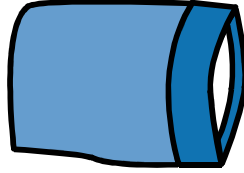
21)

----
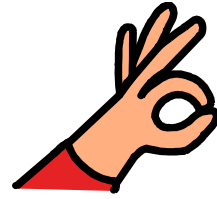
22)

----
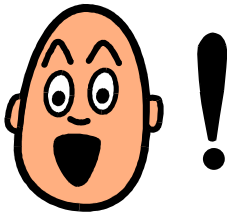
23)

----
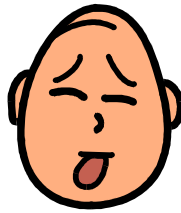
24)

----
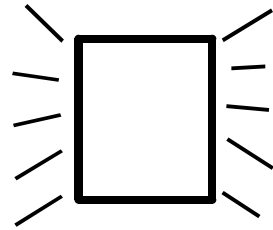
25)
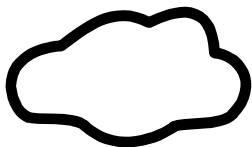
26)
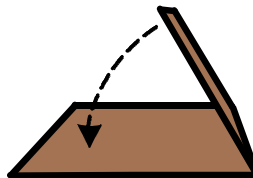
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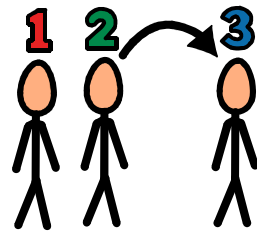
User testing Phase 3

Labels of symbols used in the communication overlays
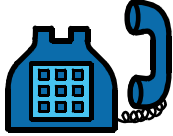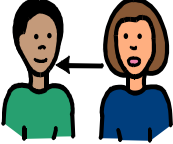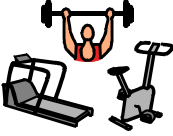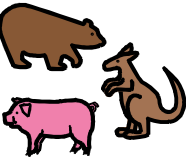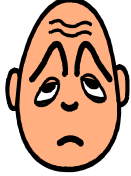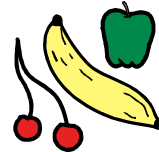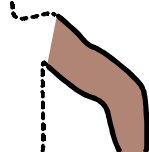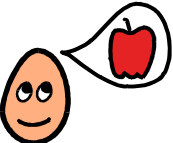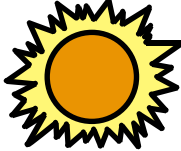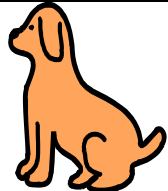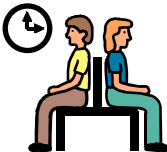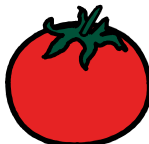
Grid order, left to right.

Num.	Pre test Symbol Grid	Num.	Main Test Symbol Grid
1	phonecall	1	**come**
2	cat	2	**small**
3	car	3	**food**
4	tell	4	**ball**
5	money	5	**frightened**
6	exercise	6	**help**
7	bathe	7	**biscuit**
8	mouse	8	**toilet**
9	ambulance	9	**eat**
10	tree	10	**fall**
11	night	11	**book**
12	hurt	12	**go**
13	spoon	13	**wash**
14	animals	14	**make**
15	fish	15	**read**
16	eyes	16	**open**
17	friends	17	**sweets**
18	family	18	**bed**
19	city	19	**funny**
20	tired	20	**hot**
21	chair	21	**sleep**
22	fruit	22	**play**
23	sing	23	**happy**
24	arm	24	**want**
25	doctor	25	**music**
26	cut	26	**sad**
27	hungry	27	**no**
28	take off	28	**girl**
29	sunny	29	**door**
30	dog	30	**dirty**
31	home	31	**cold**
32	storm	32	**give**
33	flowers	33	**ill**
34	run	34	**drink**
35	mosquito	35	**big**
36	lunch	36	**me**

37	wait	37	**television**
38	park	38	**wheelchair**
39	tomato	39	**milk**
40	dance	40	**more**
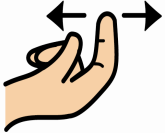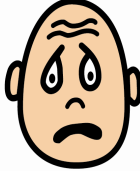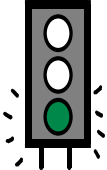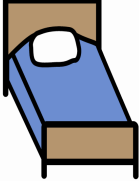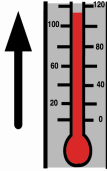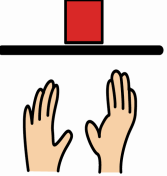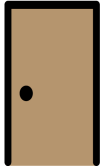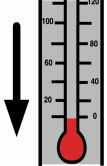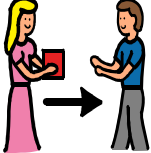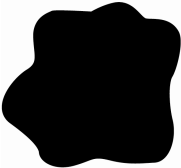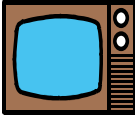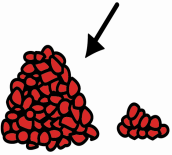
Pre-test Symbol Grid – PCS (Iconicity, Somali and English)

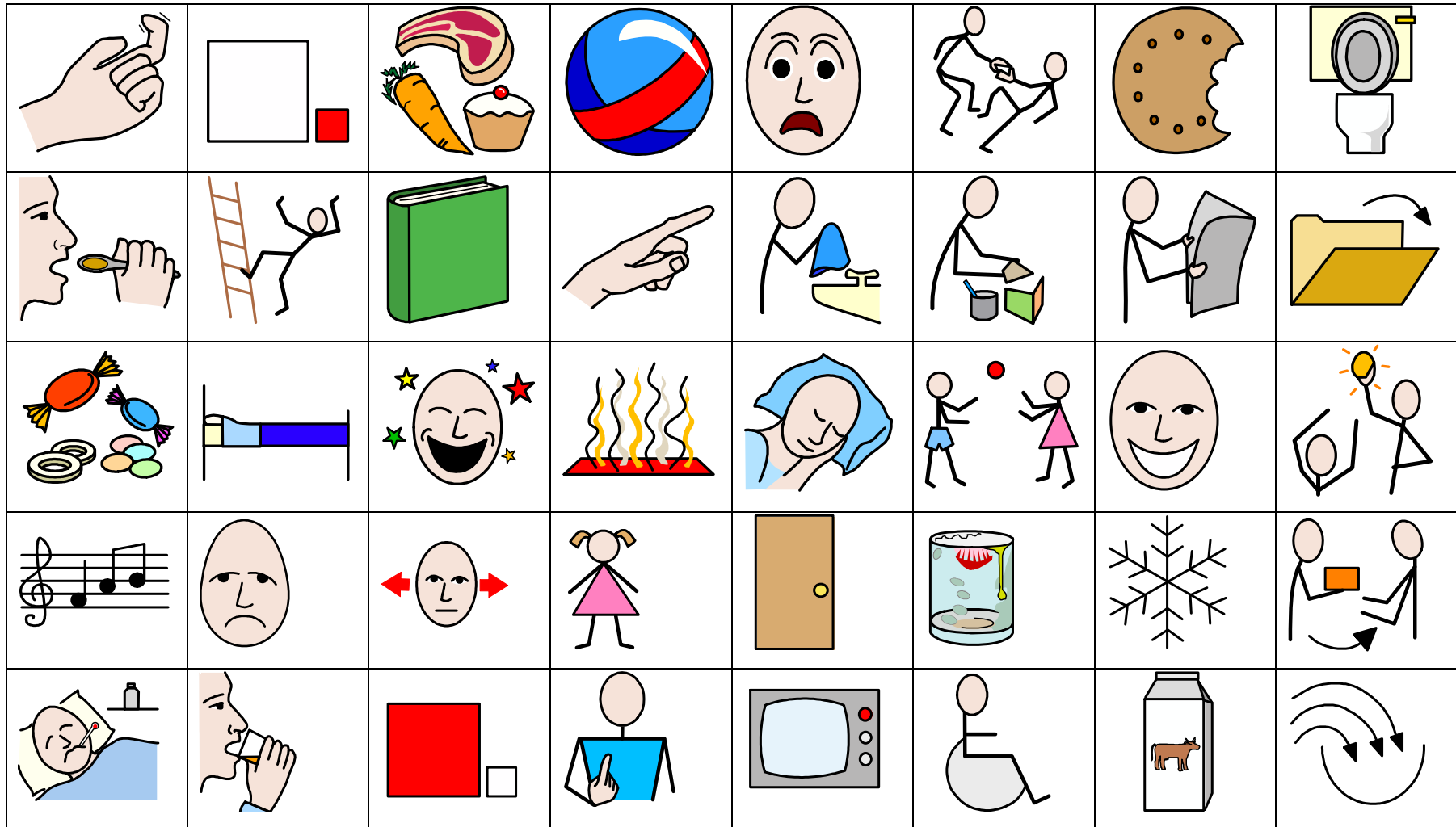## Pre-test Symbol Grid – WR (Iconicity, Somali and English)

Main Test Symbol Grid – PCS (Iconicity, Somali and English)

Main Test Symbol Grid – WR (Iconicity, Somali and English)

Annexe 4: Speech Synthesisers

Blank Task Sheet (Homographs)

					Sentences
					Double Stress
end stressed at end of phrase, over'all	front stressed before a noun 'overall				He wore a red <u>overall</u>. The <u>overall</u> effect was stunning.
					Stress Homographs
verb cons'ole	noun 'console				I had to <u>console</u> him. He had broken his computer <u>console</u>.
noun 'content	verb cont'ent				He was really <u>content</u>. The <u>content</u> of the document was excellent.
verb cont'ract	noun 'contract				We need to <u>contract</u> because we have not won the final <u>contract</u>.
verb con'verse	noun 'converse				I like to <u>converse</u> with other people, but my wife's attitude is the <u>converse</u> of mine.
verb des'ert	noun 'desert (note 1)				I want to <u>desert</u> from the foreign legion, I do not like living in a hot <u>desert</u>.
verb en'trance	noun 'entrance				I like to <u>entrance</u> people when I make an <u>entrance</u>.
verb ob'ject	noun 'object				I want to <u>object</u>, I do not like the red <u>object</u> any more.
verb pre'sent	noun 'present	verb pre'sent			Please <u>present</u> me with my <u>present</u> now. To <u>present</u> now is essential.
noun 'project	verb pro'ject				I'd like to run a <u>project</u> where big spikes do not <u>project</u>.
verb re'cord	noun 'record				I would like to <u>record</u> this session. I will keep it for the <u>record</u>.
verb re'fuse	noun 'refuse				I would like to <u>refuse</u> to take the <u>refuse</u> out.
verb se'cond	noun 'second				We should <u>second</u> her to our department; she would get the job done in a <u>second</u>.

verb sub'ject	noun 'subject					I know I should not <u>subject</u> you to this; it is not a nice <u>subject</u>.
						-ATE Words
noun (schwa in last syllable)	verb (diphthong in last syllable)					You would be a good <u>advocate</u>. I would like you to <u>advocate</u> the abolition of income tax.
noun (schwa in last syllable)	verb (diphthong in last syllable)					The amount is only <u>approximate</u>. I would like you to <u>approximate</u> to it.
verb (diphthong in last syllable)	noun (schwa in last syllable)					You <u>associate</u> the smell of grass with you old <u>associate</u>.
verb (diphthong in last syllable)	noun (schwa in last syllable)					I will <u>delegate</u> this task to you. You must attend the conference as a <u>delegate</u>.
verb (diphthong in last syllable)	noun (schwa in last syllable)					I think he <u>graduates</u> next week. He will be in the first group of <u>graduates</u> from the new course.
adjective (schwa in last syllable)	verb (diphthong in last syllable)					It was a <u>moderate</u> success. We need to <u>moderate</u> our output in future.
verb (diphthong in last syllable)	adjective (schwa in last syllable)					I think we ought to <u>separate</u>. Leading <u>separate</u> lives is for the best.
						-MENT words
noun (schwa in last syllable)	adjective (full vowel in last syllable)					You can use a hammer as an <u>implement</u>, but you cannot <u>implement</u> software with it.
						VOICING
noun (voiceless final consonant)	verb (voiced final consonant)					Don't give me that <u>abuse</u>, I do not <u>abuse</u> you.
noun (voiceless final consonant)	verb (voiced final consonant)					That was <u>close</u>. I thought the door was going to <u>close</u>.
verb (voiced final consonant)	noun (voiceless final consonant)					Particles will not <u>diffuse</u> in this atmosphere, it's too <u>diffuse</u>.
noun (voiceless final consonant)	verb (voiced final consonant)					It's a small <u>house</u>; we are not prepared to <u>house</u> him.
noun (voiceless final consonant)	verb (voiced final consonant)					It's no <u>use</u>, I cannot <u>use</u> it.
adjective (final syllable with	verb (final consonant					My <u>learned</u> father <u>learned</u> everything from books.

vowel)	without final vowel)			
				True Homographs
verb (rhymes with letter 'o') (see note 2)	noun (does not rhyme with 'o')			I need to <u>bow</u> out. I'll take the red <u>bow</u>.
verb (buff-et)	noun (buff-ay)			The wind will <u>buffet</u> us on the way to the <u>buffet</u> car.
verb (in'valid)	noun ('invalid)			It is <u>invalid</u> to call someone an <u>invalid</u> these days.
verb (leed)	noun (led)			I need to <u>lead</u> you; the compass will be affected by the red <u>lead</u> in the cave.
adjective (with diphthong)	noun (monophothong)			I like <u>live</u> music. You need it to <u>live</u> properly.
verb -past tense (no final syllable)	noun (mo-ped)			He <u>moped</u>; his <u>moped</u> had been stolen.
adjective (with diphthong)	noun (monophothong)			You are looking rather <u>pasty</u>. I bet it was that <u>pasty</u> you ate.
verb - present tense (reed)	verb - past tense (red)			I will <u>read</u> to you now. Just as I <u>read</u> to you yesterday.
verb (with diphthong)	verb (monophothong)	see note 3		The army was <u>routed</u> at the battle of Jennifer's Ear. I then <u>routed</u> them via Slough.
verb (does not rhyme with 'o')	verb (rhymes with letter 'o') (see note 4)	Noun (rhymes with the letter 'o')		I <u>row</u> with my mother, <u>row</u> my boat and sit in the back <u>row</u>.
verb (with diphthong)	noun (monophothong)			I like to <u>tear</u> paper, but afterwards I shed a <u>tear</u> or two.
noun phrase (with diphthong)	verb (with diphthong)	noun (no diphthong)	noun (no diphthong)	This is a <u>wind</u> up. You <u>wind</u> up the clock when the <u>wind</u> blows. It puts the <u>wind</u> up you.
noun (monophothong)	verb (with diphthong)			When I got the bullet <u>wound</u>, I <u>wound</u> some paper around it.
noun (month au'gust)	adjective ('august)			Next <u>August</u> I will ask the <u>august</u> man to speak.
noun (ev'ning)	verb (evening)			Good <u>evening</u>. Tonight we will be discussing levelling the playing field and <u>evening</u> the score.
proper noun	noun			He is <u>Polish</u>, that's why he is so good with boot <u>polish</u>.
noun (suppplie)	verb (supplea) (note 5)	verb pre'sent		There is a good <u>supply</u> of gymnasts. They move <u>supply</u> under pressure.
1. There are two forms of the noun desert - I am expecting that it will be the front-stressed noun meaning hot place, however, the end-stressed noun meaning what one

deserves is also possible
2. There are two nouns bow (rhyming with o) as in a loop of fabric, an apparatus for shooting arrows, etc… and bow (as in the verb) which is the prow of ship. I would expect the former.
3. Both are verbs and thus both are equally acceptable if the only the part of speech is identified.
4. There are two verbs and the sentences are not clear. You can certainly 'row' with your mother in a boat.
5. of course, the verb supply as in to make available goods is also a valid verb in this context.

Annexe 5: Web Browsing

and Screen Reading in France