

Why Popeye is still right

Author:

Fletcher, Janet

Event details:

Information Online 2011
Sydney

Publication Date:

2011

DOI:

<https://doi.org/10.26190/unsworks/1155>

License:

<https://creativecommons.org/licenses/by-nc-nd/3.0/au/>

Link to license to see what you are allowed to do with this resource.

Downloaded from <http://hdl.handle.net/1959.4/45640> in <https://unsworks.unsw.edu.au> on 2024-04-23

Why Popeye is still right

Ms Janet Fletcher, Director Information Services, University Of New South Wales
janet.fletcher@unsw.edu.au

Abstract

Undertaking iterative usability studies is a bit like regularly eating spinach; they make your online presence stronger. A well-designed interface is even more important to libraries providing a one-stop solution for the discovery and delivery of remote and local resources. In usability studies, UNSW Library regularly includes techniques for tracking movement of users' eyes to examine the effectiveness of the placement of information and the type of information users expect to see. Eye tracking, viewed as "heat maps", gives us a very clear understanding of what works and what doesn't. They are useful to see how users browse a website which not only identifies the most valuable screen real estate but also helps to consider sizing and wording of objects. Not surprisingly, most users scan rapidly and though they may be fixated on certain features it does not mean that they will actually use them. Users dislike reading busy websites, can be impatient with jargon and bored with complex explanations. They like a simple search box. Testing a few users is just as useful as testing many which is good news for weary library researchers. This paper will discuss the process and outcomes of one of the Library's eye tracking studies.

Introduction

Moving content and services online requires libraries to carefully design their websites to ensure users can find what they want. Over the last decade or so, many libraries have undertaken formal usability studies to assist in making informed decisions about the design of their websites. As websites change to incorporate new ways of doing things, the need to continue to test and retest interface design is essential. At UNSW Library usability testing is incorporated in all of its web projects and in its most recent test included eye tracking to examine the effectiveness of the placement of information and the type of information users expect to see. The testing has been very useful in observing how users browse a website which not only identifies the most valuable screen real estate but also helps to consider sizing and wording of objects.

Usability studies

Jakob Nielsen and Jeffrey Rubin are attributed to being the pioneers of usability testing by developing engineering usability techniques for computer software design and applying them to website design (Rubin 1994; Nielsen 2000a; Nielsen 2001). Corroborated through findings from usability testing, Nielsen's website guidelines (Nielsen 2001) continue to form the backbone of many of today's websites, including the design of library sites. Considering the massive increase of resources moving online and the complexity of the underlying systems that provide access to these resources, it is not surprising that libraries work hard to design websites that are user friendly. To assist with this work, many libraries have undertaken usability studies to better understand how users search for information. In these studies, methodologies for usability testing have included think-aloud protocol, timed-task analysis, pre and post-testing and focus group sessions. From these studies it is evident that barriers

to user satisfaction include confusing layout, poor placement of key features, complex processes to follow, poor navigation, ambiguous terminology and too much library jargon (Battleson, Booth et al. 2001; Cockrell and Jayne 2002; Stephan, Cheng et al. 2006).

A well-designed interface is even more important to libraries providing a one-stop solution for the discovery and delivery of remote and local resources. In the quest to create Google-like searching for library content, libraries have implemented federated and metasearch tools designed to search across disparate resources (Elliott 2004). These tools are still clumsy in the ability to search across multiple protocols with searching often very slow and returned results often not the best in comparison with searches undertaken in the native interfaces. Usability testing of these federated search engines indicates that problems with their interfaces are similar to that of general library websites. However the faults are exacerbated due to technical failures and a general lack of users' knowledge on how the systems work. (Jung, Herlocker et al. 2008; Gibson, Goddard et al. 2009). Despite these challenges, the advantage of having a single search has proven to be the preferred way of searching by many library users and as libraries continue to heavily invest in this technology it is even more important to make such tools user friendly (Wrubel 2007; Jung, Herlocker et al. 2008; Williams, Bonnell et al. 2009).

Eye tracking

Another methodology that has been successfully used in usability testing is eye tracking. Eye tracking literally means tracking eye movement to observe how people search, read and scan. Just and Carpenter's (1976) research hypothesised that the location of a person's gaze directly corresponds to the most immediate thought in a person's mind. This is due to the eye's fixation reflecting what is at the mind's "top of the stack."

Eye tracking requires hardware and software to track the eyes, collect data and analyse the results. Older eye tracking hardware required participants to wear a head-mounted device but with newer systems the hardware is located in the frame of the monitor:

Both systems measure corneal reflection of an infrared light emitting diode (LED), which illuminates and generates a reflection off the surface of the eye. This action causes the pupil to appear as a bright disk in contrast to the surrounding iris and creates a small glint underneath the pupil. It is this glint that head-mounted and remote systems use for calibration and tracking. (Cooke 2005)

The newer models, for example, Tobii T60 XL Eye Tracker, can track eyes across widescreen monitors and can measure participants' gaze positions to within 17 milliseconds allowing an accurate measure of reaction to information on the screen. The manufacturer argues that frame-mounted hardware is unobtrusive and allows for participants to behave as they would in front of any computer screen thus providing data that reflects what users do "naturally". The manufacturer also states that the eye trackers can track anyone's eyes, regardless of race, age, glasses or contact lenses (Tobii 2010). An independent study validated the accuracy of these claims and concluded that eye tracking "was an excellent tool for determining relative positions and trajectories" (Weigle and Banks 2008).

The associated eye tracking software collects and analyses the data. In the Tobii T60 XL data is stored as a series of x/y co-ordinates that relate to grid points on the

computer screen. Data is broken down into *fixations* and *saccades*. A fixation occurs when the eye focuses on a particular point on the screen usually between 250-500 milliseconds. Fixations are measured according to duration and frequency. *Saccades* are the movements between fixations and usually last between 25-100 milliseconds. *Scanpaths* are created when fixations and saccades are sequentially organised. A *scanpath analysis* shows how people visually progress through a page (Cooke 2005). A *heat map* is an aggregation of several participants' eye fixations and saccades (Outing and Ruel 2004b). While heat maps do not tell the whole story of each individual's visual interaction, they can "give an accurate representation of which pixel by pixel region draws the attention of the group" (Johnson 2004).

The red/orange on a heat map (Figure 1) reflects the areas where all subjects halt their gaze for at least a fraction of a second. The yellow represents more than half of subjects gazing at the section for at least a fraction of a second. The green (or sometimes, blue) on a heat map indicate that a few participants looked at the section. A heat map can also include small markers indicating a mouse click.



Figure 1

Eye tracking in usability studies

Cooke (2005) argues that eye tracking can be used to measure human behaviour which is difficult to do with other usability testing methodologies and is also useful to test hypotheses about design. She states, for example, that measurement and statistical analysis of eye fixations disproved the hypothesis that isolation of an object on a screen is enough to attract and sustain attention.

One of the largest studies in using eye tracking is the Poynter Institute's research in observing how consumers engage with newspapers. Eyetrack I (1990-91) was a project to study how people read print editions of newspapers whilst later studies (Eyetrack II in 1999-2000 and Eyetrack III in 2003-2004) focused on observing how users read news' websites. Eyetrack III's key findings included:

- The eyes most often fixated in the upper left of the page then hovers in that area before going left to right. Only after perusing the top portion of the page for some time did eyes explore further down the page
- Dominant headlines most often draw the eye first upon entering the page – especially when they are in the upper left
- Smaller type encourages reading and larger type promotes lighter scanning

- People often look at the left one-third of the blurb (ie only look at the first couple of words and then only read further if they are engaged with those words)
- Navigation placed at the top of a homepage performed best
- Shorter paragraphs performed better than longer ones
- The bigger the image, the more time people took to look at it
- Good descriptive writing can still be better to convey information than information presented in a multimedia graphic format
(Outing and Ruel 2004a)

Google states, via its official blog, that eye tracking is used to observe how people evaluate its search results page. Google's usability researchers argue that though eye tracking cannot tell us what people are thinking, such studies can provide data on which parts of the page people are thinking about. The researchers state that people tend to scan search results in order of presentation, ie, top down. From their heat map evidence most users find what they were looking for from the first two results (Aula and Rodden 2009).

In a recent case study that applied the eye tracking method to assess the usability of a university web site, eye tracking provided 'another layer of insight into how users process the visual information to which they respond when interacting with systems (Cinar 2009). In this study participants compared the original and proposed version of the website using the hypothesis that the website where users took less time to find what they were looking for was the better designed website. Based on their eye tracking research, the results confirmed that participants spent less time to finish tasks in the newer version. In some instances where the original version proved to be more effective, the proposed version was adjusted to take these findings into account.

UNSW Library experience

In early 2009 the UNSW Library implemented Primo, the ExLibris search and discovery solution.¹ Primo is designed to aggregate a library's resources together and present as one single point of access. This involves bringing together the catalogue and other local collections with a library's subscribed remote sources, websites etc. When first released at UNSW Library, Primo, branded as SearchFirst, searched the catalogue and a select group of remote full-text databases. It was envisaged that SearchFirst would be used as a Google-like tool for those users who wanted a quick search that would retrieve 'good enough' results. Users were able to choose between searching SearchFirst, the catalogue, and searching for databases via Metalib. In mid 2010, the Library upgraded both Aleph (the catalogue) and Primo systems so there is no longer a native search interface solely for the Library's catalogue. By the end of 2011 it is intended that Primo will also replace the Metalib search interface and thus SearchFirst will be the Library's only search and discovery interface for its local and remote collections. Though users will still be able to search native interfaces of remote databases, it is envisaged that when the Library releases ExLibris' Primo Central, a centralised index that harvests metadata from publishers and aggregators, the need to do this will decrease.

¹ See <http://www.exlibrisgroup.com> for further details about Primo and other ExLibris products

Usability testing of SearchFirst

In early 2009, as part of the Library's initial implementation of Primo, a pilot test of a small group of undergraduate students tested the effectiveness of the SearchFirst's search interface. Students were given several activities and asked to talk aloud as they used the interface. The results indicated that students often were unable to find key features on the screen, for example, did not see 'Refine my results' section and the login button.

To complement this research, in mid 2009, the Library undertook an additional study using eye tracking. The purpose of the study was to observe and assess the overall user experience of SearchFirst. It aimed to gain further insight into what page elements users see and use, and conversely, which ones they don't, by drawing attention the design features that users found difficult to understand. At the time of the study, the SearchFirst entry point was a link from the Library's homepage.

The study was conducted at the School of Computer Science and Engineering, UNSW Human Computer Interaction Laboratory under the direction of Dr Daniel Woo. The testing involved 30 undergraduate students who were recruited via recruitment posters and emails. The students came from science, arts, medicine, and engineering disciplines.

The Tobii T60 XL eye tracking system was used for the study. The students were asked to do several activities using Primo. Each student took approximately 45 minutes to complete the test. Eye tracking movements were observed and recorded and then the results from students were aggregated into a series of heat maps.

Results

i. Initial screen

Students were asked to find a book using SearchFirst. The heat map (Figure 2) shows that all students were aware of the search box located on the top lefthand corner of the screen. This finding is consistent with other studies (Dhamasbi, Siegel et al. 2009). A number of students also clicked on the advance search box. For a number of students the large orange 'feedback' star was a distraction. Very little of the rest of the screen was glanced at.



Figure 2

ii. *Browsing searching results*

Whilst browsing search results (Figure 3) it is interesting to note the patterns of searching. The first two records got the attention of all students with a few more looking at the third and fourth record. A few of the students skimmed through the other records. The students did not notice the “Refine my Results” frame on the left side. They simply skimmed the results and if unsatisfied would search again.

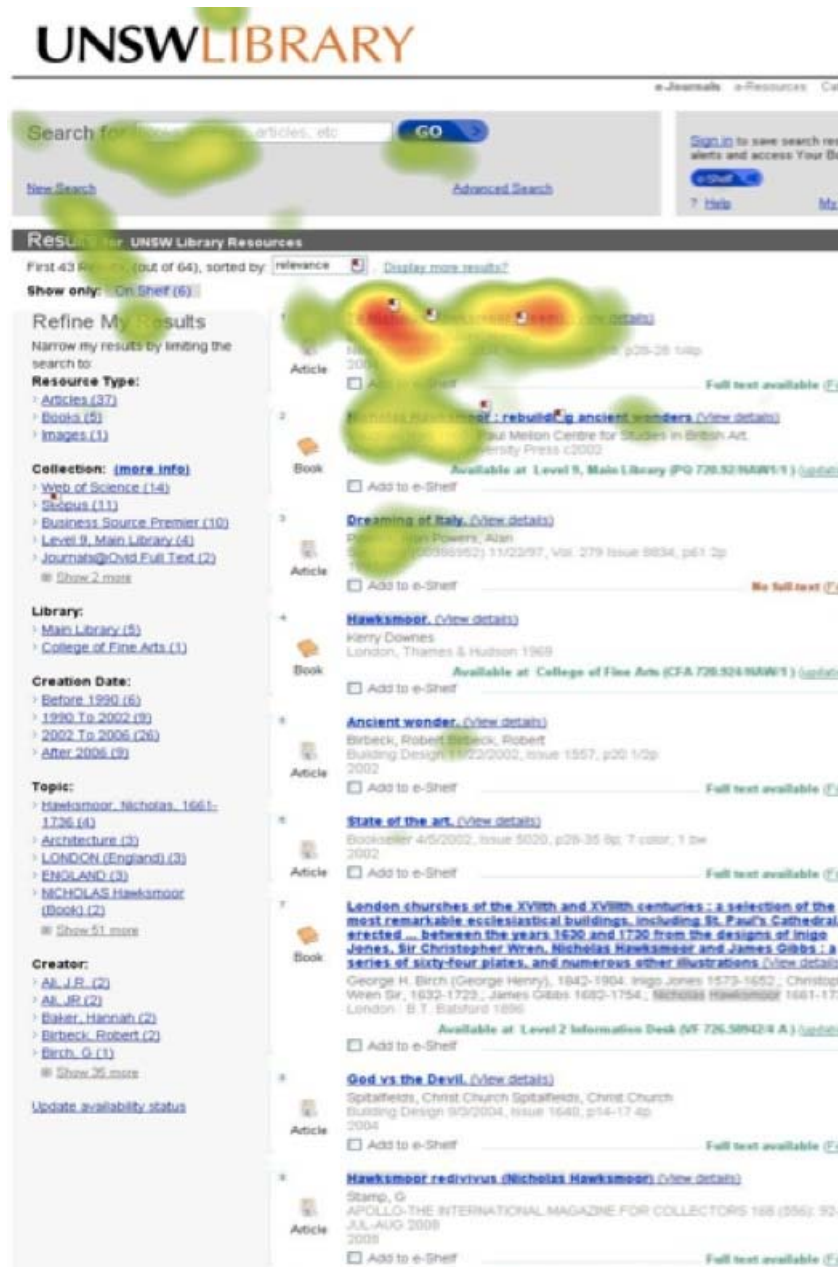


Figure 3

iii. Refine results

The students were asked to refine the search to find an ebook. From this heat map (Figure 4) it is evident that the students simply looked at the top part of the page to see if there was a possibility to refine their search results. Then they either clicked on the advanced search or added query terms to their initial search. A number of students noticed the Refine My Results section but did not click on any of the links. Interestingly, the only students who did use Refine My Results were the three Psychology students who use another web-based tool that also has a Refine My Results feature placed on the left hand side of the screen. This reflects the belief that users expect a new website to operate the same as other websites that they have come across (George 2008; Jung, Herlocker et al. 2008).

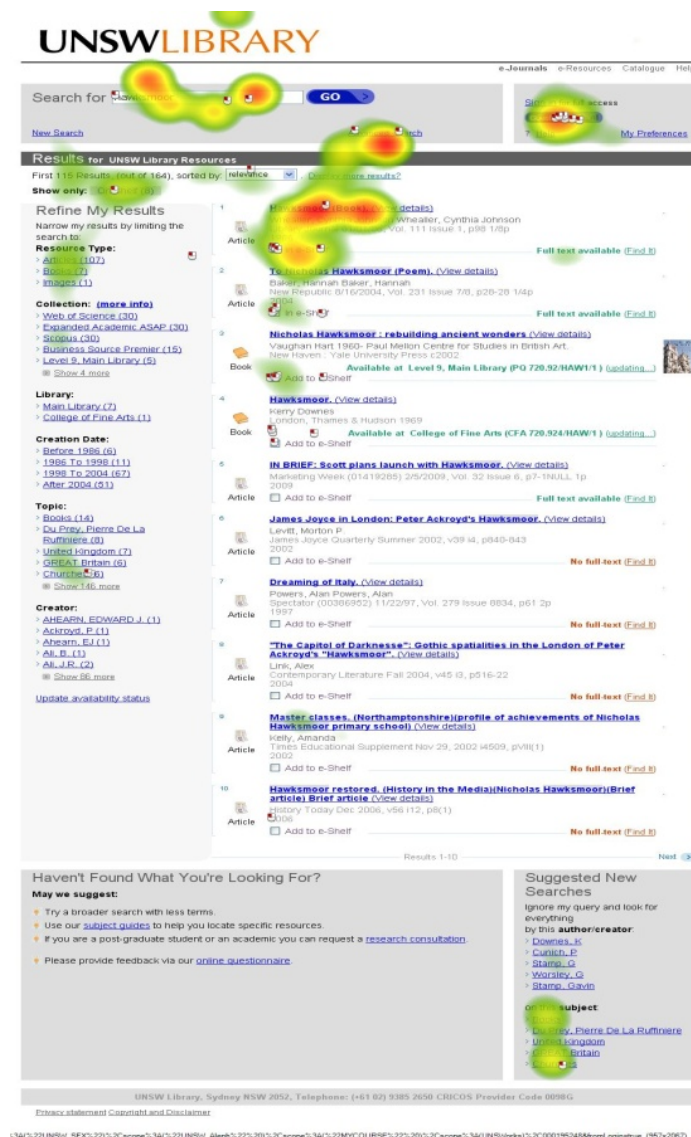


Figure 4

iv. Refined browsing

Once a search has been refined, the search term shows in the search box, for example, “And resource type is e-Books (remove)”. This heat map (Figure 5) shows that this section was not very noticeable and it appears that none of the students looked this way when trying to find a way to refine something differently.

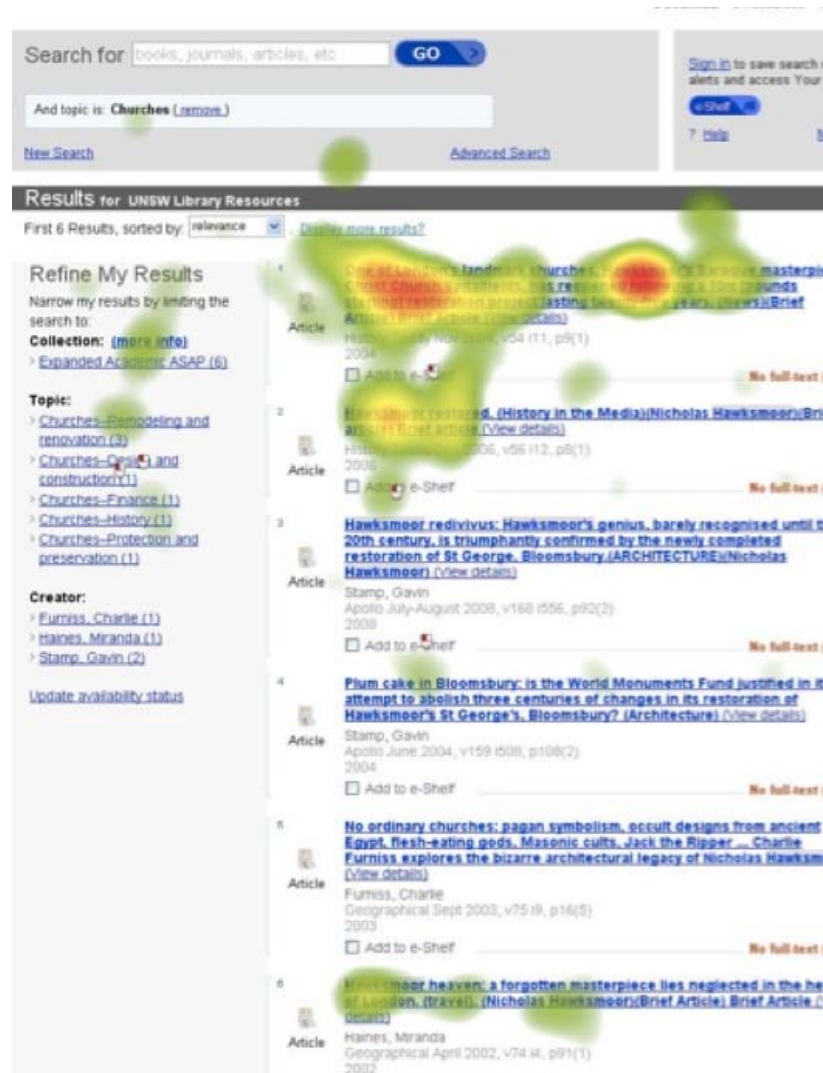


Figure 5

Looking for a physical location of resource

In this activity, students were asked to find a specific article. The right answer appeared to be the record at the top of the returned list but the author's name was incorrect. The correct answer was the last result on the page. All but two of the students clicked on the first result (Figure 6). The other two chose the correct answer. Very little eye movement was recorded over the rest of the screen, probably due to the fact that the students saw the first record and didn't see the need to look further.



Figure 6

Once students had clicked on the first (incorrect) record they still did not pay attention to the author's name. The heat map (Figure 7) indicates that the students scan downwards looking for the location of the resource with concentrated gaze data at the link to the online resource.

The Building of Castle Howard (Book).

Author: [Whittington, Christine](#)

[Whittington, Christine](#)

Subjects: [SAUMAREZ-Smith, Charles](#) ; [BUILDING of Castle Howard, The \(Book\)](#) ; [BOOKS -- Reviews](#) ; [LANDSCAPE design](#) ; [NONFICTION](#)

Is Part Of: [Library Journal](#) 3/1/91, Vol. 116 Issue 4, p88-88 1/8p

Description: Reviews the book "The Building of Castle Howard," by Charles Saumarez-Smith.

Creation Date: 1991

Language: English

[Online version](#)

☐ Add to e-Shelf

Full text available [Find it!](#)

Figure 7

i. Display more results

The students were asked to change the number of results viewed per page. The heat map (Figure 8) shows the most common area looked at was the top of the screen where it showed how many results a search produced. The dropdown menu where the users expected to be able to change results was also commonly viewed. This dropdown menu changed the sort order but not the number of results. All other focus was on the left side of the page. A few students scrolled to the bottom of the screen seeking the answer.



Figure 8

ii. Email

Students were asked to email a record. The location of the email button appears to be clear to the students, as this heat map (Figure 9) shows the majority of students' attention is on this button. This is after they gave a quick skim on the left side underneath the resource name.

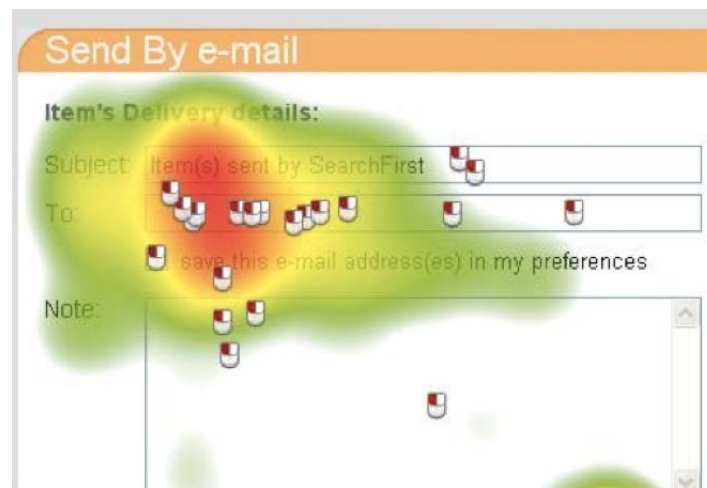


Figure 9

The heat map (Figure 10) shows that students were mostly focused on the Subject and To lines with the most time spent on To:. A minority of users noticed the "save this email address(es) in my preference" line and only a couple of students paid any attention to the Note box.

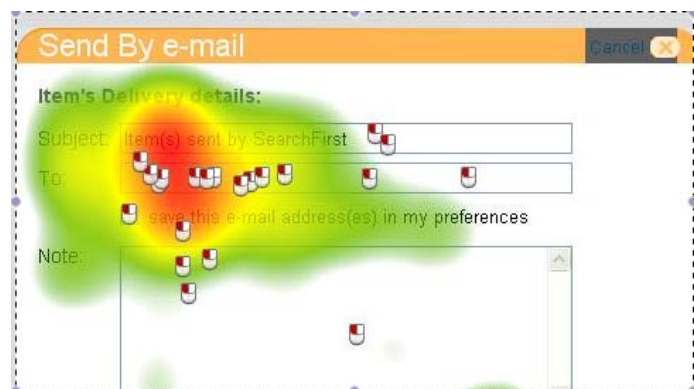


Figure 10

iii. Details screen

The Details screen shows heat map (Figure 11) data that clearly demonstrates how students read a blurb. The first paragraph was looked at to see its relevance and the rest of the text was left untouched.



Figure 11

iv. Help screens

The students were asked to locate help screens. The heat map (Figure 12) shows that browsing on the help screens is fairly standard to other studies–the top section of the screen is viewed before browsing down through the rest of the information without too much attention spent before determining whether or not this is useful.

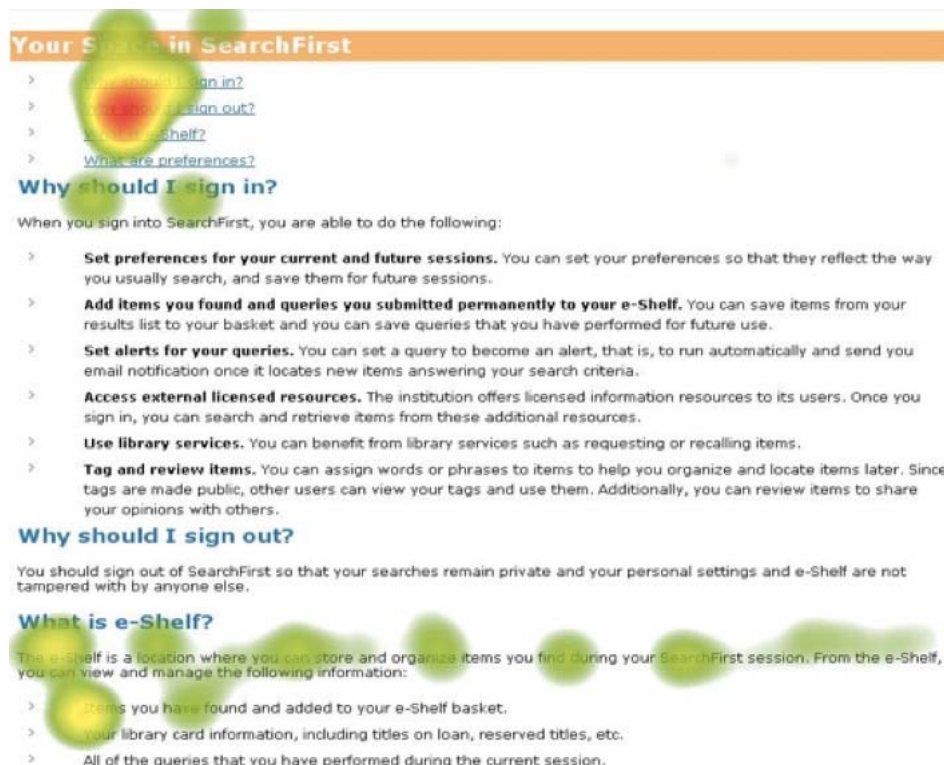


Figure 12

Discussion

After completing the activities the students were asked to make comments. Students were impressed with SearchFirst as opposed to the current Library's website, the main reason being that a search could be conducted straight away rather than having to undertake a number of clicks before starting a search. Students believed that the font sizes were too small and too similar thereby making the page look cluttered and made it difficult to differentiate between the activities. With the email screen, students suggested swapping the Subject and To boxes so that they were consistent with other email clients and as only a few students noticed the Note box, this box did not need to be as large.

The heat maps give a graphical representation of how students interrogated SearchFirst. It is evident that students do not spend much time on each page and expect to see the results they are looking for at the top of the screen. Students only scan the first paragraph implying that long blurbs are not necessary as they will not be read and just take up space. Navigation is also expected at the top of screen. Students don't spend much time looking down long results lists.

Our study observed that students did not appear to notice 'Refine My Results'. This result is similar to a usability study of Primo undertaken by the British Library – except in its example the 'Refine My Results' was on the right hand side of the screen. The British Library's report recommended moving the frame to the left hand side of the screen but also suggested reducing the number of entries in each category and reducing the font size as participants of the study had stated that 'Refine My Results' was too confusing and provided too many options (British Library 2008). As eye tracking research regularly reports that the left hand screen is the

most viewed on a screen after the top and central top areas, UNSW Library felt that moving its 'Refine My Results' frame to the right hand side of the screen would be a backward step. Thus it was decided to take heed of the British Library's other recommendations and reduce the number of options under each category and made the font smaller which differentiated the text of the returned records list. It was also decided to replace 'Refine My Results' with 'Show only'.

Conclusion

Since this study, UNSW Library has incorporated the SearchFirst search box into the Library's homepage². As previously mentioned, the subsequent search screens have also been modified. In the new version of Primo the search results also look and operate differently to the older version. The most significant and noticeable change is that actions that link to the catalogue, such as looking up locations, appear within Primo's search result rather than users being taken to another search interface. Library staff are also working with Ex Libris to ensure that search algorithms are returning the most relevant searches first as it is quite evident that users expect to see the most relevant results at the top of the list. Once PrimoCentral has been successfully installed, the next step is to create discipline specific 'SearchFirsts' thus enabling the Library to embed tailored made search tools as part of courses in learning management systems, faculty websites, etc.

Of course due to product upgrades and integration of library products and services, the Library will continue to undertake eye tracking studies (plus other usability testing methodologies) to ensure that our systems are designed effectively. As Jakob Nielsen (2000b) argues, it is far better to undertake regular testing with a small number of users than organise a single large study. Usability testing is not about finding out problems and just fixing them, it is an iterative process of improving design as there is no such thing as the perfect interface.

References

- Aula, A. and K. Rodden (2009). "Eye-tracking studies: more than meets the eye." The official Google blog. Retrieved 3 August 2010, from <http://googleblog.blogspot.com/2009/02/eye-tracking-studies-more-than-meets.html>.
- Battleson, B., A. Booth, et al. (2001). "Usability testing of an academic library web site: a case study." Journal of Academic Librarianship 27(3): 188-198.
- British Library (2008). "British Library - resource discovery usability testing." Retrieved 3 August 2010, from <http://www.wupltd.co.uk>.
- Cinar, M. O. (2009). Eye tracking method to compare the usability of university web sites: a case study. Human Centered Design, HCII 2009, Springer-Verlag.
- Cockrell, B. J. and E. A. Jayne (2002). "How do I find an article? Insights from a web usability study." The Journal of Academic Librarianship 28(3): 122-132.
- Cooke, L. (2005). "Eye tracking: how it works and how it relates to usability." Technical Communication 52(4): 456-463.

² UNSW Library: <http://www.library.unsw.edu>

Dhamasbi, S., M. Siegel, et al. (2009). "Generation Y, web design and eye tracking." International Journal of Human-Computer Studies 68: 307-323.

Elliott, S. A. (2004). Metasearch and usability: toward a seamless interface to library resources. Anchorage, AK, University of Alaska.

George, C. A. (2008). "Lessons learned: usability testing a federated search product." The Electronic Library 26(1): 5-20.

Gibson, I., L. Goddard, et al. (2009). "One box to search them all: Implementing federated search at an academic library." Library HiTech 27(1): 118-133.

Johnson, C. (2004). "How accurate is eyetracking?". Retrieved 2010, 2010, from <http://www.poynterextra.org/eyetrack2004/accuracy.htm>.

Jung, S., J. L. Herlocker, et al. (2008). "LibraryFind: system design and usability testing of academic metasearch system." Journal of the American Society for Information Science and Technology 59(3): 375-389.

Just, M. A. and P. A. Carpenter (1976). "Eye fixations and cognitive processes." Cognitive Psychology 8(4): 441-480.

Nielsen, J. (2000a). Designing web usability: The practice of simplicity. Indianapolis, IN, New Riders.

Nielsen, J. (2000b). "Why you only need to test with 5 users." Jacko Nielsen's Alertbox. Retrieved 27 July, 2010, from <http://www.useit.com/alertbox/20000319.html>.

Nielsen, J. (2001). "113 design guidelines for homepage usability." Retrieved 26 July, 2010, from <http://www.useit.com/homepageusability/guidelines.html>.

Outing, S. and L. Ruel (2004a). "The best of Eyetrack III: What we saw when we looked through their eyes." Retrieved 27 July, 2010, from <http://www.poynterextra.org/eyetrack2004/main.htm>.

Outing, S. and L. Ruel (2004b). "Understanding a heatmap." Retrieved 27 July, 2010, from http://www.poynter.org/content/resource_popup_view.asp?id=27204.

Rubin, J. (1994). The handbook of usability testing: How to plan, design and conduct effective tests. New York, John Wiley & Sons.

Stephan, E., D. T. Cheng, et al. (2006). "A usability study at the University of Mississippi libraries for the improvement of the library home page." Journal of Academic Librarianship 32(1): 35-51.

Tobii (2010). "Tobii T60 XL Eye Tracker." Retrieved 23 July, 2010, from <http://www.tobii.com>.

Weigle, C. and D. C. Banks (2008). "Analysis of eye-tracking experiments performed on a Tobii T60." SPIE-IS&T Electronic imaging 6809 680903-1.

Williams, S. C., A. Bonnell, et al. (2009). "Student feedback on federated search use, satisfaction, and web presence : qualitative findings of focus groups." Reference & User Services Quarterly 49(2): 131-139.

Wrubel, L. (2007). "Usability testing of a metasearch interface: a case study." College & Research Libraries July(292-311).