Commercial uses of eyetracking

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Position Paper

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1. Current interests and use of eyetracking

The Human Centred Systems Group at UCL has used eye tracking in both academic (see references below) and commercial contexts. In the commercial arena we have used eye tracking alongside screen recordings and think-aloud protocols to identify problems with existing e-commerce sites. Generally, screen recordings with think aloud protocols are extremely effective in identifying major usability issues. The added value of eye tracking is that it gives insight into the effect of surface or design cues on gaze behaviour. In some circumstances, even when a page element is looked at (fixated) it seems that users don't really "see" what is there.

2. Specific areas or questions you wish to discuss

When interpreting eye movements it is important to be aware of the factors that can influence eye motion. Using a traditional information-processing framework a distinction is made between *top-down* and *bottom-up* processing.

The display exerts a *bottom-up* influence. Careful manipulation of display factors such as layering, separation, colour and contrast can draw the eye to important pieces of information and reduce competition between display elements (Tufte, 1990). Motion or animation is also an effective cue to capture attention (Hilstrom and Yantis, 1994).

Eye motion is also governed by task requirements, and expectations about what is being looked for and where it might be found. These represent *top-down* factors on eye motion. The available evidence supports the claim that users have prior expectations about where things are. For example, in a study of people's schema for web pages Bernhard (2001) found that most users expected the navigation menu to be found on the left of the screen. These top-down factors are based on memories of "what is where" from previous interfaces. An important interaction between top-down and bottom–up processing results in what has been described as *information scent* (Pirolli, 1997). Scent is perceived when the proximal cues (Bottom-Up) provided by page elements such as such as WWW links, graphics, icons or menu items are evaluated relative to the current goals (Top-Down).

Case Study 01: Top Down factors – Menu Position

A problem facing users on web pages is locating the right option to achieve their goal. The user's task can be simplified by designing pages that conform to conventions or expectations (top-down). However, a designer may need to deviate from conventions, e.g. to fulfil brand guidelines. In an eye-tracking study (McCarthy et al. 2003) we investigated how menu positions (left, right, top-centre) and complexity (many vs. few page elements) of Internet portal pages influence search task performance and visual gaze. The study revealed that violating expectations through unusual menu positioning increased search time on first exposure. However, this effect did not persist on repeated exposure. Eye-tracking data allowed investigating how the search strategies of users differ between first and second exposure and across pages of differing layout and complexity.

Case Study 02: Information Scent – Location, Location, Location

The visibility of screen elements can be dramatically reduced when placed in the wrong position on the screen. As an example of positional effects, consider a simple task of trying to find a search box on the home page of an Internet Service Provider (ISP). One might assume that a search box is a highly visible screen object and finding it on a single page is a trivial task – eye-tracking data shows that this is not the case. The figure shows where people looked on three different sites when trying to complete this task (McCarthy et al. 2004a). On all three sites just 4-5 screen regions account for 50% of all glances made during the search (frequently glanced regions). Search time is longest on Site 3 even though there are two search boxes on this page. The problem is that both search boxes are outside the areas frequently glanced at.
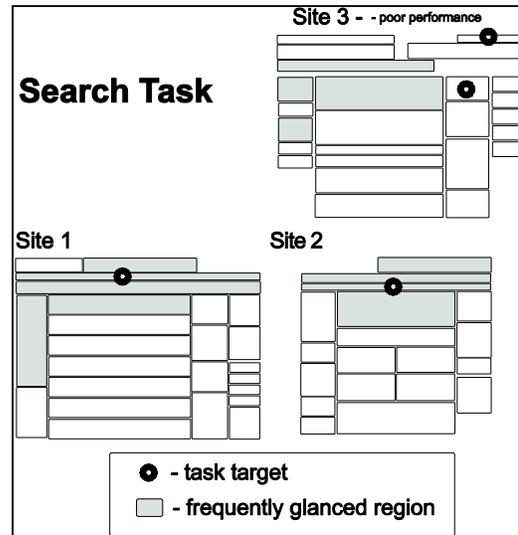
Case Study 03: Branding vs. Functionality

Designers of commercial web pages need to balance providing efficient access to functionality with assuring customers and building trust. One approach is the use of affective photos (e.g. smiling sales assistants). This approach conflicts with established usability guidelines. We used eye-tracking to infer the effect of such photos on users' gaze behaviour (Riegelsberger et al. 2002) and found that a photo attracts more visual attention than a same-sized text-box on first exposure when users are engaged in a product selection task. On repeated exposure to a page with the same layout, however, users mainly focus on the screen regions that contain the products.
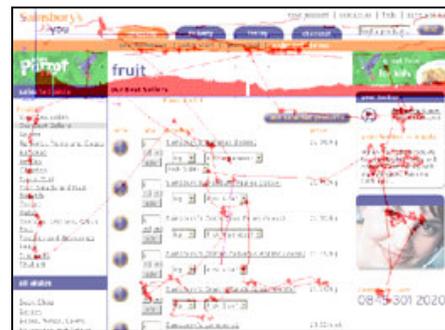
Outlook: Eye-Tracking and Video

In addition to our eye-tracking studies of web interfaces, we have started to investigate users' eye-gaze when watching video content (McCarthy et al. 2004b). The goal is to provide input for the development of compression algorithms that make optimal use of available network bandwidth by only encoding the region where users are most likely to fixate with the highest visual resolution.

4. References

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