Eye Tracking in Web Usability: What Users Really See

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Outline

- Eye tracking : Eye Tracking in Human Computer Interaction
- Eye tracking technologies
- Eye tracking in website usability
- Developed websites.
- Analysis of developed websites
  - Browser compatibility of developed websites.
  - Attention Wizard: Heat maps and gaze plots
  - Survey results
- Conclusions
Eye Tracking

- Eye tracking is the process of recording the location of a gaze and the motion of the eye.
- Eye tracking in Human Computer Interaction (HCI).
- Initial eye tracking methods were invasive.
- Eye movement research and eye tracking flourished in the 1970s.
The Eye

- Human vision has two parts.
  - Foveal Vision
  - Peripheral Vision

- The human eye may seem a lot like a camera.

- Human vision is only sharp in the center, and blurred at the edges.

- When the eye is resting or focused on a spot, it’s called a **fixation**.

- The eye’s rapid movement from one fixation to the next is called a **saccade**.
Eye Tracking Technologies

• Eye trackers
• Intrusive and non intrusive eye tracking systems
• Commercially available eye trackers
  • Head mounted
    • Worldwide used in, psychology, neuroscience, marketing research, sports, training and usability
  • http://www.arringtonresearch.com/
Eye Tracking Technologies

- Commercially available eye trackers
  - Head restrained
    - Accurate
    - Reliable measurement
    - http://asleyetracking.com/site/
Eye Tracking Technologies

• Commercially available eye trackers
  • Free head motion
    • High tracking accuracy
    • Ability to track nearly all people
    • Completely non-intrusive
  • http://www.tobii.com/corporate/start.aspx
The Mind Eye Hypothesis

- What people are looking at and what they are thinking tends to be the same.
- Looking and thinking are certainly not always intertwined.
- Mind eye hypothesis holds true for eye tracking.
- Fixations equal attention.
Benefits of Eye Tracking in Web Design

- Self-reporting tools such as questionnaires may produce biased or even wrong data.
- One can analyze how a user’s eyes move across a web page in real time using visualization techniques
  - Gaze plots and hot spots
Commercial Applications

- Web usability, advertising, medical research, computer usability etc.
  - The analyses focus on the visibility of a target product.
- Numerous companies offer eye tracking services and analysis.
- Eye tracking cameras in automobiles can monitor the drowsiness or inattention of the driver.
  - Lexus claims to have equipped its LS 460 car with the first driver monitor system in 2006.
Eye Tracking In Website Usability: Page Layout

- Full is not better when it comes to web pages.
- When designing a web page, a designer should determine the following:
  - What do visitors of their website want.
  - What priority real estate sections (areas most eye catching to the users) are in the design.
- Consistent web conventions.
- Graphics add interest but are slow to load and can impede navigation.
Eye Tracking In Website Usability: Page Layout

- Heat-maps are the best-known visualization technique for eye tracking studies.
- Red areas indicate most attention
- Yellow areas indicate fewer fixations.
- Blue areas indicate the least viewed areas.
- Gray area means no fixations.
Eye Tracking In Website Usability: Page Layout

- A gaze plot represents fixations during a single user’s visit to a page.
- The size of each dot represents the duration of that fixation.
- The bigger dots indicate longer durations.
Eye Tracking In Website Usability: Navigation

- Web is a combination of contents and presentations.
  - Allow people to plan, monitor, and control their activities.
- People use navigation on a website to move from one page to another page.
  - Gather all the information that is required.
- Global, top-level, persistent, or primary navigation should be displayed on every web page.
- Local navigation guides a user to a specific section on a long page.
Eye Tracking In Website Usability: Navigation

- Comparing different types of navigation menus, most users concentrated on the top-left.
Eye Tracking In Website Usability: Navigation

• In a study of an online banking system users were shown the entry page of the system.

• Links underneath the text “UNSERE ANGEBOTE ONLINE” get much less attention than the links above it.
Fundamental Web Design Elements: Homepage

- The home page is different from all other web site pages.
- A homepage should clearly communicate the site's purpose.
  - Show all major options available on the web site.
Fundamental Web Design Elements: Shopping Carts

- In this site shopping cart at the right in the uppermost row.
- People found shopping cart in fewer fixations.
Fundamental Web Design Elements: Web Forms

- Web forms should be easy for users to quickly look at, register, and deal with all parts of a form.
- According to Matteo Penzo’s study
  - **Left-aligned Labels**: These are easily associated labels with the proper input fields.
    - Users took more time because of excessive distances between labels inputs.
  - **Right-aligned Labels**: These reduced overall number of fixations by nearly half.
    - Forms completion times were cut nearly half.
Fundamental Web Design Elements: Web Forms

- **Top-aligned Labels:** Users capture both labels and inputs with a single eye movement.
- Gaze plot data shows how people’s eye move through a simple form.
Fundamental Web Design Elements: Web Forms

- Research shows that not all participants know what an asterisk ‘*’ means.
- Word ‘optional’ should be placed inside the text boxes in gray fonts.
Images

- Images are a powerful part of web design.
- Good images explain a concept, convey information, and enhance people’s overall experience on a site.
- Bad images waste space, are ignored by users, and create more confusion.
- Pictures express ideas and thoughts effectively.
Images

- People did not look on the small and low-contrast images
Images

- Minor tweaks in an image can increase the user’s attention
Advertisements

- Eye tracking helps us determine when and how much people look at advertisements on the web.
- What attributes of advertisements attract their attention.
- The look of an ad is important, but so is its placement on the page.
- Close proximity to popular editorial content helps ads get noticed.
- Of all types of ads tested, text ads are viewed most intently.
Advertisements

- Ads that blend into the look and feel of the page get more attention
Developed Websites: Technologies Used

- **HTML**: Hyper Text Markup Language
- **CSS**: Cascading Style Sheets
  - Styles define how to display HTML elements.
- **Javascript**: to add interactivity to HTML pages.
- **AJAX**: Asynchronous JavaScript and XML
  - It is possible to update parts of a web page without reloading the entire page.
- **PHP**: PHP: Hypertext Preprocessor.
  - It is a server-side scripting language, like ASP.
  - PHP scripts are executed on the server and support many databases.
Developed Websites: Technologies Used

• MySQL: MySQL is a database server and ideal for both small and large applications.
• PHP + MySQL: PHP combined with MySQL are cross-platform
• WampServer: WampServer is a Windows web development environment.
  • It enables creating web applications with Apache, PHP and MySql.
• Browsershots: convenient way to test website’s browser compatibility in one place.
• Attention Wizard: Eye Tracking without the Eyes
Health Website

http://farrukhjabeen.info/health/

- Layout of Health website
Health Website
http://farrukhjabeen.info/health/

- Browser Compatibility
  Test on Windows
Health Website
http://farrukhjabeen.info/health/

- Browser Compatibility Test on Linux
Health Website

http://farrukhjabeen.info/health/

- Browser Compatibility Test for Mac OSX
Kids and Parents Website
http://farrukhjabeen.info/kidsparents/

- Layout of Kids and Parents Website
Kids and Parents Website

http://farrukhjabeen.info/kidsparents/

- Browser Compatibility Test for Windows
Kids and Parents Website
http://farrukhjabeen.info/kidsparents/

- Browser Compatibility Test for Linux
Kids and Parents Website
http://farrukhjabeen.info/kidsparents/

- Browser Compatibility Test for Mac OSX
Desi Recipes Website
http://farrukhjabeen.info/recipes/

- Layout of Desi Recipes website
Desi Recipes Website
http://farrukhjabeen.info/recipes/

- Browser Compatibility Test for Windows
Desi Recipes Website
http://farrukhjabeen.info/recipes/

- Browser Compatibility Test for Linux
Desi Recipes Website
http://farrukhjabeen.info/recipes/

- Browser Compatibility Test for Mac OS X
Analysis of Developed Websites Using Heat-Maps

- AttentionWizard was used to create heat-maps for the three websites developed for this research.
- An attention heat-map is a combination of two elements:
  - Predicted attention (hot spots)
  - Eye gazing path.
- The hot spots that can be found on a generated heat-map show areas of attention concentration.
- The eye gazing path depicts the path that user’s eyes take when they first get to the page.
Heat-Maps of Health Website:
http://farrukhjabeen.info/health/

- Heat-Map of Health Website Home Page
Heat-Maps of Health Website:
http://farrukhjabeen.info/health/

- Heat-Map of BMI Calculator Page
Heat-Maps of Health Website:
http://farrukhjabeen.info/health/

- Heat-Map of Food Calories Calculator Page
Heat-Maps of Kids and Parents
Website: http://farrukhjabeen.info/kidsparents

- Heat-Map of Kids and Parents
- Home Page
Heat-Maps of Kids and Parents
Website: http://farrukhjabeen.info/kidsparents

- Heat-Map of Blogs:
  Post New Entry Page
Heat-Maps of Kids and Parents
Website: http://farrukhjabeen.info/kidsparents

Heat-Maps of Desi Recipes Website:
http://farrukhjabeen.info/recipes

• Heat-map of ‘Desi Recipes’ website’s home page.
Heat-Maps of Desi Recipes Website:
http://farrukhjabeen.info/recipes

- Heat-Map of User’s Home Page
Heat-Maps of Desi Recipes Website:
http://farrukhjabeen.info/recipes

- Heat-Map of Post a Recipe Form
Surveys

- Feedback Results for Health Website
Surveys

- Feedback Results for Kids and Parents Website
Surveys

- Feedback Results for Desi Recipes Website
Conclusions

- Eye movements are fundamental to any interaction with a visual system.
- Good visual design is important in a wide range of activities.
- This project developed three websites.
  - Analyzed the eye tracking data by creating heat-maps.
  - The heat-maps were created using AttentionWizard.
- Heat-maps assist the usability effort in various ways, based upon the website and its purpose.
  - Optimum placement of the call to action button or text.
Conclusions

• An heat-map is not a substitute for actual landing page testing.
• This study found that images and graphics draw attention before accompanying text.
  • Increases the proportion of user generated activity
  • Convert more readers into buyers, and more visitors into subscribers.
  • Crucial role in the success of banner ads.
• A survey provides qualitative information on the user’s perceptions.
Future Work

- Use of eye movements as a usability evaluation technique in the ecommerce websites.
- While ecommerce has been around since the mid-90s, it has gained traction in recent years.
- Amazon, eBay, Yahoo, and Dell are some of the more successful businesses in this area.
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