HCI: ACCESSIBILITY

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First, the news...

- Sketch of two Scottish guys stuck in an elevator
- Accessibility from a different angle
- https://www.youtube.com/watch?v=sAz_UvnUeuU
Accessibility

Many types of disabilities

Fitts Law

Visual impairments
Accessibility
Accessible systems help everyone, not just disabled people

- Well structured text is easier to read and easier for computers to parse
- Flexibility in inputs improves accessibility and makes it easier for everyone else
Curb Cuts

Dips in the sidewalk so that a pedestrian does not need to step up or cross uneven terrain to reach the sidewalk.
Many types of disabilities
Many types of disabilities

- Visual impairment
- Hearing impairment
- Physical impairment
- Speech impairment
- Dyslexia
- Autism
- Age groups (older, younger)
Hearing impairment

- Audio commonly used for feedback and situational awareness
  - Gesture-based interfaces
  - Games
- Increase in video without captions means less accessibility
- Computers can help people with hearing loss through auto transcription
Physical impairment

- Limited control over movement.
- Fine mouse movements difficult.
- Precise motions difficult.
- Speech or eye tracker input an option.

http://parkinsonsdysarthria.weebly.com/aac-assessment.html
Speech impairment

- Inability to speak at all
- Accents (Scottish), non-native speakers, or people with hearing loss
- Spoken communication is much faster than typing
- Computing technologies quite helpful for:
  - Synthesized speech, helping a user speak
  - Typing instead of speaking
Dyslexia

- Cognitive disability which impacts reading, writing, and spelling
- Understand spoken content, but struggle with same content written
- “It's estimated that up to 1 in every 10 to 20 people in the UK has some degree of dyslexia.” (NHS)
- Spelling correction is helpful, but most spell checkers are not trained on dyslexic’s spelling patterns
- Dyslexic person may have difficulty pulling the correct spelling from a list

Autism

1. Social interaction – issues relating to others
2. Communication – issues understanding verbal and textual language including expressions
3. Imagination – problems with rigidity of thought processes leading to repetitive behavior
   • Computers help because they are often consistent, predictable, and impersonal.
   • User is in control allowing management of the repetitive behavior and inflexibility
   • Text-to-speech, or speech-to-text help with language issues
Autism – common issues

- Rigid interfaces (Heuristic: Flexibility)
- Sounds that cannot be controlled
- Lack of explanation (Heuristic: Help)
- Tend toward literal interpretation of content
  - Jokes or “funny” descriptions can be confusing
Fitts Law
Fitts Law

• Predicts the time required to point at an object using a device as a function of the object’s distance and size.

• The further away and smaller the object, the longer the time to locate it and point to it.

• \( T = k \log_2\left(\frac{D}{S}\right) + 1 \)

• Where
  • \( T = \) Time to move the pointer to the target
  • \( D = \) Distance between the pointer and the target
  • \( S = \) Size of the target
  • \( k \) is a constant of approximately 200ms/bit
For each pair of boxes, try and move your finger between the boxes as fast as possible without accidentally clicking outside the box.
Basic application

Phone app with 4 buttons. Accurately clicking these buttons is challenging they are small and widely spaced.
Basic application

Grouping them would make it easier to move between them.

Putting them next to a thumb might also be helpful.
Basic application

Also making them larger would make it easier
Basic application

Locating them next to the screen edge also helps because it makes the target much larger. Screen edges are the easiest to click.
Visual impairments
Partially sighted users

- Most people experiencing sight loss are not blind and most previously had good sight
- As of 2015, over two million people in the UK are living with sight loss\(^1\).
- One in five people aged 75 and over are living with sight loss\(^1\).

Color is a huge issue

The centers of the circles are all the same color.

The human eye is complicated which makes color blindness non-trivial to handle.

https://deepview.cs.st-andrews.ac.uk/overview/
Welcome to the BBC
Sunday, 13 November

Customise your Homepage

Remembrance Sunday: Services honour war dead
UK

Tsunami hits after powerful New Zealand quake
ASIA

England face Australia in crucial Four Nations match
RUGBY LEAGUE

News headlines

Nato chief's warning for Trump
US ELECTION 2018

France 'to extend state of emergency'
EUROPE

Iraq 'retakes ancient Nimrud from IS'
MIDDLE EAST

Sport headlines

England draw Test as India cling on
CRICKET

Will Rosberg win the battle in Brazil?
FORMULA 1

Murray wants to end season 'on a high note'
TENNIS
Basic approaches

• Fix the usability problems typically developing people have, particularly
  • Poor sign posting and navigation
  • Content structure that make sense
  • Flexibility of interaction

• Play with your interface a bit
  • Try zooming the text large and small to see what happens
  • Try turning on the screen reader and hearing what it sounds like
  • Ask yourself if all non-text elements are labeled with alt text
  • Could someone navigate with only a keyboard?
Basic approaches cont.

- Alt text for images
- Headings are clear and a computer could identify them as headings (<h1>title</h1>)
- Beware keyboard traps where someone with only a keyboard can get in but not out
- Use a “Skip to Main Content” link at the beginning of each page
- Create significant contrast between your text and background
- Use an accessible template
- Enable scanning by putting important words at the front of paragraphs and links
Pair-share

- I am about to show you a website
- Is it accessible to people with limited sight?
- Why or why not?
Remembrance Sunday: Services honour war dead

News headlines:
- Nato chief’s warning for Trump
- France 'to extend state of emergency'
- Iraq 'retakes ancient Nimrud from IS'

Sport headlines:
- England draw Test as India cling on
- Will Rosberg win the battle in Brazil?
- Murray wants to end season 'on a high note'
Let's look at how the BBC website handles accessibility.
Demo using Windows’ default narrator
Add appropriate alt text to images

```html
<div class="col-sm-7 col-md-8">
    <img src="/sites/all/themes/uoe/assets/logo.png" alt="The University of Edinburgh home">
</div>
```
<h2>Accessibility links</h2>
<ul>
<li><a href="#hp-bbc-homepage-content">Skip to content</a></li>
<li><a id="orb-accessibility-help" href="/accessibility/">Accessibility Help</a></li>
</ul>
Many examples taken from this nice writeup of issues with screen readers.

Guidelines for Accessible and Usable Web Sites: Observing Users Who Work With Screen Readers

(updated December 2006 to fix broken links and first author's contact information)

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The Communication Technologies Branch of the United States National Cancer Institute (part of National Institutes of Health and Department of Health and Human Services) has been conducting usability testing with people with disabilities, specifically blind and low-vision users, to

- understand the relationship between accessibility and usability
- understand how blind and low-vision users work with Web sites
- develop research-based guidelines for accessibility and usability
- assess the usability of specific Web sites for blind and low-vision users

Since June 2001, U.S. federal Web sites must comply with Section 508 of the Rehabilitation Act (29 U.S.C. §754.d). This law requires that agencies provide access to electronic information to people with disabilities. Section 508 identifies 18 specific standards for Web site accessibility.

Meeting the required accessibility standards does not, however, necessarily mean that a Web site is usable for people with disabilities. And if a Web site is not usable, it is not really accessible, even if it has all the elements required by the law.

Why Accessibility?
Why should you design Web sites that are both technically accessible and also usable for people with disabilities? Here are six compelling reasons:

1. Disabilities affect many more people than you may think. Worldwide, 750 million people have a disability and three out of every 10 families are touched by a disability [10]. In the United States, one in five people have some kind of disability and one in 10 has a severe disability. That’s approximately 54 million Americans [8]. In 2001, 180 million people worldwide were blind or visually impaired, including 7.7 million people in the United States. This is a substantial consumer segment that should not be ignored.
Screen readers start with the first word in the line so repetition is annoying (for sighted people too)

The frequent repetition of "updated" at the front of links in this list makes the list very difficult for screen-reader users to scan.
ALT tags

• Use of alt tags is generally a good idea.
• Alt tags should be short and to the point.
• Use ALT="" to hint to screen readers that skipping the text is ok.
• Not all images need an alt
ALT tags

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• Alt tags should be short and to the point.
• Use ALT="" to hint to screen readers that skipping the text is ok.
• Not all images need an alt

Image looks nice, but adds very little to the actual content.

Undergraduate study
We have a wide range of single and joint honours degrees to choose from.
Spelling and punctuation matter because screen readers will use them to try and correctly pronounce the page.

<table>
<thead>
<tr>
<th>Word on the screen</th>
<th>What JAWS says</th>
</tr>
</thead>
<tbody>
<tr>
<td>homepage</td>
<td>hommapodge</td>
</tr>
<tr>
<td>LiveHelp</td>
<td>livahelp</td>
</tr>
<tr>
<td>MEDLINEPlus (a very large database of medical information)</td>
<td>Medlynepalus</td>
</tr>
<tr>
<td>FY (meaning &quot;fiscal year&quot;)</td>
<td>fie</td>
</tr>
<tr>
<td>VA (meaning &quot;Virginia&quot;)</td>
<td>va (like the Spanish for &quot;go&quot;)</td>
</tr>
</tbody>
</table>
Make links descriptive

- Screen readers jump down a list of links often skipping the words
- Links with descriptive words will be more usable by both those with screen readers and those skimming the page

A screen reader set to Links List would say only "Answer," "Answer," "Answer" for this page. (Also see the example earlier in the paper in the section on "Screen-reader users scan with their ears.")
Make forms usable

Use HTML elements to link labels to form boxes so screen readers read them properly.

Children's Program Consumer Survey

In order to create the most productive programs possible, your input and comments are valued. This opportunity to fill out the enclosed survey will help us meet the needs of your current and future needs from the program.

1. Name: 

2. Current address: 

3. Daytime phone number: 

Figure 6. Example of a well-behaved form. After filling in the Name field, the user presses Tab. The cursor moves to the field box for Current address and JAWS says, "Tab. Current address colon. Edit type text." The user fills out that box and presses Tab again. The cursor moves to the next field box and JAWS says, "Tab. Daytime phone number colon. Edit type text."
Make forms usable

Figure 7. Users listening to JAWS did not hear "recommended or" and thus assumed they had to put in both zip and state.

“(recommended) –OR-” is not part of the label associated with the form so the screen reader skips it during text entry. So users end up filling out Zip and State.
Bad idea: Make an accessible version of your website or app

- Organization is unlikely to have the resources to maintain both
- Small updates likely to happen to accessible version and not the other
- Later editor likely to break the accessibility features by mistake

P7: I never trust screen reader versions because the text version is never updated.
P8: It's double work to do text and graphic versions. It's better to make the graphic version accessible.
Questions?