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## Week 7 | Lecture 7.1 Accessibility

### Importance of Accessibility

The WHO estimates that 285 million people are estimated to be visually impaired worldwide, 466 million people with disabling hearing loss, and over 1 billion people to experience physical disability. Mozilla MDN is working on building accessible sites to benefit everyone, for example, semantic HTML to improve accessibility and Search Engine Optimisation to make searches more findable.

### The History of Accessibility Guidelines

WCAG (Web Content Accessibility Guidelines) were first published by the WWW in 2008, there are three WCAG levels, A, AA and AAA, with level AA being the most commonly used by industry. A decade later, in 2018, the W3C published version 2.1 which added additional guidelines.

### Web font size

Goal: Readability of font in a typical usage scenario

Challenge: Differences in devices, interaction of user settings, for example, zoom settings, and font size.

Solution:

- Explicit font size setting (16px as recommendation)
- Using standard settings
- Font size setting



### Color

Challenge: Many users cannot read text if there is not sufficient contrast between the text and background

Solution: Using a contrast ratio of at least 4.5:1, using 1px, then .75pt

- If text <18pt or <14pt (bold), then 4.5:1 contrast
- If text >=18pt or >=14pt (bold), then 3:1 contrast

### Functional Color

Functional colour use is where colours transmit important information (e.g., traffic light colours). Or, for example, in markers on these slides we use the cross and tick where the colours are only repeating the information already given by the symbols:  

### Texture

Texture aids the readability for colour blind people, instead of categorising by color, we can categorise by color and pattern / texture

### Keyboard Accessibility

Some users with mobility impairments rely on the keyboard or on assistive technologies. Every link, control, and feature that can be operated with a mouse must be accessible using only a keyboard. Hence why we need clear visual indication of the current element in focus

### Page Title

Good page titles are particularly important for orientation, hence there should be a title that adequately and briefly describes the content of the page. For example, using Login System vs source.html

### Accessibility of Forms

Labels and clear instructions are important for forms accessibility. Each field should have an associated label or an appropriate title. All form controls are keyboard accessible (in the expected order)

### Visual clues and color

For example, a password entry should have red alerts (text and color) to indicate to the user that their password has been entered incorrectly.

### ALT Text

Text alternatives ("ALT text") convey the purpose of an image, including pictures, illustrations, charts, etc. Text alternatives are used by people who do not see the image. This can happen in 2 cases: when people who are visually impaired rely completely on screen readers or when the link to the picture is broken. ALT text should be succinct, and not replicate the caption of the image (if there is one)

## Week 7 | Lecture 7.2 Senses

### Cycle times and task performance

How we can calculate and what tells us about our abilities, by cycling between two lines, and how many oscillations we can do in 5 seconds. The human processor tells us that we should expect about 71 oscillations. Also, often we would move outside of the lines, notice this and make a change, on average, with about 20 corrections in 5 seconds.

### Senses

Vision	<p>Vision happens in two ways, <b>(1)</b> physical reception of stimulus and <b>(2)</b> processing and interpretation of stimulus.</p> <ul style="list-style-type: none"><li>- Visual angle indicates how much of the view object occupies</li><li>- Visual activity to perceive detail, which is limited</li><li>- Familiar objects perceived as constant size</li><li>- Cues like overlapping help perspective of size and depth</li></ul> <p>Brightness:</p> <ul style="list-style-type: none"><li>- Subjective reaction to levels of light</li><li>- Affected by luminance of object</li><li>- Measured by just noticeable difference</li><li>- Visual activity increases with luminance as does flicker</li></ul> <p>Colour:</p> <ul style="list-style-type: none"><li>- Made up of hue, intensity, saturation</li><li>- Cones sensitive to colour wavelengths</li><li>- Blue acuity is lowest</li><li>- 8% males and 1% female are color blind</li></ul> <p><b>Visual perception</b></p> <p>Perception involves the intervention of representations and memories. Visual systems constructs a model of the world by transforming, enhancing, distorting and discarding information. The ecological approach says that, if we see a handle, there is probably a door there. The affordances provide us information to make those inferences.</p>
Hearing	<p>Hearing is involuntary, unless we are listening to what someone is saying, we are processing it. Hence, we have to make focus between what goes into the buffer, and what stays, as a coping mechanism. A baby crying would grab our attention even if we try to ignore it, or someone saying our name, etc.</p> <p>Auditory icons</p> <ul style="list-style-type: none"><li>- Sounds that relate to something in the real world, for example, the sound of filling a bottle with water to match moving a large file.</li></ul> <p>Earcons</p> <ul style="list-style-type: none"><li>- Artificial sounds where people have to learn them, more abstract relationship to action or purely convention. Representing other states, such as error states, or on a mac, putting something into the rubbish bin (deleting a file), makes a sound that has no real relation to the real world, but it is learned relatively quickly.</li></ul>
Touch (haptics)	<p>Touch provides important feedback about the environment. It might be key sense for someone who is visually impaired. Stimulus received via receptors in the skin include pressure, heat or cold, etc. Some areas are more sensitive than others, such as the fingertips.</p>

## Week 8 | Lecture 8.1 Intro to Qualitative Analysis

"Qualitative Analysis" is an analysis method that explores ideas based on data that cannot be quantified. Qualitative data include text (document), Observations, audio/visual data, and artifacts.

1. Looks for critical incidents (Focuses on key events to analyse using specific techniques)
2. Identified themes (Emergent from data depending on observational frameworks)
3. Categorises data (Pre-specified categorisation schemes)

## Approaches to Qualitative Analysis Collection

1. Direct: Interview
2. Direct: Focus Group
3. Indirect: Case Study
4. Indirect: Ethnography

The most popular approaches to analysis is Grounded Theory and Content Analysis

<b>Grounded Theory</b>	<p>A method grounded in data systematically gathered and analysed.</p> <table border="1"> <tr> <td>STAGE 1 OPEN</td><td> Open Coding: Reading text and analysing them to identify patterns and opinions <ul style="list-style-type: none"> <li>- Open to new theories as we are not basing off of anything from the past</li> <li>- Using the words interviewees directly use. For example, if a participant says the UI is clumsy, you can use "clumsy" in the analysis.</li> </ul> </td></tr> <tr> <td>STAGE 2</td><td> Development of Concepts: Codes that describe similar content are grouped <ul style="list-style-type: none"> <li>- Merging concepts into something that represents several interviews</li> </ul> </td></tr> <tr> <td>STAGE 3 AXIAL</td><td> Grouping Concepts: Into categories based on axial coding (breaking data down) <ul style="list-style-type: none"> <li>- Look at code, merge and group them (axial coding - see <a href="#">Figure 1</a>)</li> </ul> </td></tr> <tr> <td>STAGE 4</td><td> Formation of Theory: Creating correlations between concepts, selective coding <ul style="list-style-type: none"> <li>- Merging many concepts into one key theory, so all categories are connected into one</li> </ul> </td></tr> </table> <p><b>Advantage:</b> Grounded Theory provides a systematic approach with theory backed by evidence</p> <p><b>Disadvantage:</b> It's a complex and contextual process (iterative), and can be overwhelming with coding details, with potential research bias.</p> <p><b>Example:</b> Qualtrics is just like a high quality Google Forms (on steroids). Let's say a company uses the Ground theory to understand why people want to leave. Qualtrics returns quotes, which translate into managerial issues, culture of long hours, and lack of travelling routes. This translates to lack of recognition and having too much work, which translates into being overworked and under-appreciated.</p> <p><b>Figure 1</b></p> <pre> graph LR     Data["There was often a temporal circumstance like a procedure the next day or just arriving on the unit. A 'temporal' circumstance seems to lower the coping skills and modulating pathways changed and suffering intensified."] --&gt; OpenCodes["Examples of nonphysical pain (unit arrival, procedure), other event (nonphysical), suffering intensified, temporal circumstance"]     OpenCodes --&gt; AxialCodes["Understanding pain"]     </pre>	STAGE 1 OPEN	Open Coding: Reading text and analysing them to identify patterns and opinions <ul style="list-style-type: none"> <li>- Open to new theories as we are not basing off of anything from the past</li> <li>- Using the words interviewees directly use. For example, if a participant says the UI is clumsy, you can use "clumsy" in the analysis.</li> </ul>	STAGE 2	Development of Concepts: Codes that describe similar content are grouped <ul style="list-style-type: none"> <li>- Merging concepts into something that represents several interviews</li> </ul>	STAGE 3 AXIAL	Grouping Concepts: Into categories based on axial coding (breaking data down) <ul style="list-style-type: none"> <li>- Look at code, merge and group them (axial coding - see <a href="#">Figure 1</a>)</li> </ul>	STAGE 4	Formation of Theory: Creating correlations between concepts, selective coding <ul style="list-style-type: none"> <li>- Merging many concepts into one key theory, so all categories are connected into one</li> </ul>
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<b>Content Analysis</b>	<p>A method that classifies data into themes or categories based on frequencies. For example, counting how much a specific word shows up in an interview.</p> <ol style="list-style-type: none"> <li>1. Define the data set</li> <li>2. Define the population</li> <li>3. Understand the context</li> </ol>								
<b>Thematic Analysis</b>	<p>Focuses on patterns and themes. Not coming up with a theory, just listing key themes.</p> <p><b>Example: How do university students experience academic stress during exams?</b></p> <p><b>Grounded theory:</b> "pressure to perform", where theory suggests it could be due to internalised expectations and peer comparison.</p> <p><b>Content analysis:</b> 80% mention time management, 40% mention lack of sleep.</p> <p><b>Thematic Analysis:</b> "fear of failure", "coping strategies", "feeling isolated"</p>								

## Interviews

The lesser the structure, the greater the difficulties, BUT it gives more opportunity for unique insights. The interviewer skills become more important.

- Fully structured (Scripted)
- Semi-structured (Pre-specified questions where digression is allowed)
- Unstructured (Open-ended exploration)

## Focus Groups

You run them as groups of gathering for discussing specific topics, and usually requires a moderator to keep the discussion on track. They are spontaneous with a clearly defined outcome, and encourage peer relationships among participants. You don't have your boss sitting next to you so you don't feel restricted. They're basically a group interview.

## Case Study

An in-depth study of a specific instance within a specific real-life context. It involves a variety of data types including text, observation, video and artifacts. A good example is that Google maps changed from using 700+ colors to only 25, which makes it look more simple and cleaner.

## Ethnography / Observational Studies

Also known as "Observational Studies" where we observe humans in social settings and activities, and have the observer immerse themselves in the user's environment. Your presence affects the observation (Hawthorne effect).

# Week 8 | Lecture 8.2 The Coding Process

Analysing text content involves assigning categories and descriptors to blocks of text, called coding. It is not just paraphrasing or counting keywords; you interact with data, make comparisons and derive concepts.

## The Coding Approach

1. **Emergent Coding:** Qualitative analysis without prior theory, noting concepts and refining them into a model. It is appropriate for new topics with limited literature, often based on grounded theory. Is a type of inductive Analysis (data without preconceived theories). Code is purely emerged from the data with NO previous study done on this topic before.
  - **Benefit:** Open-ended, allowing theories to emerge with data
  - **Limit:** Can be more fainting as you need to be open-minded
2. **A priori coding:** Using an established theory to guide the selection of coding categories. Uses existing theoretical framework to guide coding categories (deductive analysis, data with preconceived theories). It requires doing your due diligence before, and refer to this for the coding process
  - **Benefit:** Simpler to a user with a relevant framework
  - **Limit:** Limits broader insights

## Grounded Theory

It uses emergent coding to "emerge" new theories, this involved three processes

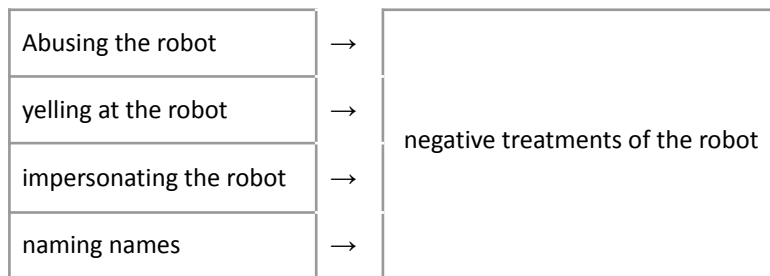
1. Open
2. Axial
3. Selective

## Open

Read through data, such as interview notes, identify patterns, opinions and behaviours. Assign a distinctive name (code) to each unique phenomenon or try "in vivo coding" where you borrow terms from participants directly.

### Axial

Grouping interview terms, and coming up with a new term, which is higher-level, that represents all the four elements below.



### Selective

Regardless of your approach, you need to organise the code into a code list. In emergent coding, it develops as you code, and in priori coding, it comes from your theoretical framework.

### Validity vs Reliability

#### Increase validity

- Data organisation
- Chain of evidence
- Data source triangulation
- Accounting for all observed data
- Consider alternative explanations

#### Increase Reliability (consistency of results)

$$K = P_o - P_e / 1 - P_e$$

$P_o$  = Probability of Agreement Observed

$P_e$  = Probability of Agreement by Chance

Example: Two coders independently coded interview data from 50 children about their computer usage. They agreed on 30 of the responses. The probability of agreement by chance is estimated to be 0.4. What is the Cohen's Kappa?

$$K = 0.2 / 0.6 = 0.333$$

#### Two types of Coders

1. Subjective Coder: Those who designed the study, have a good understanding on domain knowledge, strong biases
2. Objective Coder: Not involved in the study at all, they are more open but lack domain knowledge and require training.

## Week 9 | Lecture 9.1 Intro to Quantitative Analysis

Quantitative analysis focuses on numerical data to evaluate user experience, focusing on "how long", "how many" or "how much", to provide measurable insights, and complements qualitative analysis.

Qualitative: Why do users hesitate?

Quantitative: How many hesitate and for how long?

## Week 10 | Lecture 10.1 Design Affordance

**Affordance:** an opportunity provided by the thing for the user to interact with it correctly. It is an element of design that helps the user do something, for example, button design. A simple UI button design might give us a feeling of a button being more "clickable" than another, based on design considerations, such as text, borders, color, shading, icons.

Affordance: Knowing what something does without the designer telling you what it is. For example, good button affordance would be, a user knowing its a button without the designer saying its a button.

### Types of Affordance

**Sensory:** Seeing the doorknob, I see the button

**Cognitive:** Turning the doorknob, The button is easy to click

**Physical:** Touching the doorknob

**Emotional:** An emotionally impactful design of doorknob, The button plays a cute animation when I click it

**Functional:** Understands the doorknob opens the door, The button does what its suppose to

### Cognitive Affordance

Can be used as feed forward and feedback. Feedforward can help with a priori knowledge used to predict the outcome of an action, while feedback may help users know what happens after an action, such as visual feedback. For example, for door knobs, they all show some degree of cognitive affordance.

- They should also help the user understand something they are new to, such as Slides with "Double Click to Edit".
- A simple reminder to remind users if there is an issue completing their task, such as Message Has No Attachment reminders when sending an email.

### Physical Affordance

By looking at something, we should understand what is prioritised by the designer at the time. We should understand what items are clickable and what aren't, and in what sequence priority.

- Unlike cognitive affordance being towards more inexperienced users, physically affordance is more for experienced users as they become more efficient with the interaction.
- A physical keyboard offers better physical affordance compared to a touch screen keyboard, but technology has shifted to a touch-screen phone, hence sacrificing physical affordance for a cost (more screen real estate, nicer aesthetic design, smarter predictive features such as changing language, emojis, etc)

### Sensory Affordance

Seeing, hearing, feeling, tasting and smelling are all aspects of sensory affordance, but we will focus on visual affordance. It's about the presentation of user interfaces, including visibility, discernibility, noticeability, legibility, distinguishability, color and presentation.

- **Visibility:** The most important object shouldnt be blocked, hidden or require more actions to get to it
- **Noticeability:** Seeing something but doesn't grab attention, it is therefore visible but NOT noticeable.
- **Discernibility:** Can the user make out, detect or recognise the object, its shape, colors
- **Legibility:** How readable is text? Can people with poor vision see?
- **Distinguishability:** Are similar functions or objects distinguishable?
- **Color:** Making something stand out more to influence behaviour
- **Auditory:** Standard notifications
- **Haptic and Tactile:** On smartphones,

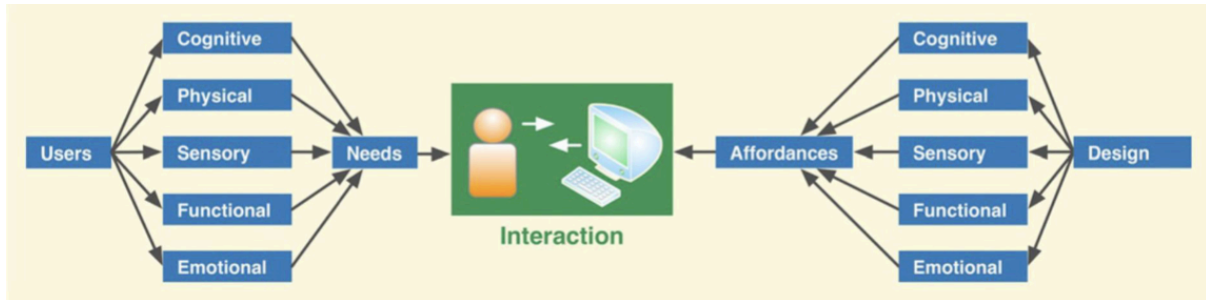
### Functional Affordance

Design features that help users employ a product or system to accomplish work, it is focused on the backend of the system.

### Emotional Affordance

Features that add impact to the user's emotional experiences and are often linked to aesthetic design.

### Consolidating Affordance



### User-created affordance

Affordance added to an original design because it was not good enough.