

# Interface Components

COMP2044: Human-Computer Interaction (2024-2025)

---

Matthew Pike

## Overview

---

## Objectives for today

- Understand the components of desktop and mobile interfaces.
- Explore design metaphors and how they inform interface design.
- Learn about designing for errors and recovery.
- Ethnography as a tool in design.

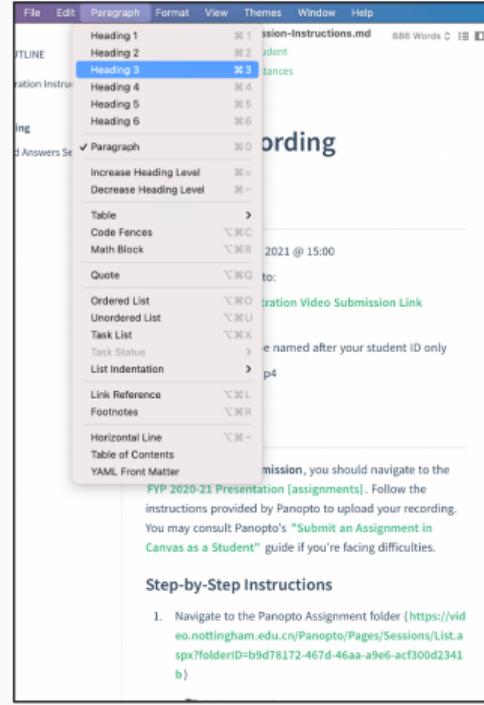
## Interface Types

---

# The same document. Different interfaces.

```
matt - nano ~/Dropbox/Work/Teaching/FYP/Practical/FYP-Practical-Submission-Instructions.m...  
UNI Name: 2.0.6 File... /Users/matt/Dropbox/Work/Teaching/FYP/Practical/FYP-Practical-Submission-Instructions.m...  
# FYP Demonstration Instruction 2020-21  
  
[TOC]  
  
# Video Recording  
  
# Key Points  
  
* Deadline – 05 May 2023 at 15:00  
* Submit Via Panopto:  
    * You must upload your video submission via Panopto:  
        * Your video must be named after your student ID only  
        * e.g.: zg1234.mp4  
* Submission  
  
For your ***Panopto submission***, you should navigate to the [FYP 2020-21 Presentation (assignments)](https://video.nettingham.edu.cn/Panopto/Pages/Sessions81)  
## Step-by-Step Instructions  
1. Navigate to the Panopto Assignment Folder (https://video.nettingham.edu.cn/Panopto/Pages/Sessions81)  
[!CleanShot 2021-03-26 at 16.15.49](FYP-Practical-Submission-Instructions.assets/CleanShot 2021-03-26-1)  
2. Click the "FYP 2020-21 Presentations..." folder to navigate into the assignments directory:  
[!CleanShot 2021-03-26 at 16.15.38](FYP-Practical-Submission-Instructions.assets/CleanShot 2021-03-26-2)  
3. Click the "Create" button and select "Upload media" from the resulting drop-down menu:  
[!CleanShot 2021-03-26 at 16.15.54](FYP-Practical-Submission-Instructions.assets/CleanShot 2021-03-26-3)  
4. Drag your demonstration recording into the dotted rounded rectangular area. Wait for the video thumbnail to appear:  
[!CleanShot 2021-03-26 at 16.15.57](FYP-Practical-Submission-Instructions.assets/CleanShot 2021-03-26-4)  
  
5. Once completed, you will be greeted with the following notification:[!CleanShot 2021-03-26 at 16.15.58]  
6. After closing the "Add files to assignment" dialogue box, you should see the following:[!CleanShot 2021-03-26 at 16.15.59]  
7. Your submission to Panopto is complete.  
  
## Late Submissions  
The standard university penalty ***does not apply here***. Because of significant time pressures, we n...  
## Guidance  
An essential component of the project is to present your work and discuss it in a professional manner. The demonstration video can be a screen-capture (your screen) or video-recording (of you), or some c...  
- Introduce yourself  
  
[!Get Help] [!WriteUp] [!Redo] [!Where Is] [!Prev Page] [!Out Text] [!Cut Pos]  
[!Exit] [!Justify] [!Read File] [!Next Page] [!End Text] [!Copy Pos]
```

(a) Command Line Interface (CLI).



(b) Graphical User Interface (GUI).

**Figure 1:** The same document is shown in both interfaces - which one would you prefer to use?

# Command Line vs Graphical Interfaces

## Command Line Interfaces (CLIs)

- Require few resources to implement and run.
- May be faster for experts to perform specific operations.
- Keyboard-driven.
- Maintains a history of commands, which can be navigated.
- May be overwhelming or difficult for new users.

## Graphical User Interfaces (GUIs)

- Users interact with graphical icons and audio indicators.
- Designed to be more friendly to novice users.
- Actions are performed through direct manipulation.
- Use of a pointing device to directly manipulate visible objects on the screen resulting in real-time feedback.

## Graphical User Interface Components

---

# WIMP: Windows, Icons, Menus and Pointing

- Developed by Xerox PARC in 1973.
- Windows are self contained and may be numerous (multi-tasking).
- Icons act as shortcuts to common/intuitive tasks.
- Menus are contextual lists of tasks that may be executed.
- Pointers enable direct manipulation via an on-screen symbol representative of control.

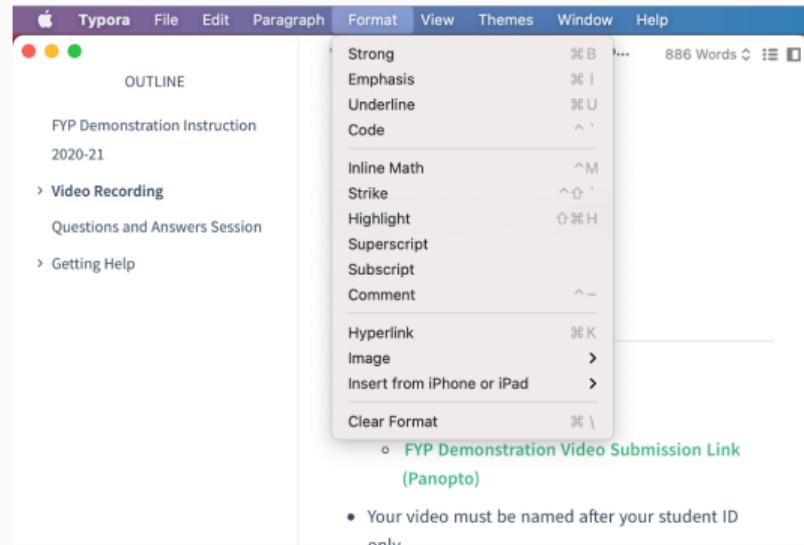
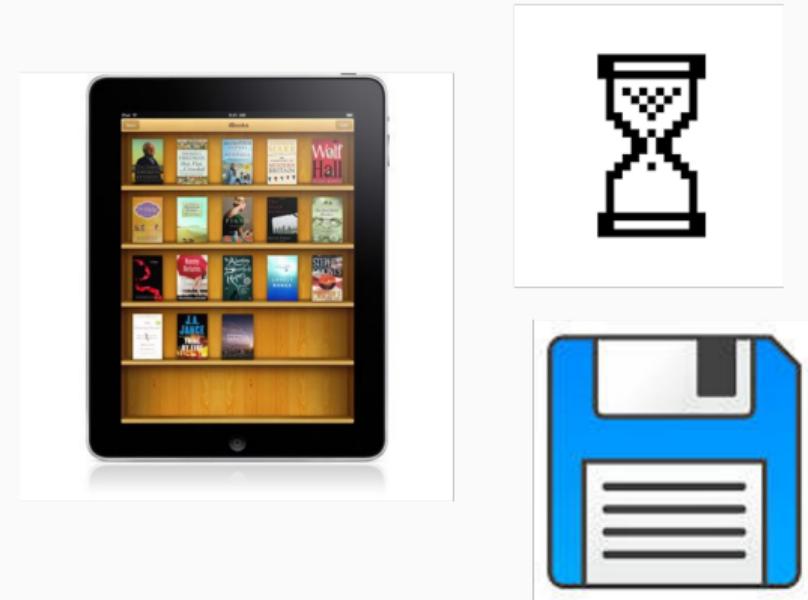


Figure 2: An example of a GUI with WIMP components.

## Icons and Metaphors

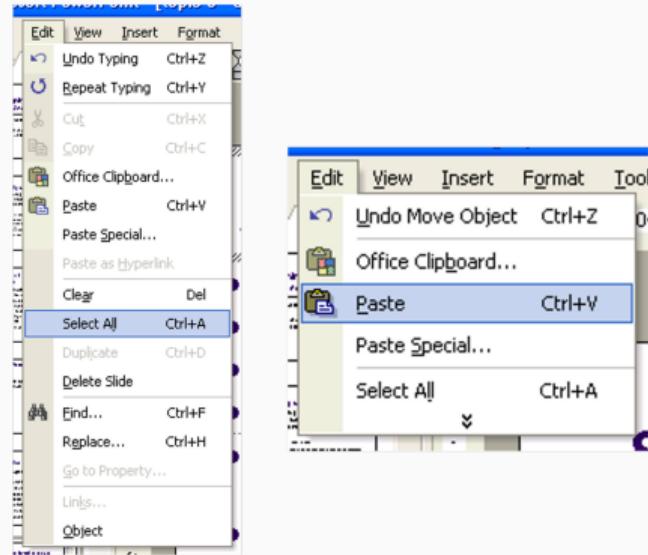
- A metaphor is something that describes one thing in terms of another.
- Interface metaphors use familiar knowledge to help the user understand the functionality of the system.
- For example, the trash can icon is a metaphor for deleting files.
- Evaluate metaphors:
  - Will the audience understand it?
  - How much is relevant to the problem?
  - How much structure does it provide?



**Figure 3:** Examples of common interface metaphors.  
Do you understand each one?

## Menu Design

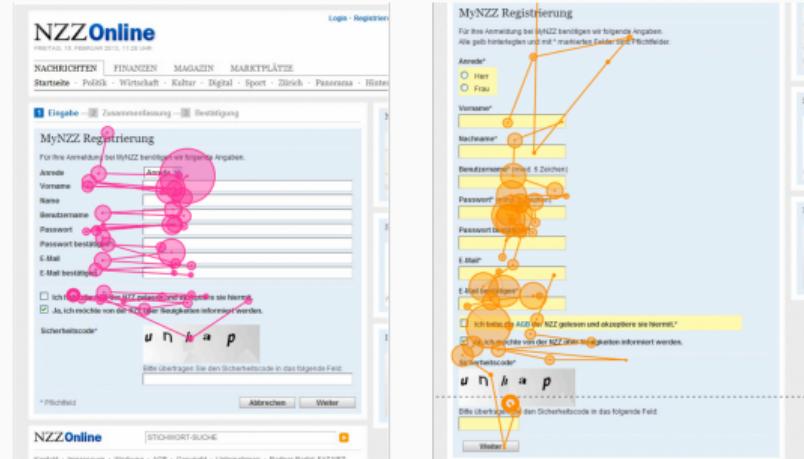
- Consider some of the principles we've discussed so far (last week, particularly).
- What principles were used to inform the redesigned menu?



**Figure 4:** Alternative menu designs. Which principles were used to inform the redesigned menu?

# Forms

- Forms are a primary method for users to input data into a system.
- Designing forms can be complex. Think about these in terms of our general design guidelines:
  - Consistency;
  - Intuitive;
  - Use of Gestalt principles;
  - Knowledge in the head and knowledge in the world.



**Figure 5:** 65 participants were studies using eye-tracking to determine the efficacy of 20 form design guidelines (Seckler et al., 2014).

## Form Design Guidelines (Bargas-Avila et al., 2010)

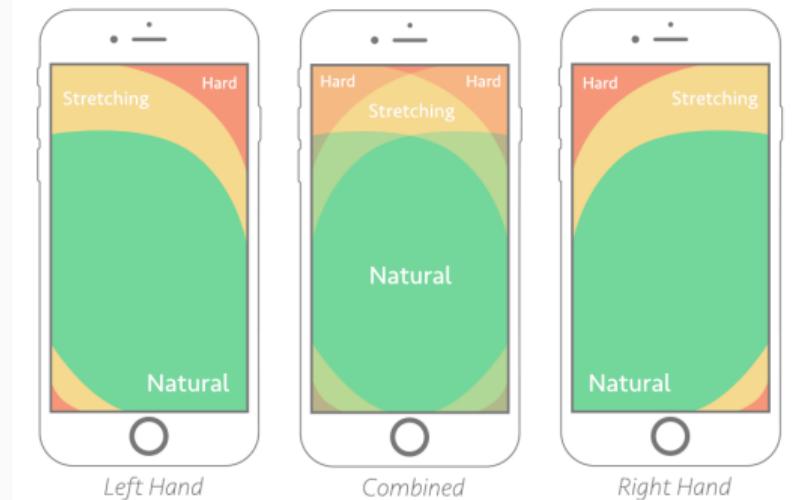
NR	Guideline	NR	Guideline
1	Let people provide answers in a familiar format.	11	Order options in an intuitive sequence.
2	If the answer is unambiguous, allow answers in any format.	12	a) Date entries should use drop-downs. b) the year field should be twice as long
3	Do not ask for unnecessary input.	13	State a specific format in advance.
4	a) Separate required from optional fields. b) Use colour to mark required fields.	14	Texting of error messages
5	Place the labels above the input field	15	Never clear the already completed fields.
6	Only ask for one input per column.	16	Show all error messages after sending the form.
7	Match the size of the input fields	17	Show error messages in red at the right side.
8	Use checkboxes, radio buttons or drop-down	18	Disable the submit button as soon as it has been clicked.
9	Use checkboxes instead of list boxes	19	Provide a confirmation site.
10	Use of radio buttons and drop-down menu	20	Do not provide reset buttons.

## Mobile Interfaces

---

## Limited Reach and Touch Targets

- Depending on the size of the device, the user's thumb may not be able to reach all areas of the screen without adjusting their grip.
- Therefore, frequently used controls should be placed within easy reach, with less frequently used controls placed further away.



**Figure 6:** The “thumb zone” on a mobile device.  
Image Credit - [smashingmagazine](#)

# Responsive Design

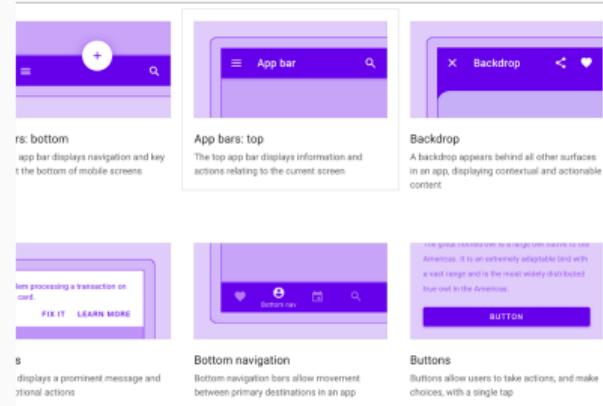
- Remember that the orientation of the device can change - significantly altering the available screen real estate.



**Figure 7:** The Guardian's website navigation menu changes depending on the available screen real estate. Image Credit - [justuxdesign](#)

# Platform Design Guidelines

- Both Apple and Google provide guidelines for designing mobile interfaces. These provide principles/best-practices for designing interfaces that are consistent with the platform's "design language" (style).
  - Apple Human Interface Guidelines
  - Google Material Design



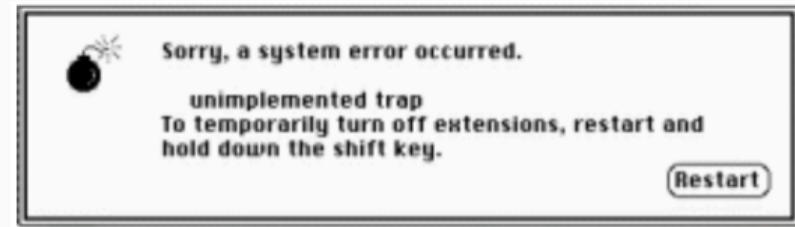
**Figure 8:** An extract from Google's Material Design Guidelines.

## Designing for Errors and Recovery

---

## Errors and Error Messages

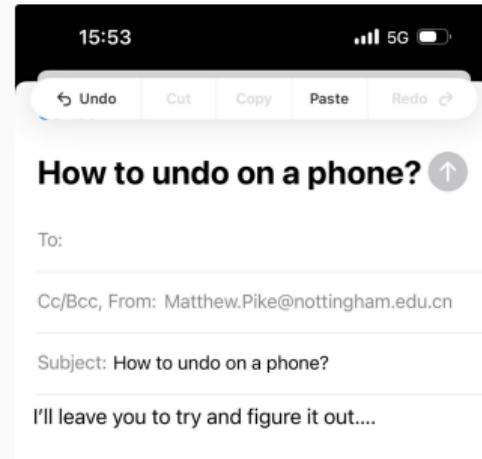
- Users will make mistakes. As designers, we need to anticipate these and provide mechanisms for recovery.
- Error messages should be clear and have a positive tone.
  - Avoid words such as “Illegal”, “Error”, “Fatal”, “Bad”.
- Provide suggestions for recovery.
  - For example, if a user enters an invalid email address, tell them why it’s invalid and suggest a valid format.



**Figure 9:** An example of a poorly designed error message. Image Credit - [mstechpages](#)

# Error Recovery / Repair Mechanisms

- **Undo/Redo:** Allow users to undo/redo an action that introduced an error or unwanted change.
- These operations should be pervasive and consistent across the system. They should always be inverse to the action they are undoing.



**Figure 10:** A pet peeve of mine - how do you undo actions on your phone? The ability to “discover” functionality on a mobile device is compounded by the limited real estate available.

## Case Study: Hawaii Missile Alert

- On January 13, 2018, an emergency alert was sent to all mobile phones in Hawaii, warning of an incoming ballistic missile.
- It was intended to be a drill, and should not have been sent to the public.
- However, a user interface design flaw led to the alert being sent, via SMS, to all mobile phones in Hawaii (!!).
  - Panic ensued for 38 minutes before a correction was issued.



(a) The SMS that was sent to all mobile phones in Hawaii.



(b) Subsequent messaging to alleviate the panic caused by the initial alert.

Figure 11: Image Credit - [nytimes](#)

Was the menu design in the Hawaii missile alert system appropriate?

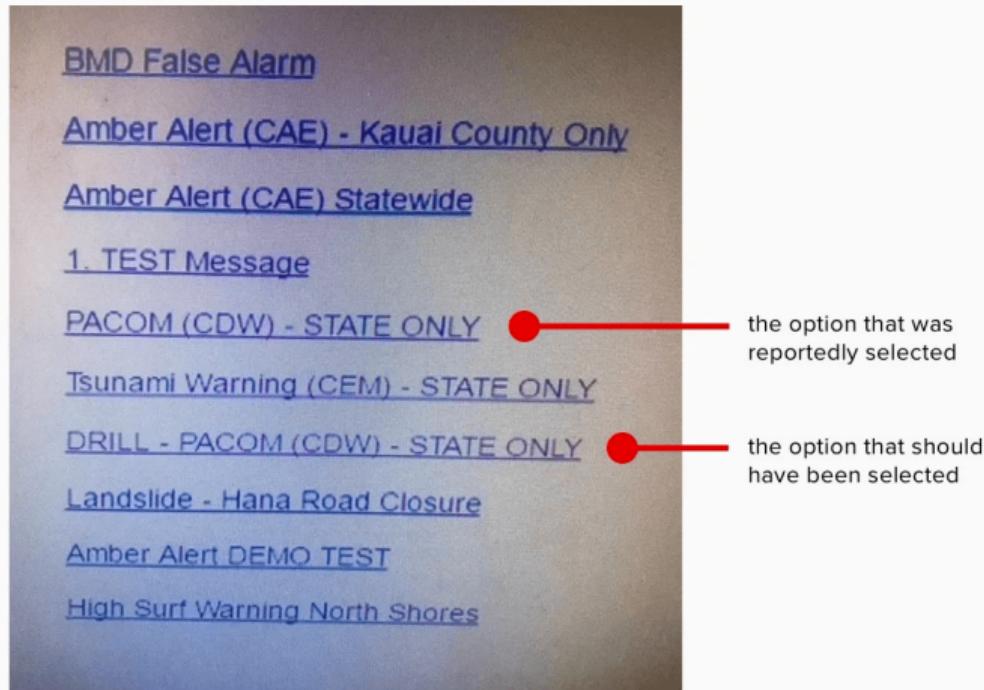


Figure 12: The menu design in the Hawaii missile alert system. Image Credit - [prototypio](#)

## Ethnography

---

## What is Ethnography?

- A **qualitative research method** used to study social interactions, behaviours, and perceptions.
- An ethnographer immerses themselves in a setting, observing what takes place, listening to what is said, and asking questions.
- Collects notes, photographs, recordings, and other data while in the “field”.
- Particular focus is given to social perspectives, such as collaboration, flow of work, awareness, and coordination.

## Case Study: Xerox PARC

- Ethnography and the PARC Copier
  - <https://www.youtube.com/watch?v=DUwXN01ARYg>
- A famous example of ethnographic research conducted at Xerox PARC in the 1983.
- Highlighted the knowledge and skills required to operate a Xerox copier.
  - Users adapted to the copier's limitations by developing workarounds, rather than the copier adapting to the user.



**Figure 13:** Likely that they are using a Xerox copier similar to this. Image Credit - [xeroxnostalgia](#)

# Collaboration

- Collaboration with, around and through artefacts.
  - Examples: Dictionaries; plans; rulebook; web forms; fare rules; regulations, procedures; traditions; instructions; agreements; physical arrangements of buildings; etc.
- Things to consider:
  - How do people coordinate activities around non-computational artefacts?
  - What competencies are brought to bear?
  - How do those activities change when technology comes into play?
  - How can this inform the design of technological artefacts?

- An ongoing mutually established, negotiated activity between members of a given setting.
  - An individualised understanding of awareness (e.g. "I know where I am").
  - A social understanding of awareness? (e.g. "I know where you are").
- Mechanisms for awareness:
  - **Peripheral awareness:** Overhearing and overseeing - allows tracking of what others are doing without explicit cues.
  - **Situational awareness:** Being aware of your surroundings so that you can understand how events, information and your own actions affect ongoing and future events.

- When a group of people act or interact together, they need to coordinate themselves
  - e.g., playing football, navigating a ship.
- They use:
  - verbal and non-verbal (e.g. nods, glances, gestures and hand-raising) communication;
  - schedules, rules, and conventions;
  - shared external representations.
- Mechanisms can include:
  - Location-based Services (e.g. WeChat's "Real-time Location Sharing");
  - Crowdsourcing (e.g. Waze);
  - Internet of Things.

## Glossed Accounts vs Actual Activities

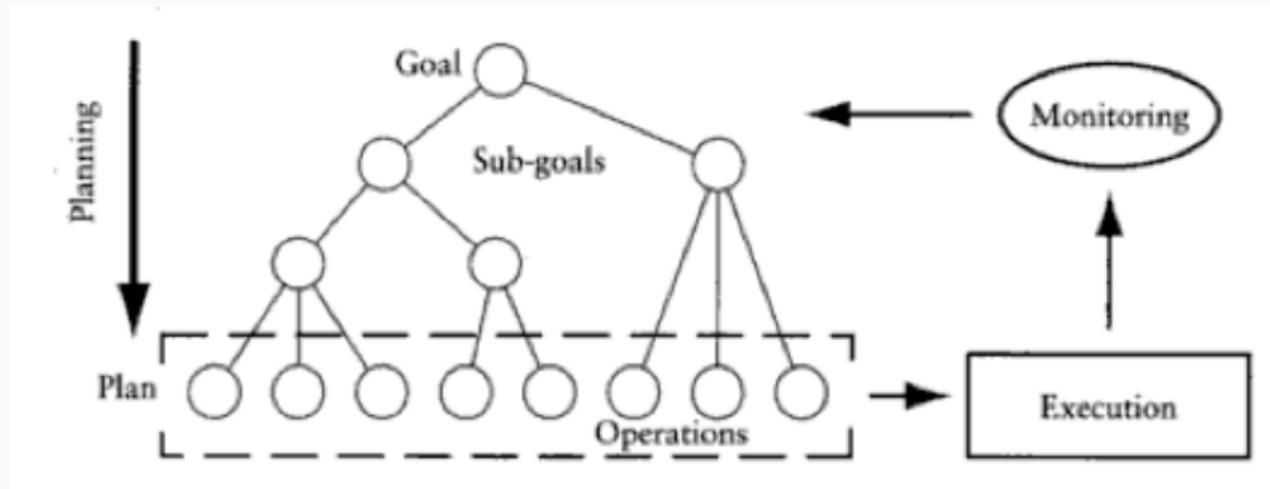


Figure 14: The diagram might show the “glossed account” of how a particular task is done. But does it actually happen like this in real life? (Dourish, 2001).

- The History of User Interfaces
  - <https://history.user-interface.io>
- The Thumb Zone: Designing For Mobile Users
  - <https://www.smashingmagazine.com/2016/09/the-thumb-zone-designing-for-mobile-users/>
- Human Interface Guidelines
  - <https://developer.apple.com/design/human-interface-guidelines/>
- Material Design
  - <https://material.io/design/>

## References

- Bargas-Avila, J. A., Brenzikofer, O., Roth, S., Tuch, A., Orsini, S., & Opwis, K. (2010). Simple but crucial user interfaces in the world wide web: Introducing 20 guidelines for usable web form design. In *User interfaces*. IntechOpen.
- Dourish, P. (2001). *Where the action is: The foundations of embodied interaction*. MIT press.
- Seckler, M., Heinz, S., Bargas-Avila, J. A., Opwis, K., & Tuch, A. N. (2014). Designing usable web forms: Empirical evaluation of web form improvement guidelines. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1275–1284.