



Maastricht University

Department of Advanced Computing Sciences

Introduction to Intelligent User Interfaces

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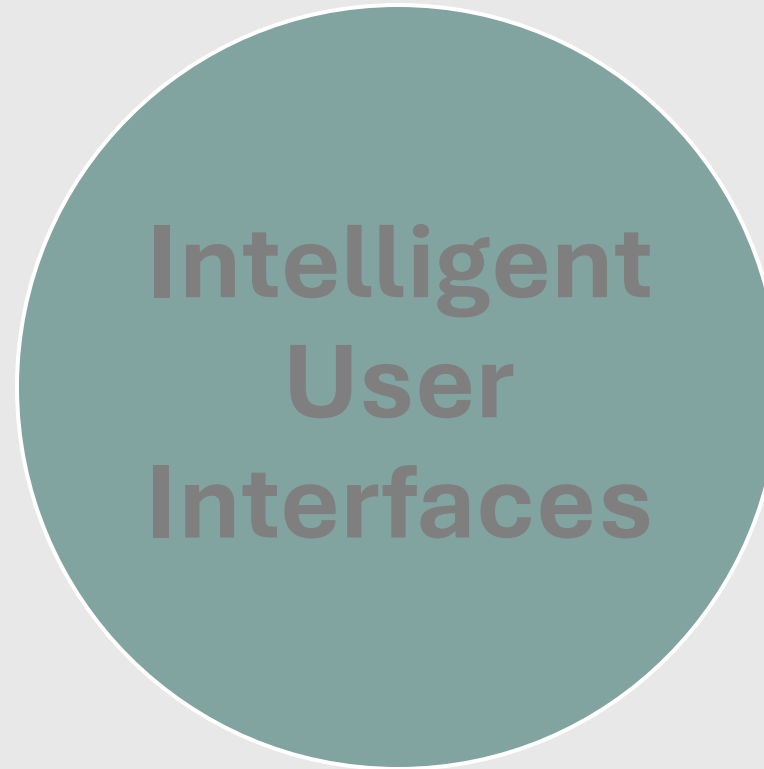
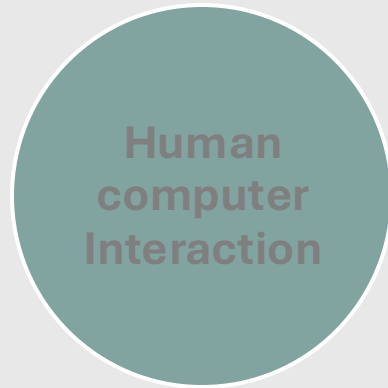
Human Computer Interaction

- From a practical point of view, human-computer interaction is the study of the manner in which people interact with computers and the level to which computers are developed for successful interaction with human beings.

User interfaces



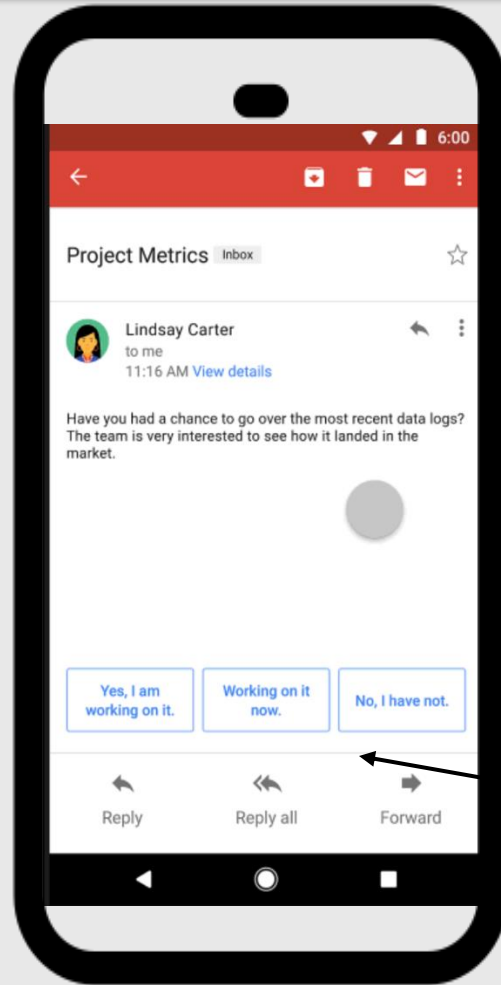
User interfaces with AI



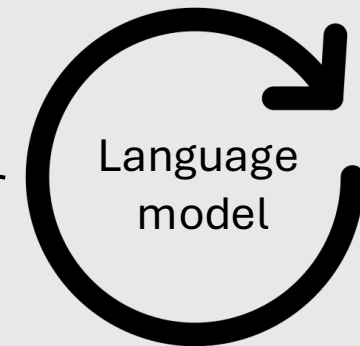
Intelligent User Interfaces

Text suggestions

Google's smart reply



Google's smart compose



<https://blog.google/products/gmail/save-time-with-smart-reply-in-gmail/>

<https://ai.googleblog.com/2018/05/smart-compose-using-neural-networks-to.html>

Intelligent User Interfaces

Smart photo editor



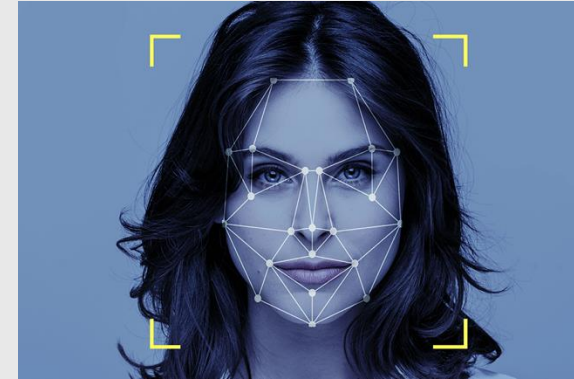
Magic Editor in Google Photos:
Complex edits facilitated by generative AI

<https://blog.google/products/photos/google-photos-magic-editor-pixel-io-2023/>

Intelligent User Interfaces

Facial recognition

- Unlock your phone
 - Hands-free identification
- Surveillance
 - Privacy



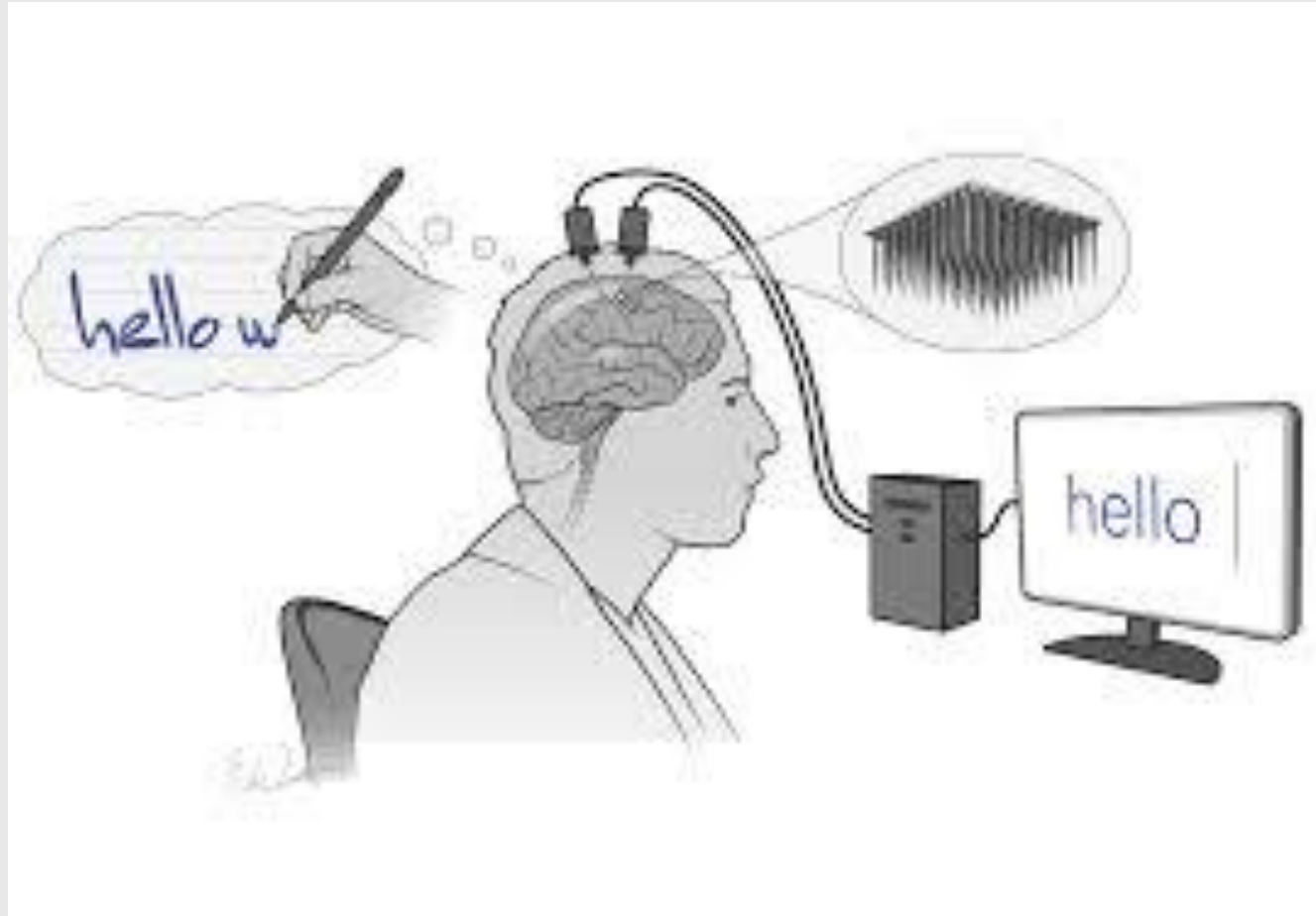
<https://news.mit.edu/2022/optimized-solution-face-recognition-0406>



<https://www.techtarget.com/searchenterpriseai/definition/face-detection>

Intelligent User Interfaces

Brain Computer Interaction



<https://www.the-scientist.com/brain-computer-interface-user-types-90-characters-per-minute-with-mind-68762>

Intelligent User Interfaces

Smart gloves



Immersive User Interfaces

Immersive User Interfaces

Augmented reality

QR 8.CODE

For your convenience we've created a shortlink that is connected to a QR code.

Shortlink

8th.io/3e9yd 

Shortlink Destination 

kzarkog.8thwall.app/roledicev5/



Scan with your smartphone to visit the connected URL

 Embed

 Download

Immersive User Interfaces

Virtual reality



<https://www.ixrlabs.com/blog/virtual-reality-transform-science-education/>
Maastricht Univ., Department of Advanced Computing
Sciences, Konstantia Zarkogianni, IUI

Immersive User Interfaces

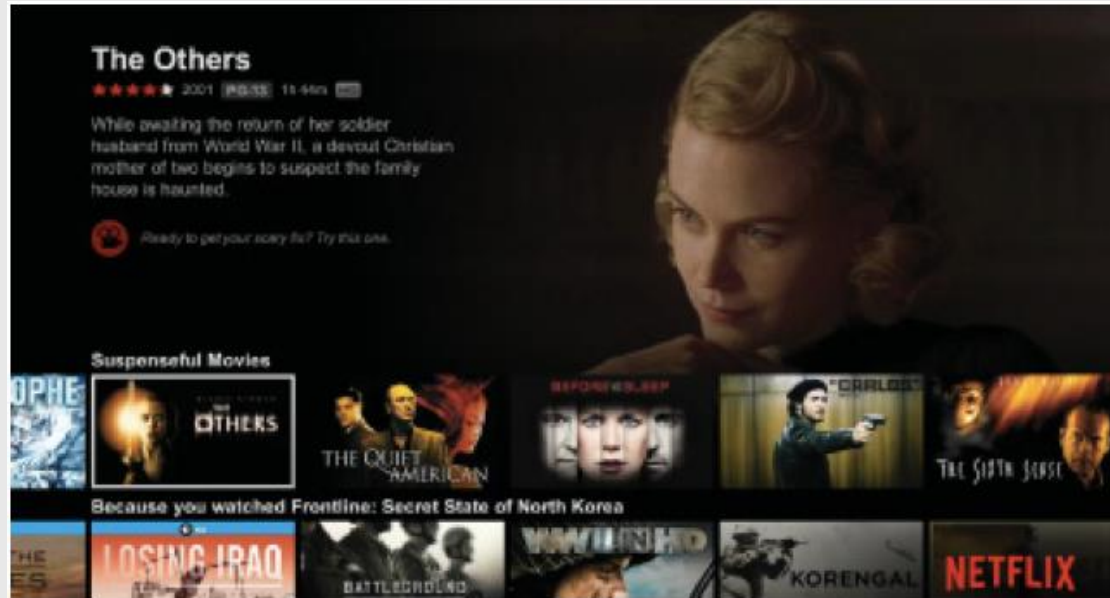
Brain Computer Interface



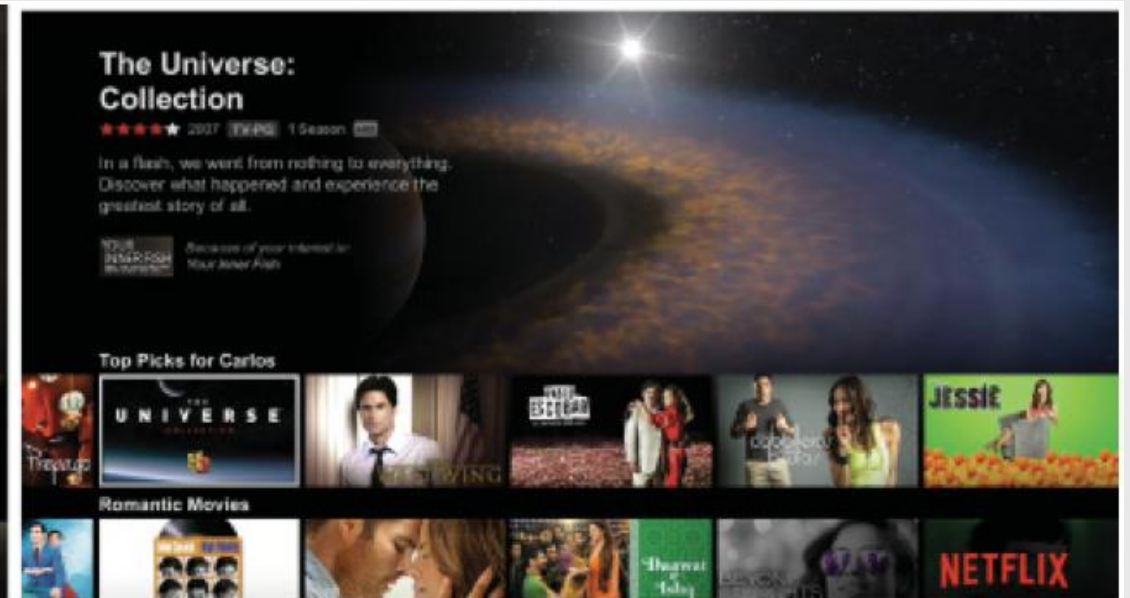
<https://www.ixrlabs.com/blog/virtual-reality-transform-science-education/>
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Sciences, Konstantia Zarkogianni, IUI

Personalized User Interfaces

Recommender systems



Personalized video ranker (PVR) algorithm: orders the entire catalog of videos (or subsets selected by genre or other filtering) for each member profile in a personalized way



SIMs algorithm: video-video similarity algorithm. It is an unpersonalized algorithm that computes a ranked list of videos—the similars—for every video in our catalog.

Carlos A. Gomez-Urbe and Neil Hunt. 2015. The Netflix Recommender System: Algorithms, Business Value, and Innovation. ACM Trans. Manage. Inf. Syst. 6, 4, Article 13 (December 2015), 19 pages. DOI: <https://doi.org/10.1145/2843948>

Definitions of HCI

- ***Scientific area on the study, design, implementation and evaluation of interactive computer systems and major phenomena around them [ACM SIGCHI 1992]***
- System design principles so that humans perform their activities in a productive and safe way
- The study of humans, computers and their interactions
- Study of User Experience (UX) through the use of computing devices
- The design & evaluation of computing technologies, through User Experience

Definitions

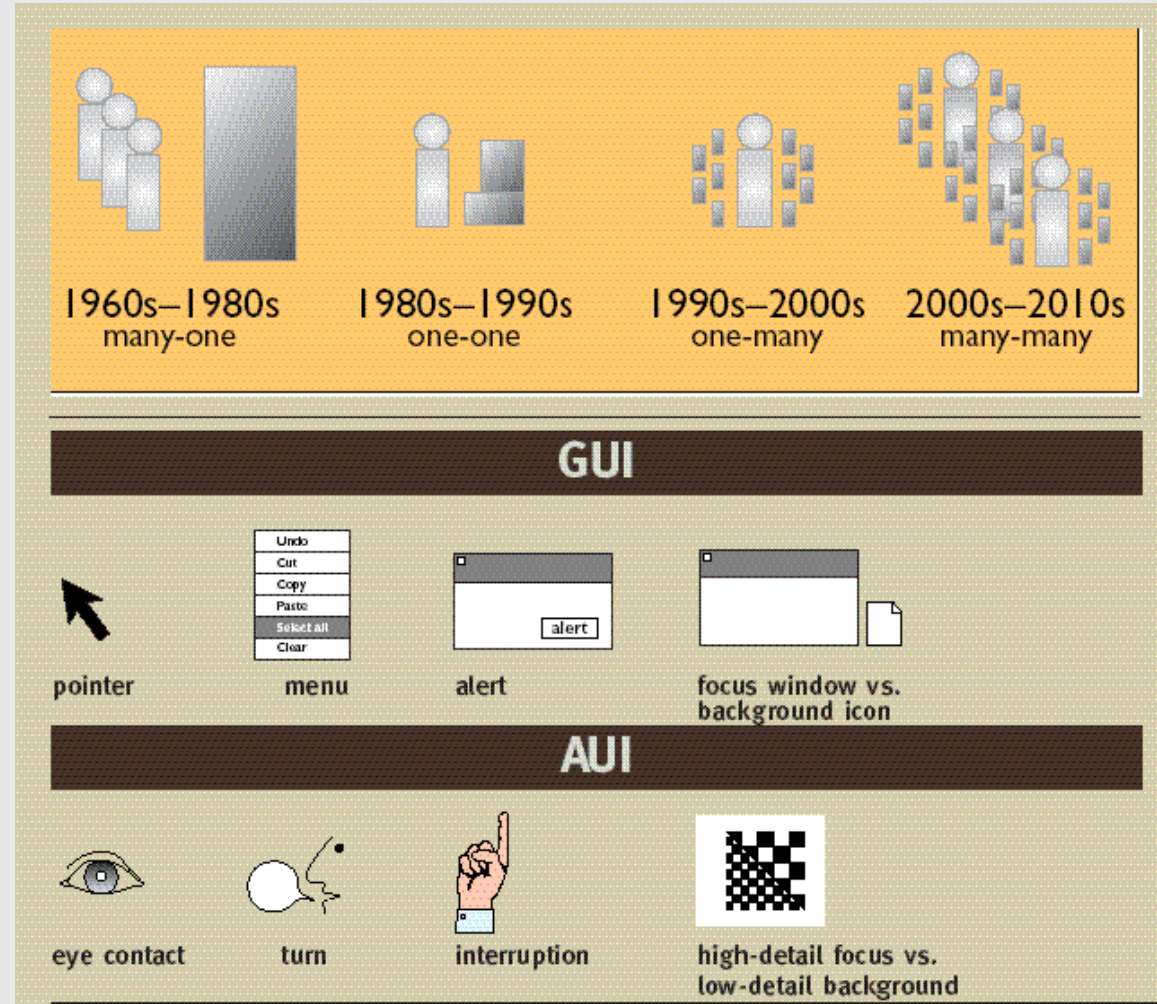
- User Interface
 - *Elements of the computational system, the user interacts with*
- Ergonomics
 - *It is a field that studies the interaction between humans and computers from the point of view of machine characteristics and the way they impact user performance.*

Put it simple

- How can we guarantee that a computer will help and not make our life difficult?
- What makes a good interface?



Evolution



Interaction Styles

Types of Interaction Styles

- Command line
- Menus
- Forms
- Direct Manipulation
- Anthropomorphic design

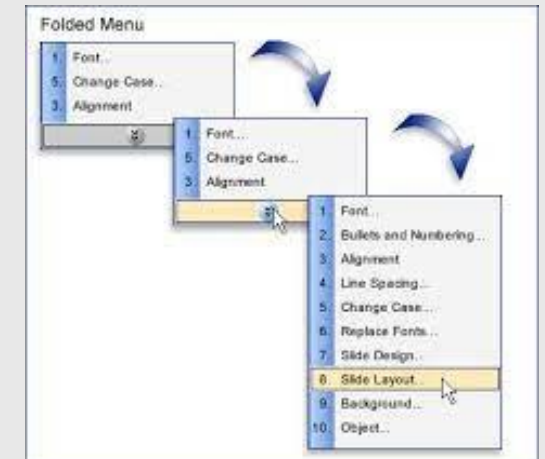
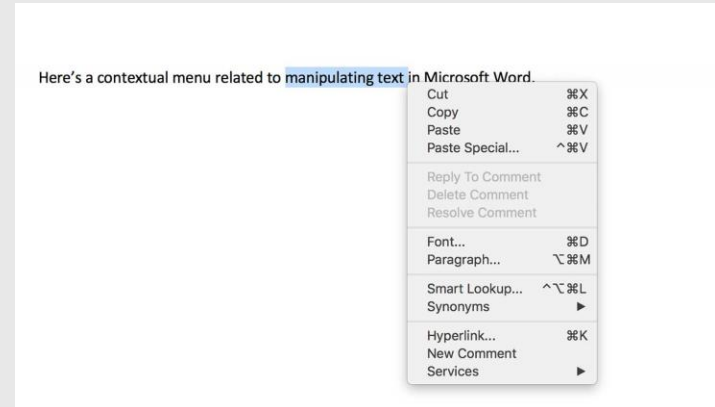
Commands

- Suitable for expert users and repetitive tasks:
 - Control over multiple objects at once
 - Sense of being in control
- Overall:
 - A lot to remember
 - Low tolerance to errors
 - Training is necessary
 - Commands sometimes non-intuitive

```
bash-2.05b$ pwd
/home/dstone
bash-2.05b$ cd /usr/portage/app-shells/bash
bash-2.05b$ ls -al
total 60
drwxr-xr-x 3 root root 4096 May 14 12:05 .
drwxr-xr-x 26 root root 4096 May 17 02:36 ..
-rw-r--r-- 1 root root 3710 May 3 22:35 Changelog
-rw-r--r-- 1 root root 2324 May 14 12:05 Manifest
-rw-r--r-- 1 root root 3720 May 14 12:05 bash-2.05b-r11.ebuild
-rw-r--r-- 1 root root 3516 May 2 20:05 bash-2.05b-r9.ebuild
-rw-r--r-- 1 root root 5083 May 3 22:35 bash-3.0-r11.ebuild
-rw-r--r-- 1 root root 4030 May 14 12:05 bash-3.0-r7.ebuild
-rw-r--r-- 1 root root 3731 May 14 12:05 bash-3.0-r9.ebuild
-rw-r--r-- 1 root root 4267 Mar 23 21:11 bash-3.0-r9.ebuild
drwxr-xr-x 2 root root 4096 May 3 22:35 files
-rw-r--r-- 1 root root 164 Dec 29 2003 metadata.xml
bash-2.05b$ cat metadata.xml
<?xml version="1.0" encoding="UTF-8"?>
<PkgType pkgmetadata SYSTEM="http://www.gentoo.org/dtd/metadata.dtd">
  <pkgmetadata>
    <herd base="system">herd</herd>
  </pkgmetadata>
</PkgType>
bash-2.05b$ sudo /etc/init.d/bluetooth status
Permission denied
bash-2.05b$ ping -q -c1 en.wikipedia.org
PING rr.chtpa.wikimedia.org (207.142.131.247) 56(84) bytes of data:
--- rr.chtpa.wikimedia.org ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 132.876/112.076/112.076/0.000 ms
bash-2.05b$ grep -i /dev/sda /etc/fstab | cut --fields=3
/dev/sda1 /mnt/cdrom
/dev/sda2 /mnt/tpad
bash-2.05b$ date
Wed May 25 11:36:56 PDT 2005
bash-2.05b$ lsmod
Module Size Used by
jogdev 8256 0
ipw2200 12512 0
ieee80211 44220 1 ipw2200
ieee80211_crypt 4672 2 ipw2200,ieee80211
e1000 84460 0
bash-2.05b$
```

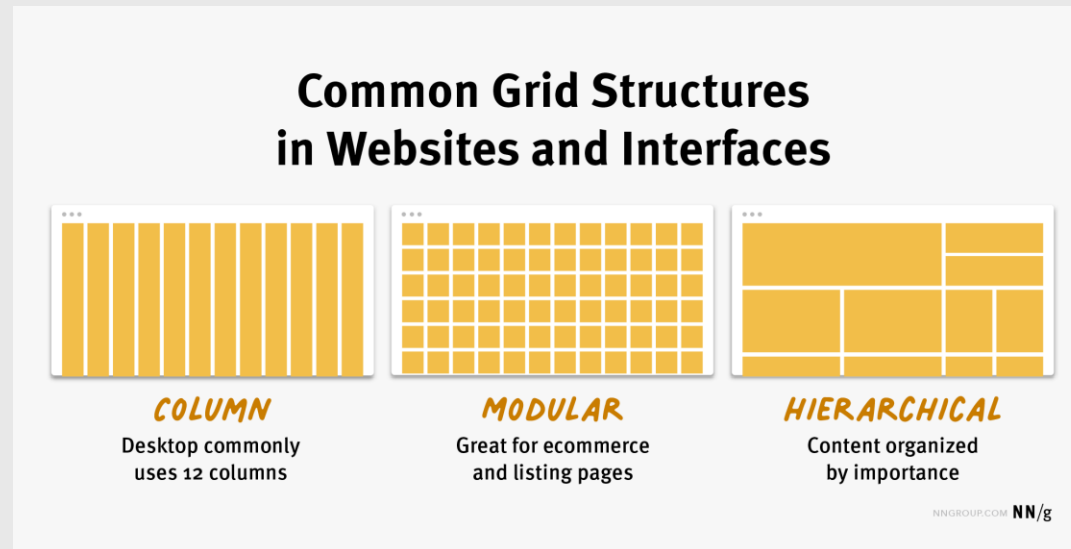
Menus

- Can be self-explanatory and easy for new users
- Good to have short-cuts for expert user
- Most common types of menus
 - At the top of the screen (often) – e.g. drop-down menus
 - Context menu
 - Pop-ups which appear as actions for selected object
 - Hierarchical menus



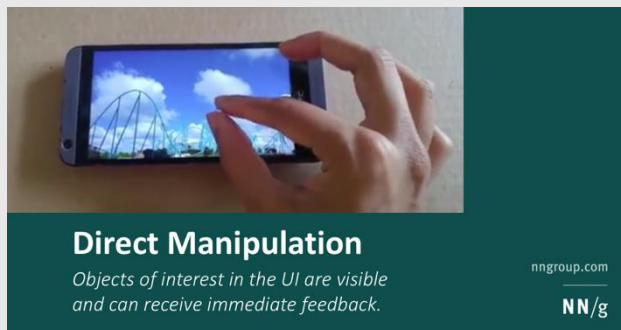
Forms

- Mostly needed when a lot of information is required from the user
 - Sophisticated type of forms are spreadsheets
- Good design is needed, matching user's mental model
- Error avoidance and correction measures, shortcuts are required



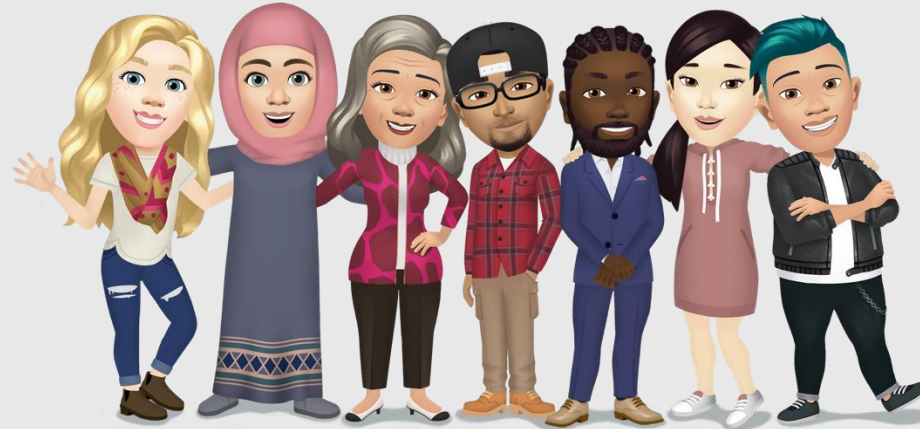
Direct manipulation

- Sense of interacting with the actual task and domain, rather than with the interface
- Intuition, physical actions and speed (dragging, clicking, opening, closing operations)
 - Real-world metaphors (e.g. desktop)
 - WIMP (Windows, Icons, Menus, Pointing devices) are mostly DM but DM is not only WIMP and WIMP may not be 100% DM



Anthropomorphism

- Avatars, chatbots, gesture recognition, speech recognition, ...
 - Promises real feeling of natural interactions
 - Active areas(s) of research



Facebook

Other interaction elements

- Queries
- 3D interfaces
- Buttons
 - Radio buttons: mutually exclusive options
 - Check boxes: not mutually exclusive options
- Toolbars
 - Usually customizable
- Tear-off menus
- Dialogue boxes
- Virtual reality
- ...

Blended interaction styles

- Usually for complicated tasks
- Addressing users of variable skills
- It can be hard to find the right combination and takes some experience..

Norman doors

ARTICLE BY 99PI

Norman Doors: Don't Know Whether to Push or Pull? Blame Design.



Examples of usual questions in interface designing

- *Which kind of menus or other interactive elements to use?*
- *How to group information and interaction elements on screen or across multiple screens?*
- *Trade-offs between ergonomics and constraints (e.g. space)?*
- *Trade-off between functionalities and accessibility (e.g. large and simple icons, simple menus)?*
- *What are the best metaphors to use?*
- *How many different ways should I use to represent the same piece of information so my interface is easy to use but not that complicated and cluttered?*

User-centered approach

- Task analysis
 - What do I want to do?
- Prototyping
 - What steps will I follow?
- Evaluation
 - Will people like it?
- Repeat
 - Well, I did not expect everyone to like it

