

COMP280 Week 11: HCI

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COMP280: Specialisms in Creative Computing

11: An Introduction to HCI

Register Attendance



Figure 1: Attendance monitoring is in place. It is your responsibility to ensure that you have signed yourself in.

Learning Outcomes

After this session you will be able to:

- ▶ **Explain** what is meant by the term human-computer interaction (HCI)
- ▶ **Discuss** how HCI has changed over the years
- ▶ **Outline** some basic HCI principles as described by Don Norman in his book, *The Design of Everyday Things*

Worksheet 4

[WORKSHEET LINK](#)

Human-Computer Interaction (HCI)

"If we didn't have people, everything would work so much better" - **Donald A. Norman**

HCI is..

the study of the relationship between people and technology



Figure 2: **Cyborg Neil Harbisson** with his antenna implant

A Little Bit of History

- ▶ Commonly understood that HCI formally acknowledged as a field of study in 1982
- ▶ driven by the shift from secure cool room computers to personal computer - Apple 2 IBM PC Commodore
- ▶ In essence, non-engineers having access to computers
- ▶ Early computers were pretty daunting to non-engineers
- ▶ HCI was born from the shift from specialist users to day-to-day use by non-engineers

Ivan Sutherland}



Ivan Sutherland Sketchpad Demo

Figure 3: [Youtube link for Sketchpad demo filmed in the early 60s](#)

More recently...

Early 90s HCI blew up as the internet and web went mainstream and there was an explosion of new interface and communication methods

Other Notable Shifts:

- ▶ Fixed computers 2004 - portable devices
- ▶ Authored content 2004 - user generated content
- ▶ personal portable screens - wearables and HMDs

Buzzword Bingo!

- ▶ Mobile
- ▶ Multitouch
- ▶ Gestures and natural computing
- ▶ Sensors
- ▶ Embedded
- ▶ Wearables
- ▶ Sustainability
- ▶ Big Data
- ▶ Social computing
- ▶ Accessibility
- ▶ Mixed Reality

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Lets begin with the principle that all artificial things are designed.

Who is doing the designing?

HCI - A Crash Course}

Generally, HCI research is empirical.

"Relying on or derived from observation of experiment" - American Heritage Dictionary

Do not...

- ▶ Presume prior knowledge of the audience
- ▶ Especially, if they are a similar demographic to you
- ▶ Expect people to read the instructions
- ▶ Blame the user for errors
- ▶ Get frustrated with the user for unpredictable behaviour

HCI is complex because . . .

- ▶ Borrow methods from other fields
- ▶ Create standards derived from other fields
- ▶ Involves Humans

- Computer Science (duh)
- Sociology
- Psychology
- Communication
- Human factors engineering
- Industrial engineering
- rehabilitation engineering
- and many more.

HCI Research

"HCI research requires both rigorous methods and relevance" **Donald A. Norman**

We use it to influence interface design, development process, user training, and public policy. Generally, to improve our relationship with computers.

What can be considered HCI contributions?

- ▶ Empirical
- ▶ Artefact
- ▶ Methodological
- ▶ Dataset
- ▶ Survey
- ▶ Opinion
- ▶ theoretical

Source

These are Exciting Times

- ▶ Tools are much better now
- ▶ Eye tracking, sensors (EMG EEG)
- ▶ Access to the masses - mechanical Turk, social networks, large amounts of generated content to analyse
- ▶ Automation - AI machine learning, neural networks

Donald Norman

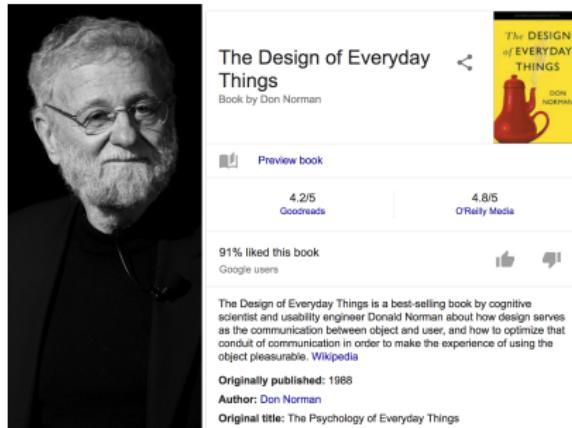


Figure 4: Donal Norman - The fundamental principles of Interaction

Affordances

"the relationship between a physical object and a person"

animal, human, robot...

- ▶ Standard Affordances - the real deal
- ▶ Perceivable Affordances - not really there (great for games)
- ▶ Anti-Affordances - designed to reduce affordances

Signifiers

“Communicate where the action should take place”

- ▶ also, hint towards what type of affordances there are (linked to mental models)
- ▶ The focus of designers
- ▶ Important for usability and accessibility

Mappings

"There is no need to understand the underlying physics or chemistry of each device we own, just the relationship between the controls and the outcomes"

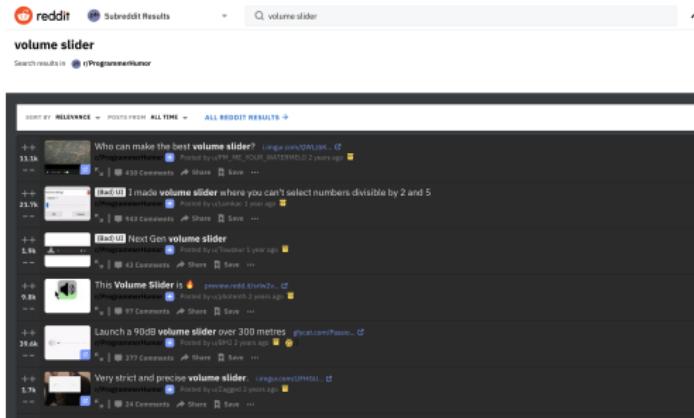


Figure 5: The worst volume UIs - [View the Reddit feed](#)

GESTALT



Figure 6: **Gestalt Psychology**

Conceptual models

- ▶ “People may hold different models of the same item”
- ▶ Models don’t have to be, “complete or even accurate as long as they are useful”

What models can we think of? (padlocks on computer screens)

Nielsen Norman Group

Nielsen Norman < NN/g

 nngroup.com

The Nielsen Norman Group is an American computer user interface and user experience consulting firm, founded in 1998 by Jakob Nielsen, Don Norman and Bruce Tognazzini. Their work includes an analysis of the interface of Microsoft's Windows 8 operating system. [Wikipedia](#)

Headquarters: California, United States
Founded: 1998

Profiles

 Twitter

Figure 7: Google Snippet about Nielsen Norman Group

UI Design Tips

- ▶ Alignment
- ▶ Alignment
- ▶ Alignment

The placement of elements such that the edges line up along common rows or columns. or their bodies along a common center.

"Visual acuity is the ability to resolve details" (Jason Jerald)

- ▶ In ideal conditions a human can resolve details as small as 1/7200th of a degree

UI Design Tips

Consistency “The usability of a system is improved when similar parts are expressed in similar ways”

Legibility The visual clarity of text, generally based size, typeface and contrast with the background.

Scaling Fallacy A tendency to assume that a system that works at one scale will also work at a smaller or larger scale

Composition

Rule of Thirds The alignment of content based on invisible guides that divide the layout into thirds both on the vertical and horizontal plane

Some useful UI laws

Fitts' Law The time required to move to a target is a function of the target size and distance to the target.

Hick's Law The time it takes to make a decision increases as the number of alternatives increases