



Contemporary theory

Fundamentals of Human-Centered Computing



Contemporary theory

The “third wave” of HCI theories:

- A turn to design: Technology as experience
- A turn to culture: Critical Theory
- A turn to the wild: Ecological rationality
- A turn to embodiment: Embodied interaction

...with special focus on the latter



The third wave

Moving from needs to values



The third wave

From **needs** to **values**

Health, fairness, activism

From **cause and effect** to **accountability**

i.e. from empiricism to philosophy

Focus on **social responsibility** and **moral narratives**



The third wave

Value-driven, cultural perspectives

- feminism
- multiculturalism
- globalization
- ICT4D
- world peace

Focus on truly understanding the users **before** thinking about technology (goal of this class!)



The third wave

4 turns:

- A turn to design
- A turn to culture
- A turn to the wild
- A turn to embodiment



A turn to design

Technology as experience



A turn to design

How to think about design (instead of practice)

- Reflection
- Highlight tradeoffs
- Use it to think critically about HCI itself

How to design for things we **live with**, not just things we use

e.g. design for play, experience, exploration/reflection, in-betweenness, interruption, pervasiveness...



Design thinking

Usually bizarre design exercises that are not meant to be used, but to **provoke thinking**

See the world through multiple lenses (interpretive flexibility)

Goal: design for activism, sustainability, inclusion, values, worth...

Deep philosophies that help understand these aspects

Heavy use theories about aesthetics, ethics, politics, etc.



More practical

A more practical approach is **technology as experience**

Consider the following aspects of a design:

- sensual (how it feels/is perceived)
- emotional (how it changes and is affected by our emotions)
- compositional (how it is put together, e.g. flow of interaction)
- spatio-temporal (how it affects and is affected by space and time)



A turn to culture

Critical Theory



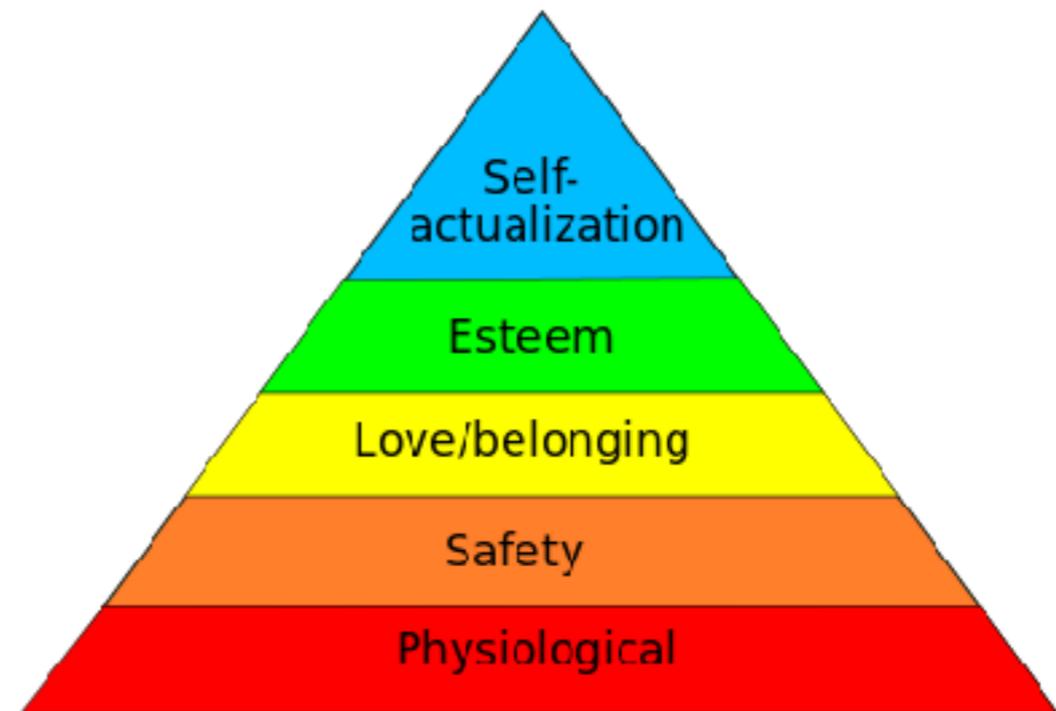
A turn to culture

How HCI affects the human condition

Fairness, inclusion, worth, self-actualization

From science, to **arts** and **humanities**

E.g. feminist, political interpretations of technology





Critical Theory

Critical Theory: Being **skeptical** about HCI and design artifacts

Knowledge as subjective construction (remember symbolic interactionism?)

Multiple layers: Any HCI is situated, social, conceptual, political

Explore these multi-perspective, multi-layered interpretations

Related to boundary objects, but more philosophical



Question...

Should HCI always be interpretive?

Or can it be prescriptive?



A turn to the wild

Ecological rationality



A turn to the wild

Develop and explore technologies to **augment** people, places and settings

Ubiquitous or pervasive computing

Great for studying IoT, wearables

Like the turn to design, see how people react to these “HCI installations”

But more hands-on



Field studies

Field studies instead of experiments

Again, with interpretive flexibility as a plus

Like situated action

But with a conceptual intervention

Look at **appropriation**

This part is similar to structuration



Ecological rationality

Ecological rationality: How do we deal with constraints?

How to deal with bounded rationality and cognitive overload

Use of **heuristics**

Take shortcuts in interaction

Question: How to combine this with a rational approach?

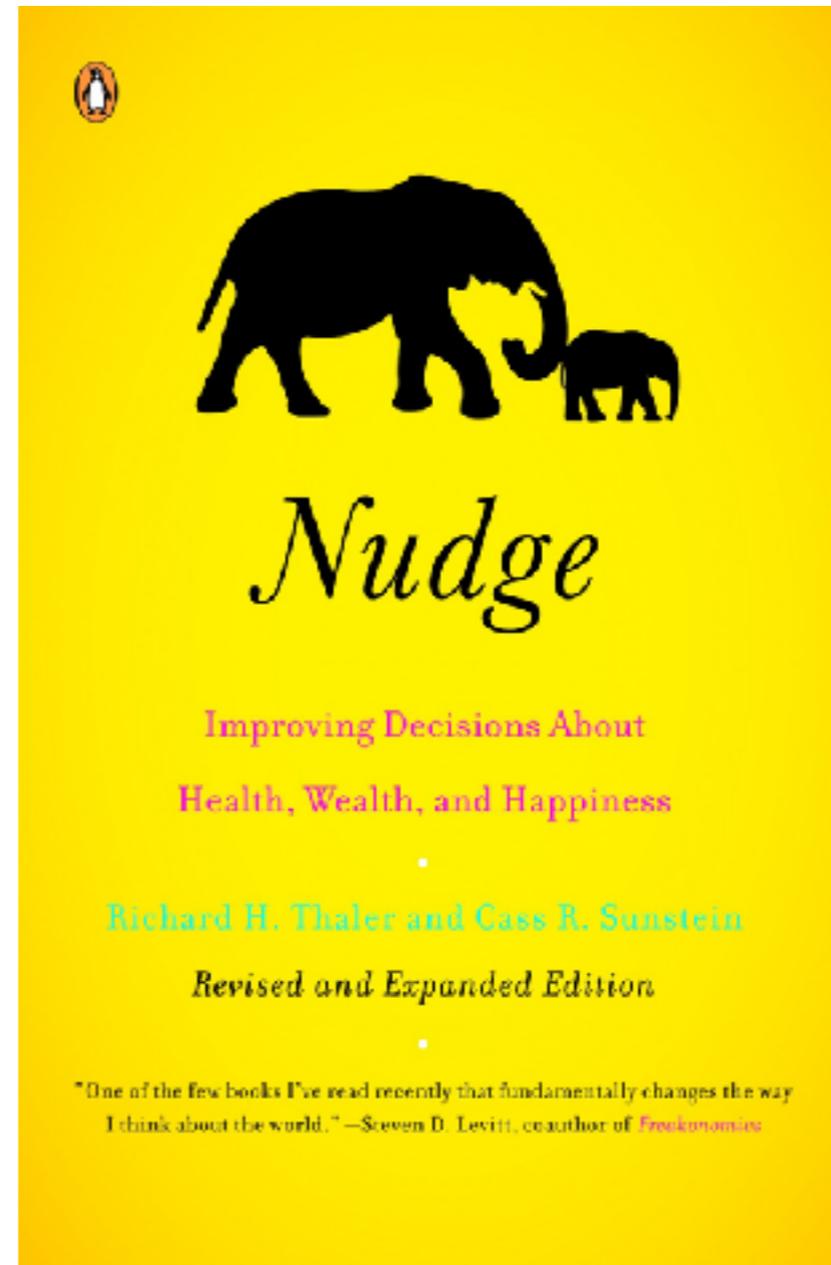


Nudges

Example design solution:
nudging instead of
transparency and control

Subtle yet **persuasive** cues
that makes people more
likely to decide in one
direction or the other.

(Thaler and Sunstein
2008)





A turn to embodiment

Embodied interaction



A turn to embodiment

Interacting with tools changes the way we think and perceive

Even more, tools can be **embodied**

3 orders of embodiment:

- Morphology
- Body schema
- Body image

Morphology: how our physical design determines our interaction



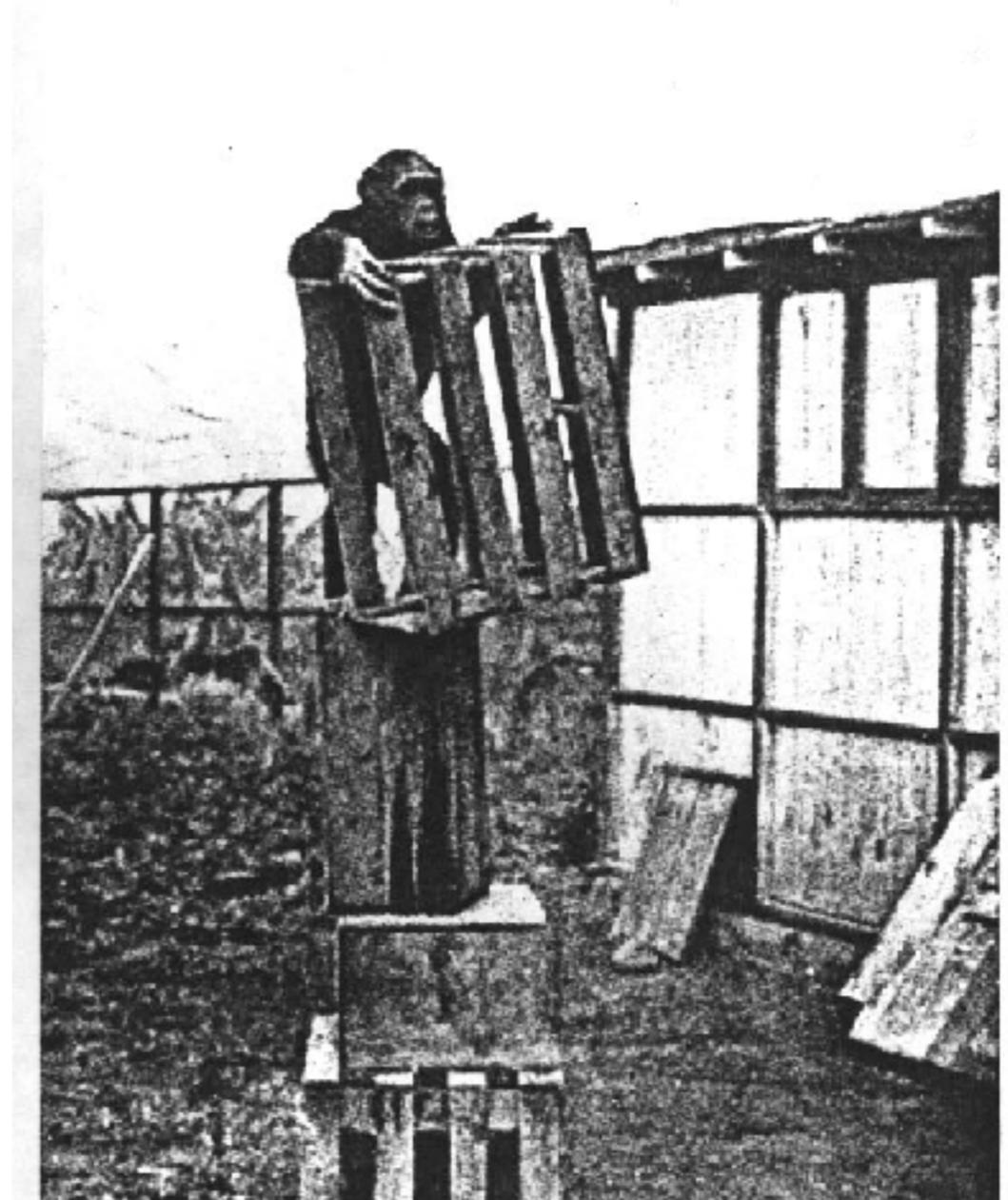
Body schema

Body schema: our representation of our body

It is a fragmented, dynamic network of procedures that guide action

Objects can be incorporated in this schema

Existing procedures can adapt to our tools





Body image

Body image: how we perceive our physical bodies, what is part of our self.

Some tools are attributed to the self

e.g. “knowing” the time, from wearing your watch

Based on sensorimotor contingencies...

Action-perception correlation

... and morphological congruence

Position in space & synchrony in time



Rubber hand

People can incorporate a table or rubber hand into the body image

- Malleability of body image
- Detection of statistical correlations in sensory input





Rubber hand

Not associative condition, because it doesn't work when real hand is visible

Insensitive to discrepancies in appearance and location

Conclusion: Our lifetime experience with a fixed body can be negated **in a few minutes**



How does it work?

The experience of unity of the body is more a function of **action** than sensation

This is how children “learn” perception and self-attribution

Kirsh: We think with our bodies, not just our brains

The fact that this can be done quickly allows for **tool integration**



Tool integration

Tangible interaction: use embodied concepts to support the process of **learning through doing**

E.g. physical manipulation, spatial interaction, facilitation, expressive representation (“legibility”)

Important to create good mappings

This brings us back to classical theories!



Consequences

Embodied interaction happens in the world, is structured by the world, and lends meaning from that world.

- look for meanings behind actions
- find meanings at multiple levels
- technology without practice is meaningless

The key about technology is its exploration/adaptation/adoption into our world and everyday practices

Technology can fulfill multiple roles at once