HUMAN COMPUTER INTERACTION

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WHAT IS HCI?

It means:

1. Understanding how humans interact with computers.

2. Creating new and effective ways for humans to interact with computers.

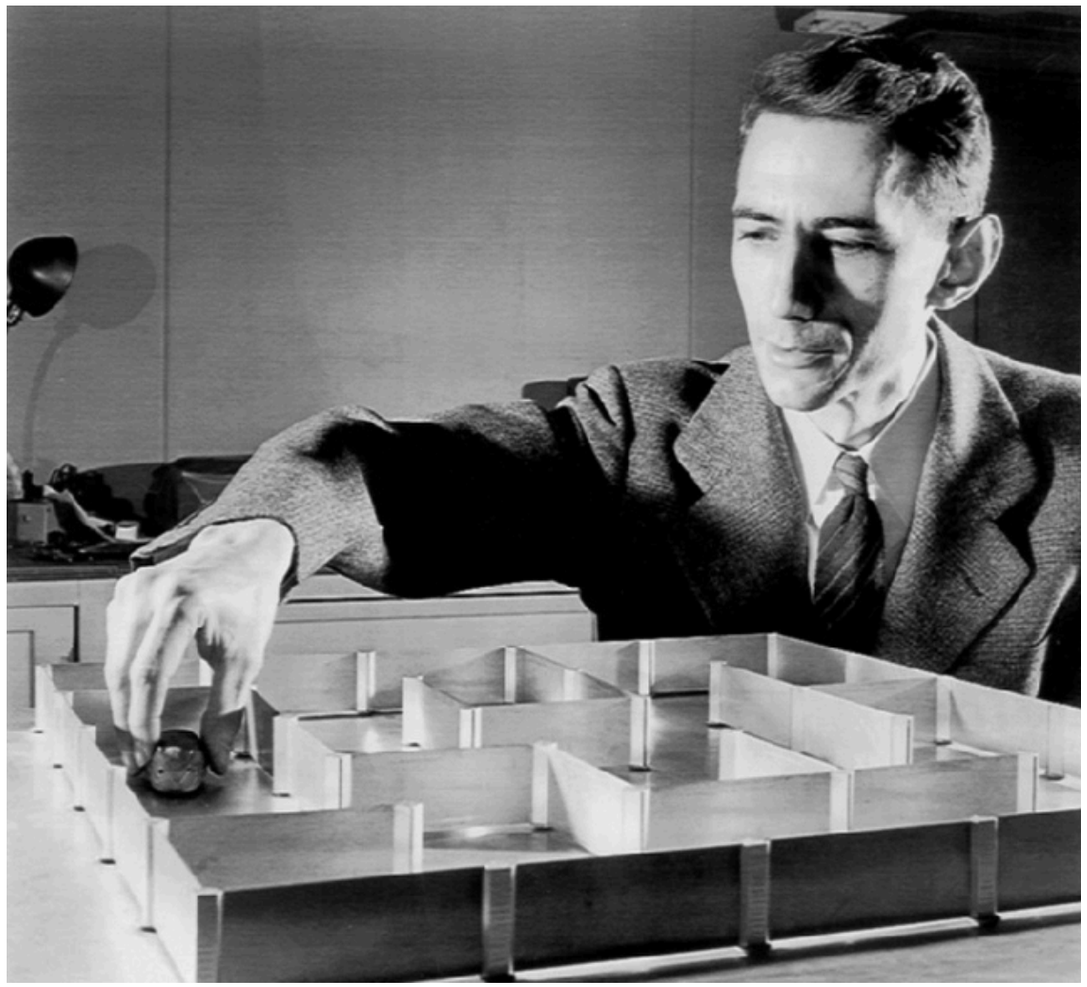
Here, the term "computer" can refer to a desktop machine, laptop, tablet, mobile phone, or an assortment of other electronic devices; it can also refer to both software and hardware running on these devices.

INFORMATION THEORY

There are a couple of key concepts relevant to HCI and design.

1. Information flows through a channel such as; an interface, a programming language, a system, a set of grammars.

2. There is always noise on the channel. Depending on the level of noise decryption is made easier or harder i.e. a car passes as someone tells you something. The job of the designer is to reduce noise on the channel.



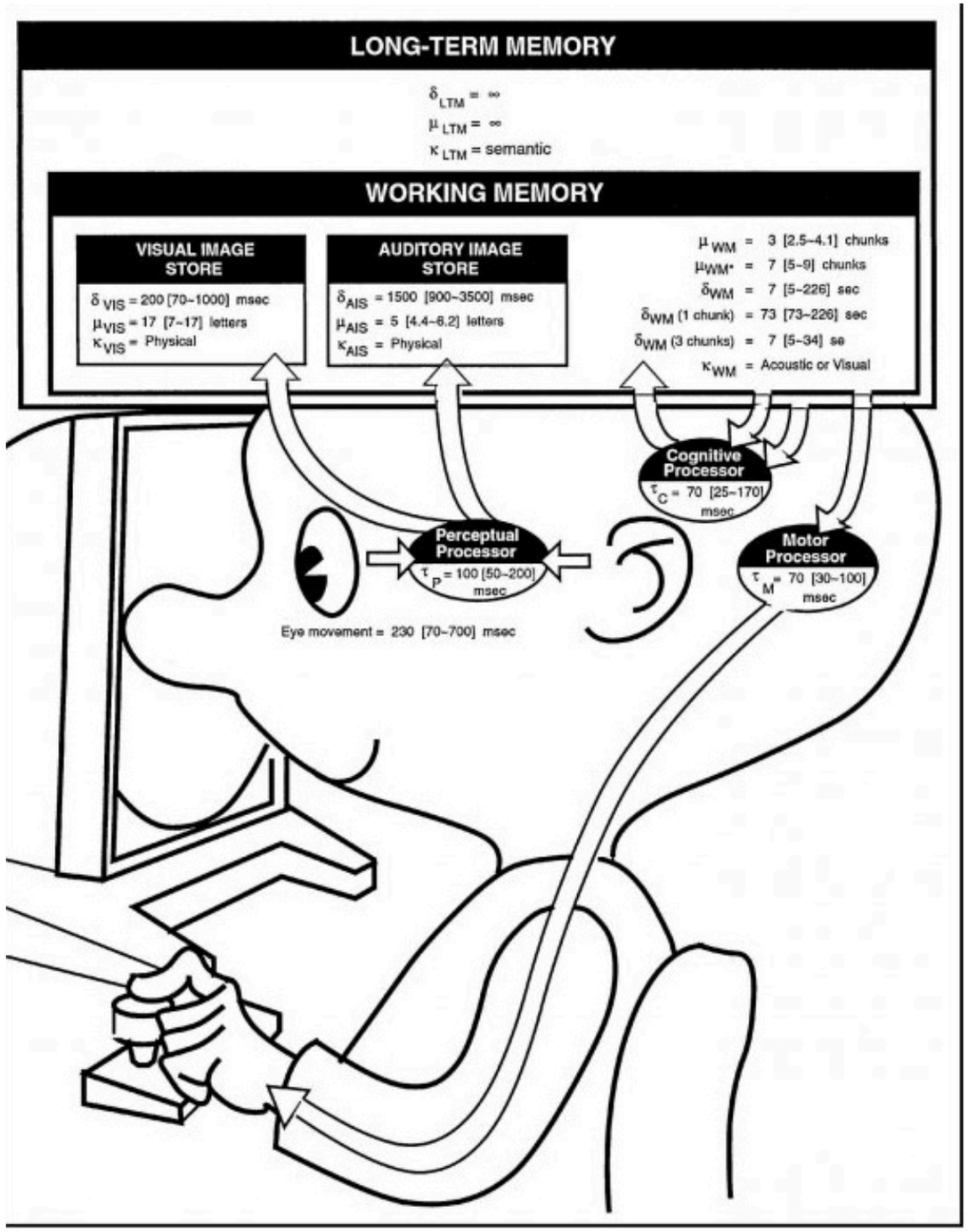
COGNITIVE MODELLING

The gulf of execution refers to the cognitive gap between the user and the physical system. The difference between the user's perceived execution actions and the required actions. The classic example is recording from a VCR.

The gulf of evaluation refers to the distance between physical system and user. ‘The gulf is small when the system provides information about its state in a form that is easy to get, is easy to interpret, and matches the way the person thinks of the system’. *Don Norman*

In other words: How well does the system communicate how it should be used?

Goals, Operators, Methods, Selection rules. The criticism is that the models can only account for predictable behaviour.



SITUATED ACTION

Prioritises the situation. This idea emphasises how actions unfold in a setting. The flux of ongoing activity is more important than motivations, learning, or artefacts.

Situated action cares deeply about how people improvise and react to contingency. One time solutions to one time problems.

Classic examples are supermarket studies of how shoppers put apples into bags or how people figure out how to use a photocopier to make double sided copies.

Highly detailed, contextually dependent, activity can only grow out of the immediacy of the situation.

ACTIVITY THEORY

Has four main axes.

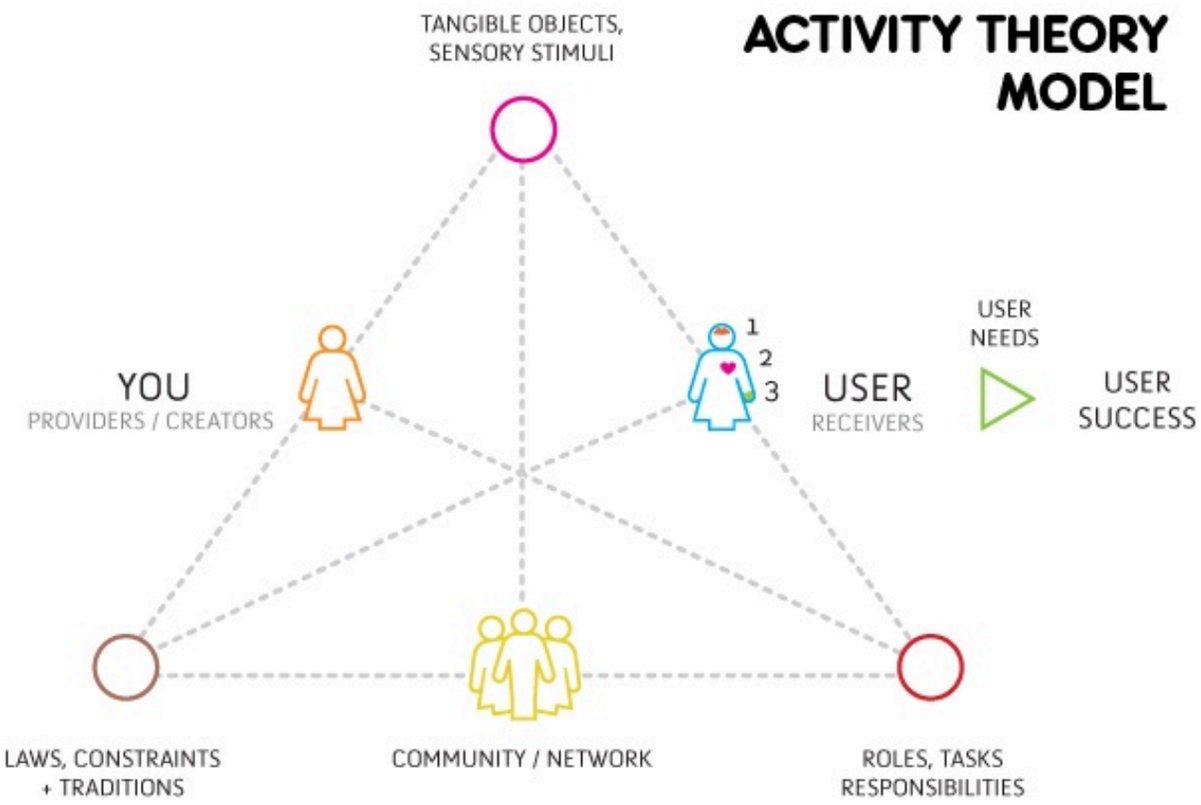
1. Internalisation over time.

2. Mediation by artefacts.

3. Hierarchy.

4. Development

Papert and constructionism, people learn through productive effort and knowledge is constructed while actions are taking place.



EMBODIMENT/HUMAN VALUES/CULTURE

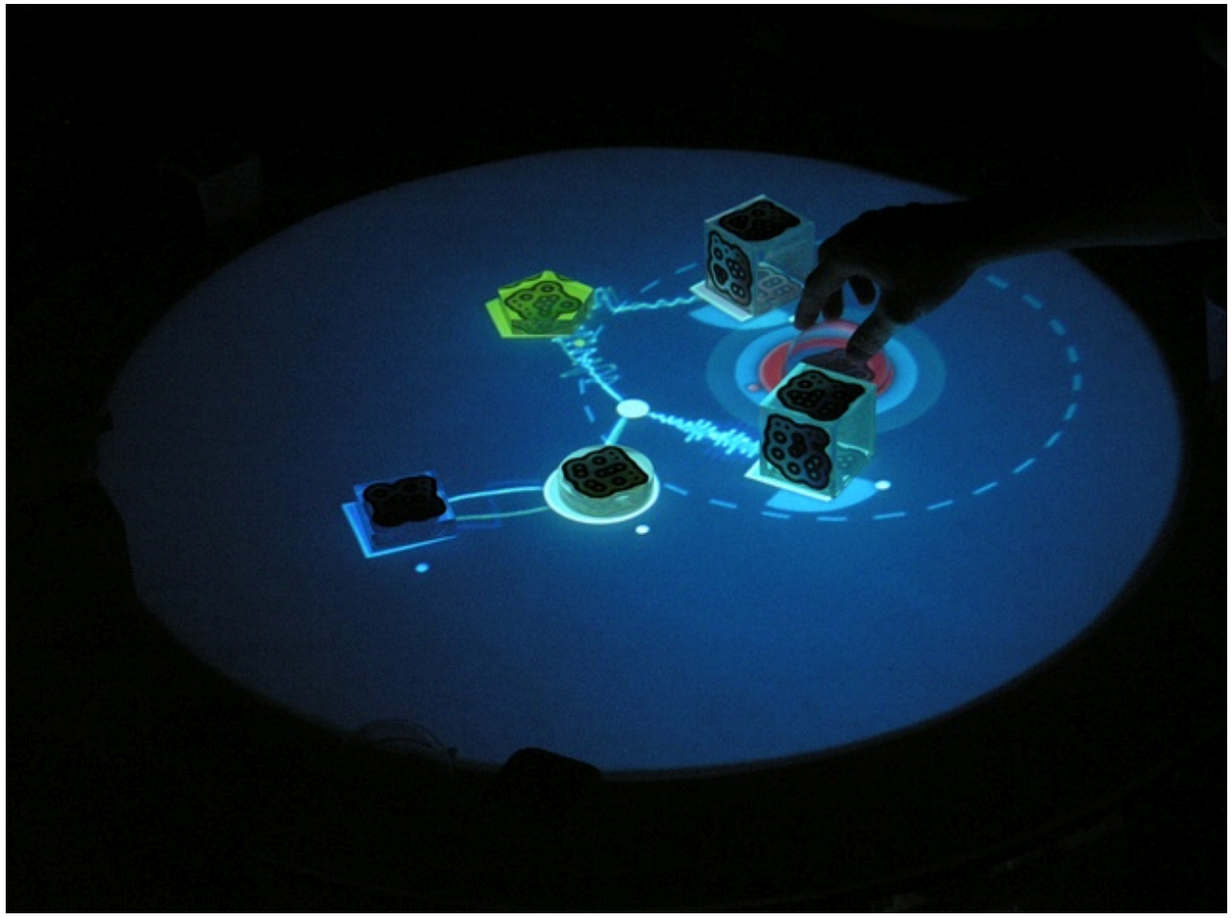
PHYSICAL
Tangible computing means using human physical abilities to interact with digital entities through tangible interfaces.

Use new metaphors, rearrange space, and reacting to physical presence. The interaction model takes account of these things.

SOCIAL
Human behaviour is also embodied in social structures.

‘Embodied interaction is based on the understanding that users create and communicate meaning through their interaction with the system and with each other, through the system’
Dourish, 2001

Connects with the phenomenological tradition in philosophy.



UBIQUITY

A move off the desktop and into the world.

Mark Weiser and *The Coming Age of Calm Technology*. Ubicomp.

Dematerialisation and what is the nature of the resulting space if objects and participants are distributed in space and time?

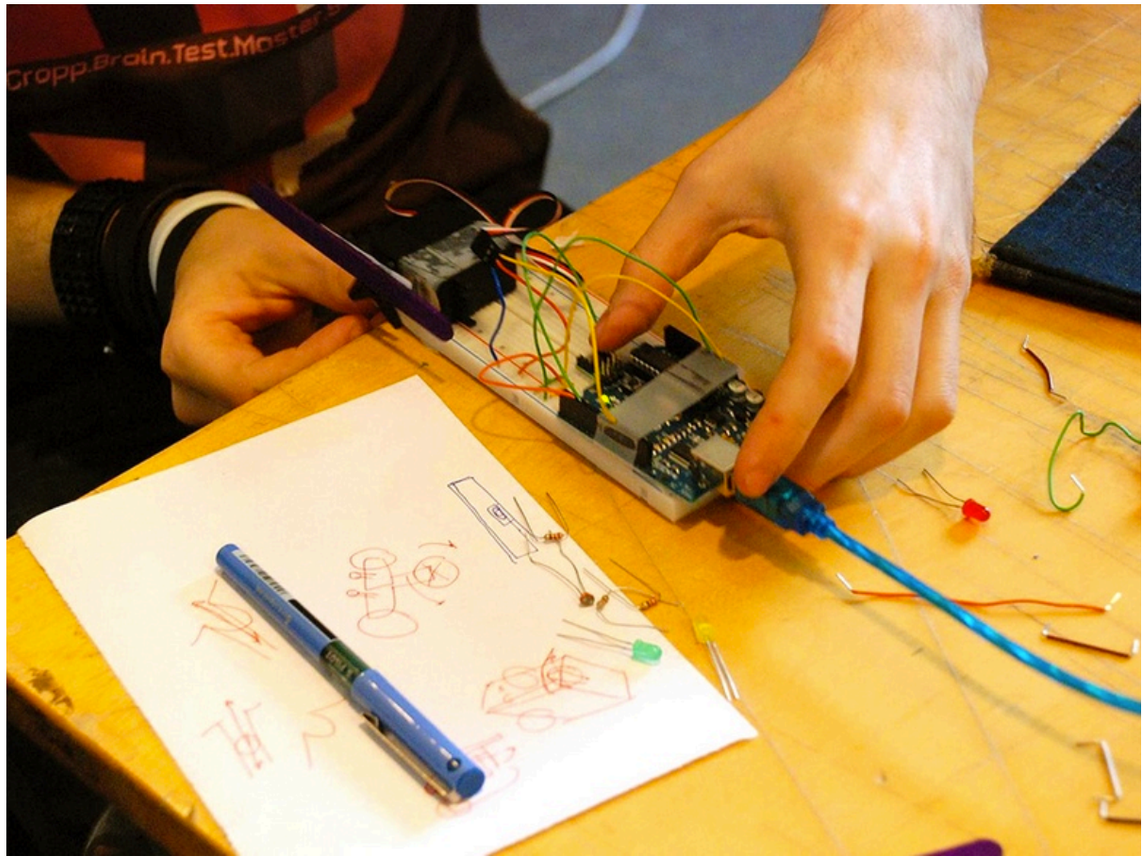
Making, hacking, tinkering and an opening of access to the means of production.

Modes of object interaction:
Physical design cues.

Iconic interaction relies on the properties of real world analogues.

Intrinsic interaction takes advantage of the intrinsic characteristics of an object.

Affordance. Things that have a repeating physical pattern afford certain actions. i.e. stacking chairs.



AFFORDANCE

Psychology

J.J. Gibson

GIbson describes affordances as ‘action possibilities’ they are often misapplied in the digital world.

Transparent windows *afford* looking through. Flat surfaces *afford* sitting, standing or placing objects.

In HCI Don Norman appropriated this term to include motivations, prior knowledge, plans, values beliefs not simply physical abilities.

In Norman’s reading objects may ‘suggest’ how they are used i.e. they fit a specific shape such as the hand or the head. Norman sees affordance therefore as relational not just intrinsic.

Movement and novelty attract attention - this is shown in cortical arousal experiments.

INTERFACE

What’s the interface in this picture?

INTERFACE

Designers limit people, change behaviour by forcing them to put key in only one way.

Interfaces work like cathedrals: unifying otherwise incomprehensible structures & ideas.

Using computer interfaces affects how we see real world, so make it meaningful.

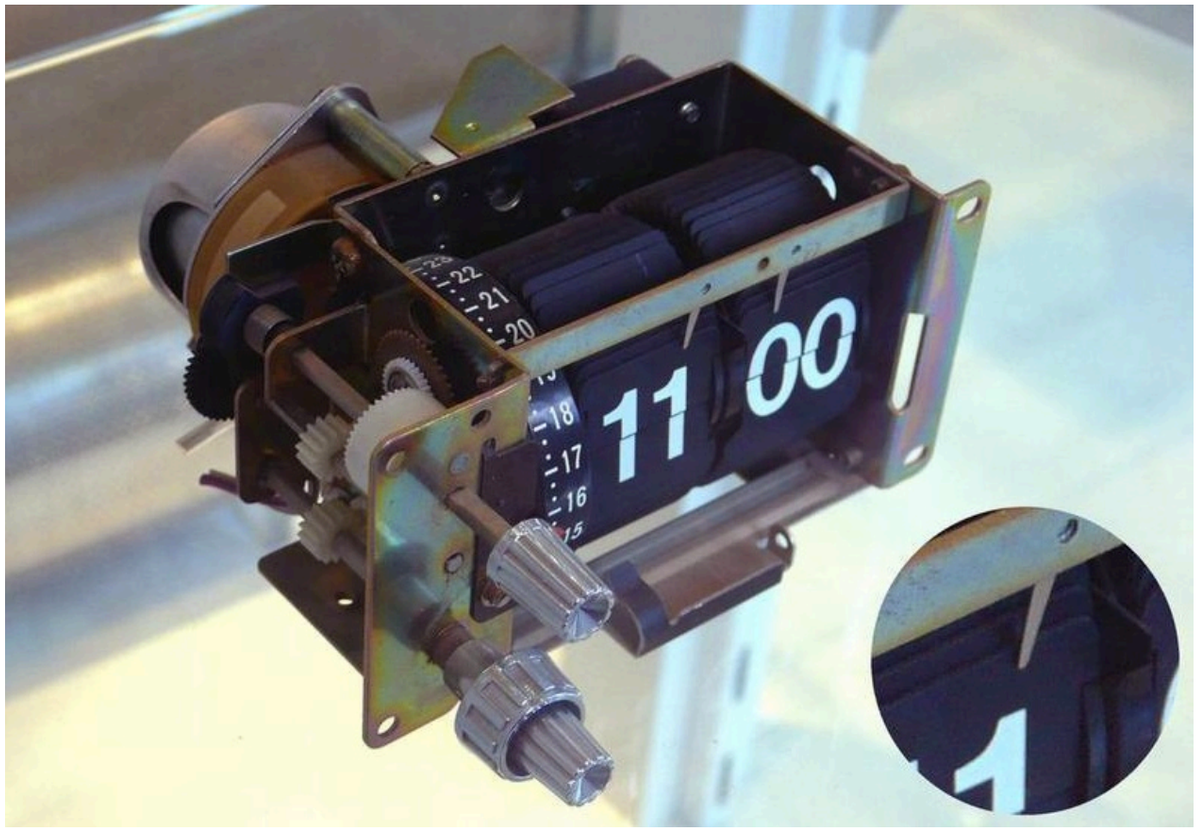
Remember Pong.

DATA MATERIALITY

Data is coming to be seen to possess material properties of its own. Code has texture which transforms as it is used, adapted, edited, improved, and shared.

‘Bits, digital ones and zeros, are not numbers or Platonic abstractions. They are physically real and subject to entropy, just like leaky plumbing. Bits are electrons moving through circuits, or photons in a fibre-optic pipe. Bits are laser burn marks in plastic, or iron filings stuck together with tape’. *Bruce Sterling, 2004*

Databases can also be described as having materiality and the historical development of the execution model and parallel processing is also the story of how data materials are structured and used.



EXPERIENCE RESOLUTION

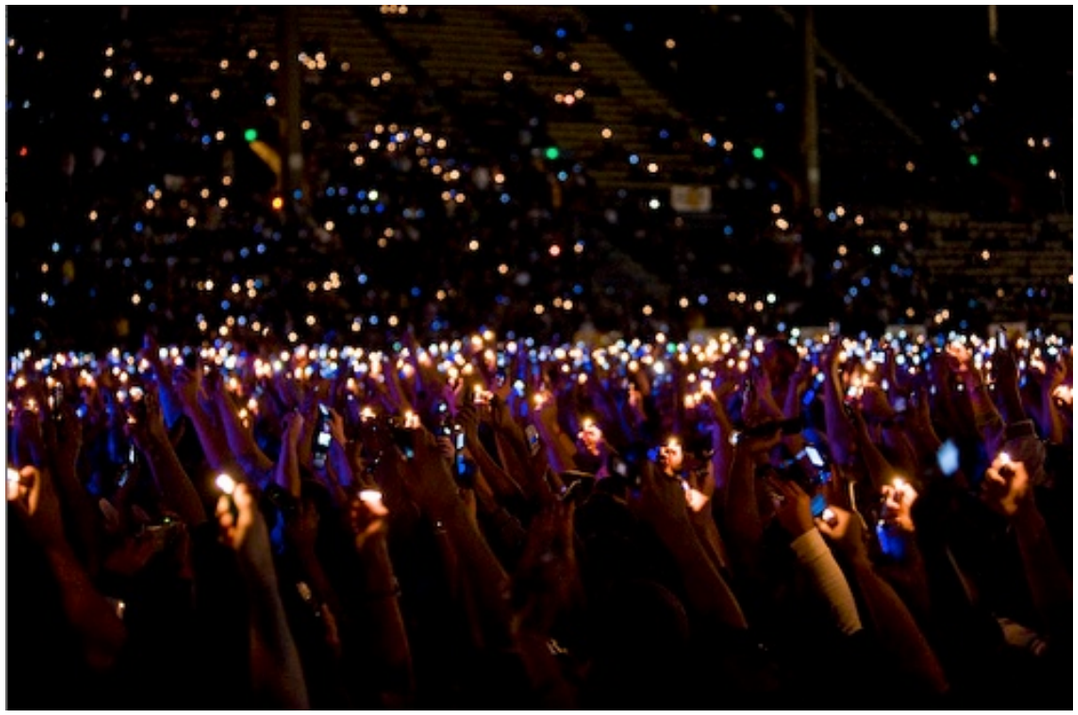
Whats the resolution of these two experiences?

In the same way a till receipt contains less resolution than a novel, so experiences can be said to feature varying degrees of resolution?

Robotic and decohered displays are ones where the interface is fragmented, distributed in space, and flexible in its resolution.

An interface spread out over 20,000 smart phones for example is high resolution experience but this resolution can be dynamically compromised at any time.

Design interfaces to operate at varying degrees of fidelity and resolution.



HCI DESIGN PRINCIPLES

1. Transparency

How is the system used? What is its perceived affordance? Is the system designed to give clues as to how it is used?

Feedback (what just happened and what does it mean?) and modalities. i.e. the tiny vibrate when an iPhone is muted

Feedforward techniques (what's going to happen if I do this?) i.e. the video scrubber on YouTube.

Progressive disclosure is all about providing just the right information for the point in the user journey. Road signs are excellent at this.

Concentrate on task not tool. Mediation versus internalisation.

HCI DESIGN PRINCIPLES

2. Perceivability

What's hidden and what left for me to discover?
This is a key principle in computer games.

How does the design allow me to perceive it's use, rules, structure, outcomes, aims?

Designing for perceivability means deciding on the level of appropriate level of transparency and on prioritising interactions so that they match user intentions and goals.

Interactions should be structured to fit overall aims of the system and people's motivations.

HCI DESIGN PRINCIPLES

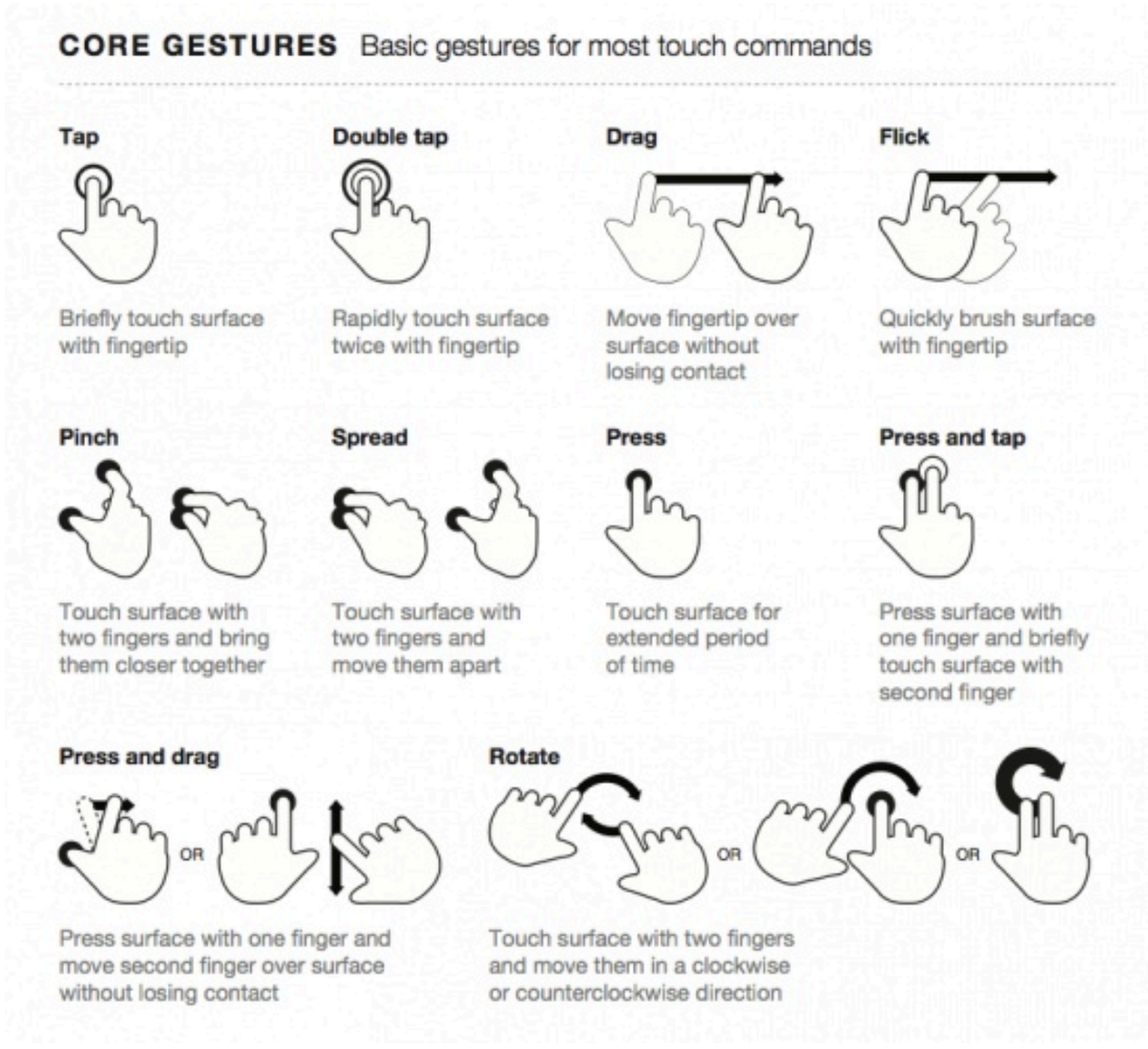
3. Learnability

How difficult is the system to use? Have you provided cues that will let me learn how to use your system? What is the shortest route to my goal? Fitt's law is relevant here.

Learnability is all about conventions and patterns. If I have to learn a new way of interacting then the system must provide me with a reward for doing so.

Well designed touch experiences do this by offering an integrated information environment where learning is kept to a minimum or is highly targeted. People are willing to lean if there is a clear benefit both in terms of social value or personal enrichment.

With new types of interfaces come new ways of interacting and new systems to learn.



HCI DESIGN PRINCIPLES

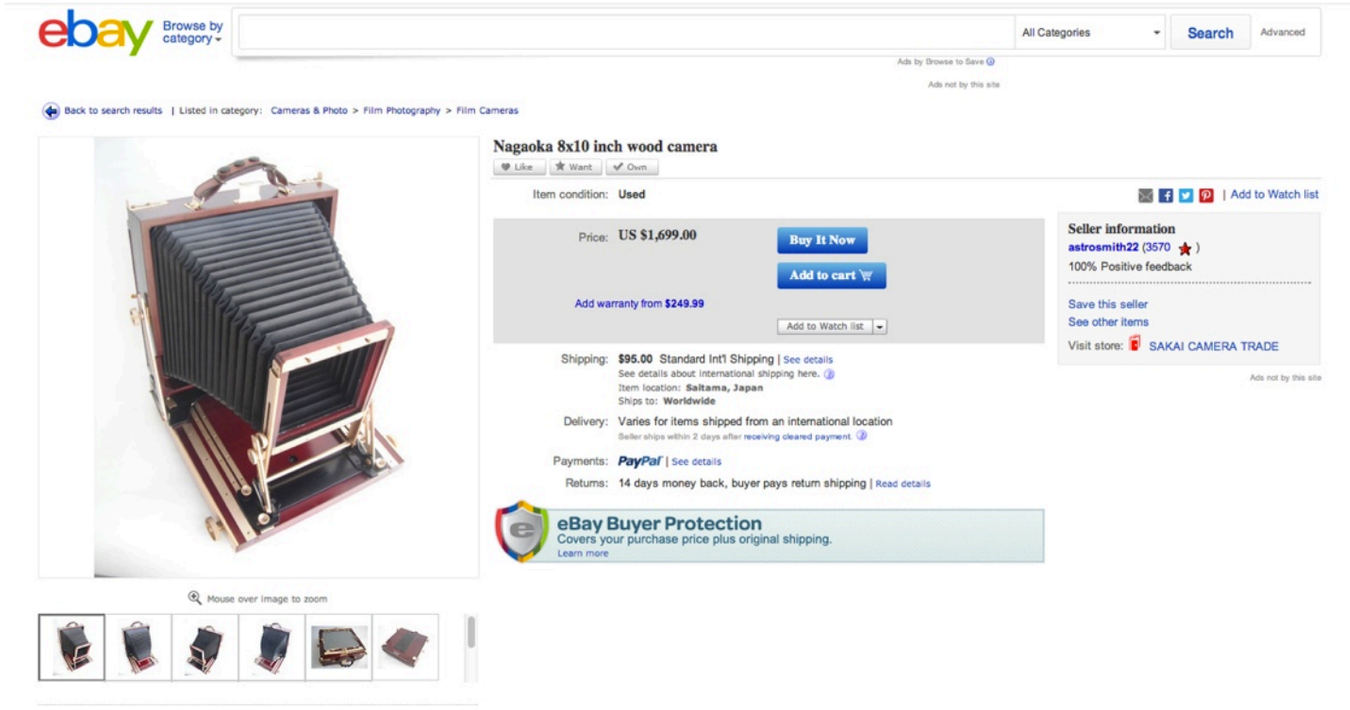
4. Predictability

What patterns are you relying on? Do you even want to be predictable? Are your patterns culturally specific?

The system should behave with at least *some* level of predictability. Whilst there is plenty of room for surprise, serendipity, and experiment, basic interactions should result in predictable outcomes i.e. provide predictable escape hatches. Retail environments are excellent at this, so are well designed mobile experiences.

If the system behaves in a predictable manner I will feel confident to explore its outer reaches, to commit to learning, and to discover the fine detail of what it does.

Predictability is a key factor in establishing trust and credibility and is closely related to consistency - things are where I expect them to be and repeated actions have similar results. Consistency of location, appearance, and behaviour are important.



COMMUNICATING IDEAS IN HCI

HCI outcomes can sometimes be abstract. The digital world can seem intangible, flat and untextured. Ways of communicating during the development process include:

Sketches
Wireframes
Storyboards
Prototypes
Use-cases
Scenarios
Functional specifications

Emerging methods include:

Bodystorming
Informance
Hackathons
Videos
Full scale environments

WHAT'S INTERACTION AGAIN?

1. Polite conversation
is listening, responding, thinking

2. Polite computing
input, processing, output

3. Interaction
people not computers. Human scales and speeds

4. When to listen/process/express?
The rhythm of interactions and their texture

5. Concentration versus mindfulness
How much energy is required?