Interaktionsdesign
E2008

Lektion 19

Mening i brug - fænomenologi

Indhold

- Social & tangible computing – embodied interaction
- Embodiment og fænomenologi
- En begrebsoversigt i det filosofiske landskab
- Nogle hovedpersoner omkring fænomenologien
- Foundations: interaktiondesigns videnskabsteori …
- Meaning
  - ontology
  - intersubjectivity
  - intentionality
- Coupling

- Refleksionsrapport – indhold / krav
- Eksamen – praktisk / gode råd
- Spørgetime, kage og oprydning designlab: fredag 19/12 kl 10

- Prototyper til præsentation, evt video
- Invitationer skal ud i dag!
- Kursusevaluering
- Onsdag næste uge:
  Selvlæs Test/evaluering (Sharp kap 12-15)
  -> Tomas: Designing for inclusive interaction
- Vejledning 3, 5, 10/12

Læringsmål

- At forstå den filosofiske/teoretiske grund for Dourish's nøglebegreb 'embodied interaction' med særlig vægt på fænomenologien
- At forstå begreberne 'meaning' og 'coupling' i relation til 'embodied interaction'

‘Being-in-the-world’: Embodied interaction

- A common theme for social and tangible computing
- Understand the relationship by finding the human skills and abilities– the ‘familiarity’ – they exploit
- Both based on our direct participation in the world
  - a world of physical and social reality
  - our experience is physical as well as social
  - unfolding in time and space
- Focusing on context
  - settings in which action unfolds
  - how action is related to those settings
- Not only ‘familiarity’ – but based on same idea – embodiment: *the common way in which we encounter physical and social reality in the everyday world*

Embodiment: initial definitions

- Embodiment 1:
  Embodiment means possessing and acting through a physical manifestation in the world
- Embodiment 2:
  Embodied phenomena are those that by their very nature occur in real time and real space

Embodiment

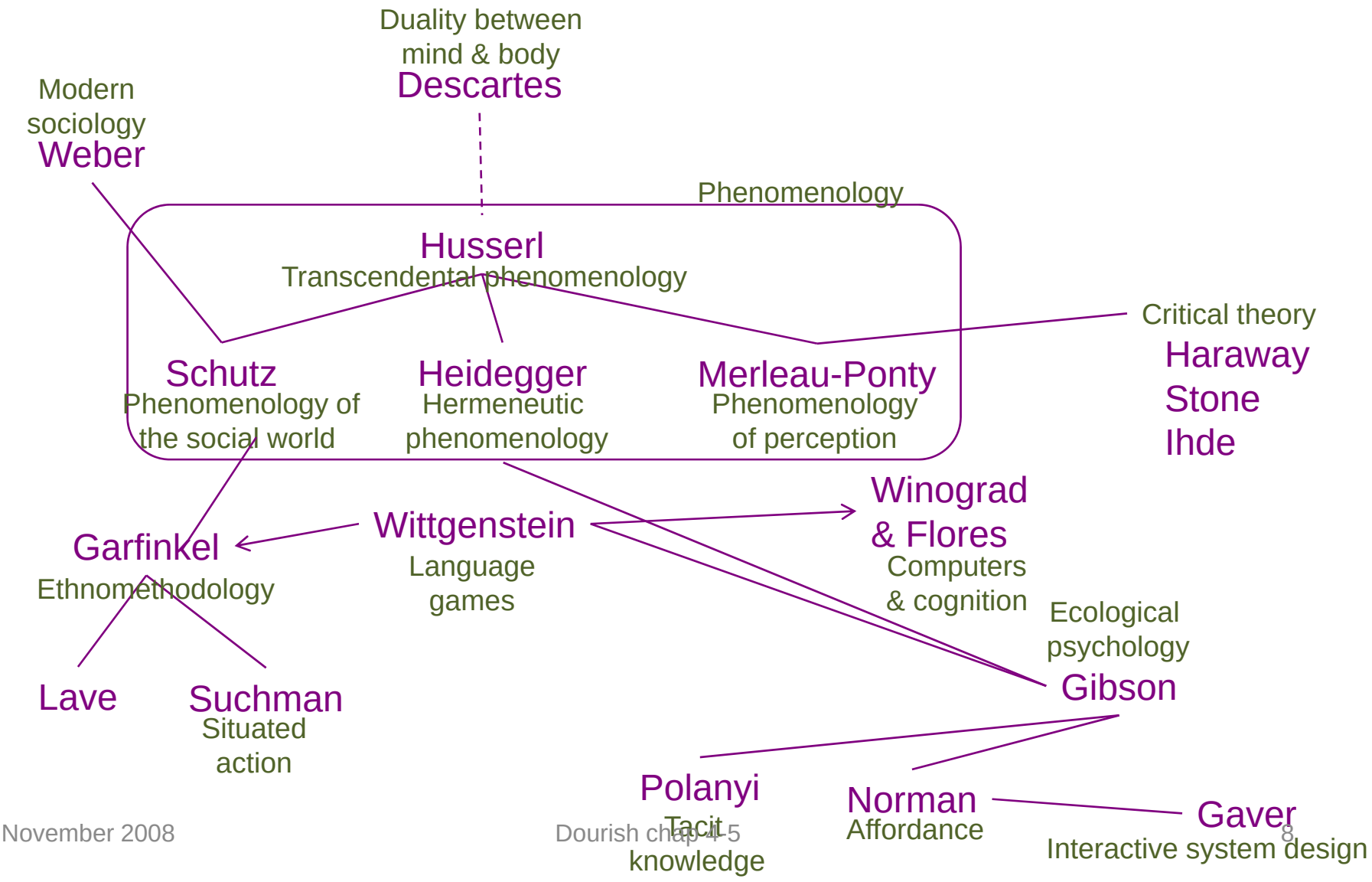
- Embodiment in physical computing
- Embodiment in social computing
- Embodiment is…
  - the nexus of presence and practice
  - a feature of engaged participation with the world
  - a pre-ontological (nature of being and categories of existence) apprehension of the world
- Making computation fit more naturally with the everyday world
- Move computation out of the world of abstract cognitive processes

Embodiment & Phenomenology

- Phenomenology
  - study of the phenomena of experience
- Edmund Husserl
- Martin Heidegger
- Alfred Schutz
- Merleau-Ponty

- Action and interaction prior to “theory” and abstract understanding

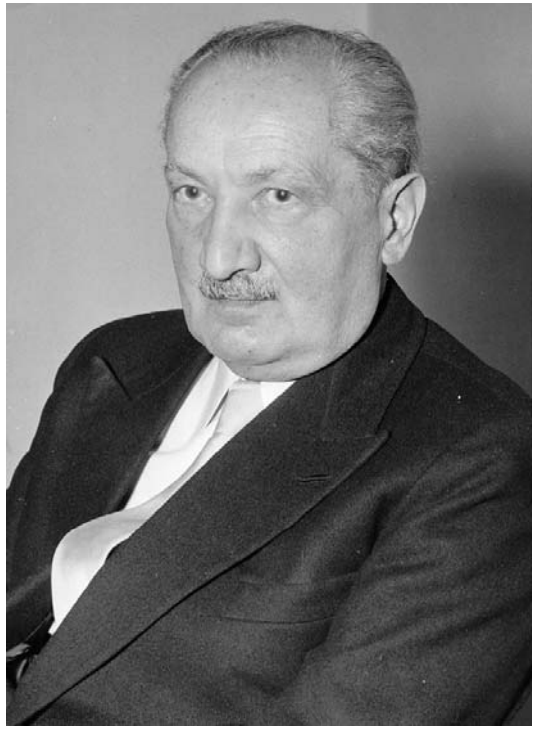
Philosophical foundation of embodied interaction



Husserl (1859-1938)
Transcendental Fænomenologi

- The crisis of Galilean science
- A philosophy of experience
  - turning towards “the things themselves”
  - experience rather than abstraction
  - Rejection of formalized and abstract reasoning
- The structure of intentionality and the life-world
  - external and internal phenomena
  - how are meaning, memory and cognition manifest as elements of our experience?

Heidegger (1889-1976)
Hermeneutisk fænomenologi



- Rejected Husserl's cartesianism
  - Husserl retained a separation between inner mental life and the outside world
- Dasein
  - being-in-the-world
  - the nature of human experience is based in engaged participation in the world
  - theory no longer prior to practice
- Ready-to-hand (zuhanden) ('tool as extension of the body')
- Present-at-hand (vorhanden) ('tool as tool')
  - Examples: mouse, hammer

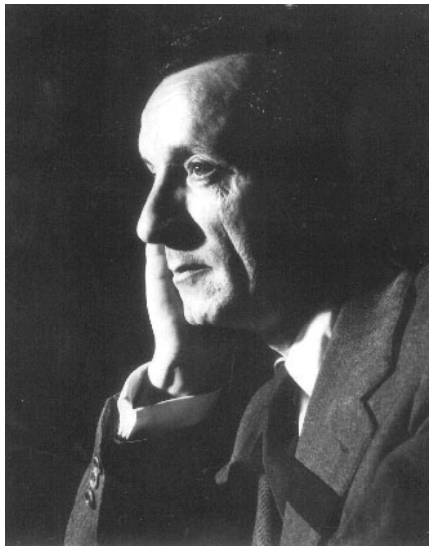
Schutz (1899-1959)

Phenomenology of the Social World

- The lived world is shared - *lebenswelt*
  - social conduct arises within the frame of everyday reality
  - inspired by / criticism of Max Weber
- The problem of intersubjectivity
  - sociology traditionally (Max Weber) places orderly nature of social interaction outside the interaction itself
  - phenomenology argues it is to be found inside, in the lived experience of social action
  - *social order* is mutually constituted by its members
  - inspired Garfinkel's development of ethnomethodology

Merleau-Ponty (1908-1961)

Phenomenology of perception



- Most central for embodiment
- Mediating between Husserl (perception) and Heidegger (being)
- The body as mediating between internal and external experience
- The role of the body in perception
- Three meanings of embodiment that contribute to and condition the actions of the individual
  - Physical embodiment (human subject with arms, legs etc)
  - Set of bodily skills and situational responses that we have developed
  - Cultural “skills”, abilities, and understandings that we gain from the cultural world in which we are embedded

- Critical theory and embodiment (concern with the body and relationship between self and technology)
  - Haraway (cyborgs)
  - Stone (virtual presence)
  - Ihde (mediating role of technology)

Other theorists: Being in …

- the physical world
  - Gibson
  - Norman
  - Polanyi
  - Gaver
  - Winograd & Flores
- the social world
  - Suchman
  - Lave

Gibson

- Psychologist
- Frustrated about separation of seeing from acting
- “Ecological psychology”: knowledge in the world rather than knowledge in the head
- Affordance (brought into design by Norman)
- Three-way relationship between environment, organism, activity

- Polanyi
  - Tacit knowledge, embodied skills
  - Implicit way of knowing vs explicit forms of knowledge characteristic of science
  - Practical reflexivity vs reflexive consciousness (OFK & LM)
  - Not all know-how can be verbalized
  - Examples:
    - Meteorologists
    - Paper pulp factory
    - Faces

Norman & Gaver

- Norman: Affordance (inspired by Gibson)
- Physical design and computer interfaces
- Affordance as an “opportunity for action”

- Gaver: ecological approach (Gibson) and affordances: a new model for interaction design
- Re-designed video-communication systems (the Virtual Window)

Suchman

- Being in the social world
- The directness of embodiment is also crucial in the social world
- Situated Action: moment-by-moment response to immediate needs and settings
- Social order
- The organization of action emerges within the frame of action itself
- Inspired by Garfinkel (ethnomethodology, who in turn is inspired by Schutz … and Wittgenstein's language philosophy)
- Link between HCI and sociology
- Also Lave and Lave & Wenger

Wittgenstein (1889-1951)

Meaning of language

- Career phases
  - early work on mathematical logic (1921)
  - later work on language philosophy (1953)
- From truth conditions to adequacy conditions - appropriateness
  - relationship between meaning and practice
  - language-games
  - “the meaning of a word is its use in the language”
  - language and meaning is inseparable from the practices of language users

- Winograd & Flores inspired by Wittgenstein (cognition, language and computers)

Two elaborate definitions

- Embodiment 1:
  Embodiment means possessing and acting through a physical manifestation in the world.

- Embodiment 2:
  Embodied phenomena are those that by their very occur in real time and real space

- Embodiment 3:
  Embodiment is the property of our engagement with the world that allows us to make it meaningful

- Embodiment 4:
  Embodied Interaction is the creation, manipulation, and sharing of meaning through engaged interaction with artifacts.

Relating Meaning and Action

- The Cartesian view
  - actions are meaningful because we observe and give them meaning
  - action arises from meaning
    - the expression of internal mental states

Relating Meaning and Action

- The Phenomenological view
  - we act in a world that is already has meaning
    - meaning in *my relation* to the world
    - meaning that reflects social practice and history
  - meaning arises from action
    - the way I encounter the world gives it meaning for me
    - the way I act in the world reflects different meanings
    - experience and interaction come before meaning

Relating Meaning and Action

- Meaning as a focus for embodiment
  - embodiment focuses on participation & action
- New questions for tangible & social computing
  - how do artifacts reflect and convey meaning?
  - how do people create and communicate meaning?
  - how does meaning arise in interaction?

Refleksion Dourish kap 4

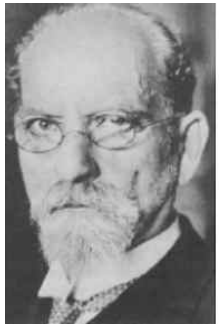
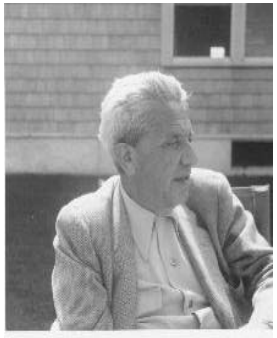
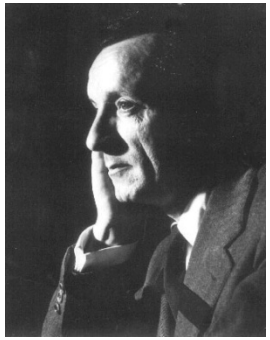
Refleksioner

1. Relater nogle af egenskaberne ved jeres design (socialt såvel som fysisk) til embodiment-begrebet
2. Hvilken / hvilke af de omtalte filosofier eller teorier synes I har størst betydning for jeres måde at tænke interaktionsdesign på?
   - I gruppen / for jeres fælles design
   - Individuelt

Dourish kap. 5: Foundations

- Mening: tre aspekter
  - ontologi
  - intersubjektivitet
  - intentionalitet
- Kobling
  - kobling - og metaforer
- Embodiment og teknologisk praksis
  - embodiment in the Media Space (RAVE)
  - embodiment and tangible applications

Resume af kapitel 4

Descartes	Husserl	Heidegger	Schutz	Merleau-Ponty
				
Adskille krop og sind Reason Abstrakt	Lebenswelt: dagligdags erfaringer Mentale≠ fysiske	Væren Dasein Ikke tænkning Verden består af mening	Flere personer Det sociale	Kroppens rolle i perception

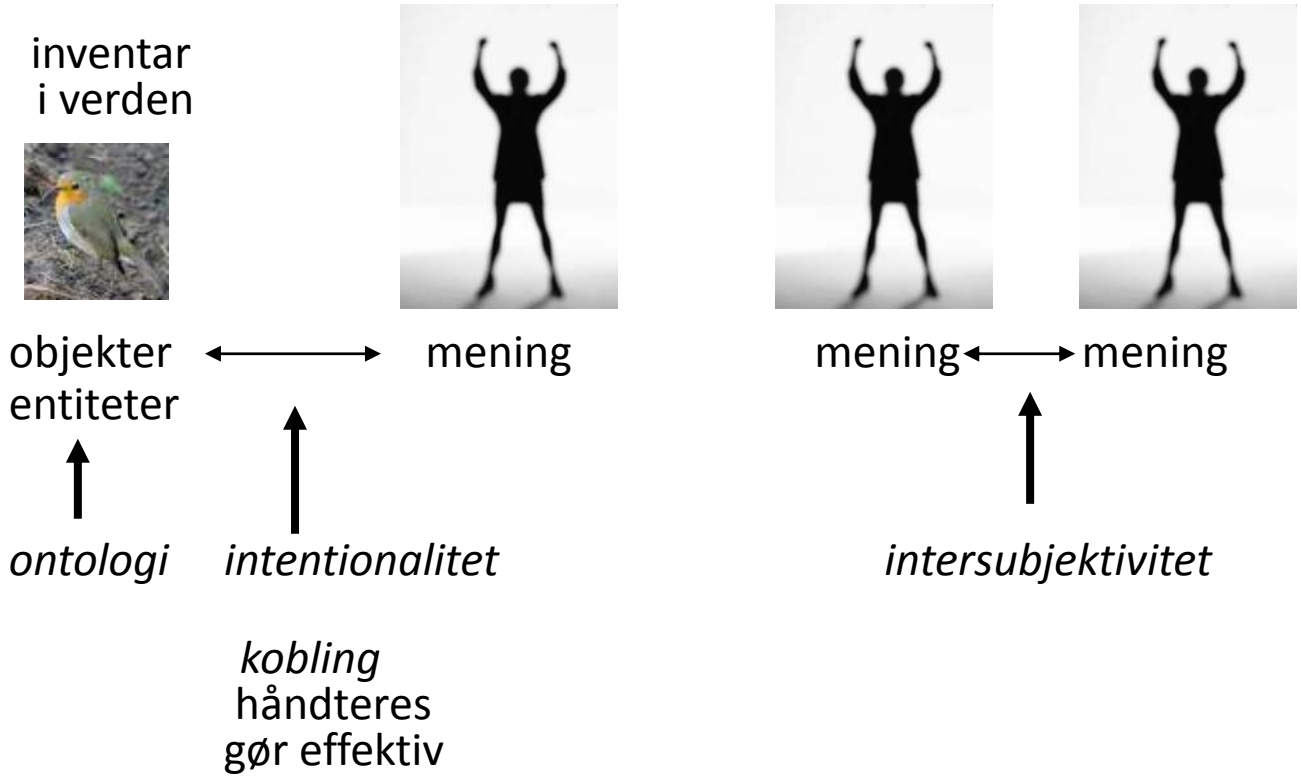
"The backdrop is now complete" (127)

- Ch. 2: *Tangible computing* encourages users to explore, adopt, and adapt interactive technology, incorporating it into their world and into everyday practice.
- Ch 3: *Social computing* recognizes that meaning that users create through the ways in which they interact with technology and with each other
- Ch. 4: "Being in the World: Embodied Interaction":
  - embodiment is a central aspect of social and tangible computing
  - the relationship between embodiment and meaning in a phenomenological perspective:
    we encounter, interpret, and sustain meaning through our embodied interactions with the world and with each other
- Now time to develop a deeper understanding of the themes that have emerged so far and to consider their consequences for the *design* of interactive systems

Overview of chap 5

- The questions to be asked
  - How does embodied interaction *come about*?
  - How do we go about *designing* systems for embodied interaction?
- Answering these questions require a deeper understanding of the foundation of embodied interaction - the topic of ch. 5.
- The chapter has two goals:
  - Open up the notion of embodiment and explore the ideas that it brings together - in particular the question of "*meaning*".
    What aspects of *meaning* are important and how are they conveyed through embodied interaction?
  - Begin to relate these topics to *design* - we need to understand how current approaches to software and interactive system design constrain and enable aspects of embodied interaction

Begrebsoversigt - mening



Ontology (129)

- Concerned with the existence of objects and entities
- "Furniture of the world"
- How the world can be separated into a collection of entities whose meanings can be established, separated, and identified, and how those entities can be related to each other
- How my world can be populated with entities such as computers, deadlines, chairs, political convictions - that play no part in the world of grasshoppers
- In particular, ontology addresses the question of
  - how we can individuate the world or distinguish between one entity or another
  - how we can understand the relationships between different entities or classes of entities

Ontology (129)

- Ontology is an aspect of meaning in the sense that it provides the *structure* from which meaning can be constructed
- Heidegger
  - Our understanding of the world around us arises from the interactions in which we engage with it
  - ontology arises from a state of awareness in which we can reassess our relationship to the obejcts in the world

Ontology - problemer (130)

- Ontological problems manifest themselves in software design in how they "line up" with the elements of the real world to which they refer
- Tech side: internal representational side of software
  - database structures, object-oriented analysis,
  - ER - entity-relation diagrams
- Both the technical and the users' model
- Is it possible to *design* the ontology deliberately?
  - Emergent - arises out of participative practice
  - A design may *reflect* a particular set of ontological commitments on the part of a designer, but it cannot *provide* an ontology for a user

Ontology - problemer (130)

- Designing *the* ontology
- Only one ontology at play?
- Designer and user share the same ontological model?
- If ontology is a consequence of interaction, then the different modes of interaction and practices of different groups of people will result in different ways of understanding the domain

- Ontology - hvad er det egentlig ?
- Ligner det noget andet - andre termer - andre tilgange ?
- Kan vi bruge personas til at repræsentere ontologier?

Intersubjectivity (131)

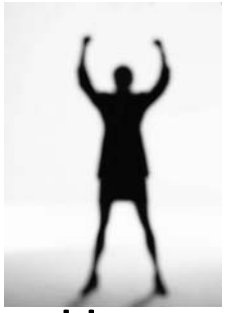
- About how meaning can be shared
- Problem of intersubjectivity: how two people can come to share an understanding about the world and about each other despite the fact that they have no immediate access to each other's mental states.
- Schutz & Garfinkel - Herbert Clark (1996):
  studies of conversations - notion of "common ground"
  - a set of commonly held and mutually established facts that provide the background necessary for interpreting and understanding utterances.

Intersubjectivity in Interaction Design (132)

- Designer-user communication
  - system as medium through which a designer and user communicate
  - making a system usable: not simply making it appropriate to a particular form of use, but also making sure that the system adequately and appropriately reveals the purposes for which it was designed and the ways in which the designer intended it to be used.
  - unfolds in use


Designer


User


User

Intersubjectivity in Interaction Design (133)

- Communication between users - through the system
  - Not through communication systems such as email ....
  - but the way that people develop and communicate shared ways of using software systems and ways of doing their work with software
  - systems come to be *apprioriated* by their users and are put to work within particular patterns of practice.
  - Organizational studies:
- Features offered - functionality tells only a small part of the story
- Important
  - Not just what it can do *(functionality),* but what it *really* does for people
  - decisions re. use, expectations, information contained
  - what they know other people do with the systems ...
  - Eksempler ....?

Intersubjectivity in Interaction Design (134)

- Organizational studies
- People communicate *through* the document collection and develop ways of using it as a part of their work
- They appropriate the technology in the creation of working practices, so that they evolve around each other
- The studies exhbit the common property that the information in the system makes sense only in the context of a set of common practices by which people can select, interpret, understand, and put the information to use in the course of their work

- Hvad har Dourish egentlig sagt om intersubjektivitet ?

Intentionality (134-5)

- Intentionality is the term philosophers use to refer to the "directedness" of meaning
- Intentionality proposes *meaning* as a relationship between some entity (thought, utterance) and some other entity (its meaning)
- Dourish's editor at MIT Press -> Bob: bearded man
- When we say that the word *tree* means an example of that class of plants with woody bark - then we imply there is an intentional reference *"directed"* from the word to the concept "tree"
- Thoughts, memories, and imaginings, then, are intentional acts

Intentionality - Brentano (136)

- Franz Brentano, Tyskland, 1838 - 1917
- Husserl studied under Brentano
- Brentano: Intentionality was the *"mark of the mental"* - it distinguished conscious thought from the merely physical or mechanical operation of the world
- If intentionality is a purely mental phenomenon, then how can things be invested with social meaning?
- Can only mental phenomena be intentional?
- Given that mental phenomena are irremediably private, how could there be any shared meaning?
- Solution: *original* intentionality and *derived* intentionality

Intentionality (136)

- *Original* intentionality
  - intentional phenomena occurring in conscious creatures like ourselves who have the power to create intentional references - to mean things
- *Derived* intentionality
  - comes around only through the interpretations performed by others
- The intentionality of language is derived from the original intentionality of our mental lives

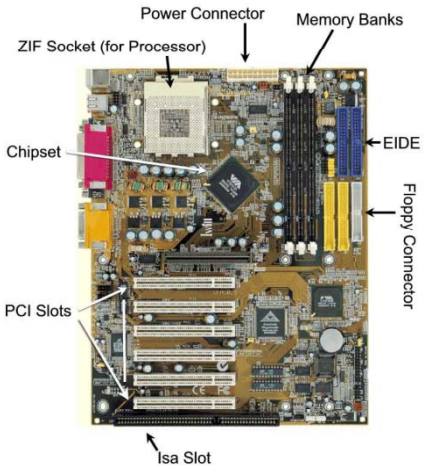
- Dennett - all intentionality is derived ...

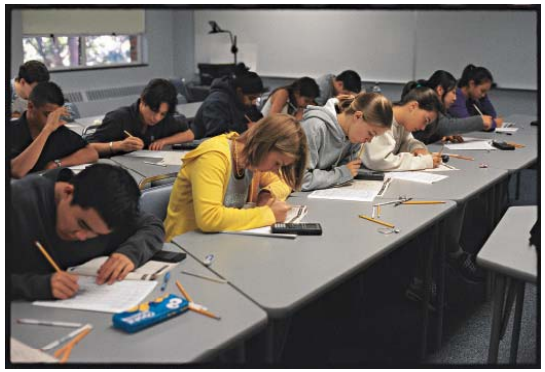
- How is it, then, that intentionality is relevant here?
- Where does it feature in an embodied model of interaction?

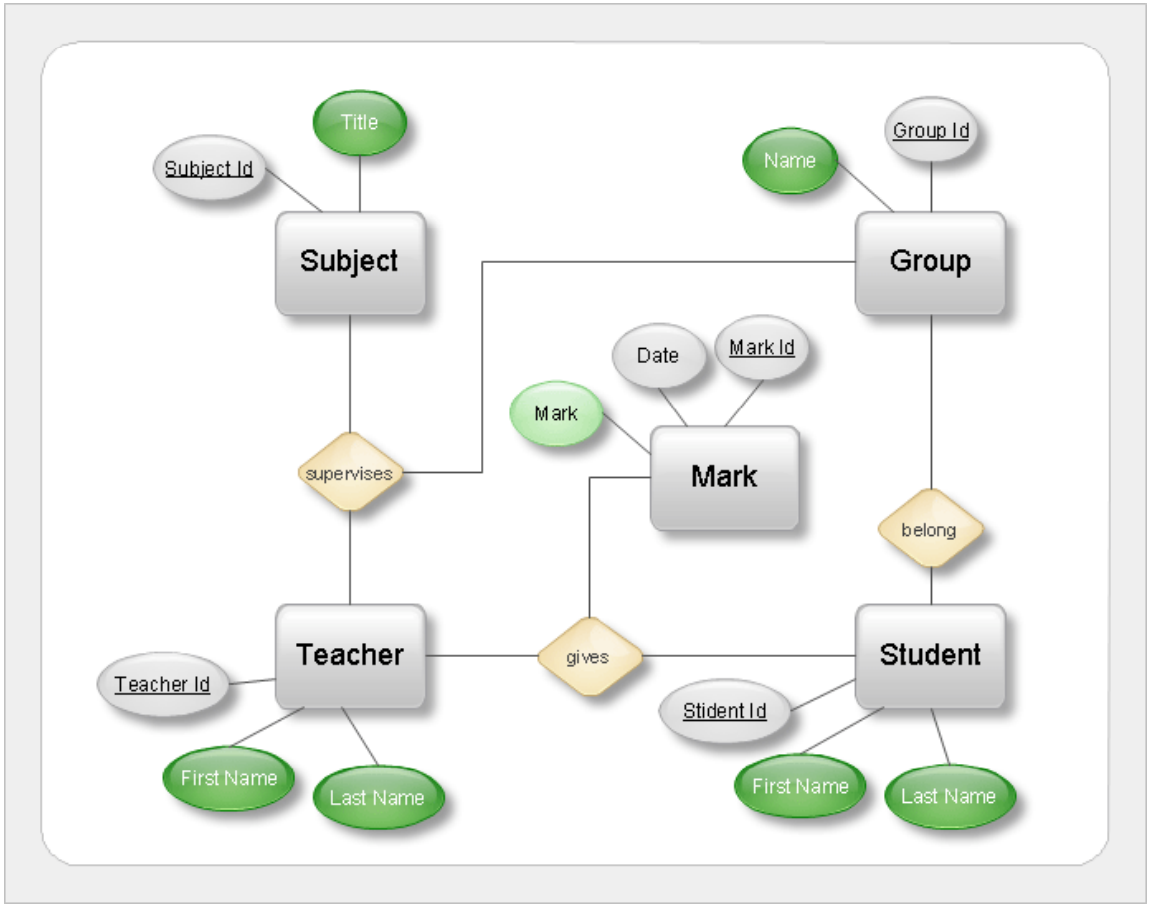
Intentionality in Interaction Design (137)

- Intentionality is central to any understanding of embodied interaction - the reason lies in an understanding of computation itself
- Computation is fundamentally about *representation*
- Dual nature of elements in software
  1. an abstraction created out of the electronic phenomena
  2. represents some entity: physical, social, conceptual
- In other words:
  - computation is an *intentional* phenomenon
  - what matters is that it refers to things
- So interaction with those computational elements also carries with it intentional connotations

Representation







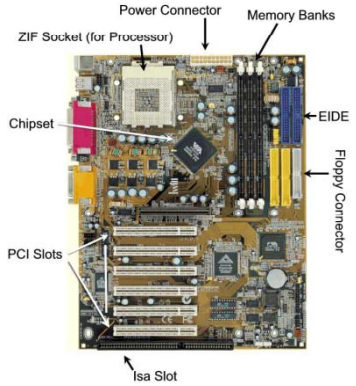
Intentionality in Interaction Design (137)

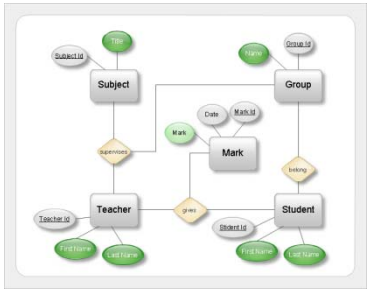
- If the key feature of the computational system is that it refers to elements in the world of human experience, then the key feature of interaction is how we *act through* it to achieve effects in the world
- Click on buying button
  - update a database record
    not important
  - Important
    delivered a few days later

- We act *through* the computer system
- Embodied interaction places particular emphasis on interaction as *activity in the world*.
- Phenomenology argues that action and meaning are inseparable

Coupling (138)

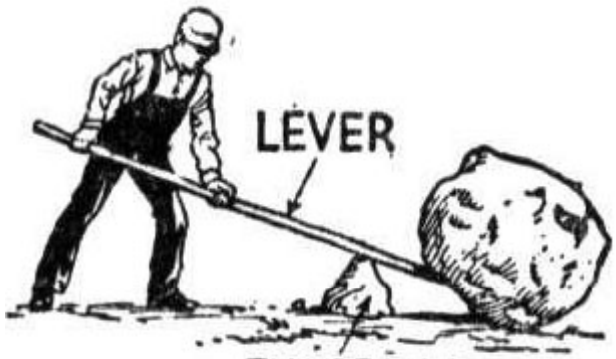
- Ontology, intersubjectivity, and intentionality each describe a different aspect of meaning, and so reveal different ways in which the representations that computer systems manipulate are *related* to the world and *related* to each other.





Coupling (138)

- Meaning: intentionality is a central component
- The relevance of intentionality is that it provides us with a route to understanding how the elements of an interactive system can take on meaning for users in the course of interactivity
- Conceptually, intentionality sets up a relationship between embodied interaction and meaning.
- **Coupling is how an intentional reference is made *effective***
- By coupling, I mean the way that we can build up and break down relation-ships between entities, putting them together or taking them apart for the purpose of incorporating them into our action.



Man lifting a stone with a lever

Coupling: Example the hammer (138)

- Heidegger: ready-to-hand (zuhanden) vs. present-at-hand (vorhanden)
- The essence: the way in which the hammer moves between
  - ready-to-hand: hammering, "invisible" extension of my arm
    arm and hammer: a single unit, *they are coupled*
  - present-at-hand: separate, object of attention
- Continual proces of engagement, separation, re-engagement
  - I need to use the hammer
  - pick it up and orient it correctly
  - use it - adjust it
  - put it down
  - turn it round and use claw on reverse side
- Alternate between disappearance and focal point
- Being able to disengage and re-engage in different ways, that is, being able to control coupling, makes our use of equipment effective

Coupling (139)

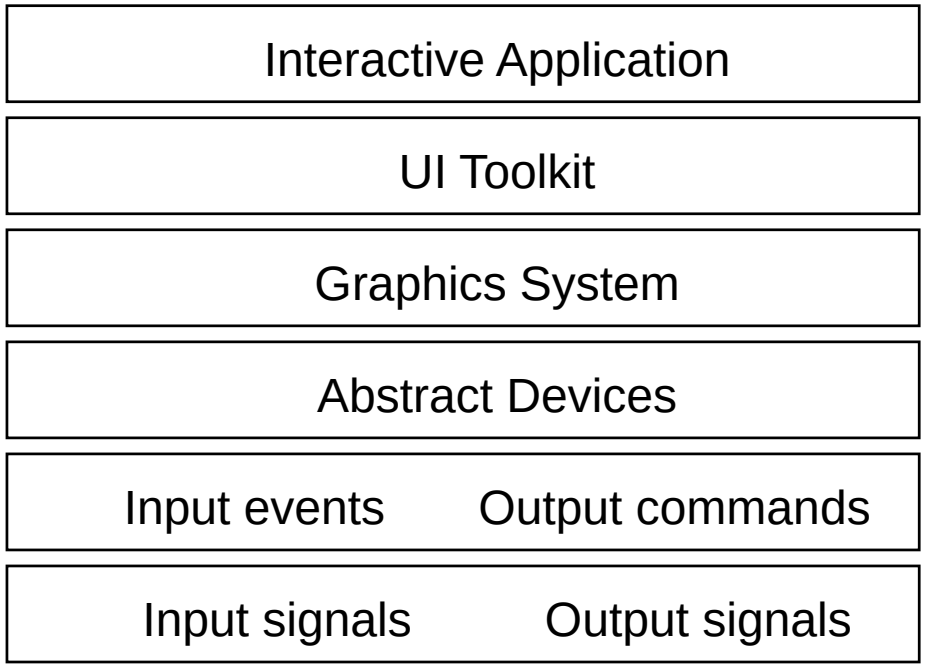
- The hammer: two states - but the truth is more complex
- In computer tools, not just physical objects, but software abstractions too
- Many abstract entities in operation at any given moment
- Abstractions can be
  - layered on top of each other
  - embedded within each other
  - joined together in lists
  - operate on each other's behalf
- Abstractions operate at different levels - hence
  there are vey many different levels of description that could be used to describe my activity at any given moment
  - I move the mouse
  - I look at the cursor
  - I focus on the content of the mail

Coupling: Abstraction and implementation (140)

- We work with abstractions, by rely on implementations to make them real.
- However, by focusing on abstraction, we often ignore the practical consequences of implementation
- This dual nature gives computers their power
  - abstractions make computer systems manageable
  - implementation makes them tools that actually gets things done
- Both aspects are critical
- Just as in the physical world I need to be able to coordinate my action with the hammer, so, too, when I approach a computational system, I need to find a level at which to address it that meets the particular task I need to get done.
- Finding the right level means finding a combination of abstraction and implementation to fit the moment

Coupling (141)

- Traditional layered decomposition of an interactive system



Coupling (142)

- If we took this model at face value, then we might conclude that the question of coupling is simply to decide which layer your are focusing on at any moment: application, keyboard, ...
- However, this would imply that the layered model is a model of software *and* a model of the user's activity - this is not the case
- The models arose as useful tools for tackling technical problems
- They are not models of user concerns

Coupling (142)

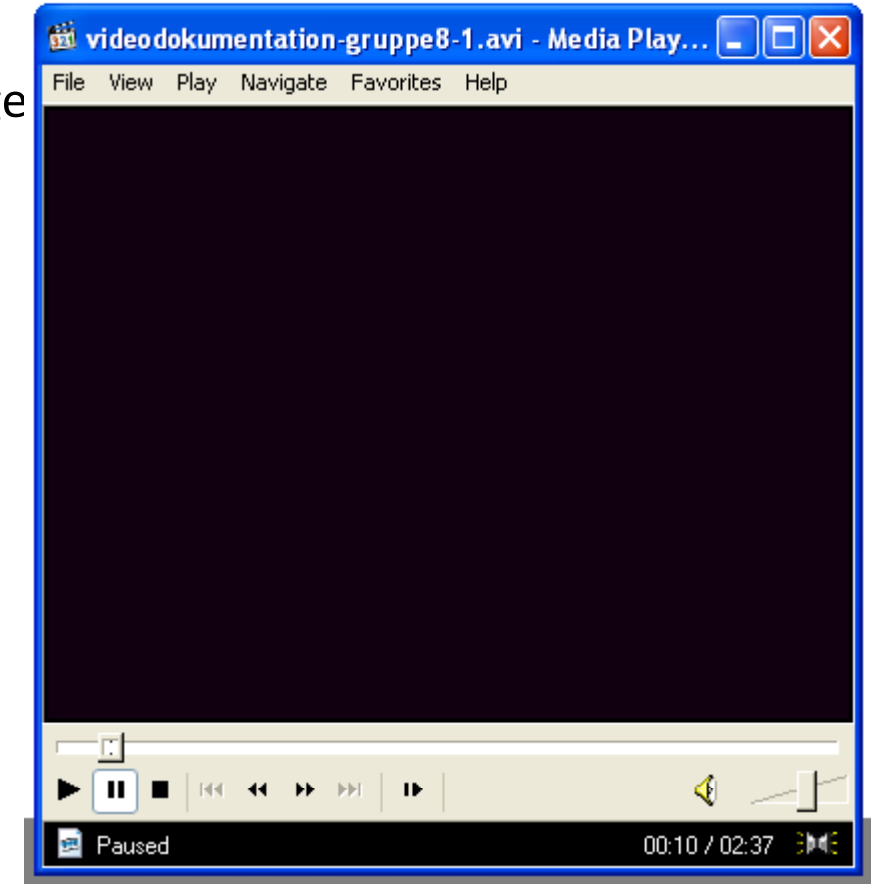
- So coupling in interactive systems is not simply a matter of mapping a user's immediate concerns to the appropriate level of technical description.
- Coupling is a more complex phenomenon through which, first, users can select from out of the variety of effective entities offered to them, the ones that are relevant to their immediate activity, and, second, can put those together in order to affect action.
- Coupling allows us to revise and reconfigure our relationship toward the world in use, turning it into a set of tools to accomplish different tasks.

Coupling and metaphor (142)

- One of the best developed uses of coupling in interfaces does not concern the abstractions in terms of which interactive software is constructed, but rather the abstractions in terms of which the user experience is design-user metaphors.
- User interfaces are suffused with metaphors - the "desktop" metaphors and its relatives are the ones that jump most immediately to mind
- But even outside of these we find: "buttons", "pages", "dialogs", "files", "menus", "dragging and dropping", "cut and paste" ..

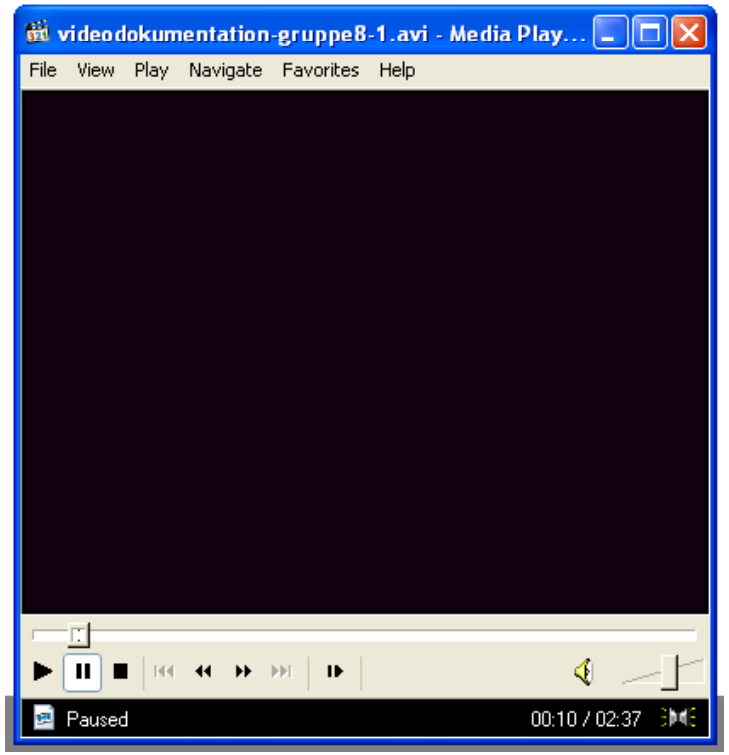
Coupling and metaphor (143)

- VCR metaphor
- The key to metaphors is the ability to manage the relationship between
  - the metaphorical vehicle; "file", "button"
  - the referent: an actual set of bits or a function activation
- The value of the metaphor is in suggesting some action - but the action is carried out on the referent, not the vehicle
- Difference between capabilities of vehicle and referent
  - indexing computer files vs. paper files
  - user interface buttons can be moved around and renamed vs. microwave oven
  - empty trashcan on desktop: really disappear, not being moved



Summary (144)

- Intentionality concerns the relationship between what is done and what is meant
- Coupling is concerned with how that relationship is maintained



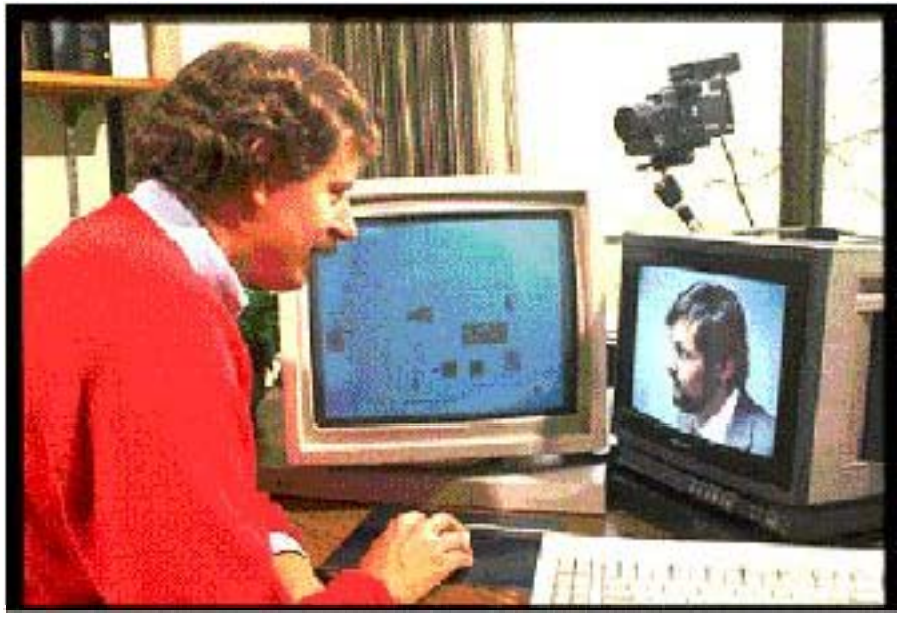
Examples: Embodiment and Technological Practice (144)

- Use the idea of embodied interaction in two ways
- Ch. 6: basis for an approach to design
  - embodied interaction is not a specific form of technological design
  - it is a stance we can take on the design of interactive systems
- The second way to use the idea of embodied interaction is as a way of uncovering issues in the design and use of existing technologies
  - *embodied analysis* - if you will
  - use embodiment as an organizing principle to understand what is going on in interactive systems
- Example 1: Media Spaces - Xerox PARC and EuroPARC
- Example 2: Illuminating Light - MIT

Embodiment in a Media Space

Bill Buxton

Xerox PARC



Embodiment in a Media Space

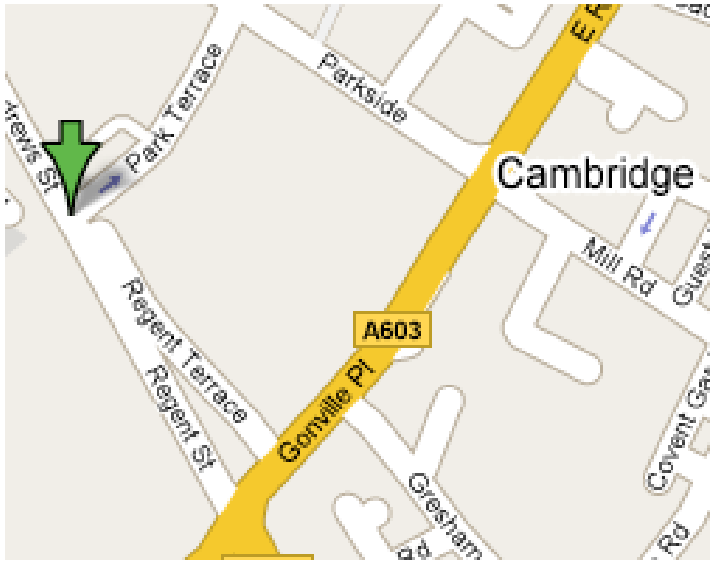
Embodiment in a Media Space: RAVE

Embodiment in a Media Space (149)

- The goal of media space research was to explore how audio and video technologies, in combination with computational tools for sharing work and control information, could create a medium for collaborative working across boundaries of space and time
- RAVE: Ravenscroft Audio Video Environment
- More accurate to describe it as an environment in which we lived and worked than a tool we used
- Technology interferes with natural models of natural conduct
  - asymmetry in video connections, restricted field of view, poor acoustics
- RAVE: long-term day-to-day use - resulted in transformations of conversational conduct that were specifically adapted to the nature of the medium
- Particularly interesting: the way in which they reflect the nature of the medium

Embodiment in a Media Space: Pointing (147)

- Colleague asked Paul: where is Arjuna?
- Paul: explains and points
- Pointing is a fundamentally embodied activity
- The example shows how the pointing gesture had become re-embodied in the new technological frame of the media space



- The media space technology had interfered with the relationship between action and meaning: a new coupling had emerged that restored the participants' ability to produce meaningful gestures

Embodiment in a Media Space: Others (149)

- See office "occupant", office visitors and passers-by outside
- Blend of physical and virtual space
- Greet both the local "occupant" but also the remote occupant
- Talk to both - hybrid space created
- Leads to the distinction between *space* and *place*
  - space: physical and mechanical elements of the environment
  - place: the ways in which spaces become vested with social meaning

Embodiment in a Media Space: Door mouse

- Bill Buxton
- Using the physical door to control both means that accessibility for both electronic and physical visitors are handled by the same mechanism.

Figure 13: The "Door Mouse".

- Hence (naturally subject to the ability to override defaults), closing my physical door is sensed by the computer and prevents people from entering physically or electronically (by phone or by video).
- One action and one protocol controls all

Embodiment and Tangible Applications (150)

- MIT Media Lab - Tangible Media group - John Underkoffler
- Illuminating Light
- A system for rapid prototyping laser-based optical and holographic layout - which in the real world is difficult and costly

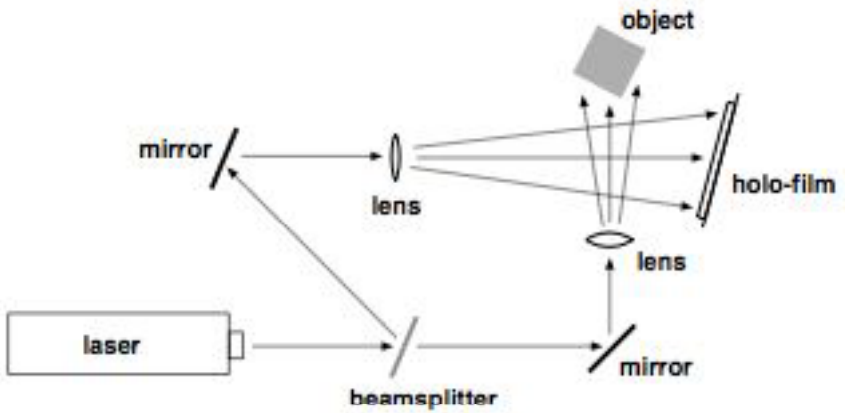


FIGURE 6: TYPICAL HOLOGRAM-RECORDING LAYOUT

Embodiment and Tangible Applications (150)

- Users of this prototype tool move physical representations of optical elements (lenses, mirrors) about a workspace while the system tracks these components and projects back onto the workspace surface the simulated propagation of laser light through the evolving layout.

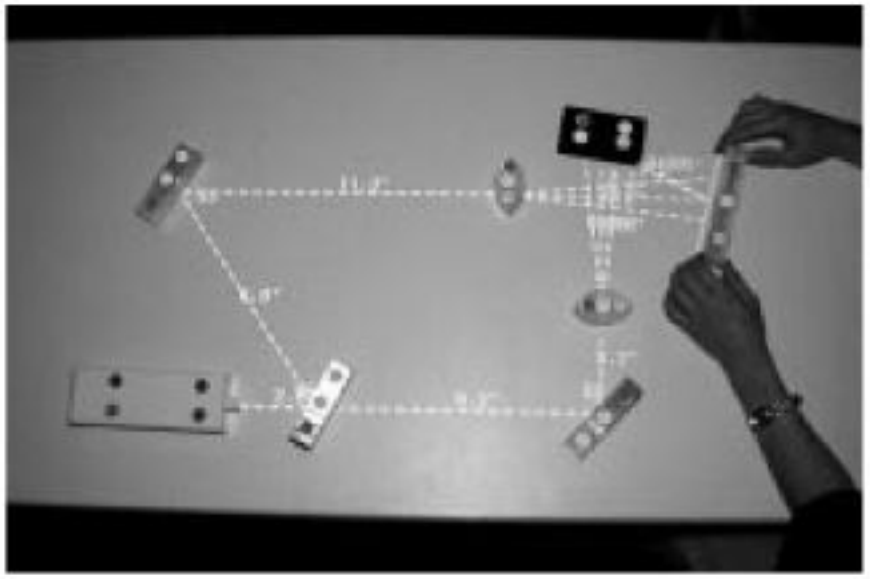


FIGURE 1: THE ILLUMINATING LIGHT SYSTEM IN USE

Embodiment and Tangible Applications (151)

- Video - part of larger project: Luminous Room
- http://tangible.media.mit.edu/projects/luminousroom/
- http://tangible.media.mit.edu/projects/luminousroom

- http://tangible.media.mit.edu/projects/luminousroom/mpeg_hires.mov
- http://tangible.media.mit.edu/projects/luminousroom/mpeg_hires.mov

Embodiment and Tangible Applications (151)

- Illuminating Light creates an environment in which physical and virtual objects are combined to form a single, seamless working environment
- Interesting issues raised about the multiple levels of meaning that can be associated with the objects and manipulating them
  - move the objects
  - move as mirrors and lenses
  - simply tools in another domain
- Both the physical and virtual objects can be regarded as tools depending on the level of intentional coupling we chose for analysis

Summary (153)

- Earlier chapters showed the foundational role of embodiment in social and tangible computing and discussed how that idea had been explored in phenomenological philosophy
- In contrast ch. 5 has begun a more analytical exploration by taking the theme of embodiment and tease it apart
- The goal has not been to propose a new theory per se of embodied interaction, but rather to build a foundation for *analysis* and *design*
- Ch 5. puts forward a view of embodiment that focuses primarily on meaning and coupling
- Meaning involves a set of related but distinct phenomena, including ontology, intersubjectivity, and intentionality.

Summary (153)

- *Ontology* concerns the ways in which, through our interaction with technological systems, we come to understand the computational world in which and through we operate.
- *Intersubjectivity* reflects the fact that this world is one we share with other individuals; the understandings we develop of technological artifacts and social action are ones that emerge in concert with other people.
- *Intentionality* concerns the directedness of our actions, and the effects that our actions are designed to cause.
- *Coupling* shows not just how we can understand and interpret interactive systems, but how we can operate through them.
- Effective action involves being able to reorient ourselves towards the technology, turning it from an object of enquiry and examination, into a tool that can be used.

Summary (154)

- The primary characteristic of technologies supporting embodied interaction is that they variously make manifest how they are coupled to the world, and so afford us the opportunity to orient to them in a variety of ways
- We see, again and again, the ways in which embodied interactive technologies allow us to easily engage with them on multiple levels
- The embodied interaction perspective begins to illuminate not just how we act *on* technology, but how we act *through* it.
- Remaining chapters: explore the implications of the embodied-interaction approach for the *design* of interactive technologies.

Eksamen 5-8 januar

Afvikling af eksamen

Der er 2 timer til en 3-pers.gruppe, 2,5 time til 4-persgruppe, 3 timer til 5-persgruppe, 3,5 timer til . Denne tid er fordelt sådan:

Der er afsat 30 minutter til gruppepræsentationen.

De 30 minutter til hver studerende er fordelt således:

- 10 min: den studerendes præsentation
- 10 min: diskussion med censor og eksaminator
- 5 min votering
- 5 min feedback

Rækkefølgen af de enkelte studerende i hver gruppe bestemmer I selv.

Spørgetime inden jul

Refleksionsrapport

- Selve rapporten må max være på 8 normalsider á 2400 tegn inkl. mellemrum. I de 8 sider indgår indholdsfortegnelse og litteraturliste, men ikke figurer, tabeller og grafik. Ud over selve rapporten kan der være bilag.
- I skal aflevere 3 papireksemplarer (censor, eksaminator, arkiv) på eksamenskontoret.
- I skal uploade en digital udgave af rapporten plus bilagene til jeres public-mappe (blot én pr gruppe) og sende linket til Signe.
- Begge dele skal ske senest fredag 12. december kl. 15, for at I kan indstilles til eksamen

Slut