LBSC 690 Session #3

Interacting with Users

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Topics for Today

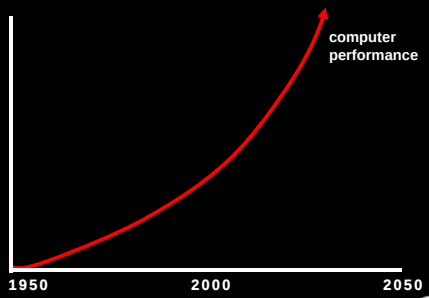
- Introduction to Human-Computer Interaction (HCI)
- Lessons from the design of everyday things
- Evaluation of systems
- Introduction to information architecture

Goals for today

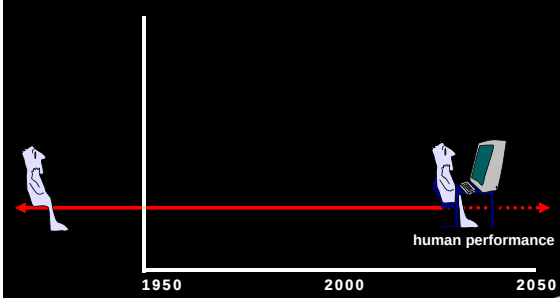
- Understand basic principles of HCI
  - Connect the design of everyday objects with computer interfaces
  - Articulate what makes an object well or poorly designed
  - Learn about metaphors in modern interfaces
- Understand how to evaluate systems
- Understand principles of good Web site design

Do you feel like this?

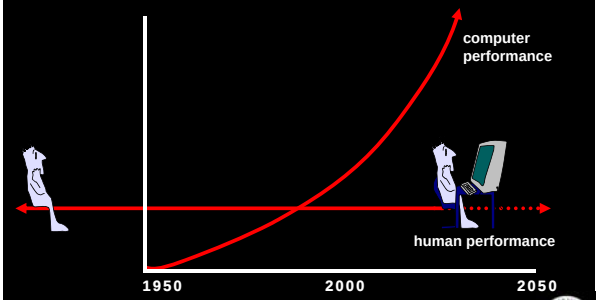
Moore's Law



Human Cognition



Where is the bottleneck?



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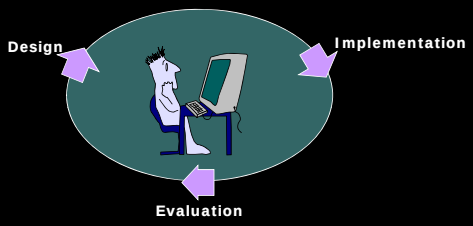
User-Centered Design

(what else?)

Human-Computer Interaction

A discipline concerned with the



of interactive computing systems for human use

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Four Stages of Interaction

- Forming an intention
  - Internal mental characterization of a goal
- Selection of an action
  - Review possible actions and select most appropriate
- Execution of the action
  - Carry out appropriate actions with the system
- Evaluation of the outcome
  - Compare results with expectations

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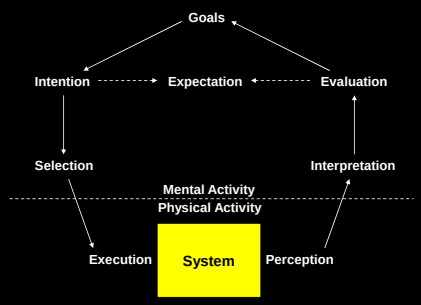
Stages of Interaction



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Challenges of HCI

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Design Concepts

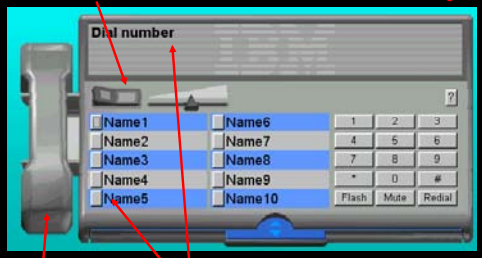
- Visual affordance
- Visible Constraints
- Mapping
- Causality
- Transfer effects
- Idioms
- Metaphors
- Cultural associations
- Individual differences

Visual Affordance

- The perceived and actual properties of the object that determine how it should be used
- Purpose should be obvious from appearance
  - Chair for sitting
  - Table for placing things on
  - Knobs for turning
  - Slots for inserting things into
  - Buttons for pushing
  - Computers for ???

Visual Affordance Problems

Visual Affordance Problems



Visual Affordance Problems

Visual Affordance Problems

Handles are for lifting,
but these are for scrolling!

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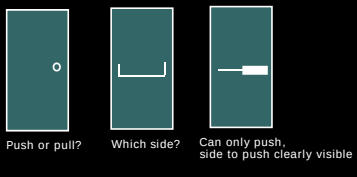
Visible Constraints

- What you can do with the object is obvious from its physical appearence



Push or pull? Which side? Can only push, side to push clearly visible

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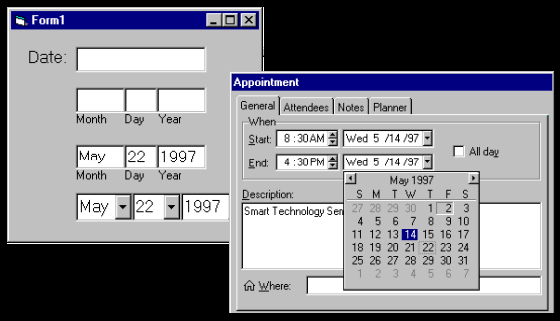
Visible Constraints: Date Entry



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The PC Cup Holder

Caller: Hello, is this Tech Support?"
Tech: Yes, it is. How may I help you?
Caller: The cup holder on my PC is broken and I am within my warranty period. How do I go about getting that fixed?
Tech: I'm sorry, but did you say a cup holder?
Caller: Yes, it's attached to the front of my computer.
Tech: Please excuse me if I seem a bit stumped, it's because I am. Did you receive this as part of a promotional, at a trade show? How did you get this cup holder? Does it have any trademark on it?
Caller: It came with my computer, I don't know anything about a promotional. It just has '4X' on it.

At this point the Tech Rep had to mute the call, because he couldn't stand it.

The caller had been using the load drawer of the CD-ROM drive as a cup holder, and snapped it off the drive.

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Mapping

- The set of possible relations between objects
- Connections between controls and what they control

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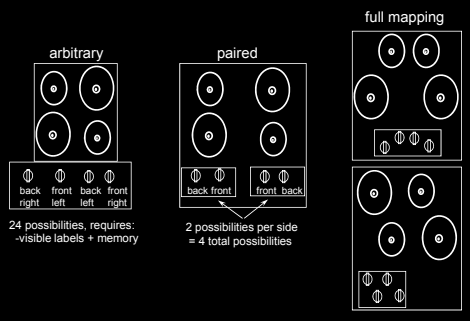
Mapping



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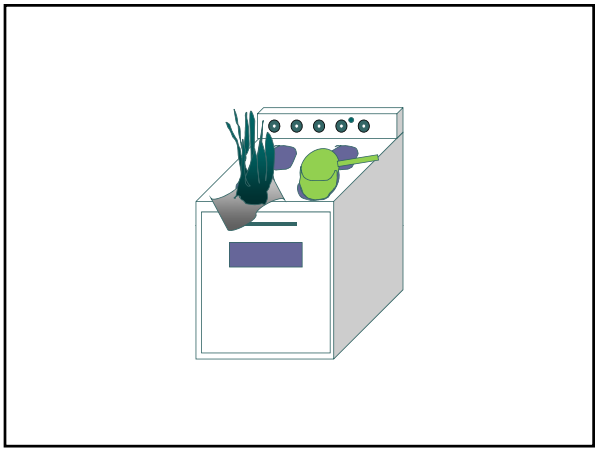

What makes a Wii fun?

Causality

- If B follows A, humans assume that A caused B
  … but this isn't always true!
- Incorrect causal associations
  - Unrelated effect, e.g., superstitious behavior
  - Invisible effect, e.g., command with no apparent result often re-entered repeatedly

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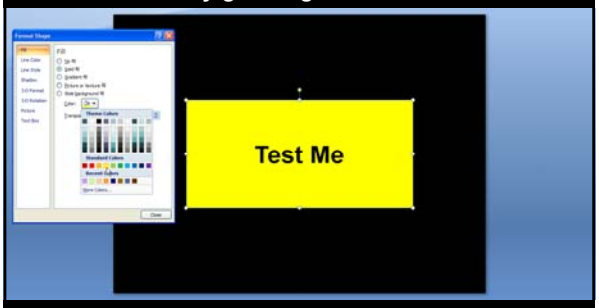
Test Me

Microsoft actually got it right….



… but not quite

Transfer Effects

- People transfer experience with old objects to new objects that look similar
- Positive transfer: previous experience helps
- Negative transfer: previous experience hurts

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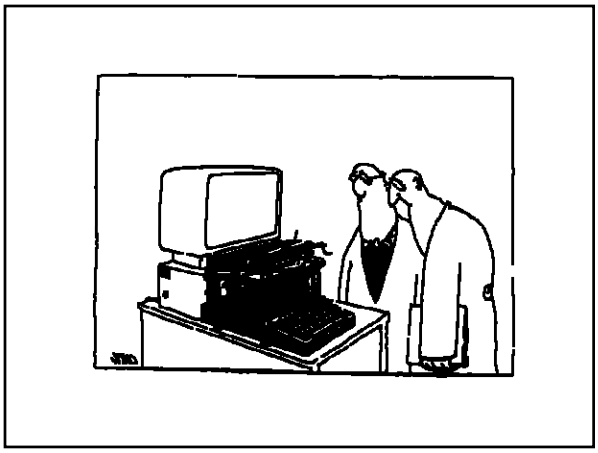

Transfer Effects: Two Examples

"First we thought the PC was a calculator. Then we found out how to turn numbers into letters with ASCII — and we thought it was a typewriter. Then we discovered graphics, and we thought it was a television. With the World Wide Web, we've realized it's a brochure." — Douglas Adams

- Keyboard layout
  - Qwerty keyboard: designed to prevent jamming of keyboard
  - Dvorak keyboard (1930s): provably faster to use
- Layout of number pads
  - Calculator vs. keyboard
  - Traditional telephone vs. fancy cell phones

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Idioms

- People learn idioms that work in a certain way
  - Red means danger
  - Green means safe
- Idioms vary in different cultures
  - Light switches:
    - America: down is off
    - Britain: down is on
  - Faucets
    - America: counter-clockwise on
    - Britain: counter-clockwise off
- Have you tried crossing a street in London?

Cultural Associations

- Because a trash can in Thailand may look like this:

a Thai user is likely to be confused by this:

- Sun found their email icon problematic for urban dwellers:

Metaphors

- Lakoff and Johnson: not just a literary device; fundamental to how we think
  - Theories are buildings: the foundation of the theory is shaky, theory was toppled, buttress your claims, support your arguments
  - Mind is a container: suddenly came into my head, back of my mind
  - Time is space: the end of the semester is getting closer, the week just whizzed by, the best part of the show is coming up, we're fast approaching Christmas
- What does this have to do with computers?

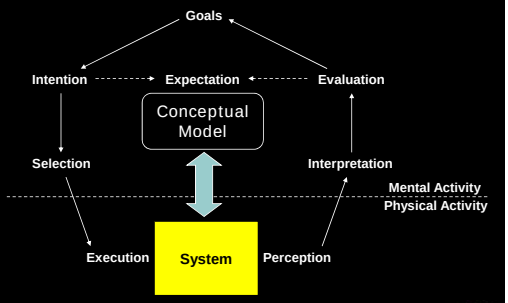
Individual Differences

- Reasonable person
- Person having ordinary skill in the art
- Typical user
- Easter bunny
- Santa Claus

Conceptual Model

- People develop a "mental model" of how things work, from
  - affordances, causality, constraints, mapping
  - transfer, idioms, metaphors, cultural associations
  - instructions
  - interactions
- Models allow people to simulate operation of device
- Models may be wrong
  - particularly if above attributes are misleading

What is good design?



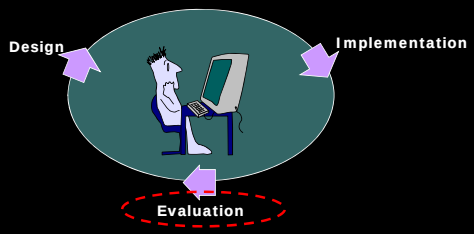
Why is a toaster well designed?
Why are modern remote controls to difficult to use?

WIMP vs. CLI

Verb-Object
Object-Verb
Direct Manipulation

Human-Computer Interaction

A discipline concerned with the



of interactive computing systems for human use

Types of Evaluation

- Formative vs. summative
- Qualitative vs. quantitative

Direct Observation

- Evaluator observes users interacting with system
  - In lab: user asked to complete pre-determined tasks
  - In field: user goes through normal duties
- Validity depends on how contrived the situation is
- What do you look for?

Think-Aloud Studies

- Users speak their thoughts while doing the task
- Gives insight into what the user is thinking
- Downsides:
  - May alter the way users do the task
  - Unnatural and potentially distracting

Controlled User Studies

- Observe users interact with system variants
- Attempt to correlate performance effects with system characteristics
  - Must control for confounding factors

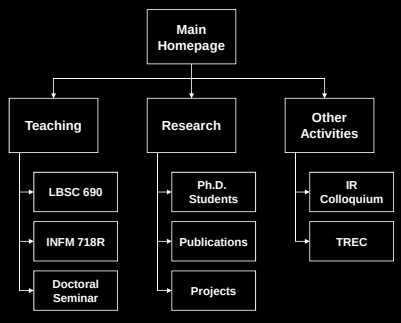
Information Architecture

- The design of an "information space" to facilitate access to content
- Consists of two components:
  - Static design
  - Interaction design

Static Design

- Different principles of organization
  - Logical: inherent structure (chronological, alphabetical, …)
  - Functional: by task
  - Topical: by subject
  - Demographic: by user
- Take advantage of metaphors
  - Organizational: e.g., e-government
  - Physical: e.g., online grocery store
  - Functional: e.g., cut, paste, etc.
  - Visual: e.g., octagon for stop

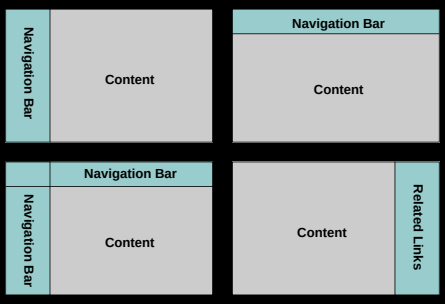
"Site Blueprint"



Designing CRAPpy Pages

- Contrast: make different things different
  - to bring out dominant elements
  - to mute lesser elements
  - to create dynamism
- Repetition: repeat design throughout the interface
  - to create consistency
  - to create unity
- Alignment: visually connect elements
  - to create flow
- Proximity: make effective use of spacing
  - to group related elements
  - to separate unrelated elements

Screen Design: Use Grids



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Grid Layout: NY Times

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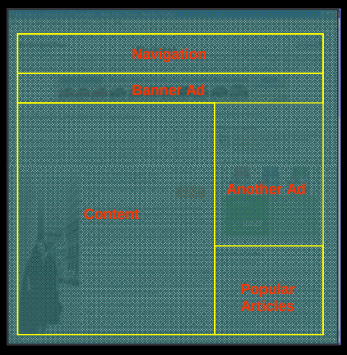

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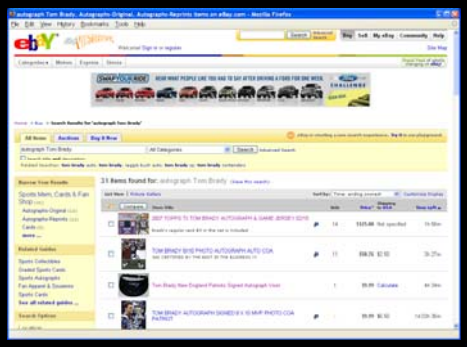
Grid Layout: ebay



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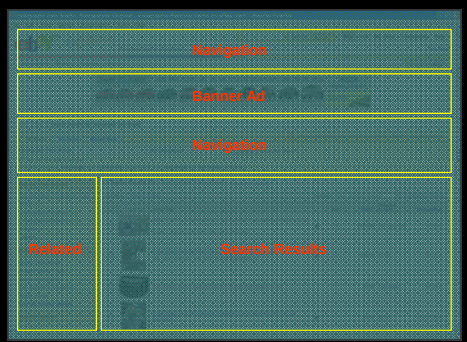

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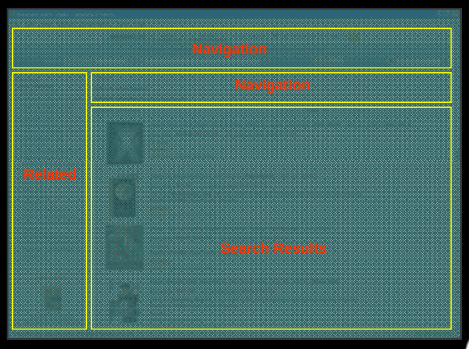


Interaction Design

- Chess analogy: a few simple rules that disguise an infinitely complex game
- The three-part structure
  - Openings: many strategies, lots of books about this
  - Middle game: nebulous, hard to describe
  - End game: well-defined, well-understood
- Information navigation has a similar structure!
  - Middle game is underserved

From Hearst, Smalley, & Chandler (CHI 2006)

Opening Moves

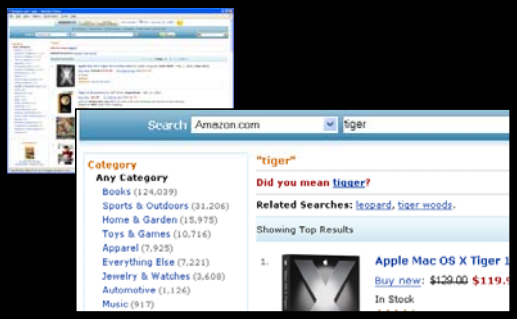
Opening Moves

Opening Moves

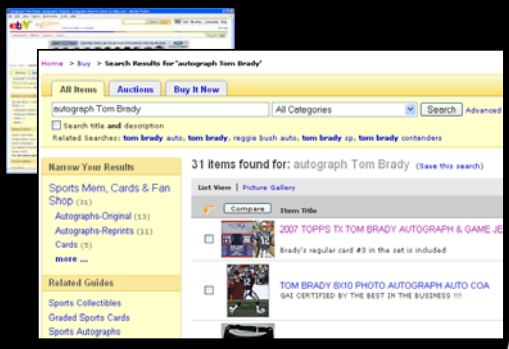
Opening Moves

End Game

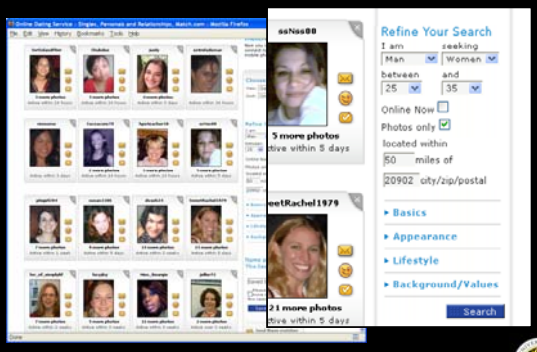
Middle Game



Middle Game



Middle Game



Navigation Patterns

- Drive to content
- Drive to advertisement
- Move up a level
- Move to next in sequence
- Jump to related

Recap: Goals for today

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