LBSC 690: Week 3

Interacting with Users

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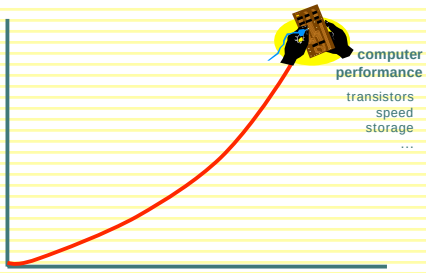
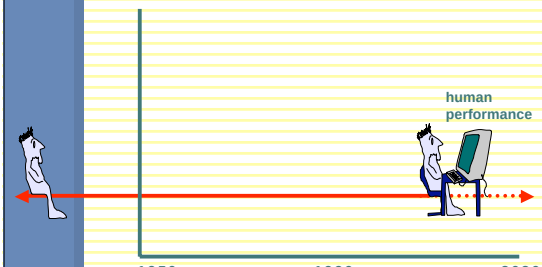
Material in these slides borrowed from Saul Greenberg: http://pages.cpsc.ucalgary.ca/~saul/hci_topics/

Do you feel like this?

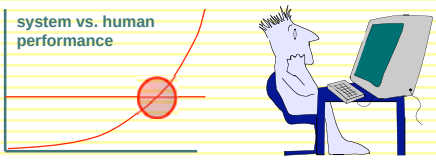
Moore's Law



Human Cognition

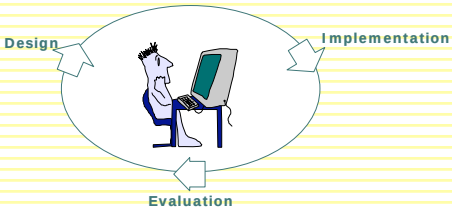


Where is the bottleneck?



Human Computer Interaction

- A discipline concerned with the



of interactive computing systems for human use

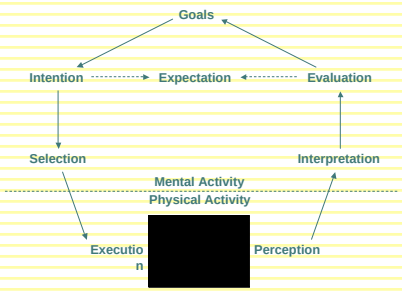
Four Stages of Interaction

- Forming an **intention**
  - "What we want to happen"
  - Internal mental characterization of a goal
  - May comprise sub-goals (but rarely well planned)
  - For example, "write e-mail to grandma"
- **Selection** of an action
  - Review possible actions and select most appropriate
  - For example, "use Outlook to compose e-mail"

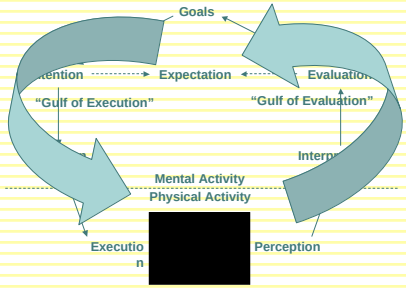
Four Stages of Interaction

- **Execution** of the action
  - Carry out the action using the computer
  - For example, "double-click Outlook icon"
- **Evaluation** of the outcome
  - Compare results with expectations
  - Requires perception, interpretation, and incremental evaluation
  - For example, "did Outlook open?"

Stages of Interaction



Challenges of HCI

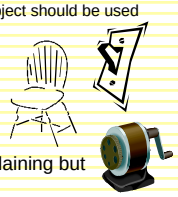


Bridging the Users and Systems

- Important design concepts
  - affordances
  - causality
  - visible constraints
  - mapping
  - transfer effects
  - population stereotypes
  - individual differences
  - conceptual models

Visual Affordance

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



- Complex things may need explaining but simple things should not
  - When simple things need labels/instructions, then design has failed

Visual Affordance Problems

Sliders for sliding?

Dials for turning?

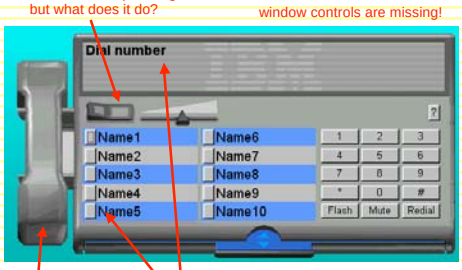
Are these buttons?

What does this button do?

Visual Affordance Problems

A button is for pressing, but what does it do?

Visual affordances for window controls are missing!

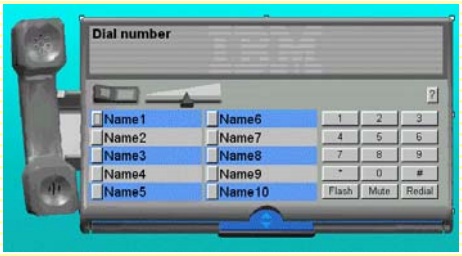


Is this a graphic or a control?

text is for editing, but it doesn't do it.

IBM Real Phone

Visual Affordance Problems



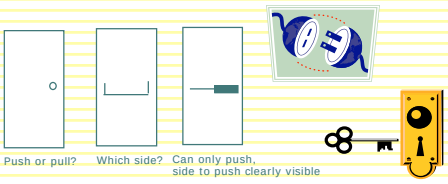
Visual Affordance Problems

Handles are for lifting, but these are for scrolling!

AudioRack 32, a multimedia application

Visible Constraints

- Limitations of the actions possible perceived from object's appearance
  - provides people with a range of usage possibilities



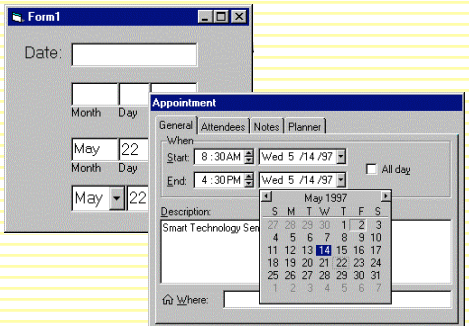
Push or pull?

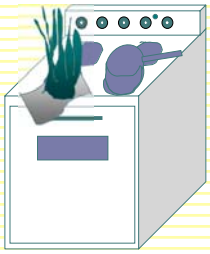
Which side?

Can only push, side to push clearly visible

The Far Side

Visible Constraints: Date Entry

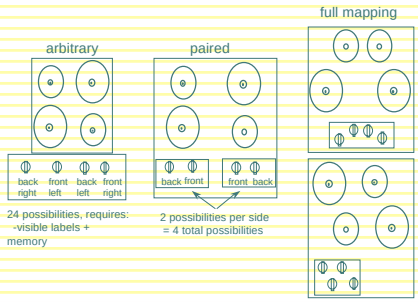




Mapping

- The set of possible relations between objects
  - Control-display compatibility
- Cause and effect: steering wheel-turn right, car turns right

Mapping

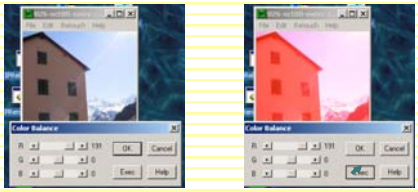


Causality

- The thing that happens right after an action is assumed by people to be caused by that action
  - Interpretation of “feedback”
- False causality
  - Incorrect effect
    - Invoking unfamiliar function just as computer hangs
    - Causes “superstitious” behaviors
  - Invisible effect
    - Command with no apparent result often re-entered repeatedly
    - For example, mouse click to raise menu on unresponsive system

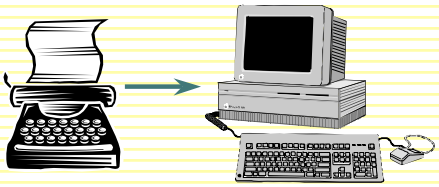
Causality: An Example

Effects visible only after Exec button is pressed
- Ok does nothing!
- Awkward to find appropriate color level

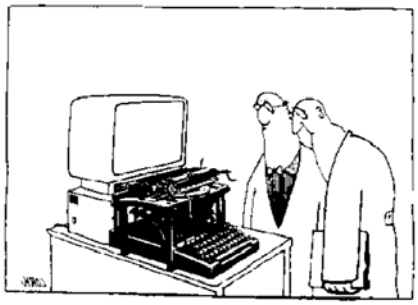


Transfer effects

- People transfer their learning/expectations of similar objects to the current objects
  - Positive transfer: previous learning's also apply to new situation
  - Negative transfer: previous learning's conflict with the new situation



Transfer?



Transfer Effects: Two Examples

- Keyboard layout
  - Qwerty keyboard: designed to prevent jamming of keyboard
  - Dvorak keyboard ('30s): provably faster to use
- Layout of number pads
  - Calculator vs. keyboard
  - Traditional telephone vs. fancy cell phones

The PC Cup Holder

- A true (?) story from a Novell NetWire SysOp

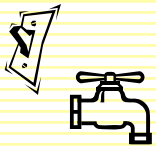
Caller: Hello, is this Tech Support?"
Tech: Yes, it is. How may I help you?
Caller: The cup holder on my PC is broken and I am within my warranty period. How do I go about getting that fixed?
Tech: I'm sorry, but did you say a cup holder?
Caller: Yes, it's attached to the front of my computer.
Tech: 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.

Population Stereotypes/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: anti-clockwise on
    - Britain: anti-clockwise off
- Have you tried crossing a street in London?



Cultural Associations

- Because a trashcan in Thailand may look like this:

- A Thai user is likely to be confused by this image popular in Apple interfaces:

- Sun found their email icon problematic for some American urban dwellers who are unfamiliar with rural mail boxes.

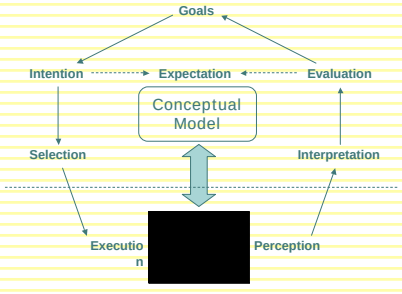
Individual Differences

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

Conceptual Model

- People have “mental models” of how things work, built from
  - affordances, causality, constraints, mapping
  - positive transfer, population stereotypes/cultural standards
  - instructions
  - interactions
- Models allow people to mentally simulate operation of device
- Models may be wrong
  - particularly if above attributes are misleading

What is good design?



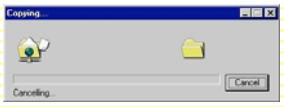
Now you know…

- Why is a toaster well designed?
- Why is it so hard to program a VCR?

Discussion Point

- WIMPy vs. CLI

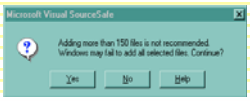
Inane Dialog Boxes



What happens when you cancel a cancelled operation?

Uhhh… I give up on this one

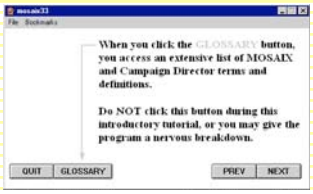
Inane Dialog Boxes



Hmm, thanks for the warning, but what should I do?

Do I have any choice in this?

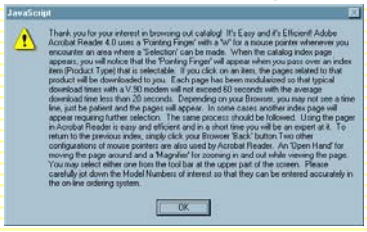
Inane Dialog Boxes



Inane Dialog Boxes

Inane Dialog Boxes

Midwest Microwave's online catalog



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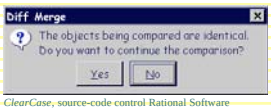

ClearCase, source-code control Rational Software

Human Computer Interaction

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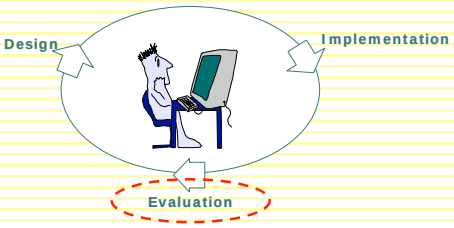

of interactive computing systems for human use

Types of Evaluation

- Formative vs. summative
- Qualitative vs. quantitative

Examples of Evaluations

- 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 controlled/contrived the situation is
- Think-aloud protocol
  - 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

Examples of Evaluations

- Controlled user studies
  - Observe users interact with system variants
  - Attempt to correlate performance effects with system characteristics
  - Control for confounding variables

Graphical Screen Design

- **Contrast**
  - make different things different
  - brings out dominant elements
  - mutes lesser elements
  - creates dynamism
- **Repetition**
  - repeat design throughout the interface
  - consistency
  - creates unity
- **Alignment**
  - visually connects elements
  - creates a visual flow
- **Proximity**
  - groups related elements
  - separates unrelated ones

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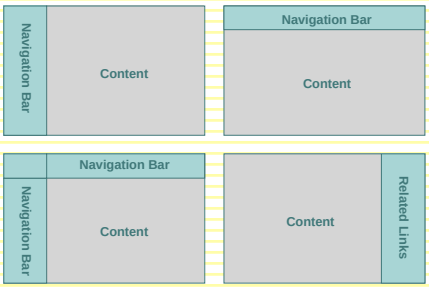
Common Layouts



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