CS160: User Interface Design

Human Information Processing (Perception) 03/01/10

Berkeley
UNIVERSITY OF CALIFORNIA

Video Puppetry

Barnes, Jacobs, Sanders, Goldman, Rusinkiewicz, Finkelstein, Agrawala, SIGGRAPH Asia 2008

Individual Programming Assignment 4 (due Mar 3)

Assignment: Low Fidelity Prototype

Due Mar 15

Identify project mission statement

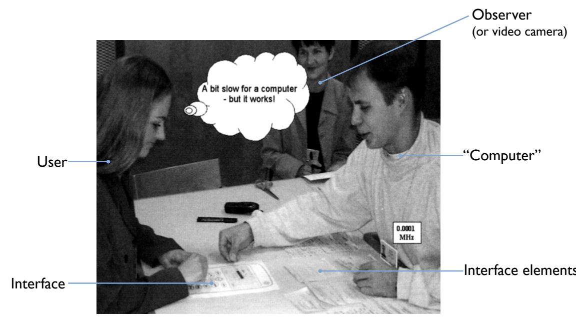
Create low-fidelity prototype that supports 3 tasks
- 1 easy, 1 moderate, 1 difficult task

Create a video prototype showing (cameras next class)
- How it supports the 3 tasks
- Context in which is will be used (back story)
- Must include narration

Test the prototype with target users
- No one from this class
- Not your friends

Wizard of Oz Prototype Testing

SIMS 213 Project: Telebears redesign



Conducting a Test

Three or Four testers (preferable)

Greeter - Puts users at ease & gets data

Facilitator - only team member who speaks

Gives instructions & encourages thoughts, opinions

Computer - knows application logic & controls it

Always simulates the response, w/o explanation

Observer(s) - Take notes & recommendations

Typical session should be approximately 1 hour

Preparation, the test, debriefing

Preparing for a Test

Select your participants

Understand background of intended users

Use a questionnaire to get the people you need

Don't use friends or family

Prepare scenarios that are

Typical of the product during actual use

Make prototype support these (small, yet broad)

Practice running the computer to avoid "bugs"

You need every menu and dialog for the tasks

All widgets the user might press

Remember "help" and "cancel" buttons

WOZ is different from pre-built/canned functionality

Record Critical Incidents

Critical incidents are any unusual/interesting events

Most of them are usability problems.

They may also be moments when the user
- Got stuck
- Suddenly understood something
- Said "that's cool" etc.

Using the Results

Update task analysis and rethink design
- Rate severity & ease of fixing problems
- Fix both severe problems & make the easy fixes

Will thinking aloud give the right answers?
- Not always
- If you ask a question, people will always give an answer, even it is has nothing to do with the facts
- Try to avoid leading questions

10 steps to better evaluation

1. Introduce yourself
   Some background will help relax the subject.

10 Steps

2. Describe purpose of observation (in general terms) and set the participant at ease

You're helping us by trying out this product in its early stages.
If you have trouble with some of the tasks, it's the product's fault, not yours. Don't feel bad; that's exactly what we're looking for.

10 Steps

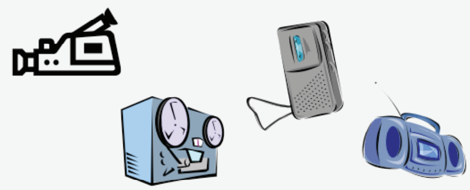
3. Tell participant that it's okay to quit at any time

Although I don't know of any reason for this to happen, if you should become uncomfortable or find this test objectionable in any way, you are free to quit at any time.

10 Steps

4. Talk about the equipment in the room.

Explain the purpose of each piece of equipment (hardware, software, video camera, microphones, etc.) and how it is used in the test.

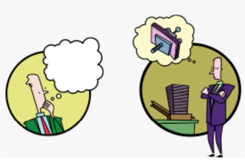


10 Steps

5. Explain how to "think aloud."

Explain why you want participants to think aloud, and demonstrate how to do it. E.g.:

We have found that we get a great deal of information from these informal tests if we ask people to think aloud. Would you like me to demonstrate?



10 Steps

6. Explain that you cannot provide help

10 steps

7. Describe the tasks and introduce the interface

Explain what the participant should do and in what order.
Give the participant written instructions for the tasks.
Don't demonstrate what you're trying to test.

10 Steps

8. Ask if there are any questions before you start; then begin the observation.

10 Steps

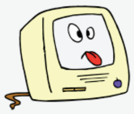
9. Conclude the observation. When the test is over:

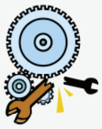
Explain what you were trying to find.
Answer any remaining questions.
discuss any interesting behaviors you would like the participant to explain.

10 Steps

10. Use the results

When you see participants making mistakes, you should attribute the difficulties to faulty product design, not to the participant.





Advantages of Low-Fi Prototyping

- Takes only a few hours
  - No expensive equipment needed
- Can test multiple alternatives
  - Fast iterations
    - Number of iterations is tied to final quality
- Can change the design as you test
  - If users are trying to use the interface in a way you didn't design it – go with what they think! Adapt!
- Especially useful for hard to implement features
  - Speech and handwriting recognition

Drawbacks of Lo-Fi Prototyping

- Evolving the prototype requires redrawing
  - Can be slow (but reprogramming usually slower)
- Lack support for "design memory"
- Force manual translation to electronic format
- Do not allow real-time end-user interaction

Caveats

- There is a down-side to the informal design approach:
- Often hard to involve paying clients as subjects – they treat the fidelity of the interface as a sign of development effort
- Involve clients early and often, correspond with the same people, explain the process up front and set expectations

Topics

- The Model Human Processor
- Memory

The Model Human Processor

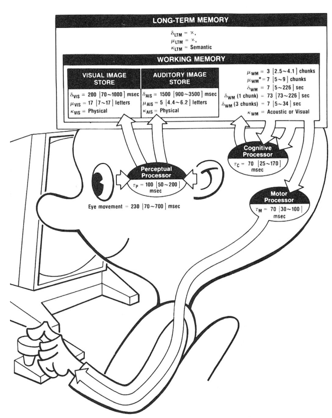
Why Model Human Performance?

Why Model Human Performance?

To predict impact of new technology/interface

Apply model to predict effectiveness

We could build a simulator to evaluate user interface designs



Human Info. Processor

- Perceptual
- Cognitive
- Motor (will discuss later)
- Working memory
- Long-term memory

Unified model

- Probably inaccurate
- Predicts perf. well
- Very influential

Perceptual Processor

- Physical store from our senses: sight, sound, touch, …
  - Code directly based on sense used
  - Visual, audio, haptic, … features
- Selective
  - Spatial
  - Pre-attentive: color, direction…
- Capacity of visual store
  - Example: 17 letters
- Decay time for working memory: 200ms
- Recoded for transfer to working memory
  - Progressive: 10ms/letter

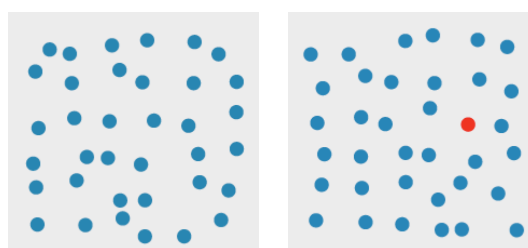
How many 3's

1281768756138976546984506985604982826762
9809858458224509856458945098450980943585
9091030209905959595772564675050678904567
8845789809821677654876364908560912949686

How many 3's

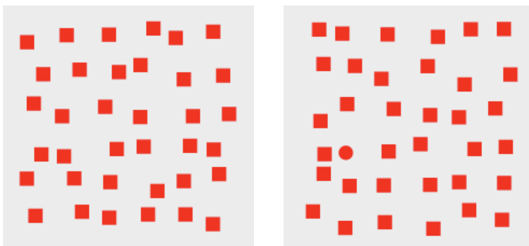
1281768756**3**8976546984506985604982826762
980985845822450985645894509845098094**3**585
90910**3**0209905959595772564675050678904567
884578980982167765487**6**3649085609129496 86

Visual Pop-Out: Color



http://www.csc.ncsu.edu/faculty/healey/PP/index.html

Visual Pop-Out: Shape



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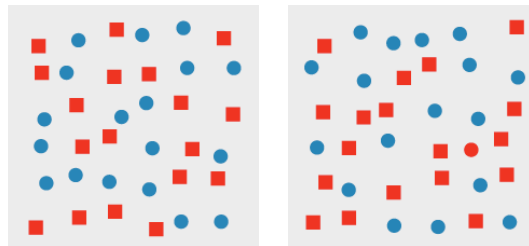
Feature Conjunctions



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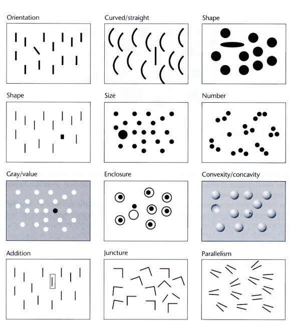
Preattentive Features



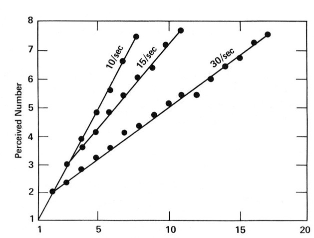
[Information Visualization. Figure 5. 5 Ware 04]

Perceptual Processor

Cycle time

Quantum experience: 100ms

Percept fusion



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Percept fusion

Frame rate necessary for movies to look continuous?

time for 1 frame < Tp (100 msec) -> 10 frame/sec.

Max. morse code rate can be similarly calculated

Perceptual causality

Two distinct stimuli can fuse if the first event appears to *cause* the other

Events must occur in the same cycle

Perception of Causality [Michotte 46]

Michotte demonstration 1. What do you see? Most observers report that the red ball **hit** the blue ball. The blue ball moved "**because** the red ball hit it." Thus, the red ball is perceived to "**cause**" the red ball to move, even though the balls are nothing more than color disks on your screen that move according to a program.

http://cogweb.ucla.edu/Discourse/Narrative/Heider_45.html

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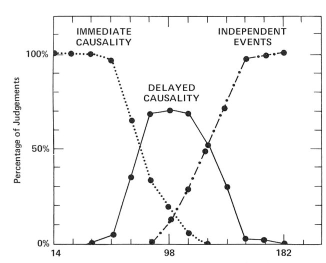
Causality



Working Memory

Access in chunks

Task dependent construct

7 +/- 2 (Miller)

Decay

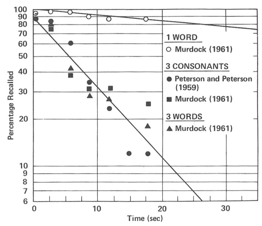
Content dependant

1 chunk 73 sec

3 chunks 7 sec

Attention span

Interruptions > decay time



Long Term Memory

Very large capacity

Semantic encoding

Associative access

Fast read: 70ms

Expensive write: 10s

Can also move from WM to LTM via rehearsal

Context at the time of acquisition key for retrieval

Cognitive Processor

Cycle time: 70ms

Can be modulated

Typical matching time

Digits: 33ms

Colors: 38ms

Geometry: 50ms…

Fundamentally serial

One locus of attention at a time

Eastern 401, December 1972

Crew focused on landing gear indicator bulb,
Aircraft is loosing altitude (horn, warning indicator…),
Aircraft crashed in the Everglades
see "The Human Interface" by Raskin, p25

But what about driving and talking?