Due Today: IPA2

Great job on the screencast videos!

Examples:
http://www.youtube.com/watch?v=e2ihhArDMzw&feature=player_embedded#
Contextual Inquiry and Task Analysis

Due Feb 23
Find and interview 3 target users (not from class)
Analyze their tasks
Explain how your application addresses their needs
Compare to five closest existing applications
See wiki for details

Start now!
Finding participants will take time
We will not accept late group project assignments
Review Conceptual Models

Designers model may not match user’s model
Users get model from experience & usage
Users only work with system image, not with designer

What if the two models don’t match?
The Action Cycle

The World

Goals

Execution
- Intention to act
- Sequence of actions
- Execution of actions

Evaluation
- Evaluation of interpretations
- Interpreting the perception
- Perceiving the state of the world

start here
Direct Manipulation
Direct Manipulation

An interface that behaves as though the interaction was with a real-world object rather than with an abstract system

Central ideas

Visibility of the objects of interest
Rapid, reversible, incremental actions
Manipulation by pointing and moving
Immediate and continuous display of results
Reduce Distance

Decrease gulfs
Semantic & Articulatory Distance

Semantic
Semantic distance reflects the relationship between the user’s intentions and the meaning of expressions in the interface languages.

Articulatory
Articulatory distance reflects the relationship between the physical form of an expression in the interaction language and its meaning.
Semantic & Articulatory Distance

**Semantic**
Is it possible to say what one wants to say
Can it be said concisely

**Articulatory**
Make form of expression similar to meaning of expression

**Onomatopoeia**
“Boom” of explosion, “cock-a-doodle-doo” of roosters
The Gulfs & **Semantic Distance**

**Gulf of Execution**
Match description level of interface language to level at which person thinks of the task (often interface is much lower)

**Gulf of Evaluation**
Match output to the user’s mental model to enable checking that goals have been met
The Gulfs & Articulatory Distance

Gulf of Execution
Permit specification of action by mimicking it (i.e. move pointer with mouse, pointing with finger, lightpen, …)

Gulf of Evaluation
Depict output so that relationships between input action and output is obvious and easy to perceive (i.e. graphical chart vs. table of numbers)
Calculator Example

User intention
What is 5 + 5?

Semantic distance vs. articulatory distance?

Infix Calculator
Press ‘5’, ‘+’, ‘5’, ‘=’

Post-fix Calculator
Press ‘5’, ‘5’, ‘+’, ‘=’

Which gulf are we talking about?
Metaphor in User Interfaces
Metaphor

**Definition**
The transference of the relation between one set of objects to another set for the purpose of brief explanation

**Lakoff & Johnson**
"...the way we think, what we experience, and what we do every day is very much a matter of metaphor."
in our language & thinking - “argument is war”
…he attacked every weak point
...criticisms right on target
...if you use that strategy

**Metaphors can highlight some features, suppress others**
There is some systematicity to the transference
Interface Metaphors

**Purpose**
Leverages knowledge of familiar, concrete objects/experiences
Transfer this knowledge to abstract tasks and concepts

**Problem**
Inaccurate or naive conceptual model of the system

*A presentation tool is like an slide projector*
The Painting Metaphor
The Desktop Metaphor

Started at Xerox PARC

Xerox Star

Bitmapped screens made it possible

Not meant to be a real desktop

Organize information the way people use information on desktop

Allow windows to overlap – make screen act as if objects are on it
Microsoft Bob’s Desktop Metaphor
Bob’s “Living Room” Metaphor
3D Desktops

[Robertson 2000]  Sun’s Looking Glass
Google Art Project

http://www.googleartproject.com/museums/moma
A Different Metaphor

[Hartmann 2009]
Metaphor Caveats
Metaphor Caveats

**Too limited**
The metaphor restricts interface possibilities

**Too powerful**
The metaphor implies the system can do things it can’t

**Too literal or cute**
Makes it difficult to understand abstract concept

**Mismatched**
The metaphor conveys the wrong meaning
Mismatched Metaphors

What is being controlled here?
Misused Metaphors

Direct translations

Software CD player that requires turning volume knob with mouse
Software telephony solution that requires the user to dial a number by clicking on a simulated keypad
Airline web site that simulates a ticket counter!
# Guidelines for Design

## Good Metaphors

Capture essential elements of the event / world
Deliberately leave out / mute the irrelevant
Appropriate for user, task, and interpretation
Modes
Modes: Definition

The same user actions have different effects in different situations.
Examples?
Modes: Examples
The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.

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Using Modes in Interfaces

When are they useful?
Temporarily restrict users’ actions
When logical and clearly visible and easily switchable
Drawing with paintbrush vs. pencil

Why can they be problematic?
Big memory burden
Source of many serious errors

How can these problems be fixed?
Don’t use modes – redesign system to be modeless
Redundantly visible
Redesigning to Avoid Modes

Setting the time on a clock
Redesigning to Avoid Modes

Setting the time on a clock

Modeless
Quasimodes

Set and hold a mode via conscious, continuous action
Shift key to capitalize (vs. Caps Lock)
Foot pedal that must remain pressed
Pull down menus
Muscle tension reminds users they are holding a mode

Also known as “spring-loaded modes”
Summary

**Metaphor**
Leverages knowledge of familiar objects & experiences
Transfer this knowledge to abstract tasks and concepts
Easily mismatched or misused so be careful!

**Cognition (Jef Raskin)**
Locus of attention – where you consciously attend

**Modes**
Can create memory issues and cause serious errors
Avoid modes in your designs!
Heuristic Evaluation
Usability Heuristics

“Rules of thumb” describing features of usable systems
Can be used as design principles
Can be used to evaluate a design

Example: Minimize users’ memory load
Heuristic Evaluation

Developed by Jakob Nielsen (1994)

Can be performed on working UI or on sketches

Small set (3-5) of evaluators (experts) examine UI

Evaluators check compliance with usability heuristics
Different evaluators will find different problems
Evaluators only communicate afterwards to aggregate findings
Designers use violations to redesign/fix problems
Nielsen’s Ten Heuristics

**H2-1:** Visibility of system status

**H2-2:** Match system and real world

**H2-3:** User control and freedom

**H2-4:** Consistency and standards

**H2-5:** Error prevention

**H2-6:** Recognition rather than recall

**H2-7:** Flexibility and efficiency of use

**H2-8:** Aesthetic and minimalist design

**H2-9:** Help users recognize, diagnose, recover from errors

**H2-10:** Help and documentation
H2-1: Visibility of system status

Keep users informed about what is going on. Example: response time
0.1 sec: no special indicators needed
1.0 sec: user tends to lose track of data
10 sec: max. duration if user to stay focused on action

Short delays: Hourglass
Long delays: Use percent-done progress bars
Overestimate usually better
H2-1: Visibility of system status

Users should always be aware of what is going on
So that they can make informed decision
Provide redundant information
H2-2: Match System & World

Speak the users’ language
Follow real world conventions
Pay attention to metaphors

Bad example: Mac desktop
H2-2: Match System & World
H2-3: User control & freedom

Users don’t like to be trapped!

Strategies
Cancel button (or Esc key) for dialog
Make the cancel button responsive!
Universal undo
H2-3: User control & freedom

Offer “Exits” for mistaken choices, undo, redo
Don’t force the user down fixed paths

Wizards
Must respond to Q before going to next step
Good for infrequent tasks (e.g., network setup) & beginners
Not good for common tasks (zip/unzip)
H2-4: Consistency and Standards

NEW CUSTOMER

Give us your measurements
Take or ask someone to help take your measurements, by following our easy instructions. It takes just 5 minutes!

Send us your best fitting shirt* (go directly to cart)
If you prefer not to take measurements, you can mail us your best fitting shirt. Our Master Tailor will take the necessary measurements and will return your shirt along with your order.

*: Your shirt will be used for measurements only. We will not copy it.

Visit our NYC showroom (go directly to cart)
Contact us at contact@listereux-paris.com to plan a private appointment at our New York showroom (Madison Ave & 40th St.).

EXISTING CUSTOMER

Your measurements are on file (go directly to cart)
If your last order fits perfectly, we will make the new shirts with exactly the same measurements.

If your measurements have changed
Simply note your measurements changes compared to your previous shirts.

http://www.useit.com/alertbox/application-mistakes.html
H2-5: Error Prevention

Eliminate error-prone conditions or check for them and ask for confirmation
H2-5: Error Prevention

Aid users with specifying correct input
H2-5: Error Prevention

MIT Scratch

Don’t allow incorrect input

Lego Mindstorms
Preventing Errors

**Error types**

**Slips**
User commits error during the execution of a correct plan.

**Typos**
Habitually answer “no” to a dialog box
Forget the mode the application is in

**Mistakes**
User correctly executes flawed mental plan
Ususally the result of a flawed mental model – harder to guard against
H2-6: Recognition over Recall
H2-6: Recognition over Recall

Minimize the user’s memory load by making objects, actions, and options visible.
H2-7: Flexibility and efficiency of use

http://www.iphoneuxreviews.com/?p=114
H2-8: Aesthetic and minimalist design

H2-8: Aesthetic and minimalist design

No irrelevant information in dialogues
H2-8: Aesthetic and minimalist design

Present information in natural order

Occam’s razor
Remove or hide irrelevant or rarely needed information – They compete with important information on screen
Pro: Palm Pilot
Against: Dynamic menus
Use windows frugally
Avoid complex window management

From Cooper’s “About Face 2.0”
H2-8: Aesthetic and minimalist design
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H2-9: Help users recognize, diagnose, and recover from errors
Good Error Messages

From Cooper’s “About Face 2.0”
H2-9: Help users recognize, diagnose, and recover from errors
H2-10: Help and documentation

Help should be:
• Easy to search
• Focused on the user’s task
• List concrete steps to carry out
• Not too long
Types of Help

**Tutorial and/or getting started manuals**
- Presents the system conceptual model
- Basis for successful explorations
- Provides on-line tours and demos
- Demonstrates basic features

**Reference manuals**
- Designed with experts in mind

**Reminders**
- Short reference cards, keyboard templates, tooltips…
Types of Help

Context sensitive help

Search
The Process of Heuristic Evaluation
<table>
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<th>Phases of Heuristic Eval. (1-2)</th>
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<tr>
<td><strong>1) Pre-evaluation training</strong></td>
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<td>Provide the evaluator with domain knowledge if needed</td>
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<th><strong>2) Evaluation</strong></th>
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<tr>
<td>Individuals evaluate interface then aggregate results</td>
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<tr>
<td>Compare interface elements with heuristics</td>
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**Work in 2 passes**
First pass: get a feel for flow and scope
Second pass: focus on specific elements

**Each evaluator produces list of problems**
Explain why with reference to heuristic or other information
Be specific and list each problem separately
3) **Severity rating**
Establishes a ranking between problems
Cosmetic, minor, major and catastrophic
First rate individually, then as a group

4) **Debriefing**
Discuss outcome with design team
Suggest potential solutions
Assess how hard things are to fix
Examples

**Typography uses mix of upper/lower case formats and fonts**

Violates “Consistency and standards” (H2-4)  
Slows users down  
Fix: pick a single format for entire interface  

Probably wouldn’t be found by user testing
Severity Rating

- Used to allocate resources to fix problems
- Estimates of need for more usability efforts
- Combination of Frequency, Impact and Persistence
- Should be calculated after all evaluations are in
- Should be done independently by all judges
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<td>minor usability problem</td>
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<td>4</td>
<td>usability catastrophe; imperative to fix</td>
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Severity Ratings Example

1. [H2-4 Consistency] [Severity 3]

The interface used the string "Save" on the first screen for saving the user's file, but used the string "Write file" on the second screen. Users may be confused by this different terminology for the same function.
Debriefing

Conduct with evaluators, observers, and development team members

Discuss general characteristics of UI

Suggest improvements to address major usability problems

Development team rates how hard things are to fix

Make it a brainstorming session
Little criticism until end of session
Pros and Cons of Heuristic Evaluation
HE vs. User Testing

**HE is much faster**
1-2 hours each evaluator vs. days-weeks

**HE doesn’t require interpreting user’s actions**

**User testing is far more accurate**
Takes into account actual users and tasks
HE may miss problems & find “false positives”

**Good to alternate between HE & user-based testing**
Find different problems
Don’t waste participants
Why Multiple Evaluators?

Every evaluator doesn’t find every problem
Good evaluators find both easy & hard ones
Number of Evaluators

Single evaluator achieves poor results
Only finds 35% of usability problems
5 evaluators find ~ 75% of usability problems
Why not more evaluators? 10? 20?
Adding evaluators costs more
Many evaluators won’t find many more problems

But always depends on market for product:
popular products → high support cost for small bugs
Decreasing Returns

Caveat: graphs are for one specific example!
Summary

Heuristic evaluation is a discount method

Have evaluators go through the UI twice
Ask them to see if it complies with heuristics
Note where it doesn’t and say why

Have evaluators independently rate severity

Combine the findings from 3 to 5 evaluators
Discuss problems with design team

Cheaper alternative to user testing
Finds different problems, so good to alternate
New Assignment: Heuristic Evaluation

Due one week from today
Choose an Android application, conduct a heuristic evaluation of its interface

Reading:
The Model Human Processor
Card, Moran, Newell.
(Complex and long!)