CS 160: User Interface Design

Conceptual Models I

2/10/14
Skeuomorphism
February 2014

<table>
<thead>
<tr>
<th>Sun 26</th>
<th>Mon 27</th>
<th>Tue 28</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Skeuomorphs

Example:skeu.it
Enjoy the way you take notes...
...noteONE is the right way!
Braun reel-to-reel tape recorder (ca 1965)

Start

Windows 8
Source: wired.com
Due This Week

**Today:** Group Brainstorm, Collaboration Plan
(Wiki and printout **handed in now**)

**Friday:** Individual Programming Assignment 2
(Source code, executable and video on wiki)
Grades

Grades for Individual Programming Assignment 1 and the Individual Design Assignments 1,2 have been released on bCourses.

Regrade policy: do not comment on bCourses. Write up a detailed justification and submit a hardcopy to one of the instructors.

No regrades on reading responses.
Learning lyrics app. Allison Leong
Individual Programming Assignment 2

Due Fri 2/14

Image Paint
(Turn in code + video)
Review: Task Analysis

Find some real users

Talk to them
Find out what they do now
How would your system fit in?
More on this a bit later

Are they too busy?
Buy their time
t-shirts, coffee mugs, etc.
Review: Task Analysis Questions

1. Who is going to use system?
2. What tasks do they now perform?
3. What tasks are desired?
4. How are the tasks learned?
5. Where are the tasks performed?
6. What’s the relationship between user & data?
7. What other tools does the user have?
8. How do users communicate with each other?
9. How often are the tasks performed?
10. What are the time constraints on the tasks?
11. What happens when things go wrong?
Review: Master-Apprentice Model

Allows user to teach us what they do
  – Skill knowledge is usually tacit (can’t put it in books)
  – Sometimes literal apprenticeship is best

Matsushita Home Bakery – First automatic bread maker to have twist/stretch motion [Nonaka 95]
New Assignment out today (due 2/26)

**Contextual Inquiry and Task Analysis - Due Feb 26 (2.5 weeks)**

Find and interview 3 target users (not from class)
Pictures of where you observed/interviewed users
Analyze their tasks
Explain how your application addresses their needs
Compile a list of existing related applications

**See wiki for details**

**Start early – there is a lot to do**
Finding participants will take time
We will not accept late group project assignments
Examples of Past Contextual Inquiries

Community Garden

Campus Tour

Aquarium Owners
DATES

Midterm Exam:
Wed Mar 19 IN CLASS
(last session before Spring Break)

Final Presentations + Posters:
Wed May 7, 2-5pm, Sutardja Dai Hall Auditorium
Topics

- Personas
- Affordances
- Conceptual Models
- Design Principles
- The Action Cycle
Personas
Personas (from Cooper)

“Hypothetical Archetypes”

Archetype: (American Heritage)
An original model or type after which other similar things are patterned; a prototype
An ideal example of a type; quintessence

A precise description of user in terms of:
Capabilities, inclinations, background
Goals (not tasks)
Persona Examples

I’m Julie, an account manager. I’m responsible for the purchases for my division.

Yo, I’m Mike, I work out in the field, and I need durable tools I can throw in my truck.

Hi I’m John. I’m an engineer, and I suggest what products might work best.

Brad Colbow (http://carsonified.com/blog/design/how-to-understand-your-users-with-personas/)
Why Personas?

It’s hard to reason about users in aggregate, and impossible to please everyone.

General users have too many conflicting goals.

http://simpsons.wikia.com/wiki/File:TheHomer.png
Why Personas?

It’s easier to reason about specific fictional people.

Specific personas have clear, well-articulated goals.

Alesandro’s goals
• Go fast
• Have fun

Marge’s goals
• Be safe
• Be comfortable

Dale’s goals
• Haul big loads
• Be reliable
Defining and Using Personas

Defining them
Identify major clusters from multiple user interviews/inquiries
Synthesize their goals
Check for completeness and specificity
Specificity prevents “elastic user”
Try them out by developing narrative

Design each interface for a single primary persona
Yet other type might use the interface
<table>
<thead>
<tr>
<th></th>
<th>AMANDA</th>
<th>GLORIA</th>
<th>CHARLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7</td>
<td>34</td>
<td>66</td>
</tr>
<tr>
<td>Occupation</td>
<td>Second grade student</td>
<td>Part-time office administrator</td>
<td>Retired accountant</td>
</tr>
<tr>
<td>Home Life</td>
<td>Lives with her mother, father, and younger sister in the suburbs of a large city.</td>
<td>Lives with her husband and two children in a mid-sized city.</td>
<td>Lives with his wife in the suburbs; has four children and six grandchildren.</td>
</tr>
<tr>
<td>Education</td>
<td>In elementary school</td>
<td>Has a bachelor degree</td>
<td>Has an MBA</td>
</tr>
<tr>
<td>Activities</td>
<td>Plays soccer, reads, and takes ballet lessons; saves her birthday money and allowance to spend at the mall.</td>
<td>Enjoys crossword puzzles and reading mystery novels. Spends a lot of time driving her children to activities.</td>
<td>Likes to work in the garden and drink wine. Enjoys traveling with his wife and investing in the stock market.</td>
</tr>
<tr>
<td>Ultimate Goal</td>
<td>Goal is to turn 10 so that</td>
<td>Goal is to make sure her</td>
<td>Goal is to make sure</td>
</tr>
</tbody>
</table>
Personas vs. Observations

How do personas differ from the people you observed in your inquiry?
Affordances
The term **affordance** refers to the relationship between *properties of a physical object and capabilities of a person*, that determine *how the object could be used*.

The Design of Everyday Things.  
Don Norman
The term **affordance** refers to the relationship between properties of a physical object and capabilities of a person, that determine how the object could be used.

**Examples**

Chair affords sitting
Chair affords lifting (only if person is strong)
The term **affordance** refers to the relationship between the **properties of a physical object** and the **capabilities of a person**, that determine how the object could be used.

**Examples**

Chair affords sitting
Chair affords lifting (only if person is strong)
Knobs afford ??
Buttons afford ??
Glass affords ??
The term **affordance** refers to the relationship between the properties of a physical object and the capabilities of a person, that determine how the object could be used.

**Examples**
- Chair affords sitting
- Chair affords lifting (only if person is strong)
- Knobs afford turning
- Buttons afford pushing
- Glass affords seeing through
- Glass affords breaking
The term **affordance** refers to the relationship between the properties of a physical object and the capabilities of a person, that determine how the object could be used.

**Examples**

Chair affords sitting  
Chair affords lifting (only if person is strong)  
Knobs afford turning  
Buttons afford pushing  
Glass affords seeing through  
Glass affords breaking

**Affordance not just property of object**
Signifiers help people figure out the affordances of objects without labels or instructions

What are the signifiers?
Chair affords sitting (flat surface held by legs)
Chair affords lifting (??)
**Signifiers** help people figure out the affordances of objects without labels or instructions

What are the signifiers?

- Chair affords sitting *(flat surface held by legs)*
- Chair affords lifting *(??)*
- Knobs afford turning *(??)*
- Buttons afford pushing *(??)*
- Glass affords seeing through *(??)*
- Glass affords breaking *(??)*
Signifiers and Affordances

Clues about how object/interface works
Affordances

Clues about how object/interface works

Signifiers
Holes
Blades

Affordances
Holes afford insertion of fingers
Blades afford cutting
Scissors afford cutting using hands
Door Handles

Signifiers suggest how to use the object
Door Handles

Signifiers suggest how to use the object
Door Handles

Signifiers suggest how to use the object
Cultural Dependencies

Signifiers suggest how to use the object

Can be dependent on the
Experience
Knowledge
Culture
Cultural Dependencies

Signifiers suggest how to use the object

Can be dependent on the

Experience
Knowledge
Culture

Switches (US down=off, UK down=on)
red = danger, green = go
Incorrect signifiers

Signifiers may suggest affordances that do not exist
Hello, Computer
Screen-Based Interfaces

Physical affordances

Screen, mouse, physical buttons, keyboard

These objects afford touching, pointing, clicking on every pixel
Screen-Based Interfaces

Physical affordances of screens are often unused

Screen affords touching, but many screens are not touch sensitive
“A magazine is an iPad that doesn’t work…”

YouTube user UserExperienceWorks
Designer Controls Signifiers

What are the affordances of these graphical objects?
Designer Controls Signifiers

What are the affordances of these graphical objects?
Do Graphical Objects Afford Clicking?

Graphic design (signifiers) emphasizes affordances
Helps user recognize objects as buttons
Scrollbar Signifiers/Affordances?
Widget Affordances

Well-designed widgets have clear signifiers/affordances e.g. resize handles:

crop handles:

motion arrows
Conceptual Models
Mental Representations

Users’ understanding of how interface works

People have preconceived models
Mental Representations

Users’ understanding of how interface works

People have preconceived models

\[ 6 \times 7 = ?? \]
Mental Representations

Users’ understanding of how interface works

People have preconceived models

\[ 1 + 5 \times 7 = ?? \]
Mental Representations

Users’ understanding of how interface works

People have preconceived models

\[ 1 + 5 \times 7 = \]

\[ 1 + 5 \times 7 = \]

Changing mental models can be difficult

For more on visual grouping and math eqns see work of Landy and Goldstone.
Interfaces Must Communicate Model

Online help / documentation useful (but shouldn’t be necessary)
Problem: freezer too cold, but fresh food just right
# Refrigerator Controls

<table>
<thead>
<tr>
<th>Setting</th>
<th>Control Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Settings</td>
<td>C and 4</td>
</tr>
<tr>
<td>Colder Fresh Food</td>
<td>C and 5-6</td>
</tr>
<tr>
<td>Coldest Fresh Food</td>
<td>B and 7</td>
</tr>
<tr>
<td>Colder Freezer</td>
<td>D and 6-7</td>
</tr>
<tr>
<td>Warmer Fresh Food</td>
<td>C and 3-1</td>
</tr>
<tr>
<td>OFF (both)</td>
<td>0</td>
</tr>
</tbody>
</table>

What is your conceptual model?
Most Likely Conceptual Model

Independent Controls

Cooling unit

Cooling unit

A  B  C  D  E

7  6  5  4  3
Correct Conceptual Model

Possible solutions:
- Make controls map to user’s model
- Make controls map to actual system
Conceptual Models

- Design Model
- User's Model
- System Image
Designers model may not match user’s model
Users get model from experience & usage
Users only work with system image, not with designer
Preconceived Models

People have preconceived models of how things work
how does your car start?
how does an ATM machine work?
how does your computer boot?

Allow us to predict how things will work or not work
Preconceived Models

Teapot

Screw
Preconceived Models Often Wrong!

Extracted from fragmentary evidence

People find ways to explain things
Certainly you’re driving on the correct road
Design Principles
1. Make Controls Visible
Poor Visibility (BMW’s iDrive)
How do you set the alarm?
Primary controls are visible

But how to set a radio station preset?
Too Much Visibility?

6 remote controls for “modest” home theater
2. Make Sure Mapping is Clear

Mapping: Relationship between controls and their result

Mercedes S500 Car Seat Controller
Which way will the sound be moved when you turn this knob?