Conceptual Models & Interface Metaphors

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Computer Science Department
Stanford University

CS 147
Autumn 2015
November 3, 2015

Hall of Fame or Shame?

• Design based on a top retailer’s site

• Color deficiency – can’t distinguish between red & green
• In study, user could not get by this screen!
• How to fix? – redundant cues

Hall of Fame!

• M-Pesa mobile payments
• Common in Africa
• Simple UI, but brings banking services to the unbanked!

Hall of Shame!

• Design based on a top retailer’s site

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Outline

- Review Heuristic Evaluation
- Design of Everyday Things
- Conceptual models
- Team break
- Interface metaphors
- UI consistency

Review Heuristic Evaluation

- Usability method that relies on who?
  - experts
- Ask evaluators to see if UI complies with heuristics
  - note where it doesn’t, say why, & suggest fix
- Combine the findings from 3 to 5 evaluators
  - different evaluators find different problems
  - adding more won’t be worth the cost
- Cheaper or more expensive than user testing?
  - cheaper than user testing (time/cost)
- False positives?
  - HE may find problems that users may never encounter
  - Alternate with user testing

Design of Everyday Things

- By Don Norman (UCSD, Apple, HP, NN Group, NU, UCSD)
- Design of everyday objects illustrates problems faced by designers of systems
- Explains conceptual models
  - doors, washing machines, telephones, ...
- Resulting design guides
  - Highly recommended

Conceptual Model

- Mental representation of how an artifact works & how interface controls affect it
- People may have preconceived models that are hard to change
  - (4 + 5) vs. (4.5 +)
  - dragging to trash?
  - deletes file but ejects disk
- Interface must communicate model
  - visually (& possibly physically or using sound)
  - shouldn’t need online help & documentation

Affordances as Perceptual Clues

- Well-designed objects have affordances
  - clues to their operation
  - often visual, but not always (e.g., speech)

- Poorly-designed objects
  - no clues or misleading clues
Refrigerator Controls

<table>
<thead>
<tr>
<th>Setting</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Settings</td>
<td>C and 5</td>
</tr>
<tr>
<td>Colder Fresh Food</td>
<td>C and 6-7</td>
</tr>
<tr>
<td>Coldest Fresh Food</td>
<td>B and 8-9</td>
</tr>
<tr>
<td>Colder Freezer</td>
<td>D and 7-8</td>
</tr>
<tr>
<td>Warmer Fresh Food</td>
<td>C and 4-1</td>
</tr>
<tr>
<td>OFF (both)</td>
<td>0</td>
</tr>
</tbody>
</table>

What is your conceptual model?
Spend 30 sec. drawing a diagram showing your model (where the cooling units are & how controlled)
Share with your neighbor

A Common Conceptual Model

Actual Conceptual Model

Can you fix the problem?
Possible solutions
- make controls map to customer's model
- make controls map to actual system

Design Model & Customer Model

- Customers get model from experience & usage
  - through system image
- What if the two models don’t match?

Conceptual Model Mismatch

- Mismatch between designer’s & customer’s conceptual models leads to…
  - slow performance
  - errors
  - frustration
  - ...

Refrigerator

Problem: freezer too cold, but fresh food just right
Design Guides

- Provide good conceptual model
  - customer wants to understand how controls affect object

- Make things visible
  - if object has function, interface should show it

- Map interface controls to customer’s model
  - infix vs. postfix calculator – whose model is that?

- Provide feedback
  - what you see is what you get! (WYSIWYG)

Make Things Visible

- Refrigerator (?)
  - make the A..E dial something about percentage of cooling between the two compartments?

- Controls available on watch w/ 3 buttons?
  - too many and they are not visible!

- Compare to controls on simple car radio
  - #controls = #functions
  - controls are labeled (?) and grouped together
  - tradeoffs of the “glass UI” (e.g., Tesla)?

Map Interface Controls to Customer’s Model

- Which is better for car dashboard speaker front / back control?
- Control should mirror real-world
Map Interface Controls to Customer’s Model

Problem?
Which knob controls which burner?

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dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation

Map Interface Controls to Customer’s Model

Possible fixes?

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dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation

Administrativa

• Louis is running an iOS workshop this week/weekend (Thur/Friday/Sat/Sun)
  - please respond to poll on Piazza so he knows which slot to run it in

• Hi-Fi Prototype Assignment posted Thur
  - final prototype due 12/3
  - mid-way milestone is due on 11/19 just before Thanksgiving
  - key deliverables (final)
    - mobile/web UI based on HE report & CA feedback
    - native prototype sufficient to carry out usability test w/ target users
      completing your three tasks (unlike medium-fidelity)
      - mobile/web implementations need pre-approval from the teaching staff
    - look & feel of final application on target platform with good visual design
    - all of underlying functionality does not have to work
  - report (cumulative)
    - key deliverables (mid-way)
      - at least 1 of 3 tasks should work (you will demo)
      - 9-minute presentation describing how you got to the new design & current implementation status

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TEAM BREAK

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Metaphor

• Definition?
  - “The transference of the relation between one set of objects to another set for the purpose of brief explanation.”

• Lakoff & Johnson, Metaphors We Live By
  - “…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

• We can use metaphor in interface design to leverage existing conceptual models

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Desktop Metaphor

Suggests a conceptual model
- not really an attempt to simulate a real desktop
- a way to explain why some windows seemed blocked
- leverages existing knowledge about files, folders & trash

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Example Metaphors

- Global metaphors
  - personal assistant, wallet, clothing, pens, cards, telephone, eyeglasses
- Data & function
  - rolodex, to-do list, calendar, applications documents, find, assist
- Collections
  - drawers, files, books, newspapers, photo albums

How to Use Metaphor

- Develop interface metaphor tied to conceptual model
- Communicate that metaphor to the user
- Provide high-level task-oriented operations, not low-level implementation commands

Metaphor for Metaphor’s Sake

- If it doesn’t help, why have it?
- Skeuomorphism: “making items resemble their real-world counterparts” or “a physical ornament or design on an object made to resemble another material or technique”
- Argument against: takes up too much space & leads to inconsistent look
- Argument for: helps people learn

Is Consistent Always Better? NO

- Palm PDA example: should “new appointment” & “delete appointment” be in the same place?
- New (add) is common, but delete is not

Is Consistent Always Better? NO

- Streamlined design
- Early Palm design (like desktop version)

Firefox 3 Back/Forward Buttons
Ways of Being Consistent

- Interfaces should be consistent in a meaningful way
  - e.g., ubiquitous use of same keys for cut/copy/paste

- Types of consistency
  - consistent internally
    - e.g., same terminology and layout throughout app
  - consistent with other apps
    - ex. works like MS Word, uses keyboard conventions
  - design patterns (across many apps)
  - consistent with physical world

Summary

- Conceptual models
  - mental representation of how the object works & how interface controls effect it

- Design model should equal customer’s model
  - mismatches lead to errors
  - use customer’s likely conceptual model to design

- Design guides
  - make things visible
  - map interface controls to customer’s model
  - provide feedback

Further Reading

- Design of Everyday Things, Donald Norman
- Design as Practiced, Donald Norman
  - Talks about failure to make changes to Macintosh
- Computing the Case Against User Interface Consistency, Jonathan Grudin
  - Talks about why interfaces should not always be consistent

Next Time

- User Testing
- Readings
  - none
- Group HE assignment in this week’s studio
  - have your individual assignment with you & easily accessible electronically
- Next team assignment
  - High-fidelity Prototype
  - fix HE issues brought up by your evaluators
  - implement application on native platform (unless permission from us to do otherwise)
  - backends & other pieces can be faked as necessary