Conceptual Models & Interface Metaphors

Prof. James A. Landay
University of Washington

CSE 440
February 7, 2013

Interface Hall of Fame or Shame?

- Tabbed dialog for setting options in MS Web Studio
  - more tabs than space to display them
- Clicking on the right arrow once gives:

Interface Hall of Shame!

- Inconsistent display of possible tabs
  - where did the “Editor” tab go?
- Position of arrows awkward (split to each side?)
  - also, small targets near each other (Fitts’ Law)

Interface Hall of Fame or Shame?

Clear iOS App
By Realmac Software

Good
- discoverable gestures
- keeping things simple means gestures don’t cause unexpected problems
- logical hierarchy of items
- sounds & animations are pleasurable & beautiful → app is FUN

Bad
- does not have some features of major competitors (priorities, etc)
Video Review

- Video prototypes allow us to quickly communicate how a user will use a design
- Concept videos set up more of the story of use
- Both techniques are useful
- In this class we will focus more on concept videos (keep them to under 2 minutes!)

Design of Everyday Things

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

Conceptual Models

- 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)
  - online help and documentation can help, but shouldn’t be necessary

Affordances as Perceptual Clues

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

• Poorly-designed objects – no clues or misleading clues

French artist Jacques Carelman
Crazy design for a screw punch!

Refrigerator

Problem: freezer too cold, but fresh food just right

Refrigerator Controls

Normal Settings  C and 5
Colder Fresh Food  C and 6–7
Coldest Fresh Food  B and 8–9
Colder Freezer  D and 7–8
Warmer Fresh Food  C and 4–1
OFF (both)  0

What is your conceptual model?

A Common Conceptual Model

What if the two models don’t match?

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
  - ...

Notorious Example

Car Example

Design Guides

- Provide good conceptual model
  - customer wants to understand how UI controls impact 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

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

• Which is better for car dashboard speaker front / back control?
• Control should mirror real-world

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

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

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

Is Consistent Always Better? NO

• 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

Early Palm design (like desktop version) Streamlined design

Is Consistent Always Better? NO

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
  – consistent with other apps
    • e.g., 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
  – [http://www1.ics.uci.edu/~grudin/Papers/CACM89/CACM89.html](http://www1.ics.uci.edu/~grudin/Papers/CACM89/CACM89.html)

Next Time

• Visual Design
• Readings
  – Mullet & Sano, *Designing Visual Interfaces*, Ch. 2 and Ch. 5

• Web site assignment due
  – all remaining team work turned in by updating your site