USER INTERFACE DESIGN + PROTOTYPING + EVALUATION

Conceptual Models & Interface Metaphors

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CSE 440
February 7, 2013

Interface Hall of Fame or Shame?

Options
| Editor | Tabs | Debug | Compatibility | Directories | Workspace | Form | ◄ ► |

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

**Options**
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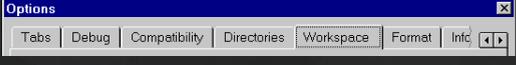
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Interface Hall of Shame!

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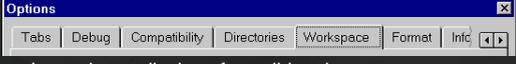
- Inconsistent display of possible tabs
  - where did the "Editor" tab go?
- Position of arrows awkward (split to each side?)
  - also, small targets near each other (Fitts' Law)

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Interface Hall of Fame or Shame?

Clear iOS App
By Realmac Software

Interface Hall of Fame or Shame?

Interface Hall of Fame!

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)

Clear iOS App
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Conceptual Models & Interface Metaphors

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Outline

- Review

- *Design of Everyday Things*

- Conceptual models

- Interface metaphors


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
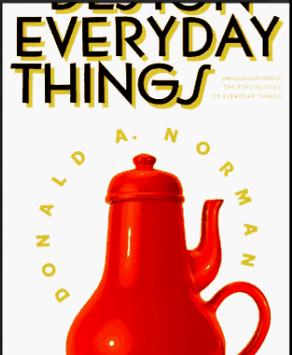
Conceptual Models

- *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

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Affordances as Perceptual Clues

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

Say Goodbye to the Grocery Store
Your Digital Items | Your Account | Help
GO   Cart   Your Lists

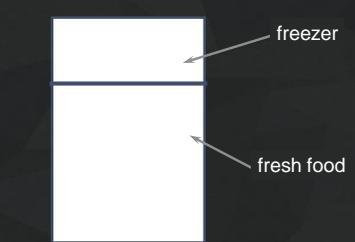**What affordances do you see here?**

Affordances as Perceptual Clues

- Poorly-designed objects
  - no clues or misleading clues

PULL UP

French artist Jacques Carelman
Crazy design for a screw punch!

Refrigerator

freezer

fresh food

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**

A   B   C   D   E   7   6   5   4   3

What is your conceptual model?

A Common Conceptual Model

A   B   C   D   E

cooling unit

7   6   5   4   3
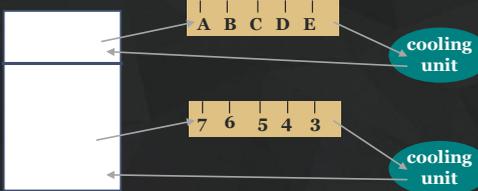
cooling unit

independent controls

Actual Conceptual Model

A   B   C   D   E

cooling unit

7   6   5   4   3
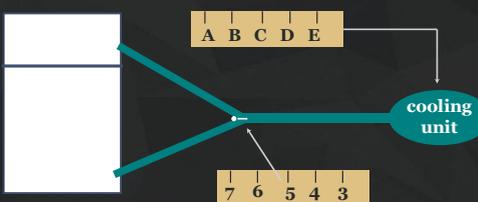
Can you fix the problem?

Possible solutions

- make controls map to customer's model
- make controls map to actual system

Design Model & Customer Model

Design Model

Customer Model

System Image

- 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
  - ...

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Notorious Example

Car Example
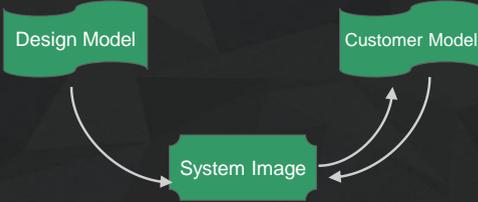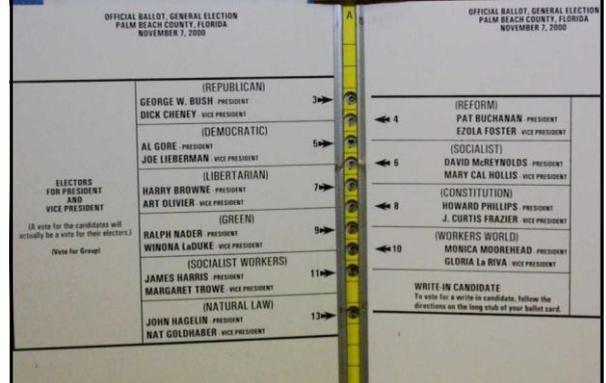

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Design Guides

- 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)

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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*

Dashboard

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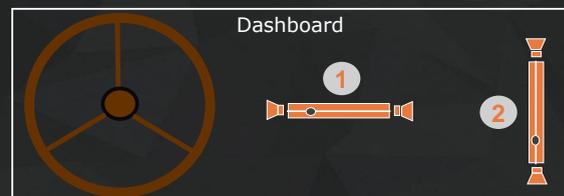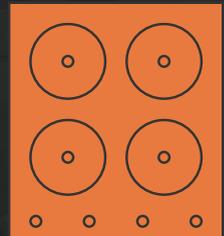
Map Interface Controls to Customer's Model

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

Mercedes Benz Seat Control

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Map Interface Controls to Customer's Model

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Map Interface Controls to Customer's Model

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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

Square Card Case

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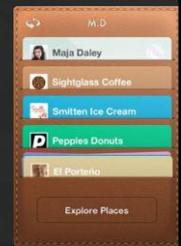
How to Use Metaphor

- Develop interface metaphor tied to conceptual model

- Communicate that metaphor to the user

- Provide high-level task-oriented operations, not low-level implementation commands
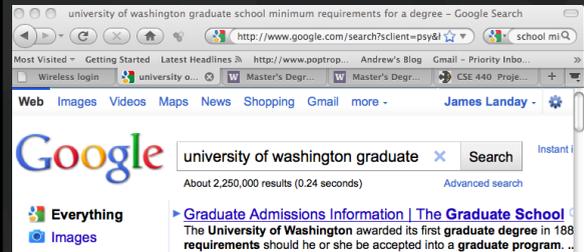
Is Consistent Always Better?   NO

- 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
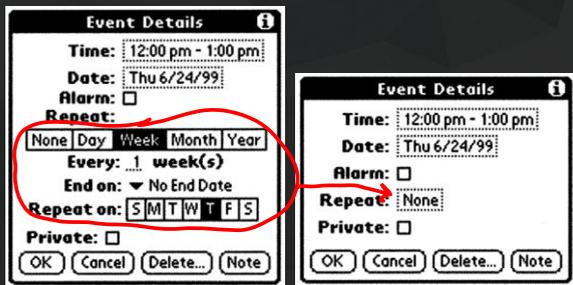
Is Consistent Always Better?   NO

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
    - 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
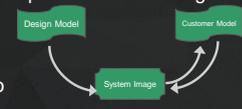
Further Reading

- *Design of Everyday Things*, Donald Norman

- Design as Practiced, Donald Norman
  - Talks about failure to make changes to Macintosh
  - http://www.jnd.org/dn.mss/Design_as_Practiced.html

- 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

Next Time

- Visual Design
- Readings
  - Mullet & Sano, D*esigning Visual Interfaces*, Ch. 2 and Ch. 5

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

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