

USER INTERFACE DESIGN + PROTOTYPING + EVALUATION

Conceptual Models & Interface Metaphors

Prof. James A. Landay
 University of Washington

Autumn 2012

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

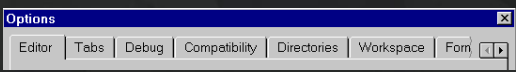
- Does not have features of major competitors (cloud, sync, multidevice)



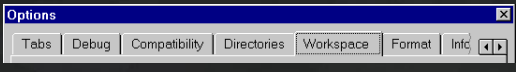
There are 3 navigation levels.

Clear iOS App
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Interface Hall of Fame or Shame?

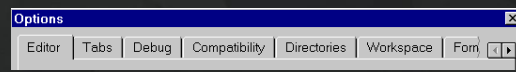


- Tabbed dialog for setting options in MS Web Studio
 - more tabs than space to display them
- Clicking on the right arrow once gives




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Interface Hall of Shame!



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



- 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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Outline

- Review
- *Design of Everyday Things*
- Conceptual models
- Interface metaphors

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Human Abilities Review

- Color can be helpful, but pay attention to
 - how colors combine
 - limitations of human perception
 - people with color deficiency
- Model Human Processor:
 - perceptual, motor, cognitive processors + memory
 - model allows us to make predictions
 - e.g., perceive distinct events in same cycle as one
- Memory:
 - three types: sensor, WM, & LTM
 - interference can make hard to access LTM
 - cues in WM can make it easier to access LTM
- Key time to remember:
 - 100 ms

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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



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Conceptual Models

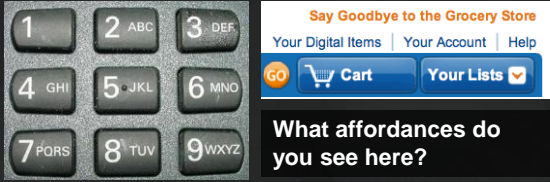
- *Mental representation of how an artifact works & how interface controls affect it*
- People may have preconceived models that are hard to change
 - (4 + 5) vs. (4 5 +)
 - dragging to trash?
 - deletes file but ejects disk
- Interface must communicate model
 - visually (& possibly physically or using 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)




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Affordances as Perceptual Clues

- Poorly-designed objects
 - no clues or misleading clues

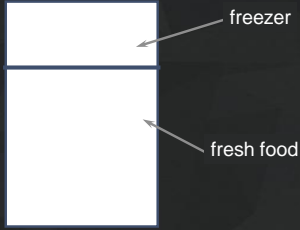


French artist Jacques Carelman
 Crazy design for a screw punch!



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Refrigerator




Problem: freezer too cold, but fresh food just right

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Refrigerator Controls

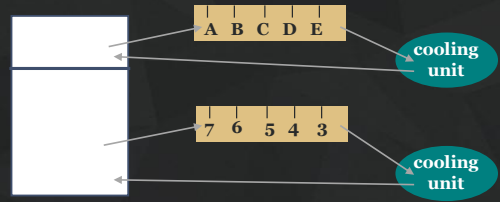
Normal Settings	C and 5
Colder Fresh Food	C and 6-7
Coldest Fresh Food	B and 8-9
Colder Freezer	D and 7-8
Warmer Fresh Food	C and 4-1
OFF (both)	0



What is your conceptual model?

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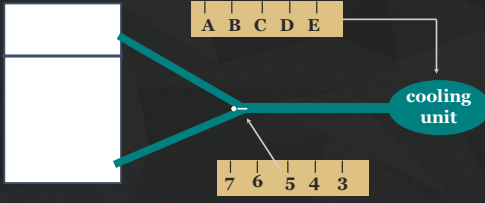
A Common Conceptual Model



independent controls

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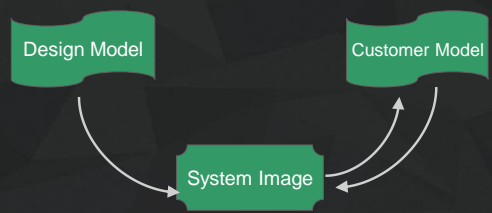
Actual Conceptual Model



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

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Design Model & Customer Model



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

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Conceptual Model Mismatch

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

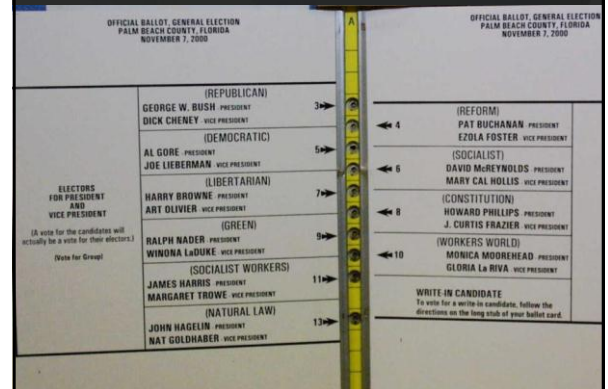


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Notorious Example



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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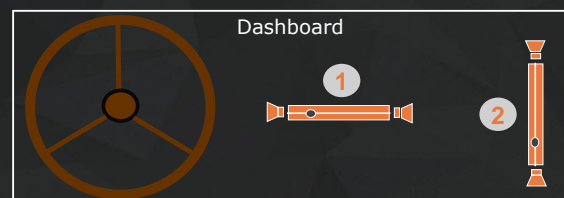
Make Things Visible

- 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*



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Map Interface Controls to Customer's Model



Map Interface Controls to Customer's Model



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

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



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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>

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Next Time

- Gestalt Principles (in class activity)
- Readings
 - Gestalt Principles from *Universal Principles of Design*
- Next Tuesday
 - Watch videos in class & critique

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