

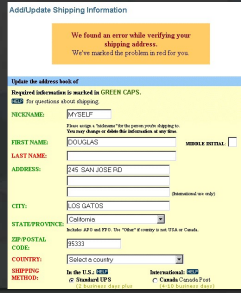
dt+UX DESIGN THINKING FOR USER EXPERIENCE DESIGN + PROTOTYPING + EVALUATION

Conceptual Models & Interface Metaphors

Prof. James A. Landay
 Computer Science Department
 Stanford University

Autumn 2018
 November 7, 2018

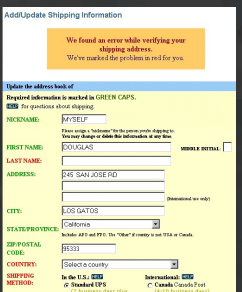
Hall of Fame or Shame?



We found an error while verifying your shipping address. We've marked the problem in red for you.

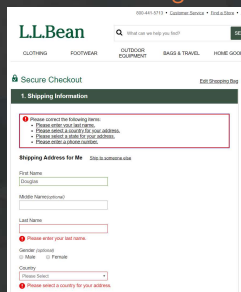
- Design based on a top retailer's site

Hall of 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

A Better Design




- Instructions at the top for all errors
- Redundant exclamation icons
- Changed color on boxes around input fields with errors
- Instructions on what to fix near each error

Hall of Fame or Shame?




- M-Pesa mobile payments
- Common in Africa

Hall of Fame or Shame?




- M-Pesa mobile payments
- Common in Africa

Hall of Fame or Shame?



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



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Outline

- *Design of Everyday Things*
- Conceptual models
- Team break
- Design guides for conceptual models
- Interface metaphors
- UI consistency


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, digital watches, & phones
- Resulting design guides
- Highly recommended



Conceptual Model

Def. 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

Affordances as Perceptual Clues

Well-designed objects have affordances


- clues to their operation
- often visual, but not always (e.g., speech)




What affordances do you see here?

Affordances as Perceptual Clues

Poorly-designed objects
 -no clues or misleading clues



French artist Jacques Carelman
 Crazy design for a screw punch!



Affordances as Perceptual Clues

Poorly-designed objects
 -no clues or misleading clues




Refrigerator



Problem: freezer too cold, but fresh food just right

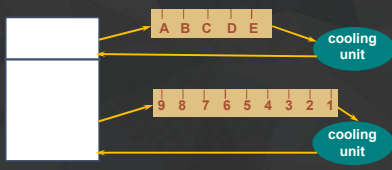
Refrigerator Controls

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



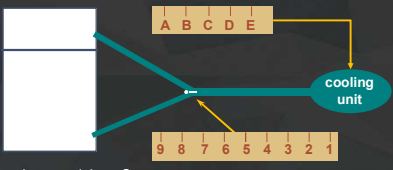
What is your conceptual model?
 Spend 30 sec. drawing a diagram showing your model
 - where the cooling units are & how they are controlled
 Share with your neighbor

A Common Conceptual Model



independent cooling units

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

```

    graph TD
      DM[Design Model] --> SI[System Image]
      CM[Customer Model] --> SI
    
```

- 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 Automatic Shifter

Administrivia

- Assignment #4 – Concept Video
 - A4 Slides: ✓-: 0% ✓: 60% ✓+: 40%
 - A4 Video: ✓-: 14% ✓: 58% ✓+: 28%
- Assignment #5 – Lo-fi Prototype & Test
 - A5 Writeup: ✓-: 2% ✓: 81% ✓+: 16%
 - A5 Group Presentation: ✓-: 2% ✓: 63% ✓+: 35%
 - A5 Individual Presentation: ✓-: 0% ✓: 35% ✓+: 65%
- Assignment #6 – Medium-fi Prototype
 - A6 Prototype: ✓-: 2% ✓: 70% ✓+: 28%
 - A6 Group Slides: ✓-: 2% ✓: 61% ✓+: 37%
- Quiz 1
 - Average: 4.1/5 points, Median: 4/5 points, Range: 2-5 points, Stdev: .5
- Quiz 2
 - Average: 4.3/5 points, Median: 5/5 points, Range: 2-5 points, Stdev: .8
- Quiz 3
 - Average: 3.5/5 points, Median: 4/5 points, Range: 1-5 points, Stdev: .8

Administrivia

Hi-Fi Prototype Assignment posted by Thursday

- mid-way milestone due on Thur/Fri Nov. 29/30 (at start of studio)
- final prototype due Thur/Fri Dec. 6-7 (at start of studio)
- final presentations at project fair, Fri Dec. 7, d.school, 6-9:30 PM (show starts at 6:30)

TEAM BREAK


Talk about how to build your hi-fi prototype

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 & they are not visible!



Make Things Visible




- Compare to controls on old car radio
 - #controls = #functions
 - controls are labeled (?) and grouped together

Make Things Visible



- Compare to controls on old car radio
 - #controls = #functions
 - controls are labeled (?) and grouped together

Make Things Visible



- Compare to controls on old 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

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

Mercedes Benz Seat Control

Map Interface Controls to Customer's Model

Problem?
Which knob controls which burner?

Map Interface Controls to Customer's Model

Possible fixes?

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 use metaphor in UI 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 overlapped
- leverages knowledge about files, folders & trash

Example Metaphors

- Global metaphors
 - personal assistant, wallet, clothing, pens, cards, telephone, eyeglasses
- Data & function
 - rolodex, to-do list, calendar, 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

Avoid Metaphor for Metaphor's Sake

- 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 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



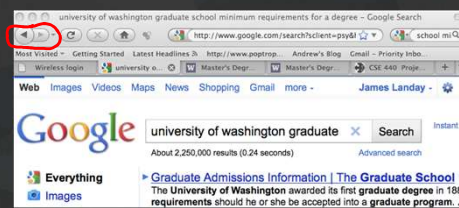
Is Consistent Always Better? NO



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 & layout throughout app
 - consistent with other apps
 - e.g., works like MS Word, uses same keyboard conventions
 - design patterns (across many apps)
 - consistent with physical world

Summary

- Conceptual model:
 - 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.ind.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://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.90.6480&rep=rep1&type=pdf>

Next Time

- Lecture
 - Monday: Usability Testing & Midterm Review
 - Wednesday: Midterm
- Studio
 - This week: Group HE (for a grade)
 - Next week: project work & feedback