Conceptual Models & Interface Metaphors

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Autumn 2022
November 9, 2022
Hall of Fame or Shame?

- Design based on a top retailer’s site

Add/Update Shipping Information

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

Required information is marked in GREEN CAPS.

NICKNAME: MYSELF

FIRST NAME: DOUGLAS

ADDRESS: 245 SAN JOSE RD

CITY: LOS GATOS

STATE/PROVINCE: California

ZIP/POSTAL CODE: 95033

COUNTRY: Select country

SHIPPING METHOD: In the U.S. (Standard UPS) / International (DHL)

1-2 business days / 4-10 business days
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
1. Instructions at the top for all errors
2. Redundant exclamation icons
3. Changed color on boxes around input fields with errors
4. 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

https://techweez.com/2017/04/27/is-our-over-dependence-on-mpesa-a-dangerous-move-can-something/
• M-Pesa mobile payments
• Common in Africa

• Simple UI but brings banking services to the unbanked!

• Good example of H12 – Value Alignment & Inclusion
Conceptual Models & Interface Metaphors

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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)

Gibson: “actionable possibilities”
Affordances as Perceptual Clues

Poorly-designed objects
- no clues or misleading clues

Jacques Carelman, *Catalogue d’Objets Introuvables*
Crazy design for a screw punch!
Affordances as Perceptual Clues

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Affordances as Perceptual Clues

Poorly-designed objects
– no clues or misleading clues

http://alistapart.com/article/flat-ui-and-forms
Refrigerator

Problem: freezer too cold, but fresh food just right
Refrigerator Controls

Normal Settings
Colder Fresh Food
Coldest Fresh Food
Colder Freezer
Warmer Fresh Food
OFF (both)

What is your conceptual model?
Spend 60 sec. drawing a diagram showing your model
- where the cooling units are & how they are controlled
Share with your neighbor & put a picture in the slack channel
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

- Customers get model from prior experience & usage of new
  - 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
  - ...

Autumn 2022
dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation
Model Mismatch: Car Automatic Shifter
Model Mismatch: Windows 10 Bluetooth

- Is Bluetooth on or off?
- Often switches show the state that sliding towards will execute

Example and images from https://www.nngroup.com/articles/two-ux-gulfs-evaluation-execution/
Model Mismatch: Windows 10 Bluetooth

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Model Mismatch: Windows 10 Bluetooth

• Is Bluetooth on or off?
• Often switches show the state that sliding towards will execute
• We see how it works when we see several switches

Notifications

- Get notifications from apps and other senders: On
- Show notifications on the lock screen: On
- Show reminders and incoming VoIP calls on the lock screen: On
- Hide notifications when I’m duplicating my screen: Off
- Show me the Windows welcome experience after updates and occasionally when I sign in to highlight what’s new and suggested: On
- Get tips, tricks, and suggestions as you use Windows: On

Example and images from https://www.nngroup.com/articles/two-ux-gulfs-evaluation-execution/
Model Mismatch: Windows 10 Bluetooth

• Is Bluetooth on or off?
• Often switches show the state that sliding towards will execute
• We see how it works when we see several switches

The system state is **visible**, but we fail to **evaluate** the state correctly

Example and images from [https://www.nngroup.com/articles/two-ux-gulfs-evaluation-execution/](https://www.nngroup.com/articles/two-ux-gulfs-evaluation-execution/)
Gulf of Evaluation & Gulf of Execution

reduce the gulf through design

Gulf of Evaluation
What’s the current system state?

Gulf of Execution
How do I use this system?

Example and images from https://www.nngroup.com/articles/two-ux-gulfs-evaluation-execution/
Gulf of Evaluation & Gulf of Execution

reduce the gulf through design

- Bluetooth & other devices
  - Add Bluetooth or other device
    - Bluetooth
      - Off
  - Mouse, keyboard, & pen
    - Dell KB216 Wired Keyboard

Example and images from https://www.nngroup.com/articles/two-ux-gulfs-evaluation-execution/
Administrivia

• Hi-Fi Prototype Assignment posted later today or tomorrow
  – mid-way milestone due on Thur/Fri Dec. ½ (at start of studio) including report draft
  – video demo due Wed. Dec. 7\textsuperscript{th} at 11:59 PM
  – final prototype due Thur./Fri. Dec. 8-9 (at start of studio)
  – final presentations at project fair, Fri. Dec. 9, 6-9 PM
    (arrive at 5:30 PM to setup)
  – final write-up due Sun. Dec. 11, 11:59 PM

• Midterm Wednesday, Nov. 16\textsuperscript{th} (\textit{review session in 2\textsuperscript{nd} half of class next Monday})
  – if you sent us OAE letter, you should get email from us about exam accommodations

• If you aren’t in CS47 & want to learn React Native
  – see CS147 home page for links to CS47 assignments 1-4 & Lectures 1A-6B

• CS194H this Spring on Mon./Wed.1:30-3:20 pm
  – continue your project or join another one & get it to app store quality
  – practice design principles individually w/ crit
  – meets senior project requirement
  – slower pace than 147
  – small size w/ feedback from me & a very experienced TA
TEAM BREAK

Talk about how to build your hi-fi prototype
EXIT TICKET

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 1..9 dial something about percentage of cooling between the two compartments?

- Functions available on watch w/ 4 buttons? Is there an issue?
  - too many & they are not visible!
Make Things Visible

- Compare to controls on old & new car radios
  - #controls = #functions
  - controls are labeled (mostly) and grouped together
Make Things Visible

- Compare to controls on old & new car radios
  - #controls = #functions
  - controls are labeled (?) and grouped together
Make Things Visible

- Compare to controls on old & new car radios
  - #controls = #functions
  - controls are labeled (?) and grouped
  - 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 maps to real world
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 everyday 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

Engelbart’s windows

In today’s Emacs
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

Xerox PARC’s overlapping windows
Example Metaphors

- Global metaphors
  - personal assistant, wallet, clothing, cards
- Data & function
  - 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
Avoid Metaphor for Metaphor’s Sake

• Metaphors can become dated

iPhone metaphors dated?

iPad Podcast app – ever seen a reel-to-reel tape deck?
Ways of Being Consistent

• Interfaces should be consistent in a *meaningful* way
  – e.g., ubiquitous use of same keys for cut/copy/paste
  – H4: Consistency & Standards

• 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
  – consistent with physical world
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?  

Firefox 3 Back/Forward Buttons
Is Consistent Always Better?  NO

Most Recent Firefox Back/Forward Buttons
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?
  - provide good conceptual model
  - 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
  - [https://www.semanticscholar.org/paper/The-Case-Against-User-Interface-Consistency-for-can-Jonathan-Grudin/71cc342910a4add7ee522c5510769a1c51df2ebd](https://www.semanticscholar.org/paper/The-Case-Against-User-Interface-Consistency-for-can-Jonathan-Grudin/71cc342910a4add7ee522c5510769a1c51df2ebd)
Next Time

• Lecture
  - Monday: Usability Testing/Midterm Review
  - Wednesday: Midterm

• Studio
  - This week: HE group assignment, Midterm Q&A
  - Dec. 1 & 2: Hi-Fi Prototype Midway Milestone