DESIGN PRINCIPLES
SO FAR...

getting the right design  getting the design right

Brainstorming
Information gathering
Prototyping: tasks
TODAY

• Conceptual/mental models
• Design principles
  – Norman’s principles
  – Nielsen’s heuristics
Interface

INTERFACE

user

system
Interface

INTERFACE

transparency

user

system
Interface

 INTERFACE

 user

 transparency

 control

 system
Design model

user

INTERFACE

system

designer knows exactly how it works
Conceptual model

Conceptual models are mental representation of how something works.
Conceptual models depend on the user and the interface.
Conceptual model

problems occur when these do not match
Example: Flawed conceptual model

Let’s say:
Freezer is too cold and fresh food is just right.
I want to make just the freezer warmer
Example: Flawed conceptual model

Let's say: Freezer is too cold and fresh food is just right. I want to make just the freezer warmer

hint: instructions - already a bad sign!
Example: Flawed conceptual model

Two compartments, two controls

INTERFACE
Example: Flawed conceptual model

The Freezer Control controls the freezer temperature and the Fresh Food Control controls the fresh food temperature.
Example: Flawed conceptual model

system
Flawed conceptual models...

result in wrong actions!
A problem with feedback

Seeing the results of wrong actions will take time...
Design principles

how do we match these?

INTERFACE

system

user

system

University of Washington
Design principles
Don Norman, Design of Everyday Things.

Affordances
Visibility
Constraints
Mapping
Metaphors
Consistency

important concepts for understanding
Norman’s design principles
Affordances

• Visual clue to interaction
  – knobs afford turning
  – levers afford moving
  – buttons afford pushing
Pull or push?
Pull or push?
Pull or push?
Pull or push?
Pull or push?
Pull or push?
Pull or push?
Pull or push?
Affordances

• Visual clue to interaction
  – knobs afford turning
  – levers afford moving
  – buttons afford pushing

Handles afford pulling
Using a flat plate would constrain the user to push
Affordances

DO NOT PRESS!
Affordances

DO NOT PRESS!
Affordances
Affordances

• Visual clue to interaction: what a thing communicates about how it can be used, often by its appearance

Design principle: Make affordances clear and accurate
Affordances

• Visual clue to interaction: what a thing communicates about how it can be used, often by its appearance
Visibility

• Phone: How do you put someone on hold? How do you change volume?
Visibility

• 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
Knowledge in the world

[Image of 12 penny designs labeled A to O]
Constraints
Constraints
Constraints
Constraints
Mappings

Correspondence between an interface and action in ‘the world’
Mappings
Mappings
Mappings
Mappings
Mappings
Metaphors

• Suggest a conceptual model

• Desktop metaphor
  – Not an attempt to simulate a real desktop
  – Leverages knowledge of files, folders, trash
  – Explains why some windows seem hidden
Consistency

• Ubiquitous use of same keys for cut/copy/paste

• Types of consistency
  – Internal (same terminology/layout)
  – External
    • consistent with other apps
    • common widget appearance
    • design patterns (across many apps)
    • consistent with physical world
Standardization

• If all else fails, standardize
  – fewer things to memorize, reduced learning time, adapt to new situations faster

keyboard layout not optimal, but standard
Norman’s Seven Principles for Design

• Provide a good conceptual model
• Make things visible
• Get the mappings right
• Exploit the power of constraints
• Design for error
• Provide feedback in response to actions
• When all else fails, standardize
Nielsen’s heuristics

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help recognize, diagnose, and recover from errors
- Help and documentation

Note overlaps with Norman’s principles
Exercise: Discuss design principles
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Task review critiques

• Maya
  – Success in a course
  – Food spoilage
  – Relationships
  – Sunlight

• Matt
  – Drugs
  – Eldercare
  – GI symptoms

• King
  – Alcohol
  – Habits
  – Pet informatics

• Brad
  – Decision making
  – Mood factors
  – Speech

Start thinking about team names!