Design of Everyday Things
- Donald Norman

CS A470

Overview

- Why are some everyday things difficult to understand and use?
- What are Don Norman's principles and how do they apply to the design of everyday things?
- How can we apply Norman's principles to the design of computer interfaces?

Psychopathology of Everyday Things

- We are surrounded by many everyday things that have poor *usability*
  - Programming a VCR
  - Telephone features we can't remember how to use
    - How to change the remote access code?
  - Photocopiers and fax machines
    - Face down or face up?
- Many of these things can be difficult to interpret and frustrating to use if they provide no clues or false clues as to how they operate

Why is usability important?

- poor usability results in
  - anger and frustration
  - decreased productivity in the workplace
  - higher error rates
  - physical and emotional injury
  - equipment damage
  - loss of customer loyalty
  - costs money

What is usability?

Usability is a measure of the **effectiveness**, **efficiency** and **satisfaction** with which specified users can achieve specified goals in a particular environment.

- ISO 9241
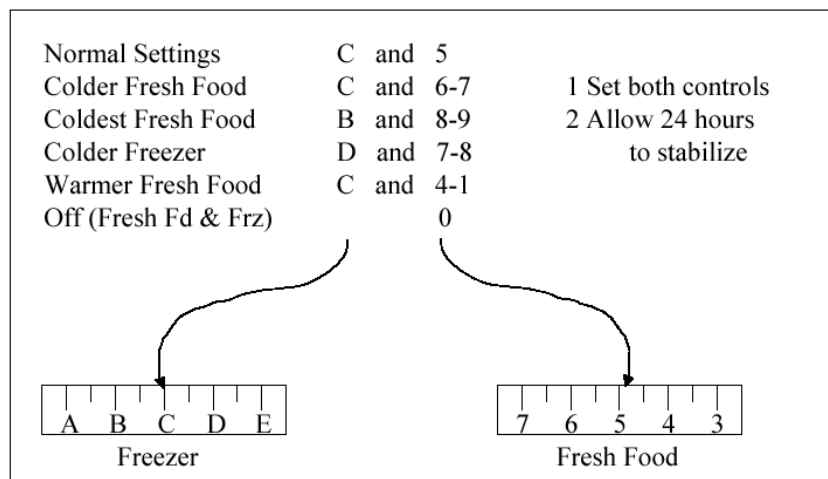
Examples of Poor Design

- Trapped between doors!
- Handles **afford** pulling
- Using a flat plate would **constrain** the user to push

Examples of Poor Design

- Wireless Powerpoint slide controller
  - Short press to go forward
  - Long press to go backward
- Refrigerator temperature control
  - Two compartments and two controls
  - One cooling unit

Temperature Control

Normal Settings	C and 5	
Colder Fresh Food	C and 6-7	1 Set both controls
Coldest Fresh Food	B and 8-9	2 Allow 24 hours
Colder Freezer	D and 7-8	to stabilize
Warmer Fresh Food	C and 4-1	
Off (Fresh Fd & Frz)	0	

A   B   C   D   E
Freezer

7   6   5   4   3
Fresh Food

Norman's Principles of Design

- Make things visible
- Provide a good conceptual model
  - Affordance
  - Mapping
  - Constraints
  - Feedback

Visibility

- The correct parts must be visible and they must convey the correct message
- Natural signals are naturally interpreted
- Visibility problems occur when clues are lacking or exist in excess
- Just by looking the user should know
  - State of the system
  - Possible actions
- Don't violate these principles to make something "look good"!

How fast are we going?

The well-trodden path

Please Push Slowly!

- Wonder why doors are made out of glass?

Evidently someone was smacked…


The case of the mistaken urinal

Good Conceptual Model

- A good conceptual model allows us to predict the effects of our actions
- Without a good model we operate blindly
  - Simply follow rules without understanding a reason
  - No understanding of cause or effect
  - No recourse when something breaks

Affordances

- The affordances of an object determine, naturally, how it can be used
  - Button affords pushing
  - Handle affords grasping
  - Chair affords sitting
  - Knob affords turning
- Just by looking at the object, a user should know how to use it
  - Example: The doors with handles to push, mop sink

Affordance of this Handle?
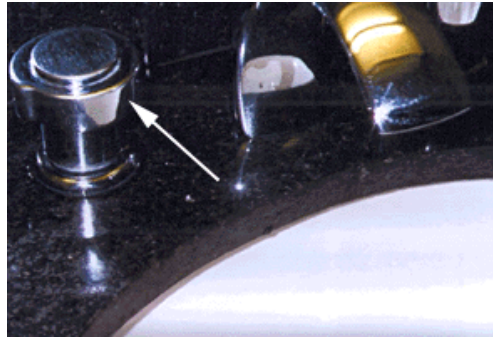
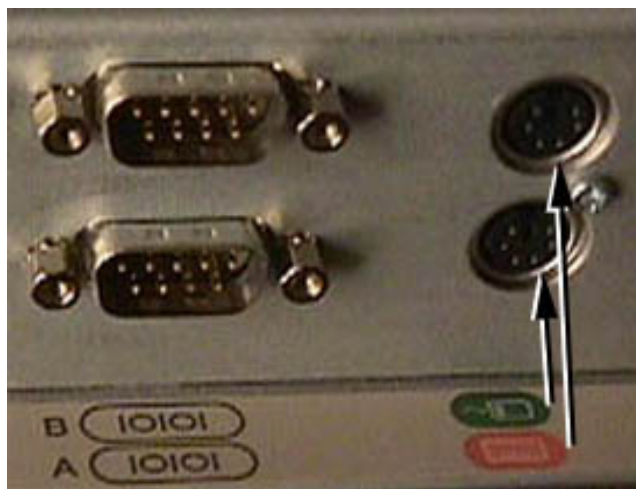Difficult to get a grip when slippery

How do you open this drawer?

Mapping

- Controls and displays should exploit natural mapping
- Natural mapping takes advantage of physical analogies and cultural standards
  - Physical: Steering wheel
  - Cultural: red means stop, green means go

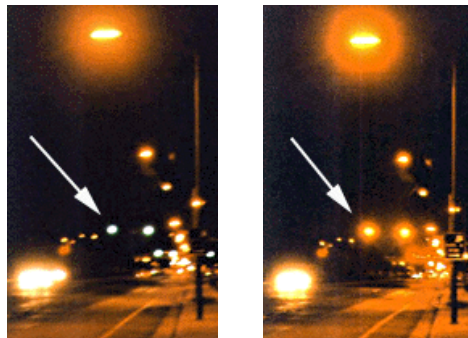# Mouse or Keyboard?

What Knob Goes Where?
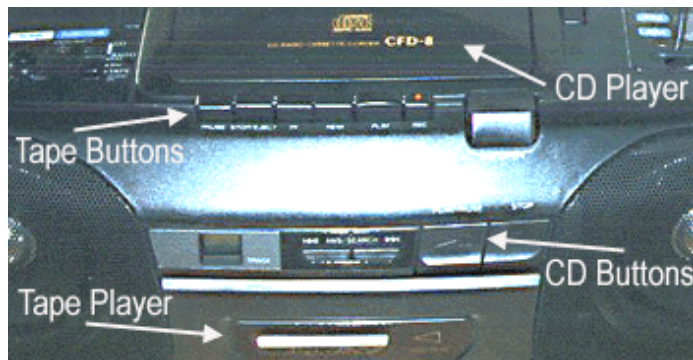

Exploiting Natural Mapping

Yellow Street Lights

- Possible to confuse with stoplight

How do you play the CD?
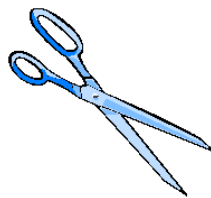
How do you turn on the shower?

- Must reach down where the water comes out and pull down!

Instructions!

Constraints

- Constraints limit the ways in which something can be used
- Constraints can be
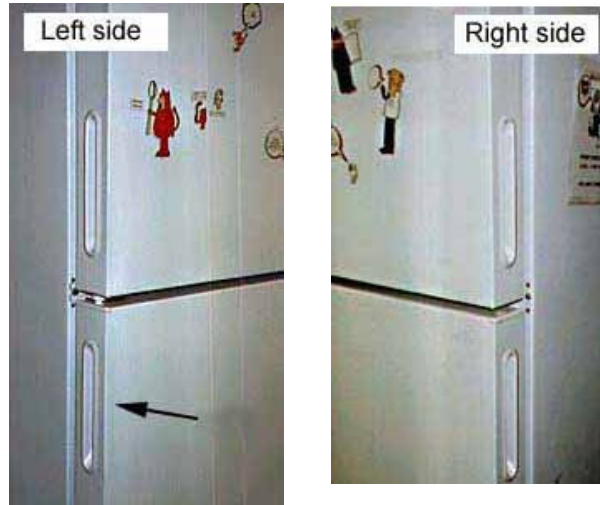 - Physical
  - Semantic
  - Cultural
  - Logical

Paper scissors   Barber scisssors

On which side does the door open?

How do you open this package?

- If you are like me, by ripping it open

But that will dry out the wet pack – the proper way is to use the flap

Remove tearable perforations at top, add hand or more attention to location of flap

Feedback

- Feedback is sending back to the user information about what action has actually been done
- Visibility of the effects of the operation tell you if something worked correctly
- Systems should be designed to provide adequate feedback to the users to ensure they know what to do next in their tasks

Feedback Examples

- Telephone button press tones
  - Telephone clicks
- Rice cooker goes "bing!"
- Clicker on your turn signal
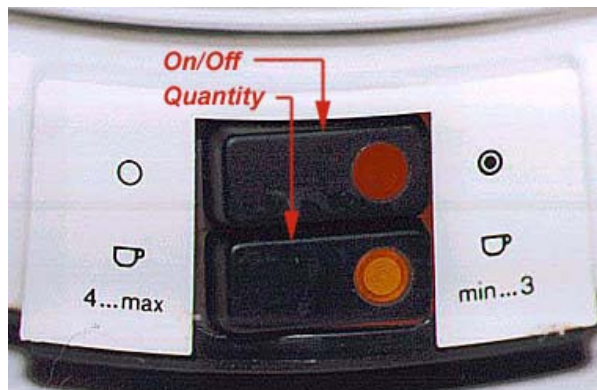- Animated icon while waiting for a web page to load

VCR Feedback

- Did I really set it correctly to record at 8PM on Tuesday?
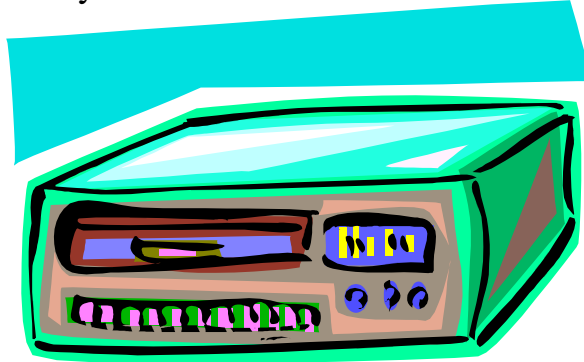
More or Less Coffee?

- Does the light on the bottom indicate 4-max cups, or min-3 cups?

On=min to 3

Norman's Principles in Software

- Visibility
  - Visibility of the tasks the interface supports
  - Communication of system state / mode
- Affordance
  - If it looks like a button it can be pressed, if it is a underlined it can be clicked (web)
- Mapping
  - Clicking on a particular interface element produces expected effect (under F)ile should be O)pen)

Norman's Principles in Software

- Constraints
  - Constraining search criteria, graying out menu items that don't apply in a particular context
- Feedback
  - Providing clear and immediate feedback for each user action

Larson's dog effect

Same with Software

Thank you for registering! We appreciate your business. To activate your software, you will be sent an email key. After you have received the key then you will be able to click here and you can then proceed with the activation process.

Blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah click here blah blah blah blah blah blah blah blah blah blah blah

Summary

- Usability problems are common
- If there are usability problems in everyday "simple" things, the challenge is 100-fold for complex software
- Usability problems can be overcome through attention to design and addressing studies from HCI

References

- The Design of Everyday Things
  - By Donald Norman
- Bad Design Studies

  http://www.baddesigns.com
- Usability Studies

  http://www.useit.com/

Sources for examples:
  Sachen Macdonald, Univ. of Victoria
  Dey Alexander, Monash University