Designing Everyday Things

Norman in 90*

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*um...errr...80 actually, but that is less alliterative

Agenda

Your reactions to Norman
Frameworks for understanding interaction
Norman's heuristics as design advice
Understanding Errors
Don Norman

http://www.jnd.org/  
Professor of CS and Psych  
Northwestern University

Nielsen Norman Group  
Formerly  
HP  
Apple  
UCSD  
Writes A LOT!!

Your thoughts

What did you pick up from the book?
My thoughts

Good examples
  car
  VCRs
  watches
  Doors
  Let’s modernize the examples

But... relatively few computing examples

Examples of good and bad

Travel is inspirational

The microwave in our apartment in Australia
Alarm clocks

There is hope: My beard trimmer

Apply this to USB?
Interaction models

Understand whole interaction cycle

Explain interaction characteristics
why do problems arise

Two models
Norman
DFAB

Execution-Evaluation cycle

Norman (DOET, p. 46)
Simple idea

7 stages
Graphically

Interaction framework

Abowd & Beale (DFAB, p. 128)

4 languages and translations
Graphically

Norman’s formative rules

Create effective mental models
Make appropriate functionality visible
Use natural mappings
Use affordances
Use constraints
Provide feedback
Memory in the world vs. in the head
Recognition over recall
Design with errors in mind
Designers are not users

“I’m a human, after all.”

Real customer not always end-user

The challenges of design
  features, aesthetics, cost

Natural mappings

Predictable link between action in the world and the consequences
Example: Toaster Ovens

Affordances

Perceived properties

Relationship between person and object and interaction

Combination of good visibility, natural mapping, constraints, feedback
Constraints

Convey possible / appropriate actions
- physical (floppy disk, keys)
- semantic (menu graying)
- cultural (red/green)
- logical (spatial)

Example: USB interface

Designing for Error

The myth of the perfect system

To err is human

Making mistakes is part of learning
What can we do?

Prevent errors

Identify and understand

Recover from errors

User-Computer Dialog

Three phases

Read-scan phase -- Perceptual errors

Think phase -- Cognitive errors

Respond phase -- Motor errors
Perceptual Errors

Result from insufficient or poor perceptual cues
- Display of objects that are visually similar
- Invisible or poorly expressed states
- Failure to capture user’s attention
- Lack of perceivable feedback

Cognitive Errors

Caused by taxing the memory and problem solving capabilities
- Tax recall memory
- Lack of or poor mnemonic aids
- Inconsistency
- Lack of context or status info
  e.g., where came from in a menu
- Mental calculations and translations
Motor Errors

Taxing the eye-hand coordination and motor skills

Awkward motor movements
Highly similar motor sequences
e.g., double click, click
Pressure for speed
Require a high degree of hand-eye coordination
Requiring special types of motor skills (type)

Slips and Mistakes

What’s the difference?
Slips and Mistakes

Slips
- skilled behavior

Mistake
- incorrect mental model
- learning

Moral ...

... slips happen
Types of Slips

1. Capture error - Continue frequently done activity instead of intended one (similar starts)
   Confirm deletion of file instead of cancel

2. Description error - Intended action has much in common with others possible (usually when distracted, close proximity)
   ctrl key & caps lock key / Sun & Mac

3. Data driven error - Triggered by arrival of sensory info which intrudes into normal action
   Call to give someone a number, dial that number instead

4. Associative activation - Internal thoughts and associations trigger action
   Phone rings, yell “come in”
Types of Slips

5. Loss of activation - Forgetting goal in middle of sequence of actions
   Start going into room, then forget why you’re going there
6. Mode errors - Do action in one mode thinking you’re in another
   Delete file, but you’re in wrong directory

Minimizing Error

Design to human capabilities
Appropriate representation
Better feedback
   (mode and capture slips)
Minimize modes
Minimizing Error (cont.)

Distinguish objects
(description slips)
Constraints
Avoid false understanding - assist learning

Recover from errors

Detection - Feedback
Comprehension
Recovery strategy
Implications for design

Scenarios can be used to locate potential error-prone situations
Distinguish between skilled errors and learner errors
Uncover errors in the existing system
  how do people self-monitor (cheat sheets)
Don’t forget closure
  e.g., email attachments