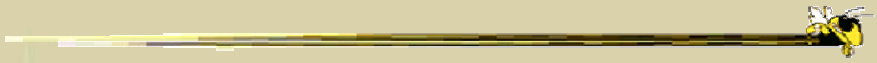
Designing Everyday Things



*Norman in 90**

Gregory D. Abowd

**umm…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

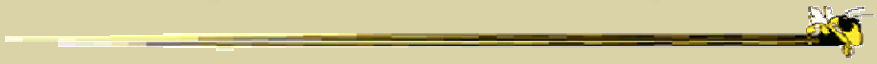
Graphically

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

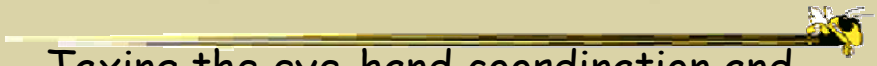
- Display of objects that are visually similar
- Invisible or poorly expressed states
- Failure to capture user's attention
- Lack of perceivable feedback

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

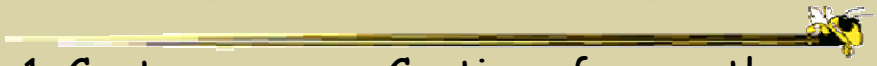
Slips
- skilled behavior

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

Types of Slips

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