

# Mental Models

Jeff Offutt

<http://www.cs.gmu.edu/~offutt/>

SWE 632

User Interface Design and Development

Cooper, Ch 2

## Three Models for Interfaces

Mental : Users'  
perception of  
reality

Manifest : How the  
machine represents  
the implementation to  
the user

Implementation : How a machine,  
virtual or otherwise, is actually  
built

## Example: Driving a Car

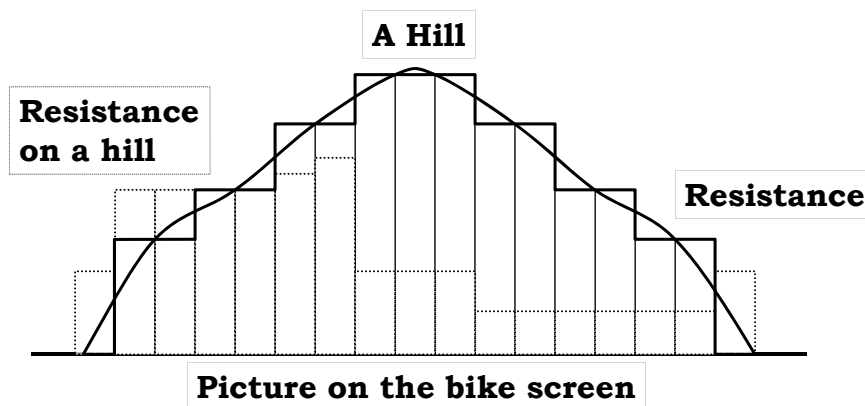
- When we push the gas pedal, the car goes faster
  - Mental : Pushing makes it go faster
  - Implementation : More gas to the engine, more pressure, pistons go faster, tires go faster ...
- When we turn the wheel, the car turns
  - Mental : Turning the wheel turns the tires
  - Implementation : Turning the wheel turns something else (with the help of a motor for power steering), which causes something else to turn, which puts the tires into a different angle

2-Feb-11

© Jeff Offutt, 2001-2011

3

## Stationary Bicycles at the Gym



2-Feb-11

© Jeff Offutt, 2001-2011

4

## Manifest Model

- The manifest model is more significant in software than in other engineering artifacts
- Example:
  - Implementation : Network protocols
  - Manifest : Local disk
  - Mental : Files

2-Feb-11

© Jeff Offutt, 2001-2011

5

## User Interfaces

Telephones : I want to call Mom, not 1-606-XXX-XXXX

Compile : I want to Run my program, not compile, link, run

File Manager : Dragging a file from window to window is:

- Move on disk
- Copy from disk to diskette

Calendars : Scrolling is better than paging

**Interfaces should conform to the user's  
mental model**

2-Feb-11

© Jeff Offutt, 2001-2011

6

## UIs and Mental Models

- Predicting storms
  - Does the prediction “30% chance of snow” mean
    - It will snow in 3 of 10 locations in the area
    - Less snow than if 50% chance, but more than if 10%
    - On 3 days out of 10 with these “weather conditions,” it has snowed in the past
- Dice
  - If I roll a 6 five times in a row, what is the probability that my next roll will be a 6 ?
- Patriotweb
  - Login-Faculty&Advisor-Summary Class List-Submit-Submit ... Roster ...
  - I expect : Faculty&Advisor-Summary Class List-Submit-Submit ... Roster ... but no!

2-Feb-11

© Jeff Offutt, 2001-2011

7

## Typical Paging Calendar

Jan Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

This makes perfect sense ... for a paper calendar

2-Feb-11

© Jeff Offutt, 2001-2011

8

## Scrolling Calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	Feb 1	2	3	4	5	6
7	8	★ 9	10	11	12	13
14	15	16	17	18	19	20

A vertical scroll bar is positioned on the right side of the calendar grid, with the word "scroll" written vertically inside it.

This is closer to the user's mental model

2-Feb-11

© Jeff Offutt, 2001-2011

9

## Mental Model Summary

- Engineers are very comfortable thinking in terms of the implementation model
- Users are **not**

**Adapting to users mental models  
causes cognitive dissonance**

2-Feb-11

© Jeff Offutt, 2001-2011

10