“Darn these hooves! I hit the wrong switch again! Who designed these instrument panels, raccoons?”
Conceptual Models

The designer expects the User’s Model to be identical to the Design Model.

User’s model is created through interaction with the system!

All communication takes place through the system image!
The Principle of Mapping

• Mapping is the relationship between two things.
  – Between the controls and their movement and the results in the real world.

• Natural mapping leads to immediate understanding!

• Example - Steering a car
  – Turning the steering wheel turns the car
  – The choices are visible, closely related to the desired outcome, and provide immediate feedback
Principle of Feedback

- Feedback - *sending* information *back* to the user about what action was actually happened *and* what result has been accomplished…
  - Imagine talking to someone when you cannot hear your own voice, or
  - Try drawing a picture with a pencil that leaves no mark.
The Paradox of Technology

• Technology offers the potential to make life easier and more enjoyable; each new technology provides increased benefits.
• However, added complexities arise to increase our difficulty and frustration.
• *Whenever the number of functions and required operations exceeds the number of controls, the design becomes arbitrary, unnatural, and complicated!*  
  – Digital watch, microwave…
How People Do Things

The Seven Stages of Action

1. Goals
2. Intention to act
3. Sequence of actions
4. Execution of the action sequence
5. Evaluation of interpretations
6. Interpreting the perception
7. Perceiving the state of the world

The World
Gulf of Execution

- The difference between the *intentions* and the *allowable actions*.
- A measure of this “gulf” is how well the system allows the person to do the intended actions directly.
Gulf of Evaluation

- The amount of effort that the person must exert to interpret the physical state of the system and to determine how well the expectations and intentions have been met.

- The *gulf is small* when the system provides information about its state in a form that is easy to get, is easy to interpret, and matches the way the person thinks of the system.
The *Gulfs* are everywhere...

- The difficulties are usually unremarked and invisible!
- The users either
  - Blame themselves (things they believe they should be capable of using, such as water faucets, refrigerator temperature controls, stove tops, etc.), or
  - Decide that they are incapable of operating the pesky devices (sewing machines, washing machines, digital watches, digital controls on household appliances, VCRs, etc.)
Using the Seven Stages to Ask Design Questions

Can you determine the function of the device?

- Can you tell what actions are possible?

- Can you determine mapping from intention to physical movement?

- Can you perform the action?

- Can you tell if the system is in the desired state?

- Can you determine the mapping from system state to interpretation?

- Can you tell what state the system is in?
Principles of Good Design

• **Visibility**
  By looking, the user can tell the state of the device and the alternatives for action.

• **A good conceptual model**
  The designer provides a good conceptual model for the user, with consistency in the presentation of operations and results and a coherent, consistent system image.

• **Good mappings**
  It is possible to determine the relationships between actions and results, between the controls and their effects, and between the system state and what is visible.

• **Feedback**
  The user receives full and continuous feedback about the results of actions.
The Psychology of Everyday Actions
Beginning Primers

Donald Norman


The Invisible Computer, MIT Press, 1998

Emotional Design: Why we love (or hate) everyday things, Basic Books, 2004

© BBuckley, Spring 2005