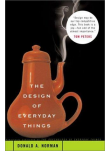


Design - not just software



2006 Benjamin Franklin Medal
in Computer and Cognitive Science

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1

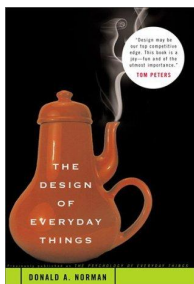
Design for software and beyond



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

2

Design for software and beyond



Don Norman's principles of design:

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

3

Don Norman's design principle: **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"!

4

Don Norman's design principle: **Visibility**



Visibility problems occur when clues are lacking or **exist in excess**.

Larson's dog effect



5

Don Norman's design principle: **Visibility**



Visibility problems occur when clues are lacking or **exist in excess**.

Larson's dog effect works 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 blah
blah blah blah blah blah blah blah [click here](#) blah blah blah blah
blah blah blah blah blah

6

Don Norman's design principles



Provide a Good Conceptual Model (Metaphor)

- 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

Name several good conceptual models used in software.

Apple's desk top model

iBook's book shelf model.

7

Don Norman's design principles



Affordances

Afford – provide naturally as in
"The sun affords warmth to the Earth."

- 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: A door with handles means to pull.

8

Don Norman's design principles

Affordances and Constraints

Example of poor door design!

People get trapped between the two doors!

You need to pull on one side and push on the other.



Handles **afford** pulling.

Handles provide
pulling naturally.

Using a flat plate would **constrain** the user to push.

Constraints limit the ways in which something can be used.

Constraints can be

- Physical
- Semantic
- Cultural
- Logical



9

Don Norman's design principles

Affordances

Example of poor desk design!

How do you open this drawer?



The handle in left image is to pull the section of the desk out.



10

Don Norman's design principles



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

11

Don Norman's design principles

Poor design due to poor Mapping

Where do you plug in the mouse?



12

Don Norman's design principles

Poor design due to poor Mapping

Which control turns on which burner?



13

Don Norman's design principles



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.

14

Don Norman's design principles



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.

Name some examples of poor feedback.

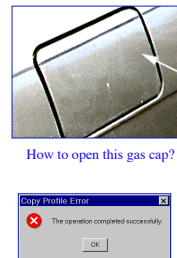
15

Where do these go wrong?

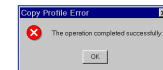
Mapping Visibility Feedback Affordances



This handle unfastens the seat from the floor.



How to open this gas cap?



Win NT Dialog



Set to 5 minutes?

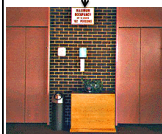


How to turn on this stove?

16

Where do these go wrong?

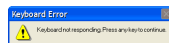
Mapping Visibility Feedback Affordances



Sign between two elevators.

The giant panda lives in a few mountain ranges in central China, mainly in Sichuan province, but also in the Shaanxi and Gansu provinces.^[8] Due to farming, deforestation and other development, the panda has been driven out of the lowland areas where it once lived.

What can I click on?



Huh?



How fast am I going?



How to open a window?

17

Norman's design 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 underlined, it can be clicked (web).
- **Mapping**
 - Clicking on a particular interface element produces expected effect, e.g., **Open** should be under the **File** menu.
- **Constraints**
 - Constraining search criteria, e.g., graying out menu items that don't apply in a particular context.
- **Feedback**
 - Providing clear and immediate feedback for each user action.

18

Don Norman's design principles



Human Computer Interface (HCI) – research area in CS

- designing effective **Graphical User Interfaces (GUI)**

References

1. Bad Design Studies <http://www.baddesigns.com>
2. <http://www.math.uaa.alaska.edu/~afkjm/cs470/handouts/design-norman.pdf>