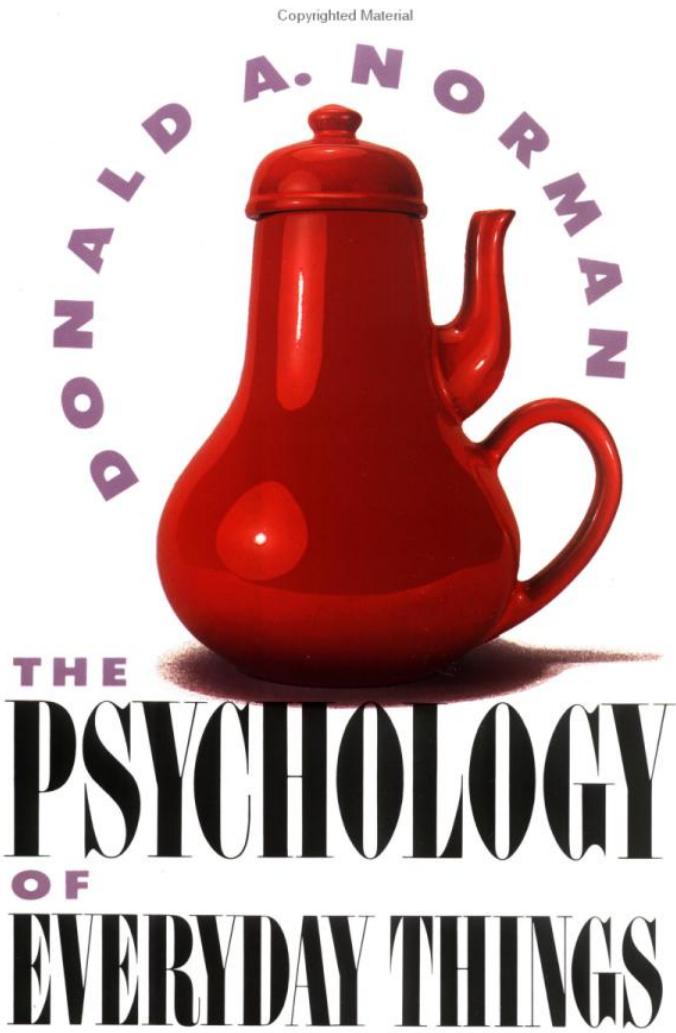
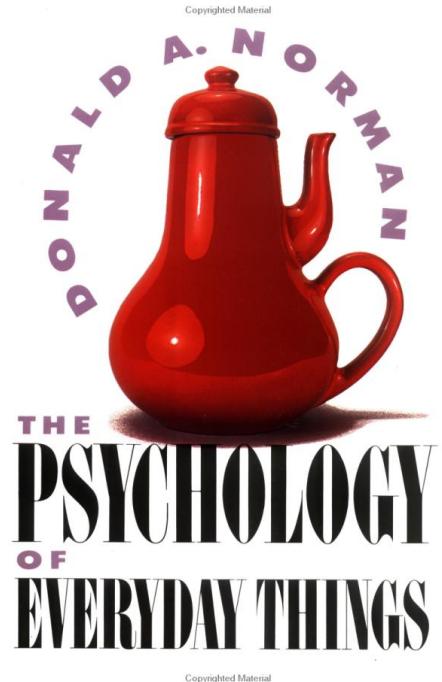


CS4826 - HCI

Week 3

Don Norman: The Psychology of Everyday Things, 1988



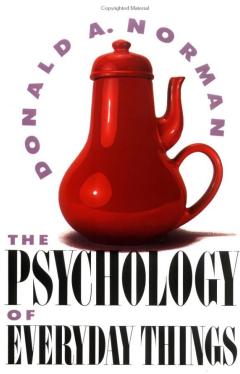


From cognitive ergonomics principles
to User-Centred Design principles

Theory of Action (the 7-stage model)

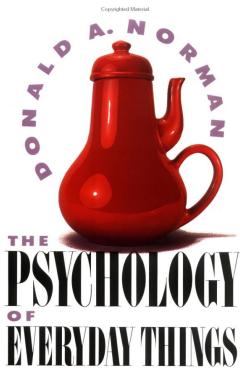
User mental models

Use of representations



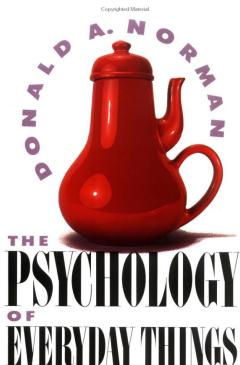
Qualities of Designed Artefacts

- Visibility
- Mapping
- Feedback
- Affordances/Constraints



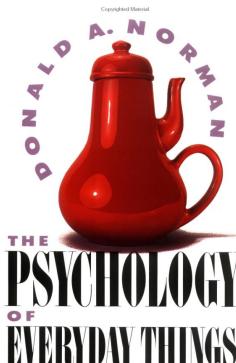
Visibility

- Make the users aware of what possibilities for interaction are available to them
 - People's memories are better at "recognition" rather than recall
 - Make things visible, not hidden



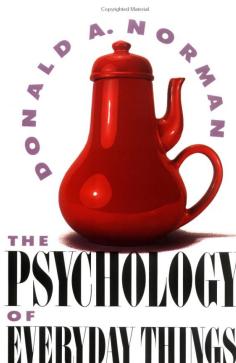
Visibility





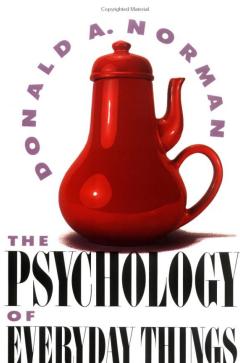
Visibility





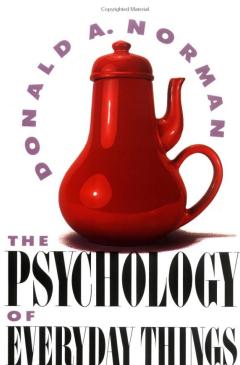
Visibility





Visibility

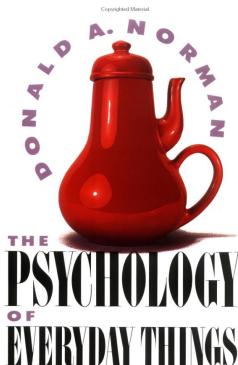




Visibility

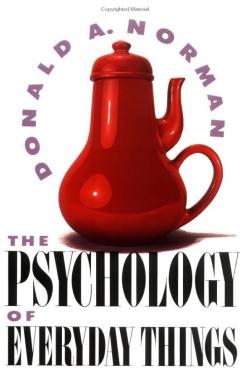


Fresh Promotions



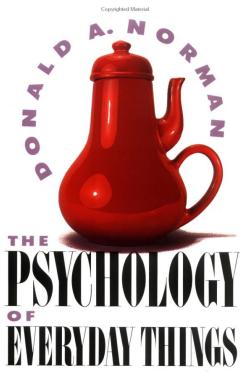
Visibility





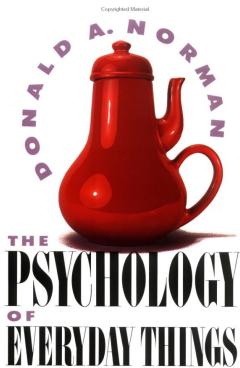
Visibility

- Use the power of external representations
- Norman talks about everyday objects that are not designed with visibility in mind, for example taps that are difficult to operate



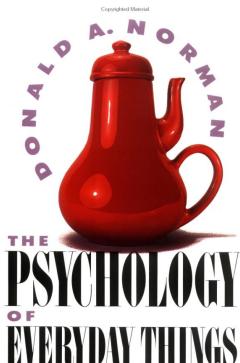
Visibility

- For example: a GUI - Graphical User Interface exploits the power of visual representation to make action visible to the user
 - Drop down menus, icons, buttons
 - It's not necessary for users to recall how to reach a certain function/object when things are visible
 - Think of how a good interface makes *sound* visible

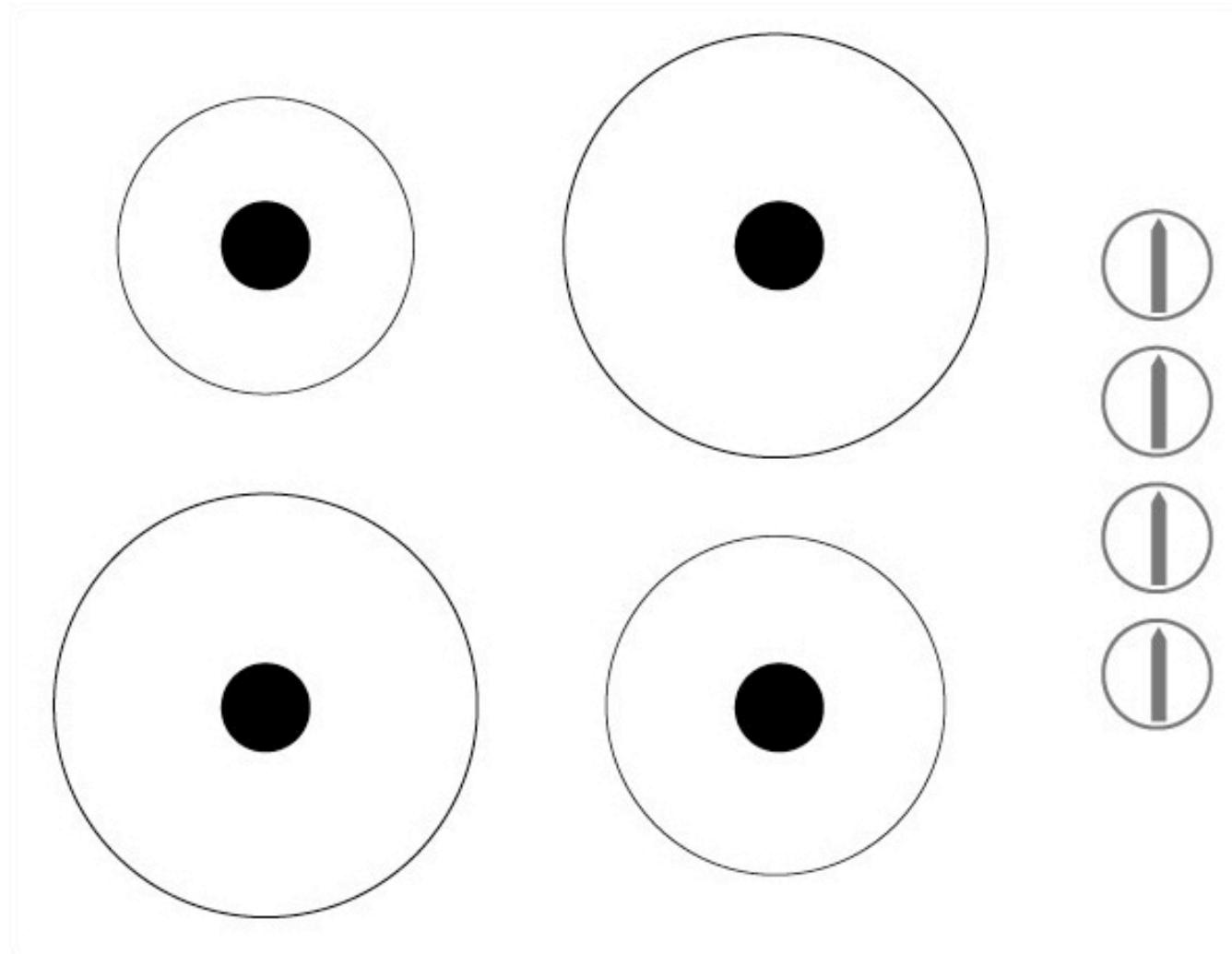


Mapping

- Mapping correctly between an interface element and its direct effect
- Making sure that users know on to what their actions will have an effect
- Link between function and result
- Norman talks about everyday examples such as cookers, light switchers and cars



Mapping

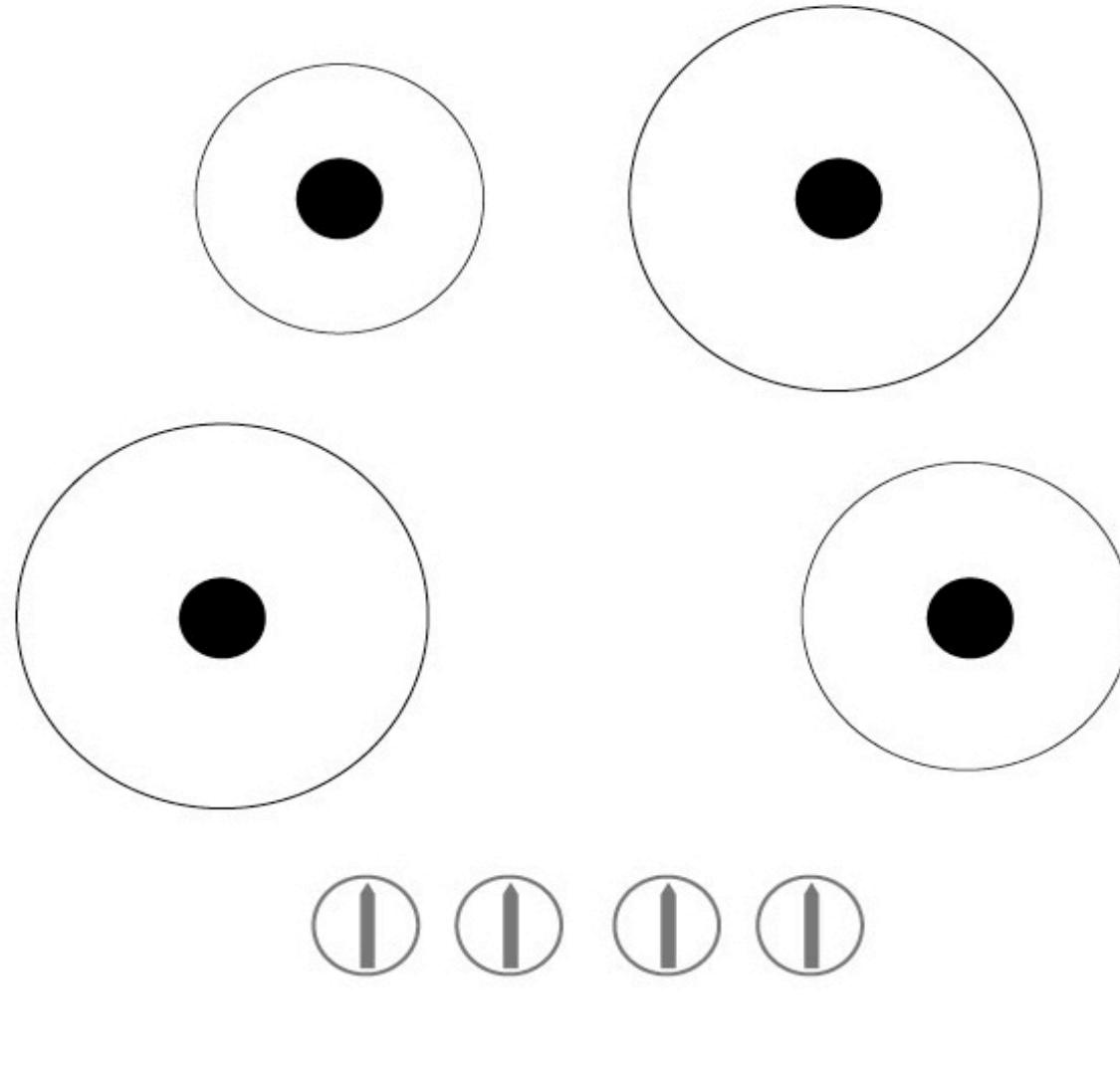


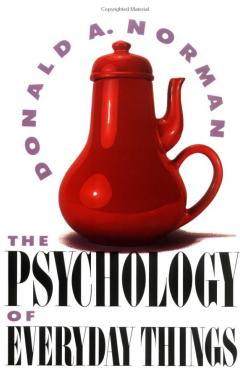


THE
PSYCHOLOGY
OF
EVERYDAY THINGS

Copyright Material

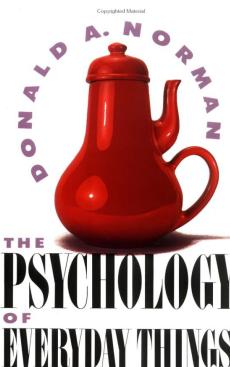
Mapping



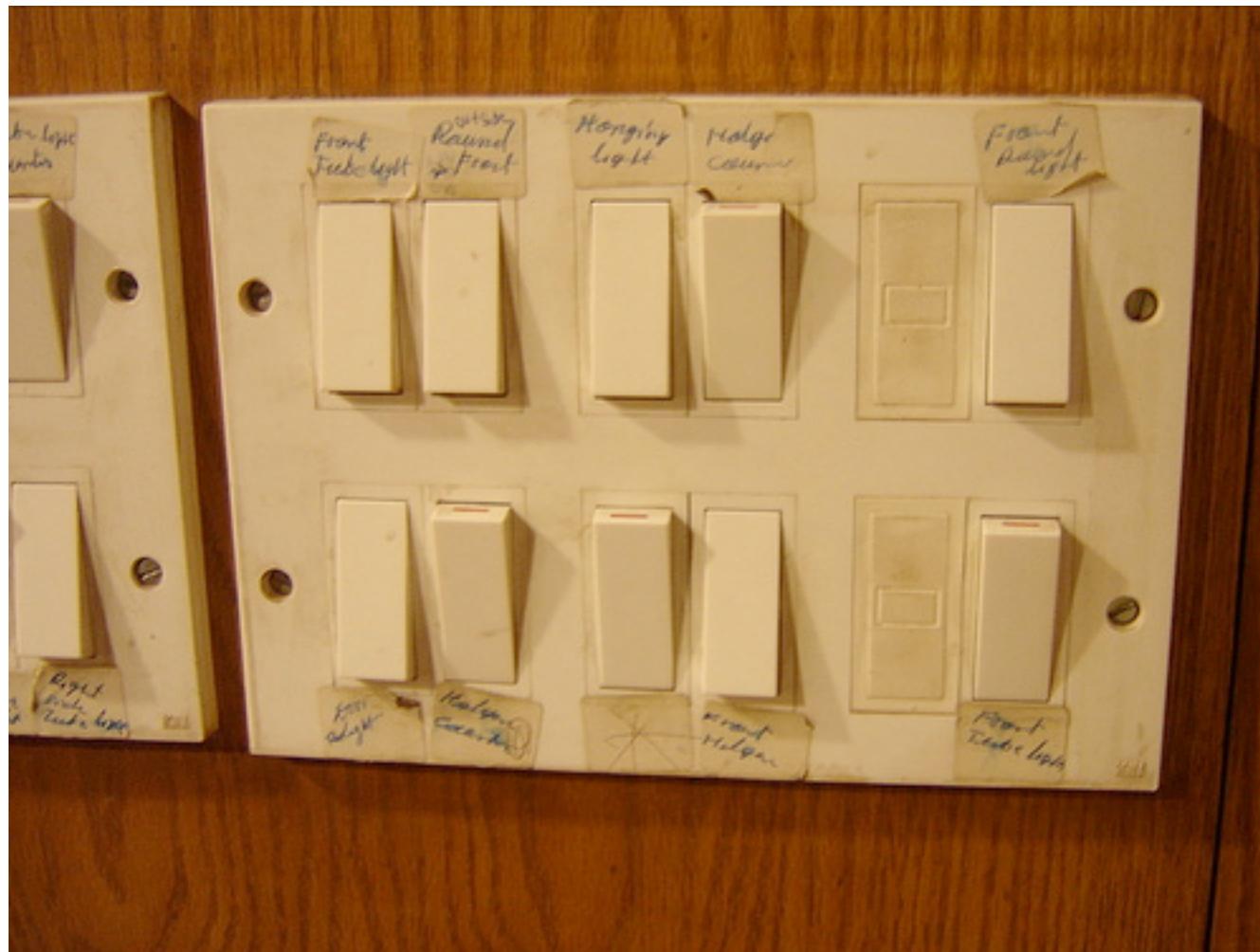


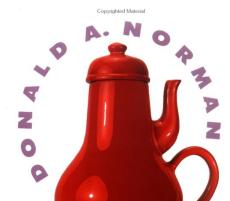
Mapping





Mapping

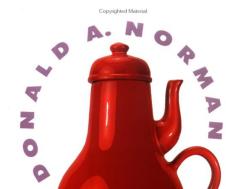




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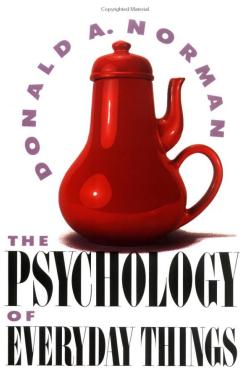
Copyright Material

To make a withdrawal, please solve for x:
 $y = 264^{15} / 99xyz * 2n + 1 - (\text{Pi} + \text{Phi})$

Then press ENTER.

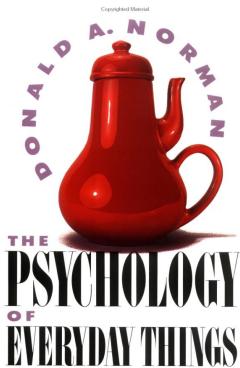
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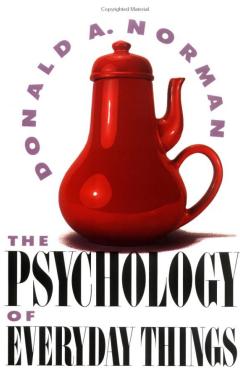
Mapping

- In a digital interface, mapping is not mechanical. It's important to design carefully the connection between an element of the interface and its behaviour
- The steering wheel is a good example of mapping metaphor



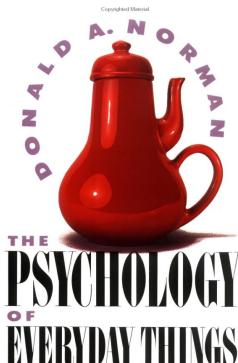
Feedback

- Feedback is the perceivable information we receive when operating an interface, telling us that our actions are having an effect
- We make sense of the progress of our actions in the world through feedback of different kind (visual, tactile, auditory)
- Think for example of the importance of auditory feedback when using a vending machine, or an ATM machine

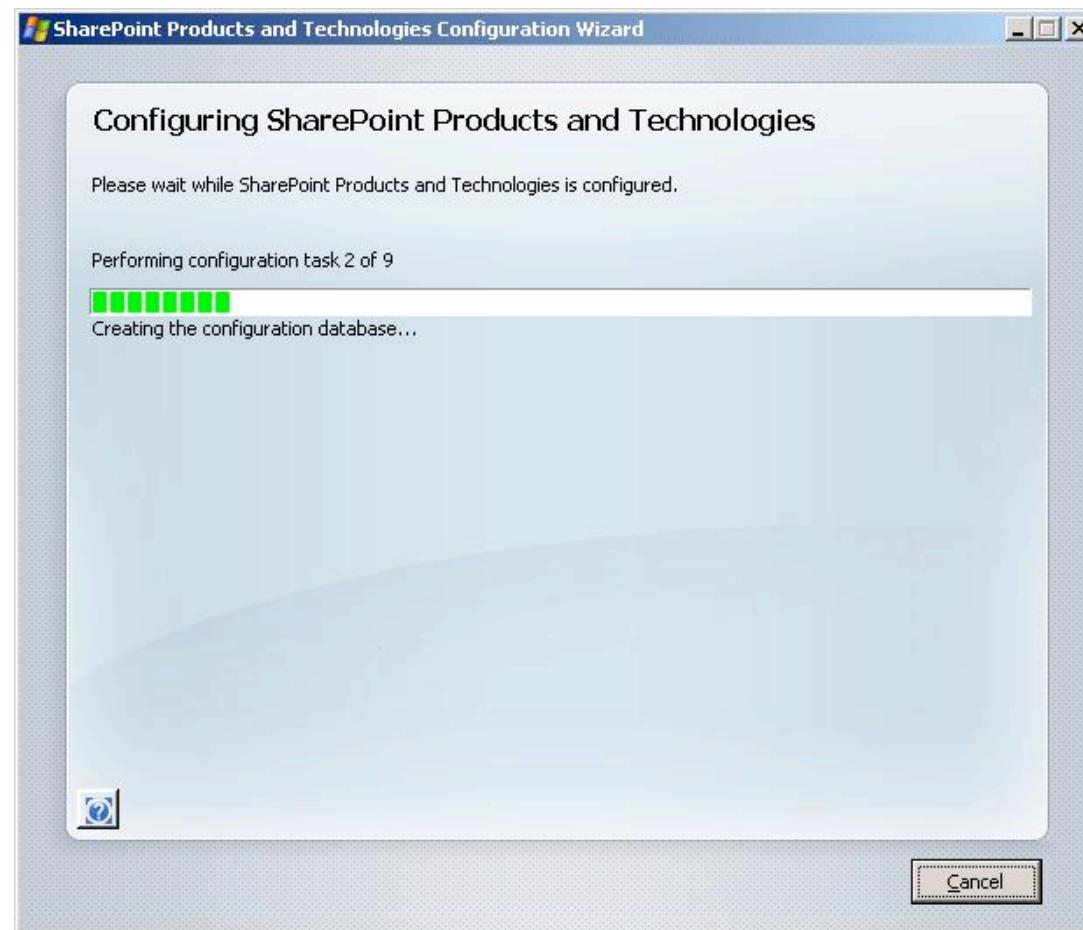


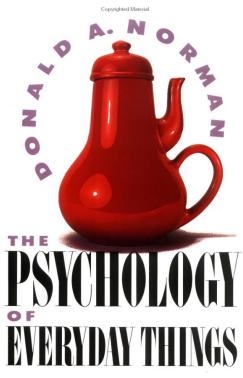
Feedback

- In digital interfaces, feedback is to be designed in such a way that the users will know how successful their actions were.
- For example “3D effect” when pressing a button, auditory feedback at certain actions, etc.
- Good feedback allows users to progress in their interaction, knowing that certain steps don’t have to be repeated.



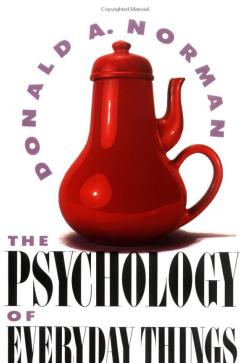
Feedback





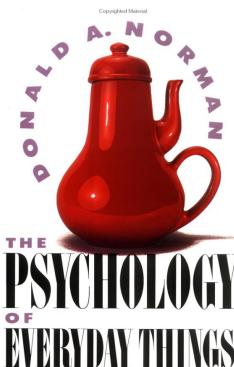
Affordances

- When we encounter everyday artefacts, in many cases we can have a good guess at how to use them, even though we haven't seen them before
- For example, a chair, by the way it is structured, suggests the possibility of sitting



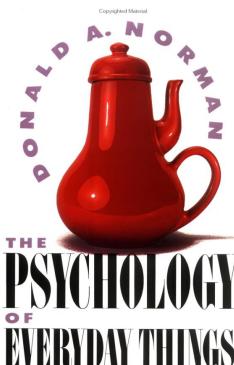
Affordances



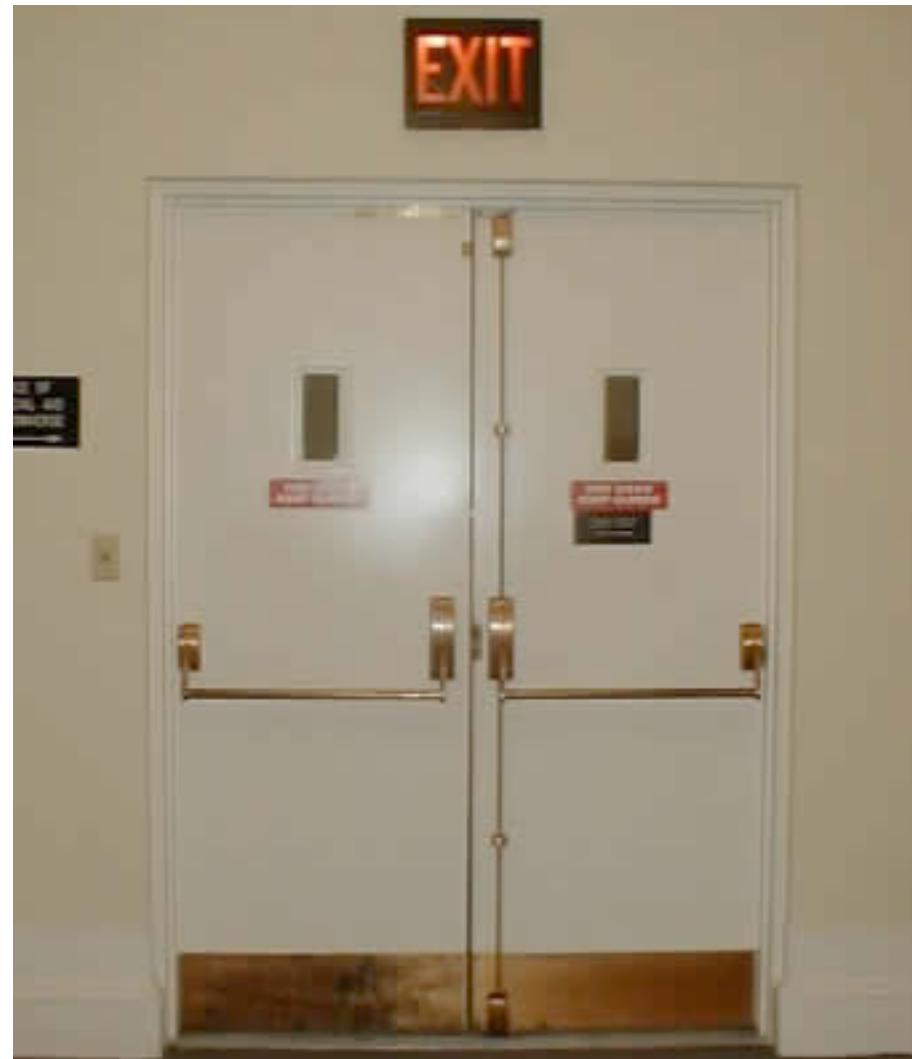


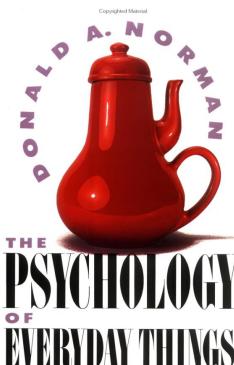
Affordances



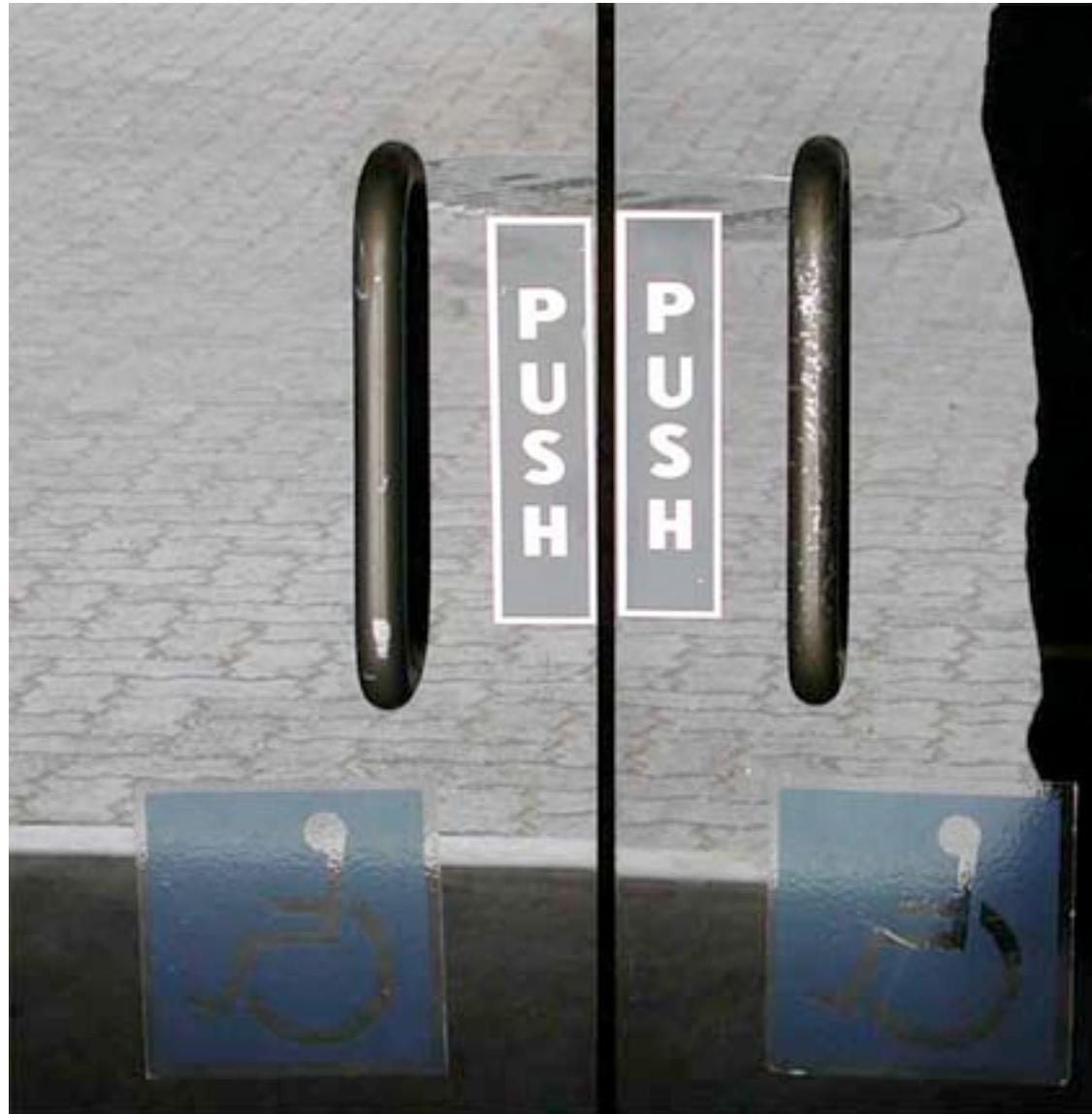


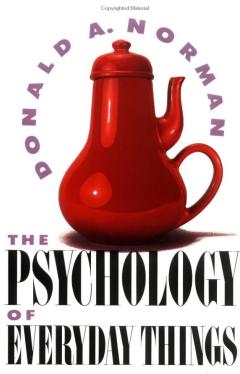
Affordances





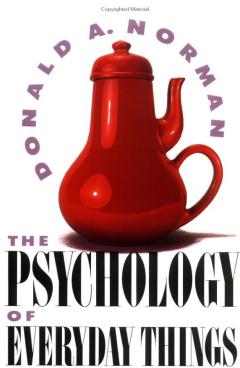
Affordances





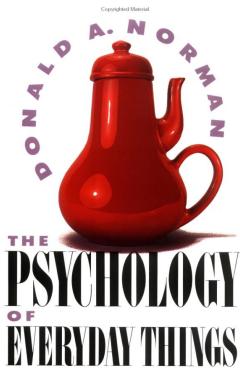
Affordances

- Affordances are the given, perceived qualities of an artefact that suggest a person how such an artefact could be used/operated
- They are not something that can be put on objects, but something that can be highlighted, something to make the most of through design
- Notion from J.J. Gibson theory of “Ecological Perception”



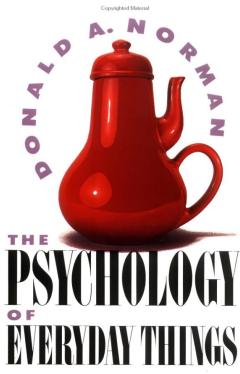
Affordances

- Norman's notion of Affordances is slightly different from Gibson's, but it builds on Gibson's idea of perceivable clues to action



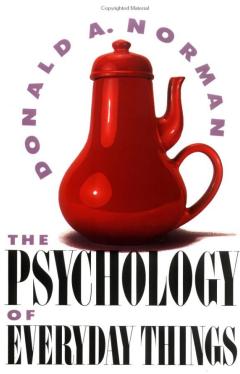
Constraints

- Constraints and affordances are like 2 sides of the same coin
- Affordances are properties giving us clues about what we can do
- Constraints give us clues on what cannot be done with a certain artefact
- Again, the scissors are a good example: they afford putting fingers through the holes, also blocking out any other interaction with them.
You can only use them the right way



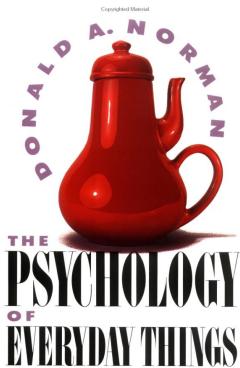
Constraints

- Door handles are another example of affordances/constraints
- Flat panels on doors afford pushing/they cannot be pulled. See the design of emergency exists
- Other constraints includes ways of making things difficult: for example tampering with a fire alarm.



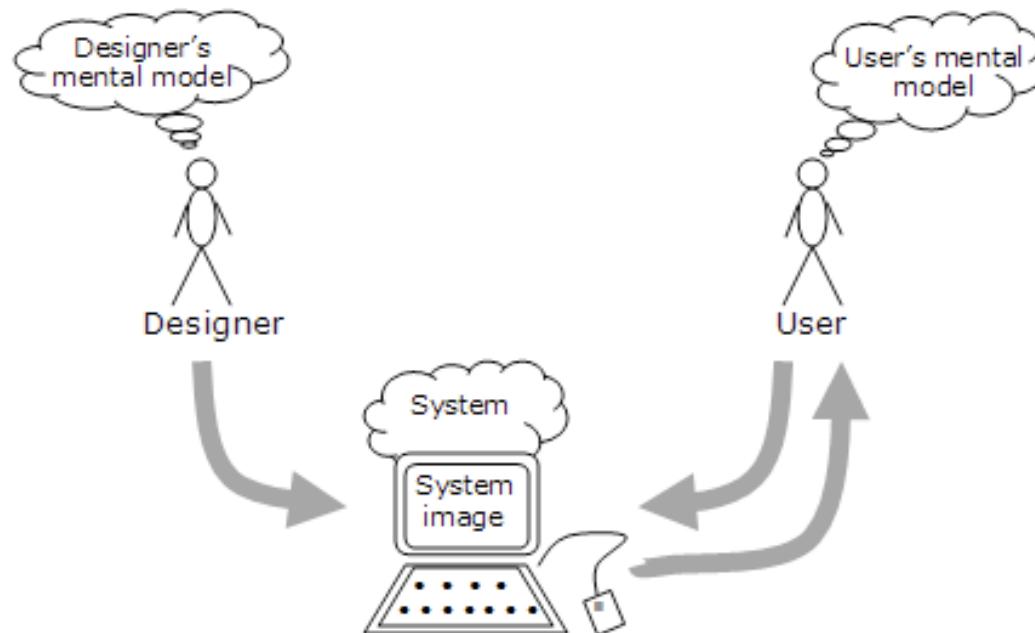
The importance of mental models

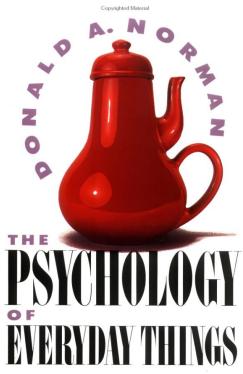
- All these properties of designed artefacts help us create a Mental Model of how a certain system works
- A representation of how we think the system reacts and behaves to our actions
- Importance of helping users build an appropriate mental model of an interactive system



The importance of mental models

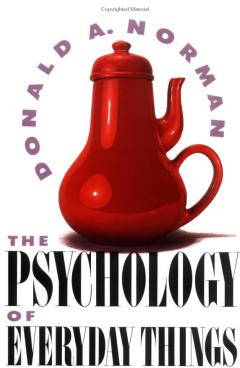
- Designer's Mental Model vs. the User's Mental Model





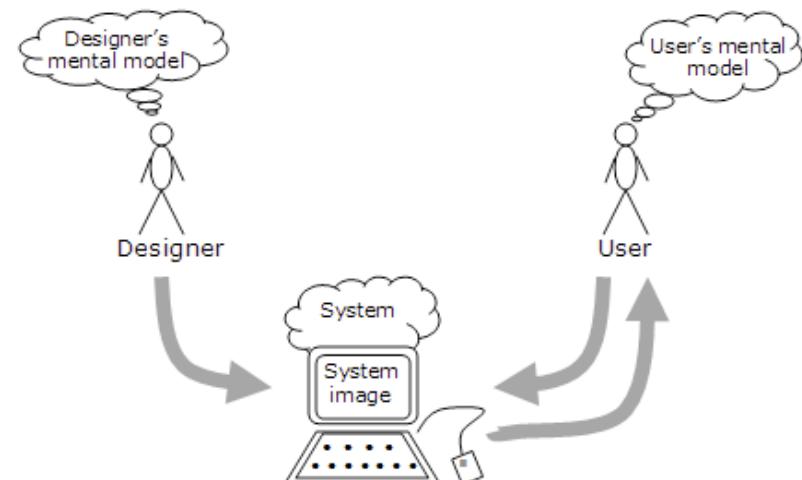
The importance of mental models

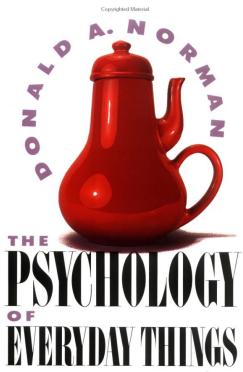
- The Designer's Mental Model and the User's Mental Model are not the same (e.g. if I am the programmer of a software product, my mental model of it is created by my technical knowledge of how it works)
- It's important that the designers consider how the Users will create their mental model
- Importance of System Image



The importance of mental models

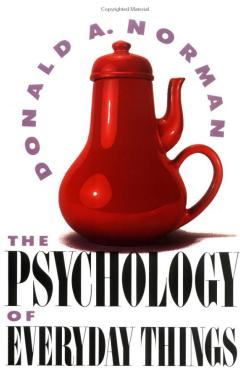
- The system image is the overall set of perceivable and interactable qualities of a system that the user will encounter. The user mental model is built on it





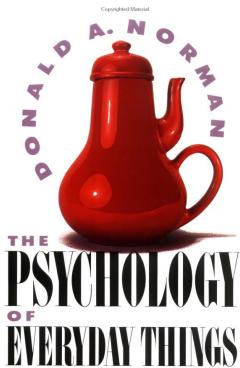
The importance of representations

- External representations and external artefacts are cognitive aids in everyday life
- E.g, we don't have to remember everything by heart because we can rely on forms of externalisation (such as writing) to help our brain cope
- Example: knotting a hankiechief as a memory aid



The importance of representations

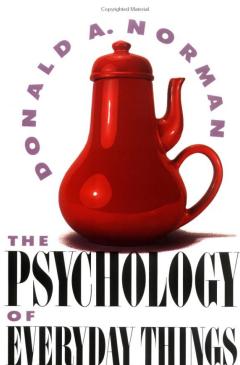
- We rely on such devices continuously
- Norman calls things that help us in our cognitive abilities, “Cognitive Artefacts”
- Conceptual perspective of “Distributed Cognition”: cognition does not only take place in one’s head, but relies on external artefacts
- Therefore when we do things, we rely on external clues



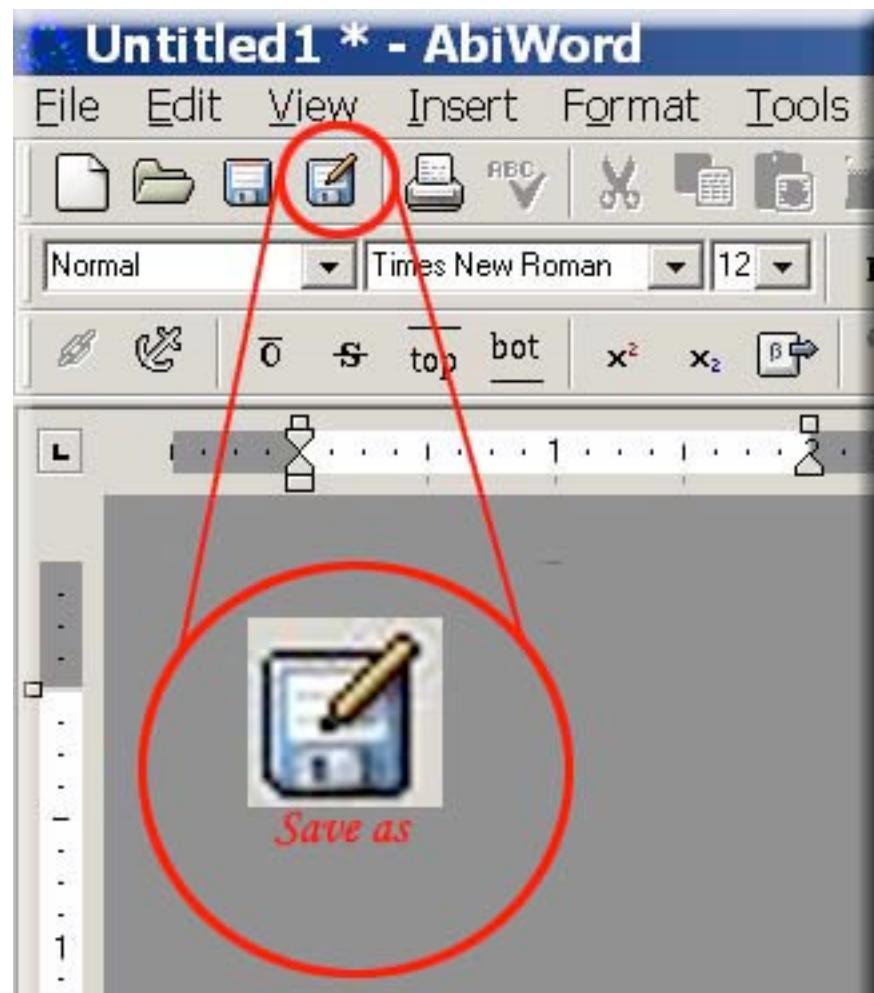
The importance of representations

- A good interface provides the user with good support for action
- GUI elements should provide good representations for functions and actions, so that it is easy for users to understand what they can do
- Provide cognitive support
- Sometimes, representations become standards and they are easy to understand, for example...





The importance of representations



Norman's User Centered Design Principles

1. Use both knowledge in the world and knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible: bridge the Gulfs of Execution and Evaluation.
4. Get the mappings right.
5. Exploit the power of constraints, both natural and artificial.
6. Design for error.
7. When all else fails, standardize.