Notes on Norman's Terminology

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<table>
<tr><th></th><th>Real World</th><th>Simulated World of a Program</th></tr>
<tr><td>Affordance</td><td>• reflects the possible relationships among people (or animals) and objects [3, pp. 39, 42]
• refers to the actual [. . .] properties of the thing, primarily those fundamental properties that determine just how it could possibly be used.
• ' "the operations and manipulations that can be applied to a particular object" ' [4, p. 6][1]</td><td>• in the environment/world/realm of a computing interface
• about what users of a computer program think that specific parts of the interface can be used for and how they can be used.
• 'what a person thinks can be done with the object, for example should a door be pushed open or pulled?' [4, p. 6]</td></tr>
<tr><td>Constraints</td><td colspan="2">Three kinds of behavioural constraint [3]:
physical constraints are inherent
logical constraints use reason to determine choices
cultural constraints a learned convention, e.g. the right tap is for cold water or how a scroll bar operates
• evolve over time
• require a community of practice
• slow to be adopted, and slow to go away</td></tr>
</table>

References

[1] Donald A. Norman. *The Psychology of Everyday Things*. Basic Books, 1988.

[2] Donald A. Norman. *The Invisible Computer: Why good products can fail, the personal computer is so complex, and information appliances are the solution*. The MIT Press, 1998.

[3] Donald A. Norman. Affordance, conventions, and design. *interactions*, 6(3):38 – 43, May 1999.

[4] Jenny Preece, Yvonne Rogers, Helen Sharp, David Benyon, Simon Holland, and Tom Carey. *Human-Computer Interaction*. Prentice-Hall Europe, 1994.

[1] Preece et al. [4, p. 6] quote Don Norman's *Turn Signals are the Facial Expressions of Automobiles*.

1 Affordances

Physical objects can play a variety of roles. A rock can be moved, rolled, kicked, thrown, and sat upon — not all rocks, just those that are the right size for moving, rolling, kicking, throwing, or sitting upon. The set of possible actions is called the *affordances* of the object. An affordance is not a property, it is a *relationship* that holds between the object and the organism that is acting on the object. The same object may have different affordances for different individuals. A rock that affords throwing for me does not for a baby. My chair affords support for me, but not for a giant. My desk is not throwable by me, but might be by someone else. . . .

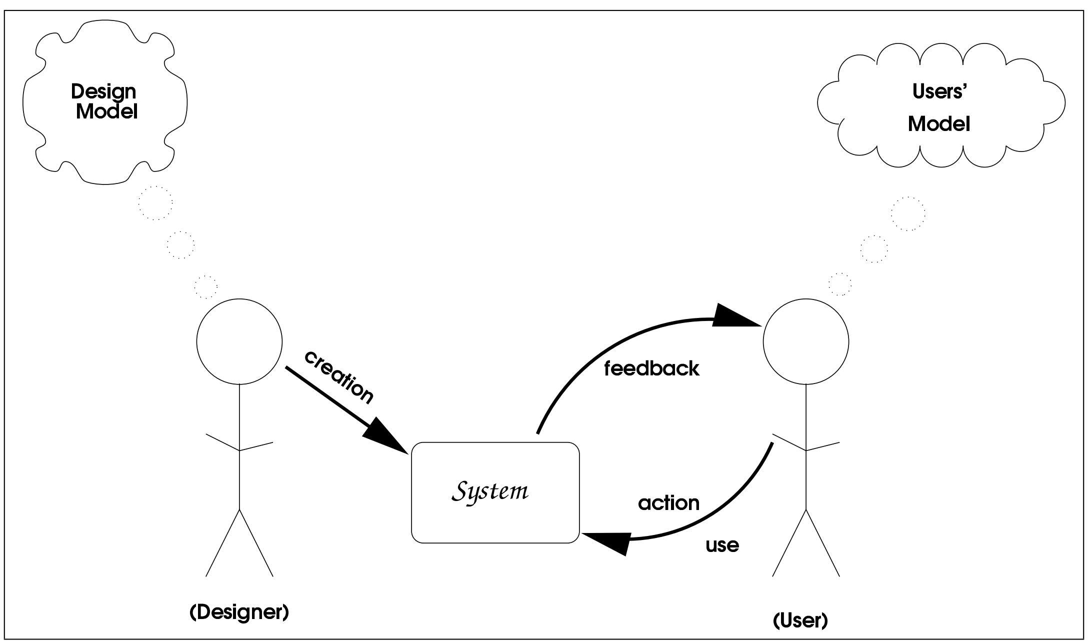
In the design of objects, real affordances are not nearly so important as *perceived* ones; it is perceived affordances that tell the user what actions can be performed on an object and, to some extent, how to do them. . . .

Perceived affordances are often more about conventions than about reality. The scrollbar on the side of a computer window does indeed afford movement vertically, constrained so as not to permit movement sideways. "Buttons" depicted on the screen do allow a person to "click" upon them to get a desired action accomplished. These control operations now have well-established conventions for the manner by which they are depicted on the screen. Shading and other graphical techniques do influence the visibility of the parts that can be moved and therefore the understanding and usability of the system. But they don't offer the actual affordances, only the perceived ones.

Perceived affordances are not necessarily the same as actual ones. If I saw a realistic painting of a door on a wall, the perceived affordance would be that I could open the door and walk out of the room, and I might even try to do so, but the painting would not really afford those actions. Similarly, if a cupboard door has no perceivable handle, it may be impossible to figure out how to open it, even if the cupboard affords opening.

— Don Norman [2, pp. 123 – 124]

2 Mental Models and Interactions[2]



The only communication between the user and designer is through the system. By making a (fundamental) design model *clear* and *consistent* the designer can help the user to form a useful mental model of the system. The user will use that model to reason about how the system will act in response to their actions. [1, p. 16]

[2]See also Preece et al. [4, Fig. 7.3, p. 152].

3 How the pieces fit together

A feeling of control, a good conceptual model, and knowledge of what is happening are all critical to ease of use. The controls must be recognizable, it must be easy to remember their function and operation, and they must provide immediate and continual feedback about the state of the system.

When is something difficult? When the controls and actions seem arbitrary, when the system can get itself into peculiar states, peculiar in the sense that the person using it does not know what it is doing, how it got there or how to recover. When there is a lack of understanding. ...

Given a chance, people are wonderfully good at making sense of the world. People see faces and objects in the clouds. They see patterns in tea leaves. They give explanations of people's behavior, even people they don't know. We human beings are sense-makers, making sense of the way we experience the world, but only if there is something to go on, some hints and clues as to what is happening, and why. ...

[I]n new situations we look for familiar patterns, we look for any signs that might direct us, and we try to make sense of whatever happens. In general, people make up explanations, stories of events that help us make our way through novel and complex situations until they become understandable and comfortable. ...

What does it mean to understand how something works? Do I really have to understand automobile mechanics to drive my car. or to understand solid state physics and computer programming to use my computer? Of course not. But what I do need is a good conceptual grasp of what is going on, and understanding of the different controls and alternative actions I can take and what their impact is on the device. I need a story that puts together the behavior and appearance of a device in a sensible, comprehensible pattern. Good designers present explicit conceptual models for their users. If they don't, users create their own mental models, which are apt to be defective and lead them astray. ...

The basic principle is this: Start with a simple, cohesive conceptual model and use it to direct all aspects of the design. The details of implementation then flow naturally from the conceptual model.

To summarize, a conceptual model is a story. It doesn't have to discuss the actual mechanisms of the operation. But it does have to pull the actions together into a coherent whole that allows the users to feel in control, to feel there is a reason for the way things are structured, to feel that, when necessary, it's possible to invent special variations to get out of trouble and, in general, feel mastery over the device.

— Don Norman [2, pp. 174, 176–177, 179]