

Concepts

- *Discoverability*: is it possible to figure out what is possible and how you would perform actions? (Norman 2013, p. 3)
- *Understanding*: Meaning of the interface, the feedback, settings, controls and so on. (Norman 2013, p. 3)
- *Human-centered design*: A design philosophy that puts humans first with regards to their intentions, desires and behavior. Postponing definition of problem in order not to solve wrong problem. (Norman 2013, p. 8)
- *Affordance*: The relationship between the properties of a physical object and the capabilities of person, determining how it is used. What can be done? Not internal to the object or technology but relative between object and user. (Norman 2013, p. 10)
- *Signifier*: A signal of an affordance. Signifying where the action should take place. Planned or accidental. (Norman 2013, p. 14)
- *Mappings*: Layout of controls to correspond with their function, fx placement of buttons for lights. Mapping between our action and what will happen. They work because of our conceptual model. (Norman 2013, p. 20)
- *Feedback*: Communication of results of an action. (Norman 2013, p. 23)
- *Conceptual model*: A model of how the technology works, can be simplified (Norman 2013, p.25)
- *System image*: The combined image and model we have of the technology from friends, interaction, salesmen, manuals and so on (Norman 2013, p. 31).
- *Gulf of execution and gulf of evaluation*: The gulf of execution is where people try to figure out how to execute their goals using the technology. The gulf of evaluation is faced when evaluating whether their actions resulted in what they wanted or how the system has changed. (Norman 2013, p. 38)
- *Declarative and procedural memory*: Declarative memory is about facts while procedural memory is about action and physical movement, how to do stuff. (Norman 2013, p. 47)
- *Feedforward*: Provides information about how to execute, helping to close the gulf of execution (Norman 2013, p. 72)
- *Constraints*: Limitations or constraints that help minimize the perceived actions support the execution and also makes it easier to interpret (Norman 2013, p. 73)
- Usability
- Goodness-of-interaction
- User experience
- Feedforward
- Accessibility
- Goals, tasks, activities
- PACT
- Context
- Contextual inquiry
- Affinity diagramming
- Universal design
- Ecological validity
- Analytical/empirical investigation

- Cognitive walkthrough
- Evaluator effect
- Gestalt principles
- Proximity
- Similarity
- Continuity
- Memory load (data entry, display)
- Information assimilation (display)
- Flexibility (data entry, display)

Models

- Guidelines for display Sch&Plai p. 63
- Guidelines for attention Sch&Plai p. 64
- Guidelines for data entry Sch&Plai p. 65
- Norman's 7 stages of action (Norman 2013, p. 40): Related to the concepts of the two gulfs, Norman has a model with 4 subparts for execution and 3 subparts for evaluation. For executions: Form the goal, plan the action, specify the sequences of subactions, perform these subactions. The evaluation is divided up into the perception of the world, the interpretation of what has happened and the comparison with intentions and goals.
- Norman's 3 levels of processing: Visceral, behavioral and reflective. The visceral level is primal, quick judgments, learning is good, bad stimuli, reflexes, fight or flight, adrenaline, subconscious, immediate perception; irritating or nice. The behavioral level: The behavioral level relates to larger learned patterns of actions corresponding to perceived patterns. Behavior is mostly subconscious, perhaps only the goal itself is conscious. Reflective level is cognitive, deep and slow, connecting more deeply with memories and experience, logic, complex emotions such as guilt, pride, blame, praise.
- Norman's 7 fundamental principles of design: Based on the stages of action Norman has 7 questions that every user should be able to answer, thus the designer should design the product in a way that provides the user with this information. The seven principles are affordances, signifiers, feedback, discoverability, conceptual model, constraints and mappings.

Useful quotes in Norman 2013

- p. 4: *In the best of cases, the products should also be delightful and enjoyable, which means that not only must the requirements of engineering, manufacturing, and ergonomics be satisfied, but attention must be paid to the entire experience, which means the aesthetics of form and the quality of interaction*
- p. 5: *Or they might be usable, but force us to behave the way the product wishes rather than as we wish.*
- p. 6: *When people fail to follow these bizarre, secret rules, and the machine does the wrong thing, its operators are blamed for not understanding the machine*
- p. 6: *much of the design is done by engineers who are experts in technology but limited in their understanding of people.*

- p. 8: *That's the point: even experts make errors. So we must design our machines on the assumption that people will make errors.*
- p. 8: *The solution is human-centered design (HCD), an approach that puts human needs, capabilities, and behavior first, then designs to accommodate those needs, capabilities, and ways of behaving.*
- p. 10: *When our home technology behaves in an uninterpretable fashion we can become confused, frustrated, and even angry—all strong negative emotions. When there is understanding it can lead to a feeling of control, of mastery, and of satisfaction or even pride—all strong positive emotions.*
- p. 22: *Natural mapping, by which I mean taking advantage of spatial analogies, leads to immediate understanding.*
- p. 23: *Feedback must be immediate: even a delay of a tenth of a second can be disconcerting. If the delay is too long, people often give up, going off to do other activities. AND Feedback must also be informative.*
- p. 26., regarding conceptual models: *Simplified models are valuable only as long as the*
- *assumptions that support them hold true.*
- p. 28: *Conceptual models are valuable in providing understanding, in predicting how things will behave, and in figuring out what to do when things do not go as planned. A good conceptual model allows us to predict the effects of our actions.*
- p. 32: *Designers expect the user's model to be identical to their own, but because they cannot communicate directly with the user, the burden of communication is with the system image.*
- p. 34: *The same technology that simplifies life by providing more functions in each device also complicates life by making the device harder to learn, harder to use. This is the paradox of technology and the challenge for the designer.*
- p. 39: *The Gulf of Evaluation reflects the amount of effort that the person must make to interpret the physical state of the device and to determine how well the expectations and intentions have been met.*
- p. 39: *What are the major design elements that help bridge the Gulf of Evaluation? Feedback and a good conceptual model.*
- p. 42: *Not all of the activity in the stages is conscious. Goals tend to be, but even they may be subconscious.*
- p. 42: *most activities will not be satisfied by single actions. There must be numerous sequences, and the whole activity may last hours or even days.*
- p. 42: *So the hierarchy of goals is roughly: satisfy hunger; eat; cook; read cookbook; get more light. This is called a root cause analysis: asking "Why?" until the ultimate, fundamental cause of the activity is reached.*
- p. 44: *Most of human behavior is a result of subconscious processes.*
- p. 48: *Subconscious thought is biased toward regularity and structure, and it is limited in formal power. It may not be capable of symbolic manipulation, of careful reasoning through a sequence of steps.*
- p. 52: *For designers, the most critical aspect of the behavioral level is that every action is associated with an expectation. Expect a positive outcome and the result is a positive affective response.*

- p. 57: *Conceptual models are often constructed from fragmentary evidence, with only a poor understanding of what is happening, and with a kind of naive psychology that postulates causes, mechanisms, and relationships even where there are none.*
- p. 67: *Eliminate the term human error. Instead, talk about communication and interaction: what we call an error is usually bad communication or interaction.*

Concepts from Benyon 2019 on Usability pp. 103-125

- Accessibility (Benyon 2019, pp. 104-105)
- Universal design (Benyon 2019, p. 105)
- Inclusive design (Benyon 2019, p. 106)
- Usability (Benyon 2019, p. 108)
- Value sensitive design (Benyon 2019, p. 109)
- PACT (Benyon 2019, p. 109)
- Acceptability (Benyon 2019, p. 112)
- System Usability Scale (Benyon 2019, p. 113)

Concepts from Benyon 2019 on memory and attention

- working memory: central executive, auditory loop, visuo-spatial sketchpad (Benyon 2019, p. 507)
- longterm memory (Benyon 2019, p. 508)
- recall and recognition (Benyon 2019, p. 510)
- accessibility vs availability (Benyon 2019, p. 510)
- Broadbent's single-channel theory of attention (Benyon 2019, p. 513)
- Kahneman capacity allocation model of attention (Benyon 2019, p. 515)
- Mental workload (Benyon 2019, p. 515)
- visual search (Benyon 2019, p. 518)