**Chapter 1: The Psychopathology of Everyday Things**

In this chapter, Don Norman talks about the most important characteristics of good design which are discoverability and understanding.

**Discoverability** — Is it possible for users to figure out what the possible actions are to use that product?

**Understandability** — Is it possible[easy] for users to figure out how the product can be used, is the language clear enough?

An example is a door; a door handle helps a user “discover” what action is possible, while a pull or push sign helps the user “understand” what to do with that door handle, which direction the user should push or pull it.

***Good design requires good communication***

Discoverability results from the application of 5 fundamental psychological concepts which are Affordances, Signifiers, Constraints, Mappings, Feedback, Conceptual Model [Mental Model]

**Affordances**

Affordances are the possible actions a person can perform with a particular object/product. For example, a chair affords sitting. If an affordance cannot be easily perceived by a user, a means of signalling it is presence is required. Affordances determine what actions are possible.

**Signifiers.**

Signifiers help users know what affordances a product has and how to use them. They are used when a product’s affordances are not easily perceived. Signifiers are signals. Some signifiers are signs, labels that tell the users what to do.

**Constraints.**

Limitations in application or use that can help with the formation of conceptual models. This will be explained further in chapter 4.

**Mappings.**

It is the relationship between the elements of two sets of things. The relationship between a control and it is results are easiest to understand when there is an understandable mapping between the control and it is results. Controls should be close to the items been controlled. For example, light switches in hall are usually arranged in such a way that a user will immediately know which switch controls which light.

**Feedback.**

It is important designers communicate the results of an action. Feedback when an action is performed must be immediate and informative. Delayed feedback can be disconcerting and lead to user abandonment or failure. Too much feedback can be annoying and irritating to users. Too little feedback can be as useless as no feedback at all. Feedback also needs to be prioritized (important messages/alerts vs. unimportant). **Poor feedback can be worse than no feedback at all**, because it is distracting, uninformative, and in many cases irritating an anxiety provoking.

**Conceptual Models.**

Conceptual models/Mental models are the understanding in the minds of users of how certain products work. In our daily life, we create a conceptual or mental model about everything we interact with. We use that knowledge while interacting with new things.

**The Paradox of technology**

Over the period of time technology is bringing changes and innovations to make our life easier. Devices are getting complicated as they are stacked with lots of options. The main challenge for designers is to bring the same technology that simplifies life by providing more functions in each device.

**Chapter 2: The Psychopathology of Everyday Actions**

When people use a thing — product, tool or service — they face two gulfs (obstacles) between desired outcome (goal) and available options (what actions to perform). The first gulf is called the gulf of execution (how it operates) and the second gulf is called the gulf of evaluation (how it happened). The role of the designer is to help people bridge the two gulfs. **Feedback and good conceptual model help bridge the Gulf of Evaluation.**

**Human Thought: Mostly Subconscious**

Conscious attention is needed to learn new things. But when users repeatedly perform tasks/actions over a period of time, they perform those same actions subconsciously.

There are 3 levels of processing that goes on in the human brain; Visceral, Behavioural and Reflective.

**Visceral**

This is the most basic level of processing. It allows us make quick judgments(responses) about the environment subconsciously without conscious awareness. Visceral responses are fast and automatic. Great designers use aesthetic sensibilities to drive visceral responses. **For designers, the visceral response is about immediate perception.**  
This has nothing to do with how usable, effective, or understandable the product is. It is all about attraction and repulsion. Great designers use their aesthetic sensibilities to drive these visceral responses.

**Behavioural**

It is the home of learned skills, triggered by situations that match the appropriate patterns. Actions/Analysis at this level is largely subconscious.

**For designers, the most critical aspect of the behavioural level is that every action is associated with an expectation.**  
The information in the feedback loop of evaluation confirms or disconfirms the expectations, resulting in satisfaction or relief, disappointment, or frustration.

Feedback is critical to managing expectations, and good design provides this.

**Reflective**

Home of conscious cognition. This is where deep understanding develops, where reasoning and conscious decision-making take place. Reflection is cognitive, deep, and slow. It often occurs after the events have happened.

It is a reflection that drives us to recommend a product, to recommend that others use it — or perhaps to avoid it.

Design must take place at all levels of processing. Understanding arises at a combination of the behavioural and reflective levels. Enjoyment requires all three.

**Chapter 3: Knowledge in the Head and in the World**

In this chapter, Don Norman explains further how mental models [knowledge in the head] helps users interact with a product. Knowledge exists in both the head and the world.

Head: Person knows/remembers how to do a thing.

World: Person can derive how to perform a task from things and the environment.

Not all knowledge required for precise behaviour has to be in the head. It can be distributed — partly in the head, partly in the world, and partly in the constraints of the world.

**Precise behaviour can emerge from imprecise knowledge for four reasons:**

1. **Knowledge is both in the head and in the world.**Behaviour is determined by combining the knowledge in the head with that in the world.
2. **Great precision is not required.**Perfect behaviour results if the combined knowledge in the head and in the world is sufficient to distinguish an appropriate choice from all others.
3. **Natural constraints exist in the world.** Each object has physical features that limits its relationship with other objects, the operations that can be performed on it, and so on.
4. **Knowledge of cultural constraints and convention exists in the head.**

“Whenever knowledge needed to do a task is readily available in the world, the need for us to learn it diminishes.”

Example: We don’t memorize phone numbers as readily in the smartphone era.

There are two types of knowledge;

**Declarative knowledge** (“knowledge of”)

* Knowledge of facts and rules.
* Easy to write down and teach.
* Example: New York is east of Chicago.

**Procedural knowledge** (“knowledge of how”)

* Knowledge that enables a person to perform music, return a serve in tennis and move the mouth/tongue properly when saying a tongue twister.
* Procedural knowledge is taught by demonstration and learned through practice.
* Procedural knowledge is largely subconscious.

Knowledge in the world is usually easy to come by. Signifiers, physical constraints, and natural mappings are all perceivable cues that act as knowledge in the world.

**Chapter 4:** **Knowing What to Do: Constraints, Discoverability, and Feedback**

Knowledge in the world includes perceived affordances and signifiers, the mappings between the parts that appear to be controls or places to manipulate and the resulting actions, and the physical constraints that limit what can be done. Knowledge in the head includes conceptual models; cultural, semantic, and logical constraints on behaviour; and analogies between the current situation and previous experiences with other situations.

Constraints are powerful clues, limiting the set of possible actions. The thoughtful use of constraints in design lets people readily determine the proper course of action, even in a novel situation. Constraints are used to limit the number of possible actions a user can perform with a product so as to reduce chances of errors occurring. There are 4 types of constraints;

**Physical constraints**

Physical limitations that constrain the range of operations.

Example: A square peg cannot be used with a round hole.

**Cultural constraints**

Culturally accepted range of actions for a given situation.

Example: Red as a the culturally accepted colour for “stop.”

Conventions are a kind of cultural constraint. For instance, some cultures eat with forks, some with chopsticks and some with their hands.

**Semantic constraints**

Rely on the meaning of a situation to control the range of actions.

Example: A windshield is meant to block wind from a rider’s face and therefore must be placed in front of the rider.

**Logical constraints**

Using reason to determine the range of actions.

Example: Two switches to control two lights. Logically the left switch should operate the left light and the right-side switch the right light.

**Legacy problems**: Existing standards or ways of doing things that make change (innovation) difficult or problematic.

**Chapter 5**: **Human Error? No, Bad Design**

Don Norman in this chapter puts emphasis on the fact that when users make a mistake when using a product, it is never their fault and always the designer’s fault. He says “Learn to see human errors as design problems rather than human incompetence”

When users make mistakes using a product or when a product fails, designers should strive hard to determine what the cause is. Most errors are the cause of multiple failures. One of the methods we can use to determine what the underlying cause of failure is to make use of the “Root Cause Analysis” method.

Root Cause Analysis method tells us to ask the 5 Whys when searching for a reason. For example;

* Why did the plane crash? (Because it was in an uncontrolled dive)
* Why didn’t the pilot recover from the dive? (Because the pilot failed to initiate a timely recovery)
* Why was that? (Because he might have been unconscious)
* Why was that? (We don’t know. Need to find out).
* Further inquiry as needed.

The lesson of the Five Whys is that we usually end our inquiry too soon.

**“The tendency to stop seeking reasons as soon as a human error has been found is widespread.”**

**Designing for Error**

* Understand the causes of error and design to minimize those causes.
* Do sensibility checks. Does the action pass the “common-sense “test?
* Make it possible to reverse actions — to “undo” them — or make it harder to do what cannot be reversed.
* Make it easier for people to discover the errors that do occur, and make them easier to correct.
* Don’t treat the action as an error; rather, try to help the person complete the action properly. Think of the action as an approximation to what is desired.

Novices are more likely to make mistakes than slips, whereas expects are more likely to make slips. Mistakes often arise from ambiguous or unclear information about the current state of a system, the lack of a good conceptual model, and inappropriate procedures.

**Design Lessons from the Study of Errors**

**Adding constraints to block errors**

* This can be done through clever use of shape and size

**Undo**

* Reversing the operations performed by the previous command, wherever possible.

**Confirmation and Error Messages**

* Prevent errors by requiring confirmation before a command will be executed, especially when the action will destroy something of importance.

**Chapter 6: Design Thinking**

In design, the secret to success is to understand what the real problem is. We often rush to solve a problem without questioning whether or not we are solving the right problem. HCD (Human Cantered Design) is a procedure for addressing these requirements but with an emphasis on two things; solving the right problem and doing so in a way that meets human needs. HCD is an iterative problem-solving process that designers use, it includes stages such as Observation (Research & Understanding of the problem), Idea generation, Prototyping and Testing.

**Chapter 7: Design in the World of Business**

When new technologies emerge, there is a temptation to develop new products immediately. How can businesses create innovative products that users will love without considering the users mental models? There are two forms of product innovation; Incremental Innovation (less glamorous, but most common) and Radical Innovation (most glamorous, but rarely successful). An example of radical innovation is Apple launching an all touchscreen smartphone in a time when phones still had physical keys. If done well, radical innovation can be successful.

**Featuritis** (aka “feature creep”) is a phenomenon whereby a successful product keeps adding new features and capabilities to the point that it overcomplicates and obfuscates what was once a simple, elegant, straight-forward solution. Reasons for this could be;

* Existing customers want more features, functionality and capabilities.
* Competing companies add new features that create pressures to match those offerings.
* Market is saturated or stagnant. Adding new enhancements will boost the upgrade cycle.

The lesson here for businesses is to focus on strengths of their products, not to follow their competitions blindly.

Design is successful only if the final product is successful — if people buy it, use it, and enjoy it, thus spreading the word. A design that people do not purchase is a failed design, no matter how great the design team might consider it.

Designers need to make things that satisfy people’s needs, in terms of function, in terms of being understandable and usable, and in terms of their ability to deliver emotional satisfaction, pride, and delight.

Designers will be more effective as they learn more about sales and marketing, and the financial parts of the business.