Praarthana Ramakrishnan

Professor Sabarish Babu

Human Computer Interaction

6 Mar 2016

## **Report Introduction**

As new products with modern technology are being used by the users, the need for good design of

# **Chapter 3**

## **Introduction:**

The first chapter deals with how design of everyday things matter in day-to-day life. The concept.

## **Constraints simplify memory:**

There are two aspects of knowledge acquisition and its effects in the behavior of performing tasks. Knowledge in the head involves thoughtfulness and elucidation, while knowledge developed from the world depends on the organization of the world. Accurate precision is not required if combined knowledge from the head and the world leads to appropriate behavior. There are many constraints in the world (knowledge in the world) that simplify the number of combinations of work that can be done. The amount of knowledge that needs to be stored in the memory is condensed due to these factors. People tend to reduce the amount of knowledge that they store in their memory, instead the above mentioned two types of knowledge are pooled together and utilized. There are various types of constraints such as physical, cultural that simplifies the memory usage.

### **Example:**

When a user operates the computer for the first time, he/she will not be aware of how the mouse pointer works on the screen. But the physical constraint that **the mouse pointer cannot move out of the screen** ensures the user’s proper usage of the moue. There are also cultural constraints such as the **scroll bar on the right side of the window**. The scroll bar can be scrolled down to see the objects beneath and scrolled back up to see any content on the top. Such constraints restrict the number of options and allow the new users to adapt using knowledge in the world [1].

## **Memory is knowledge in the head**

People often forget passwords, numbers or any security codes because they are all hard to memorize (knowledge in the head). Instead, they write down their memory into the world, note down in their sticky notes or wherever it seems easy to access. There are two different kinds of identifiers for safety methods: ‘something you know’ (e.g. knowledge in the head) and ‘something you have’ (e.g. eye pattern recognition, biometrics). However, the passwords and codes designed for security reasons are difficult to recollect because they were developed for machines without taking human form of memo-ry into consideration.

Norman tries to present two forms of memory: the short memory and the long memory. Short memory is volatile and retains information only for a small amount of time. If people are distracted, then the information gets destroyed. Hence, information is presented using different modalities such as haptics, auditory feedback. Long memory that stores information about the past, takes a long time to extract as well as fill in. Retrieving information from the long memory is a productive process that involves organizing things. Norman explained about ‘approximate models’ that work better than real conceptual models for certain mappings and to store the knowledge in the head.

### **Example:**

A customer, who is from a non-computer science background, is asked to attend a usability session of a product. When the on-screen instructions of the session instructed the user to choose a “drop-down box”, the customer was searching around the page for a box labelled “drop down”. The user didn’t have any knowledge (knowledge in the head) regarding this terminology. The language that we use every day need not be common everywhere [2]. To avoid such conventions, knowledge in the world can be used.

## **The tradeoff between knowledge in the world and in the head**

Norman illuminates the combined power of knowledge in the head and in the world. Knowledge in the head supplements the knowledge in the world. The following tradeoffs are mentioned by Norman, 1) Effectiveness: As long as the environment doesn’t change, knowledge in the world does not require any learning, whereas knowledge in the head requires substantial volume of learning. 2) Reminders: Knowledge in the head is short-lived, but knowledge in the world is easily accessible and self-prompting. To enrich memory performance, Norman suggest the usage of multiple heads which is known as ‘transactive memory’. Nowadays, due to technological advances, smart devices are more convenient in providing responses to our queries which is termed as ‘cybermind’. Thus the collaboration of both the technology and the people will make us live better in this world.

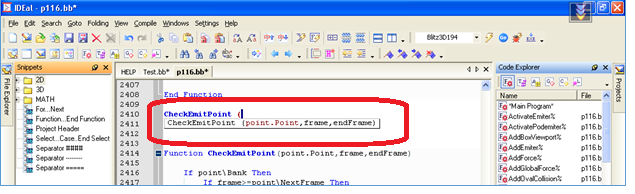


Figure 1

### **Example**

Programming languages vary in the syntax and usage. Specific languages are developed mainly for front-end applications whereas few others are developed for back-end design of a software. For example, when software developers start designing an application, they need to have **basic knowledge about the programming language (knowledge in their head).** Since there are several syntaxes in any programming language, and one cannot remember all the syntaxes, they depend upon the **knowledge in the world (E.g. auto-syntax completion features in programming IDE** **as shown in Fig 1** and other applications) for complex operations involved in developing a high end application.

## **Natural Mapping**

Norman talks about the importance of natural mapping. When there is a good correlation between the controls and the things being controlled, life is at ease with less memory needed. He lists three levels of mapping: 1) Best Mapping: The controls are placed on top of the product being manipulated and require no memory aid 2) Second-best mapping: Controls are placed close to the products being controlled and require less memory whereas 3) Third-best mapping: Controls are aligned identical to the items require more memory than the former two types of mapping. When purchasing any kind of product, the consumers need to be aware if the product is actually easy to use and has good natural mapping. The author also comments that the natural mapping differs with respect to culture and also the viewpoint.

### **Example**

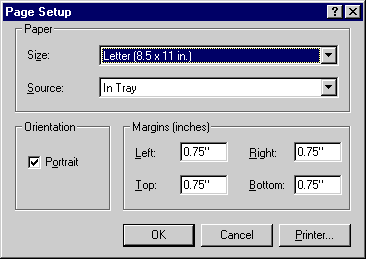


Figure 2

In dialog boxes that show up in a computer application, there are no signifiers or labels used. This is because it offers natural mapping as follows: 1) the check boxes are used to turn ON and OFF 2) The radio buttons are used for mode switching as only one option can be selected [3].

## **Discussion and Conclusion**

Mapping is the relationship between the devices being controlled and its control layout designs. Mapping is important since it determines how to use the device. An understandable mapping between the controls and the actions adds advantage to easy operation of the device. Example, in the figure below, the controls of the kitchen stove that is mapped/ aligned in the same way as the position of the four coils as

# **CHAPTER 4**

## **Introduction**

The second chapter deals with the seven stage model of action and how different emotions occur at different stages and how it relates with the three level processing model. The three level processing model includes visceral, behavioral and reflective. It depicts how people falsely blame themselves and how positive psychology can help overcome it. This chapter explains how various factors for good design such as conceptual model, constraints, signifiers and good mapping can eliminate frustration in everyday actions.

## **Define Constraints**

The gulf of execution is referred as the gap between user’s goals and the methods to perform the goal. Signifiers, Mapping and Conceptual models are used to bridge the Gulf of execution.

### **Negative Examples**

1. VCR Problem

In order to record a TV show, the user just presses a “Record” button. But to record in VCR, several steps has to be done [4]:

* Record button is pressed
* Change the hour and minute settings to mention the recording time.
* Specify channel number manually or through buttons
* Save the record settings by clicking the respective buttons

1. Online Shopping

The user decides to purchase an item in online store [5]. The user looks into an item that he/she likes and decides to put the item into the cart. But the user couldn’t find any icon to add the item into the cart. This is called gulf of execution where the user doesn’t know how to perform his goal of checking out the item.

### **Positive Examples**

1. Setting up WIFI enable devices

Setting up WIFI enabled devices like Wii, Wireless gateway in IPhone has the narrowest gap with respect to gulf of execution. The methods are pretty obvious for the user to achieve the goal.

1. Modern Home Alarm System

Today, the home alarm systems have a prompt (feedback) that shows a countdown timer. It mentions the time between the user’s commands and the arm time. This is helpful for users who don’t know whether the command worked and how much is left to leave the building [6]. Such feedback systems should be added by the designers in order to reduce the gulf of execution.

## **The gulf of evaluation and why is it important**

The gulf of execution is the expectations that the users have from the system or in other words it is the users figuring out what happened. Feedback and a good conceptual model are the design elements that help bridge the gulf of evaluation. The user expects feedback from an action and is not receiving what is expected.

### **Negative Examples**

### Online Shopping

The user adds an item into the shopping cart and tries to checkout using the “Checkout” button. The page is not responding, so the user waits and presses the button again [5]. The user waits again ad gets frustrated to see that the system has failed. This is called gulf of evaluation where the user has no feedback on what the current state of the system is.

* **Positive Examples**

1. Reading Filenames in the Computer

The user is trying to look at a directory full of photographs and guess from the filename who and what is in the picture [6]. Instead, the users’ evaluation is quicker by adding thumbnail of the picture along with its name.

1. GPS Locater

Olden GPS locaters gave only the latitude and longitude information of the current location. This made users decision as whether to turn left or right based on the GPS information more difficult [6]. But nowadays since the GPS includes street location and tells where to turn, the whole map-reading step has been reduced from the user to the device. Thus the gulf of evaluation has minimized to a far extent.

## **Human Cognition and emotion with implications to computing systems**

There are three levels of processing within the brain that applies of both human cognition and emotion and provides basic knowledge in understanding human behavior.

1. **The Visceral Level**

Visceral is the home of basic emotions and responds to the immediate present. The visceral design dominates the physical features. The visceral design can be studied by allowing people to note the designs and observe their reactions. When we perceive something as “beautiful”, the judgement comes from the visceral level.

* **Example**

Sales increased when Apple introduces colorful Mac even when these Mac contained same hardware and software features as other models. Thus at the visceral level, physical features such as look, feel, sound dominate than other features.

1. **The Behavioral Level**

The behavioral design involves understanding how people use the product. For example , the cup holder s in car became important only after realizing that the car sales was low because of the lack of cup holders.

1. **The Reflective Level**

The reflective level involves the conscious cognition. It encompasses deeper understanding rather than quick reflexes. Reflective design involves long-term consumer experience.

## **People as Story Tellers**

People’s behavior is generalized from the experience and story of others. People form a conceptual model based on their previous experience and knowledge. Based on this model, they predict the future outcomes that most probably turn out to be wrong. This is because, there might be a chain of events that is responsible for a particular event, but people take into account just one cause of the event.

## **Blaming the wrong thing**

When people fail at doing things after trying several times, they start blaming themselves. Similarly when the users are expecting a result and don’t get any responses, they repeat the action that can be equally dangerous. Feedbacks are highly important when performing tasks as it would satisfy people’s expectations.

## **Principle of mapping**

Due to the lack of usability and bad design of the devices, people make bad mappings and blame themselves. For example, when people buy new device such as a washing machine and try operating it, they blame themselves for not able to perform the desired operation. This is because of the bad design of the device.

## **Learned Helplessness and positive psychology**

Learned Helplessness refers to the situation where people start blaming themselves when they repeatedly fail at doing a task. Instead of blaming the poor design of the technology, people blame themselves and feel helpless. Looking at failure as a learning experience is a positive psychology. Failures are important for exploration and bringing creativity. The designers should take people’s difficulties as signifiers and improve on the product.

## **How technology users can falsely blaming technology**

If products or devices are designed based on the user’s requirements, the design and the usability of the product would be highly better than those designed without taking requirements into consideration. The device should work well even when thing go no as planned.

## **The seven stages of actions: seven fundamental design principles**

The seven stages of actions consists of two types of information’s called feedforward and feedback. Feedforward gives information on how to execute the process, whereas feedback helps in understanding what has happened. Signifiers, constraints and mappings are useful for obtaining feedforward information. The conceptual model does a critical role in providing feedback information. There are seven stages of action is shown in Fig 4 [7], and the corresponding seven fundamental principles of design are discussed below.

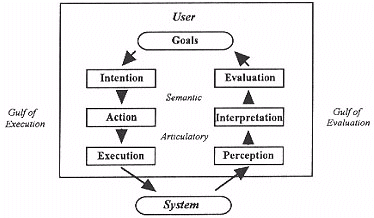


Figure 4. Seven stages of action [7]

1. Discoverability - Actions possible and current state
2. Feedback – Information on the results of action
3. Conceptual model – Enhancing discoverability by illustrating all information needed to create better conceptual model
4. Affordances –To perform desired actions
5. Signifiers – Ensure discoverability
6. Mapping – A good relationship between controls and their actions leads to good mapping
7. Constraints – For Easy interpretation

### **Example**

A software company designing a product with different teams involved, adopts agile methodology which is very analogous to the principles mentioned in the section. Agile methodology involves the following steps: acquiring the users’ requirements, analyzing the mental model of the design, getting feedback from the User interface Design experts, iterating back the requirements after every major improvement in the product’s design is made. The testing team along with the developing team contribute in meeting the end users’ needs. These steps adopted in companies are very helpful in attaining good design of the product.

## **Discussion and Conclusion**

This chapter builds ideas on how to take failures as learning experience and how to relate with the everyday actions. It made me understand how important the bridging between the user’s goals and methods of attain the goal is. It makes the product more utilizable and sensible for users. In the user’s perspective, this chapter instills the details needed before choosing a product. In the designers’ and developers’ perspective, it demonstrates how close the users and developers model need to match and how good design reflects the usability of the product.

# **Discussion and Conclusion**

It had made me ponder upon the design of the devices that I use everyday things and those that I wished to buy. I realized how one can view minute details and design of conventional things. It has really made me more thoughtful about the problems and the necessities of the people.

**References:**

[1]. Jnd.org, "*Affordances And Design - Jnd.Org*", http://www.jnd.org Don Norman. Licensed under the Creative Commons Attribution, Non Commercial 4.0 International License.

[2]. ERTELL, KEVIN. "*Retail: Shaken Not Stirred By Kevin Ertell » Knowledge In The Head*". Retailshakennotstirred.com. N.p., 2011. Web.

[3]. McKay, Everett N. *Developing User Interfaces For Microsoft Windows*. Redmond, WA: Microsoft Press, 1999. Print.

[4]. Wikipedia,. (2016). *Natural mapping (interface design)*. Retrieved 6 February 2016, from https://en.wikipedia.org/wiki/Natural\_mapping\_(interface\_design)

[5]. Petekinser.com,. (2011). *Illustrated: Don Norman’s Action Cycle | Unthought Known - An Exploration of Experience*. Retrieved 6 February 2016, from http://petekinser.com/norman-action-cycle/

[6]. murphy, n. (2006). *Put the user in the driver's seat*. *Embedded*. Retrieved 6 February 2016, from http://www.embedded.com/design/real-time-and-performance/4006687/Put-the-user-in-the-driver-s-seat

[7]. Ascilite.org,. (2016). *IIMS 1994: Quinn - implications of instructional and game design for interactive multimedia interfaces*. Retrieved 6 February 2016, from http://ascilite.org/archived-journals/aset/confs/iims/1994/qz/quinn.html