

## **HCI Lab Assignment 3**

Harshvardhan R

181IT217

### **Fitt's Law**

#### **Introduction**

Fitt's law analyzes the human motor system by exploring its movement limits and capabilities, and accordingly designing human-centered interaction techniques for computing systems. Considerable research is directed at modeling, predicting, and measuring human performance. Fitt's law primarily measures the spectrum of movement of our arms, fingers and wrists. However, modern enhancements and improvements to the law have been able to extend it to advanced contexts such as computer gaming, virtual reality, augmented reality based computing, etc, wherein the parameters involving torso, lips, face, feet, eyes, etc are also analyzed. Hence we see that Fitt's law can be extended to a wide range of input modalities.

#### **Observations**

Fitt's Law has far-reaching implications in UI design. In fact, the design of the computer mouse was only considered after taking Fitt's Law into consideration.

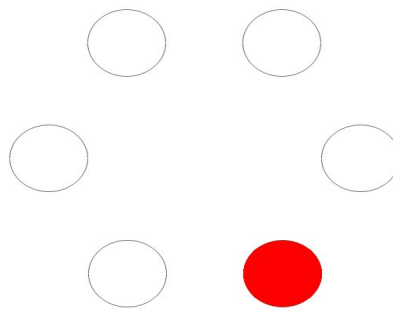
In a nutshell, Fitt's law says that big targets that are close to the initial position are reached faster than smaller targets at a further range. It also tells us that it varies with the logarithm of the distance to the target, and the inverse logarithm of the width of the target.

Some UI design conventions that have emerged due to this law are -

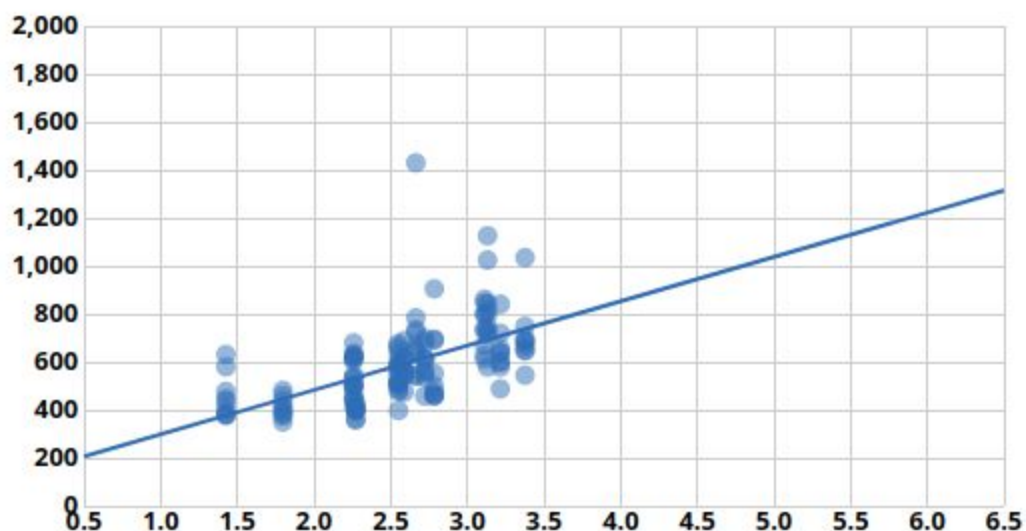
On pressing right-click, many OSes show a context menu at that spot. The user can continue interaction right from their mouse position and don't have to move to a different preset area.

A UI that allows for pop-up menus rather than fixed drop-down menus reduces travel times for the D parameter.

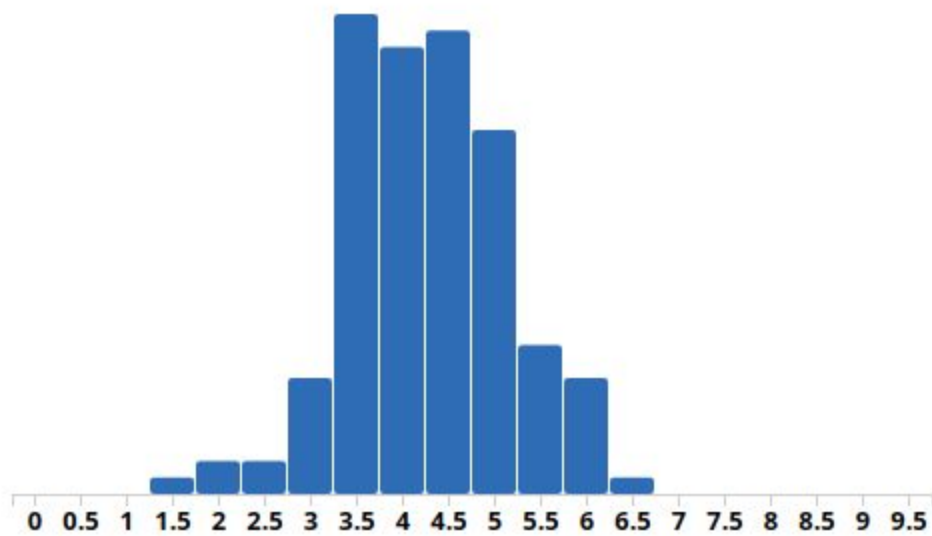
Radial menu designs were also analyzed by James Boritz et al in 1991. The research tells us that the direction in which the user has to move the pointer also plays a role in the time taken. For right-handed users selecting the left-most menu item was much more difficult than the right-sided one. Grouping functions that are commonly used together is often done to reduce the D parameter, decreasing travel times. The mouse pointer stops when it hits one of the four corners of the screen, allowing for infinitely large targets in that direction. This allows users to seek these targets very fast. This is kept in mind while designing commonly used operations (such as clicking the cross button to exit a program, which is usually at the top right, the start menu which is usually at the bottom left, etc.).



#### With Mouse

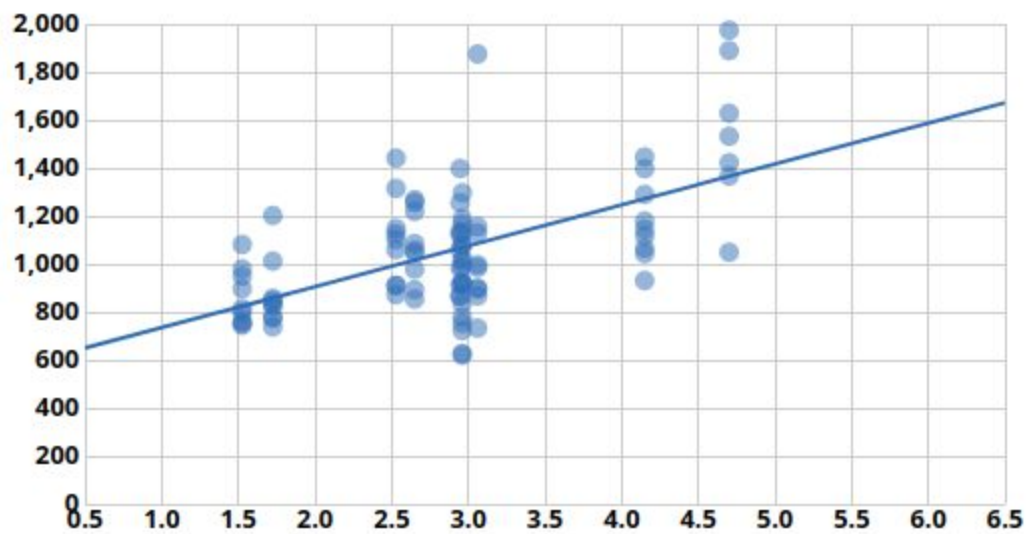


Time in ms vs Difficulty measure when used with mouse

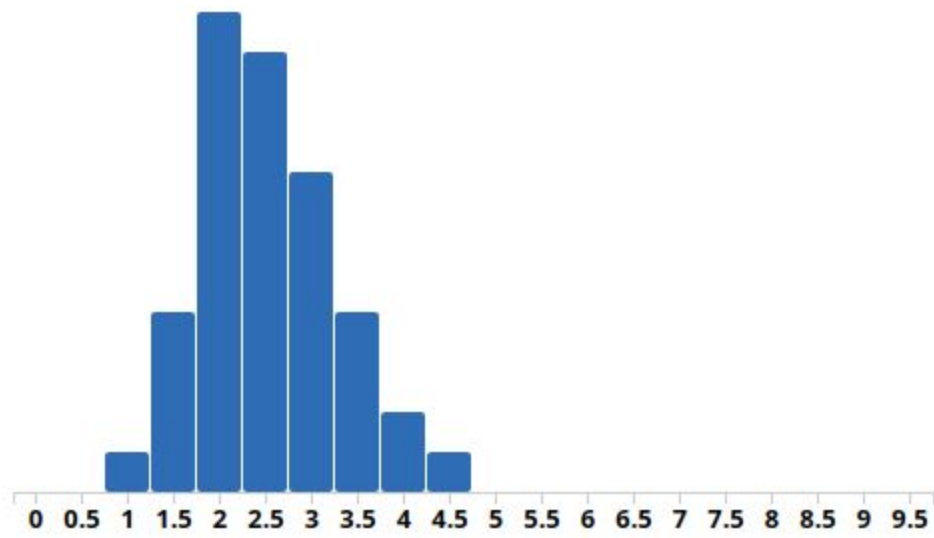


Histogram of effective throughput when used with mouse

With Touchpad



Time in ms vs Difficulty measure when used with touchpad



Histogram of effective throughput when used with touchpad

# Hick Hyman's Law

## Introductions

Hick's Law says that the more choices you present your users with, the longer it will take them to reach a decision. It examines the relationship between the number of stimuli present and an individual's reaction time to any given stimulus. As you would expect, the more stimuli to choose from, the longer it takes the user to make a decision on which one to interact with. Users given many choices have to take time to interpret and decide, giving them work they don't want.

$$RT = a + b \log_2 (n)$$

RT is the reaction time,

n is the number of stimuli present

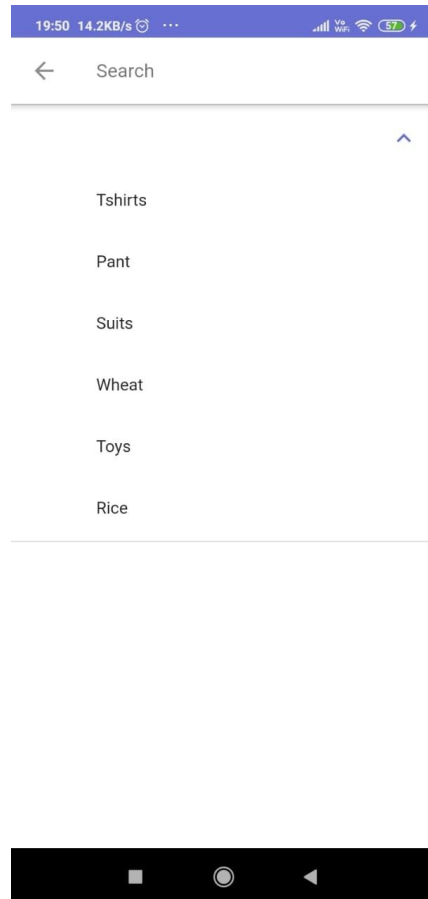
## Observations

### Menu 1

All the choices are listed.

These are neither sorted alphabetically nor are categorized,

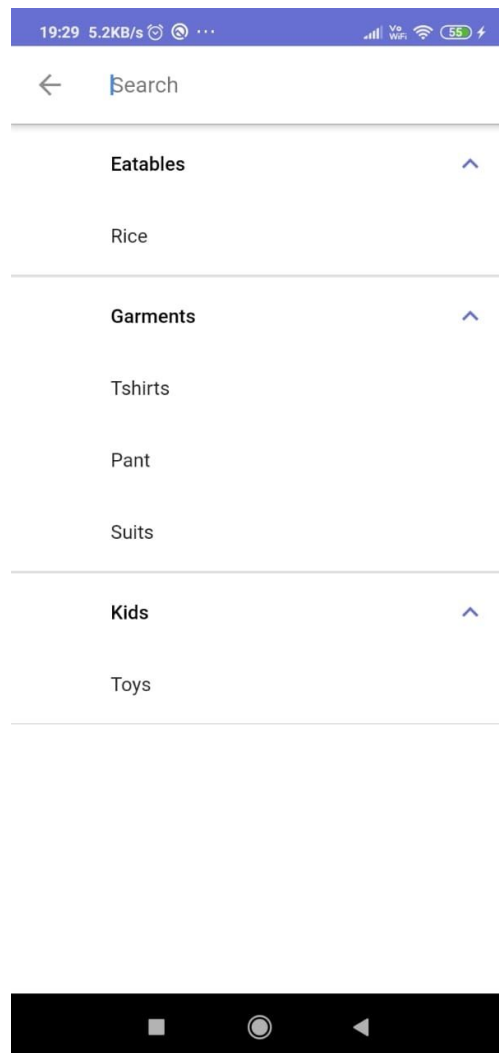
The user will have to go through all the options to look for what they want to buy.



## Menu 2

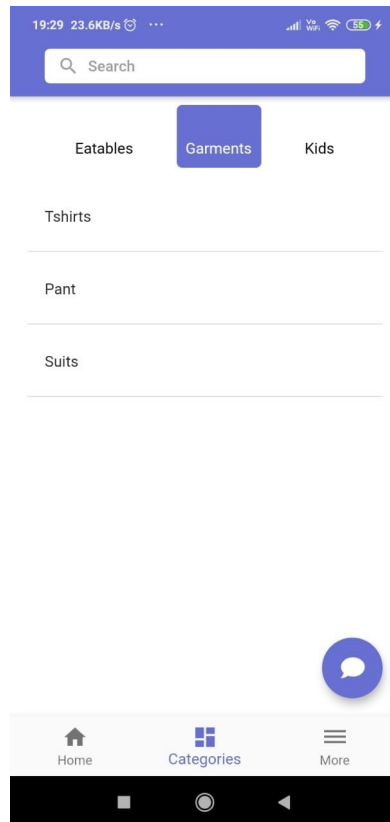
Categorized all the options

If the user knows what they want to buy, they can go to that category and select that option.



### Menu 3

Like in menu 2, here we have created categories and also have placed the other items in sub-menus. Thus we are simplifying things for the user.





To make these designs work we need to see to that:

- The user's time is precious.
- Categorizing Choice – Enabling users to find items from higher categories, as if they were looking under sections in a library.
- Keeping things simple

Menu	Measured Time	Hicks law Time
1	6	6.1
2	4	4
3	2	2.5