Introduction to Human Computer Interaction
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Lecture – 22
Visual Design – 2

Welcome back to the course Introduction to Human Computer Interaction. This is course on NPTEL, this is week-9, but I am going to cover some content that we showed in week-8 quickly and we will cover on the week 9 content. So, what did we see last time and I am hoping that you are enjoying the class I see the attention, I see the discussion mailing list going up keep it flowing like that and please feel free to share the experiences that you have and the things that you are thinking about this topic on the mailing list. It will be fun to see what you are doing and what how you are applying things that you are learning from this course.

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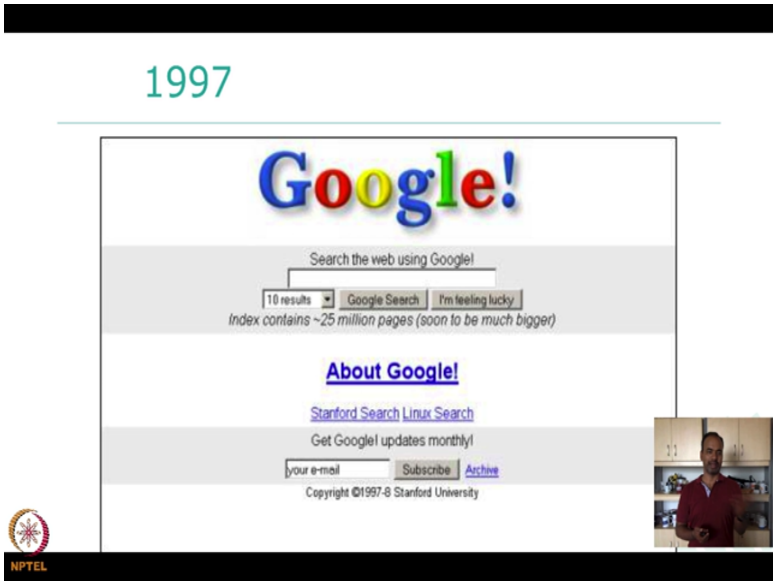

So, when we finished last time I actually walked you to through walked you through different services that are available that we are using currently and how they looked many years before.

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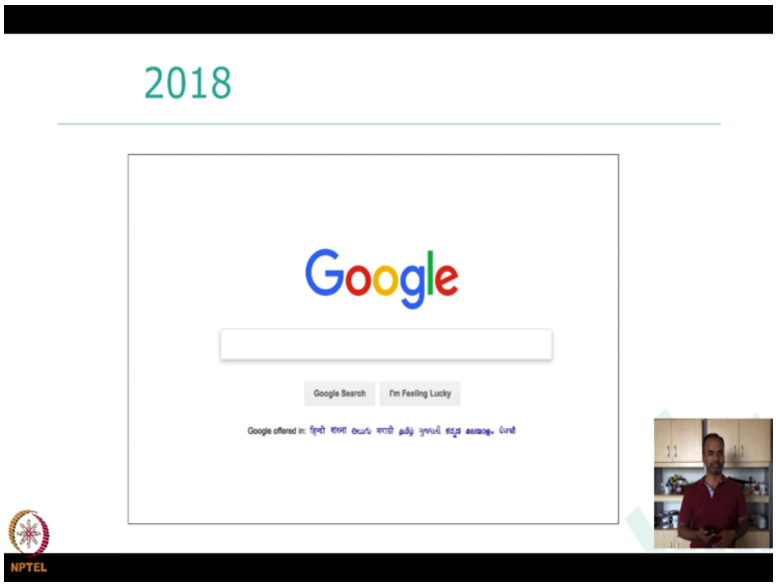

1987 Google, 2018 Google.

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1994 Yahoo.

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2018 Yahoo.

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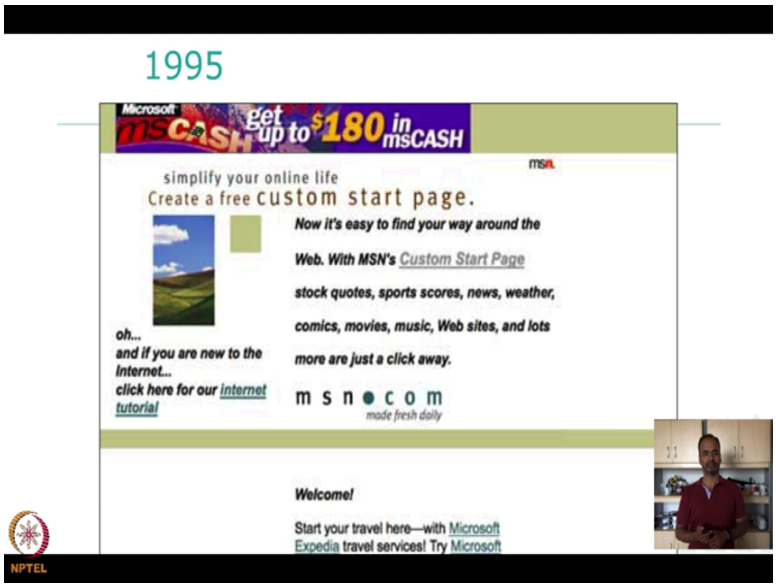

1995 MSN.

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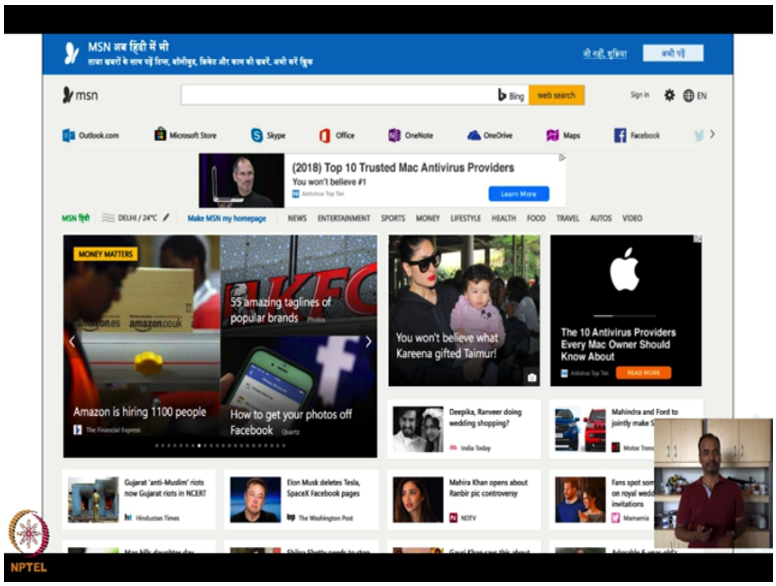

2018 MSN.

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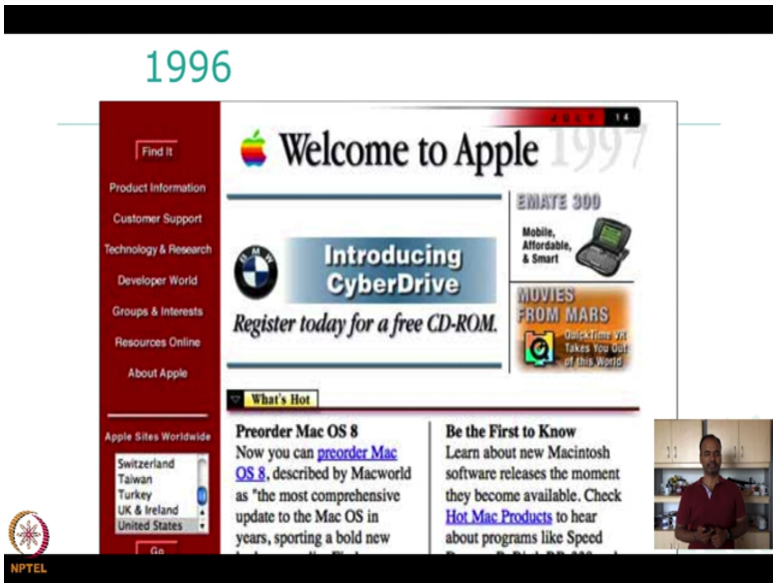

1996 Apple.

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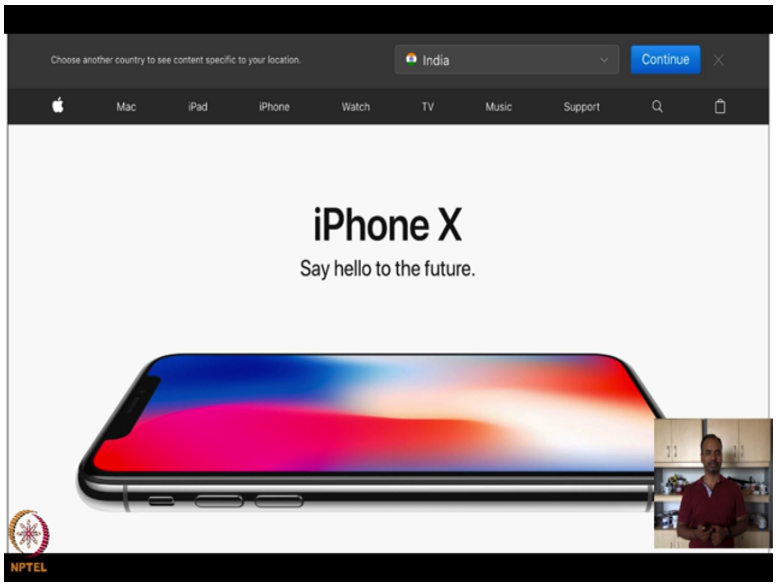

2018 Apple.

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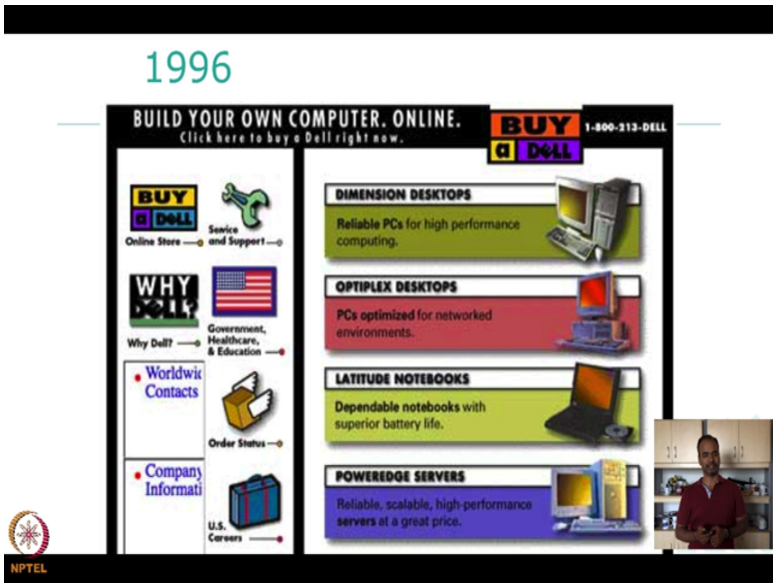

1996 eBay.

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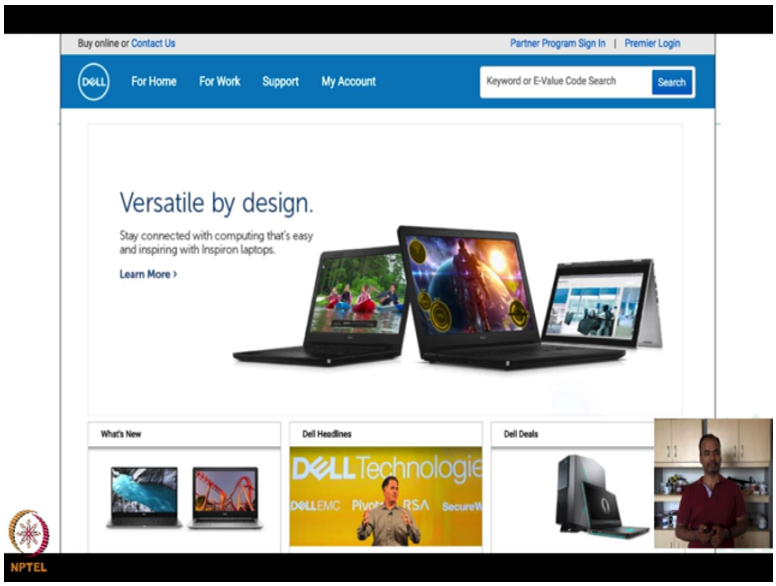

2018 eBay, right; so this the whole purpose of actually showing you this is to convey the point that the design that you are doing now, will follow some of the patterns that are emerging now and the patterns that are available now and the designs that looks cool look very appealing, attractive to the audience now. For example, apple now is like this because they have the trend of actually keeping it that way, which is very simple which is showing you the information only what they want you to look at particularly very boldly presenting the information that have.

Now, let us get into the topic of visual design, right. Visual design is an interesting topic is because it is known to get you introduced to how information visually that you can present is actually going to make a difference a lot. For example, I would ask you to just think about let us take a website called times of India dot com just visualize what the times of India dot com website is or just open up the browser family and see how the information is presented. Compare that to information that is presented in an (Refer Time: 02:36) for you, just think about it and compare it to the information that is presented in this remote for the slight change, right. So, visually the information that is getting presented in different ways conveys different information and the way that you present this information can be actually appealing to the users can appeal to the users and there by your usability may increase.

I am going to walk you through some (Refer Time: 03:06) design patterns and visual design.

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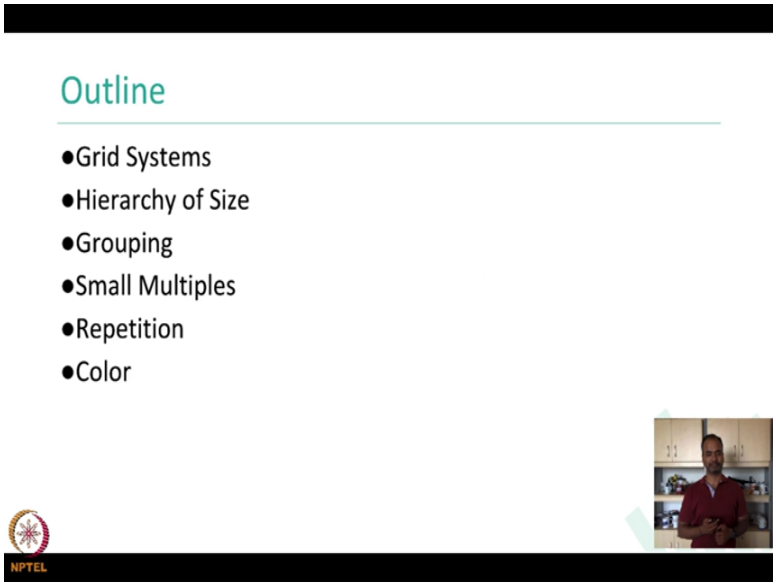

So, the topics that we are going to cover is grid systems, hierarchy of size, grouping, small multiples, a repetition and color. So, first grid system one of the things that you would actually realize in the systems in the services that we used regularly (Refer Time: 03:29) are the example that I told you Times Of India dot com if you look at times of India dot com and let us take Washington Post and let us take New York Times the information is actually presented in a very griddy format, right.

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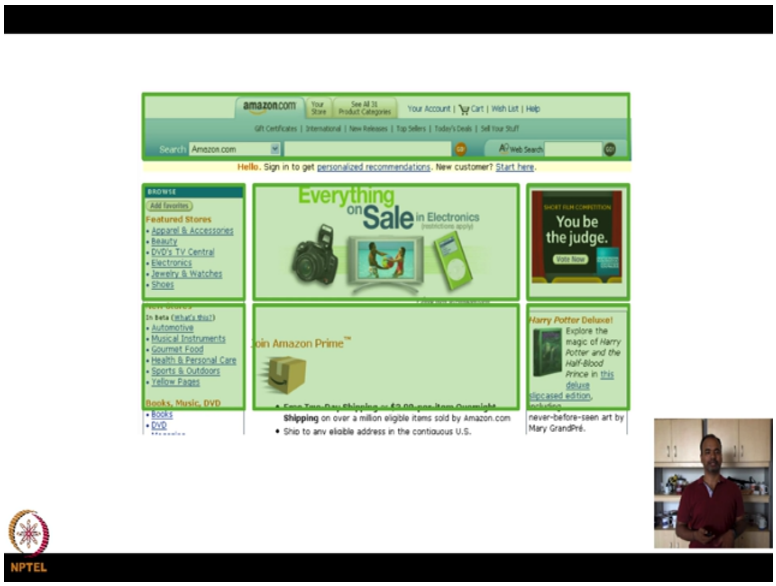

So, grid is the way that the information is (Refer Time: 03:44) just look at this, right. The highlighted ones are in the grid, right on top, on the left, on the right and in the middle. If you take Facebook that how it is. If you take twitter that is how it is. So, that what this information presentation in a grid form is very popular and information presented in this visual form has some appeal to the users who are referring to these web services and who are using these services. Let us continue on looking at other types of visual design, hierarchy of size, grouping, small multiples, repetition and color. Let us look at few more.

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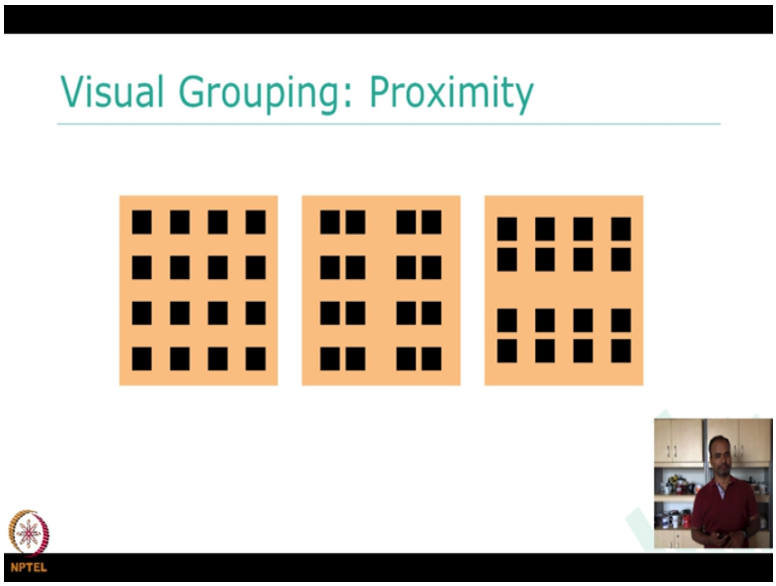

This is grouping, visual proximity; visual grouping in that there are multiple ways of actually visual grouping. So, I will give you examples as you as move forward have some images also which actually walks you through these examples which will let you to think through where all this can be actually apply proximity, right.

So, when you wanted a information to be presented that is relevant to each other you put them close to each other. For example, I will show you if you if you think about a research papers where you have seen tables without the line also the information presented next to each other. And then let us take there is a sub column a column is broken into two more columns and that information is presented without the line also if the information is presented like this visually you would think that they are actually same group, same thing you can think of it is in the horizontally also.

I assume that is making sense to think about it where information is presented you want the two pieces of information together and that is presented next to each other, if they are close there is some kind of grouping that the designer wants you to have in mind.

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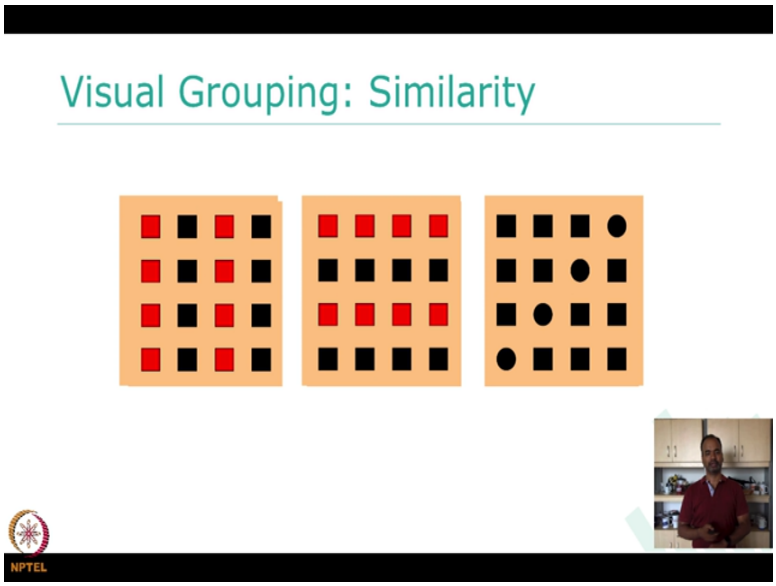

Same visual grouping this is similarity now the earlier one was proximity now it is similarity. What does similarity means? Similarity here means for example, look at the look at the first one on the left that is showing you the red colors in the black colors right it is basically saying that why I am I am actually putting the first column to be all red, third column to be all red which means they are all of the similar grouping that I am that

the designer wants to make same thing in the second one which is horizontal. Third one is slightly different where the similarity is being presented with the circles. So, the ones that are diagonally there I am presenting that there is a those are similar values (Refer Time: 06:19)

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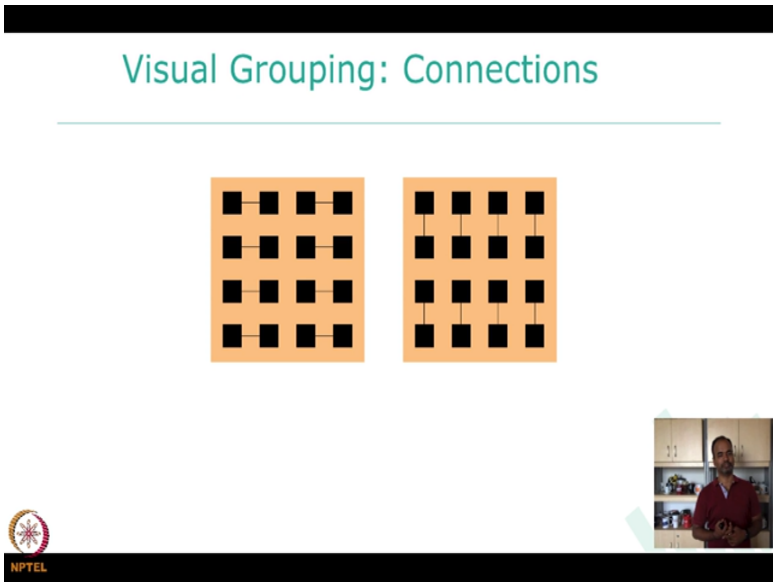

Here is another one visual grouping with connections I mean you can you can think of this is in the first category also in terms of proximity itself. Visual grouping proximity now in within the proximity I could actually put them if I were to have connections I will draw a line between them, right. So, these are the different types of groupings that you can do.

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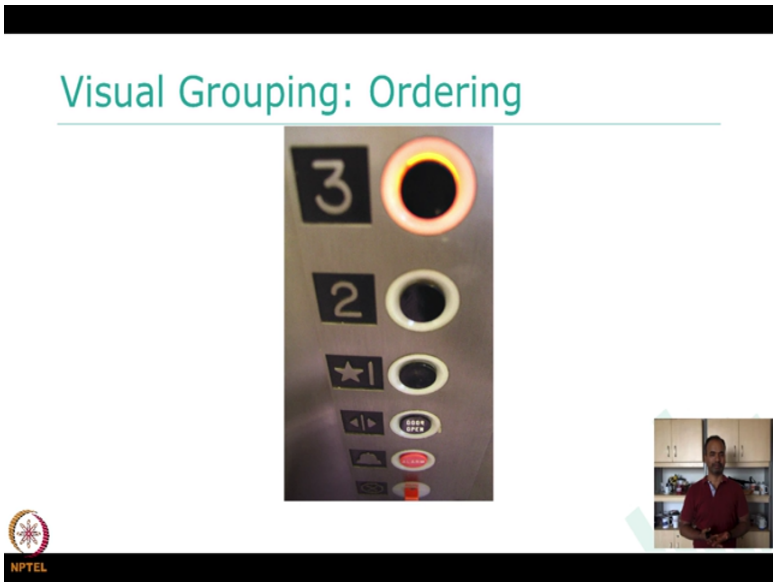

Here are more grouping that more practically you could see it very regularly. This is ordering, right. Ordering is elevator is a simple example where the information is presented in some order of the floors that you are going to take in the elevator. I am sure you are able to recollect the elevator discussion that we had in the lec week one, where we said that elevator has one of the good designs by keeping the mirror outside the elevator or inside the elevator so that people actually have it the person taking the elevator getting distracted, but I am going to show you some examples how elevator design here in terms of ordering is actually pretty bad in that sense.

Or some things to take away from in the in the visual grouping ordering is to actually look at the different designs that you see while taking elevators let us see if when whenever you are taking elevators from now when you listen to this lecture if you find any of this interesting designs, interesting visual grouping in the elevators please take a picture and send it as a group in the mailing list.

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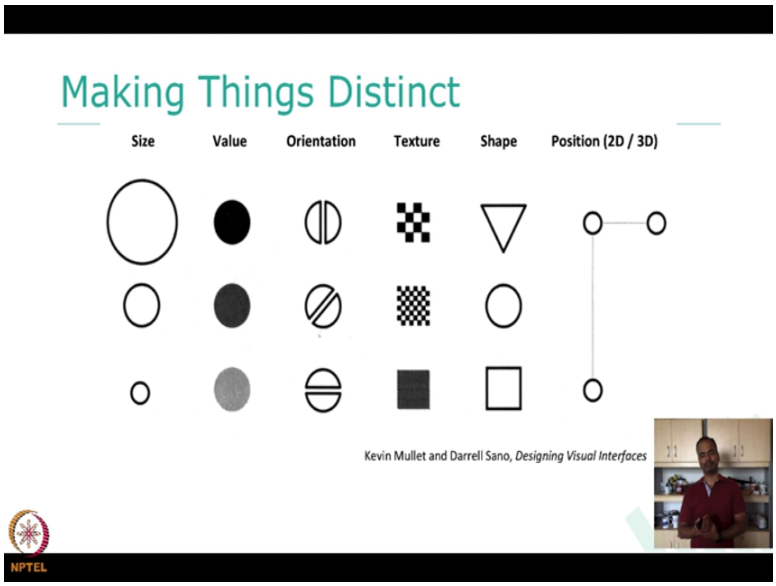

Now making things distinct, so I think if you think about this the meaning if I just say danger you will already recollect that the way that danger information is presented is so to say a triangle and an exclamation in between, right and if I say let us take a bumper in the road or speed breaker in the road so, there is traditionally now we are using black color and a yellow color half I mean as stripes, right. So, that is the way that you are presenting things that are distinct that we want to keep, normal road and then speed breaker in a different color. So, you could think of all of this in the ways by which we are consuming this information we are taking this information that is presented. So, in this case size, value, orientation, texture, shape and position, let me go through one one by one, size right.

So, I am sure you would have seen size and shape some several examples that you could have uh. Sizes the let us take if you are looking at look at the toys that kids play, they would have sizes for example making things distinct, right. So, in this case the reason how you actually put I am sure you have seen these kinds of shapes in different places let me give you some examples let us take let us take the orientation.

Orientation is when meaning when you play lego or when you play with the toys they keep it in which direction the screw has to be kept, right the nuts and bones how they have to be placed for example, texture you could think of it as the way that the roads are sometimes placed, right. So, if you are putting less check for a chess board game like that

in where the checks are very small the expectations are little more rough and then if it is a checks are slightly bigger the surface is supposed to be less rough in that sense. A shape I think you could also think of it in the playing games with the kids there are games where you keep they will have a triangle and only a triangle will go into the triangle shaped object will go into the triangle, circle and square in the square, right. So, those are the ways that these kind of making think these things from the design visual design point of view is getting implemented.

Value also right, the gray scale the level of gray scale would depend for example, if you go by paint to paint your home or a wall or anything the organization where you plan the shop where you plan to buy the paint will actually give you a booklet where they will show you different shades so to say the same blue colour different shades so, to say the same green color. So, that is the value.

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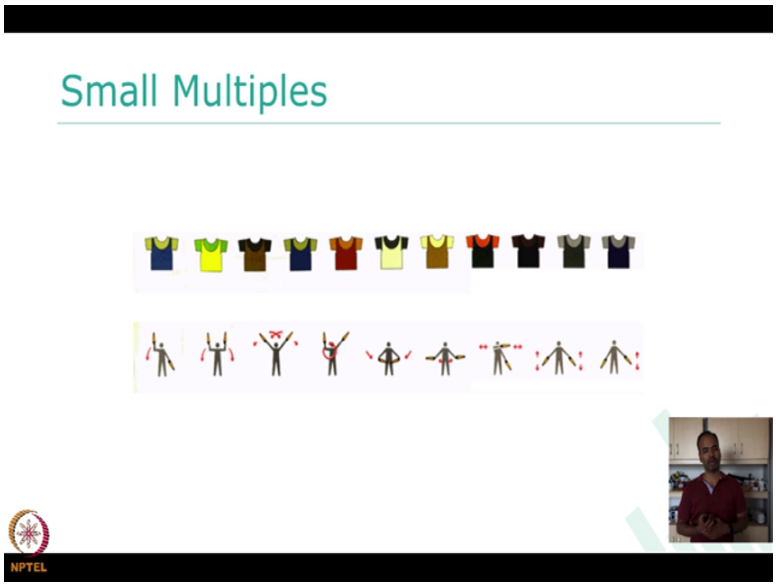

Let us move on in terms of small multiples, right. Small multiples let us look at the bottom one first bottom one is basically showing you small changes in the way how the person was bringing the aero plane to stand still in the airport would do small instructional changes that the person is doing starting from like this, going like this and then coming like that and then closing and bringing it to the place, right. So, that is what he is trying to do and the small indication small changes is represented in the visual design and I am sure you already made connections to saying that safety for these aero

planes and their landing is super important and that is why this game of instructions have to be very very clear, very very so to say explicit to them and the one on the top is actually small multiples of different color shades.

Again, this is connecting to the value the one that I was talking about here, it is different colors you be going to buy T-shirt you want to print something on the T-shirt. You want a certain type of T-shirt if you go to shop. So, if you go to even online shopping services they would actually provide you information about different shades of the same thing different colors are the same kind of design T-shirt or cloth that is more multiples and the variations are actually is small from let us take let us look at the right hand most two of them, but the shades look very similar where or looks very close to each other, but there is a small difference between them. That is the small thing that we are talking about here.

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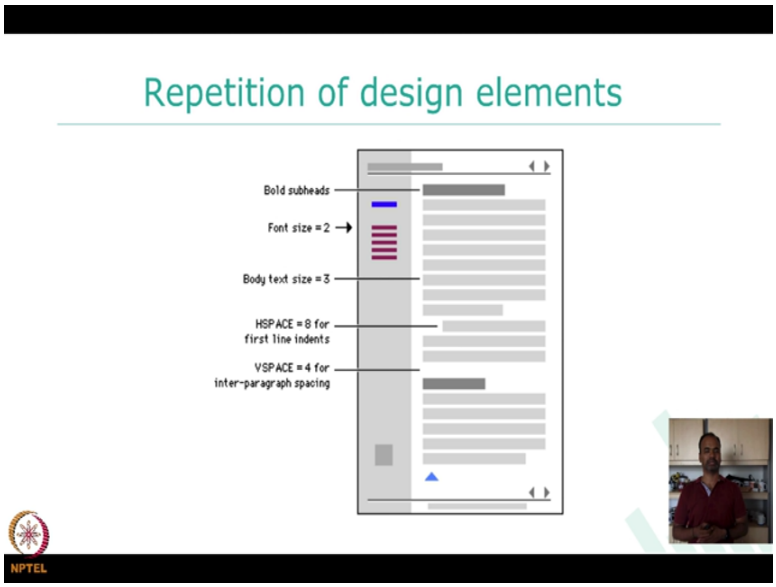

Let us come back to repetition of designed elements, right. So, this is Microsoft word from where you can actually see that we generally actually you can even think about it as a research paper even in a research paper we actually have different parts of the research paper clearly to highlight how for example, section looks different from subsection, subsection looks something different from sub section, right. So, in that repetition of the designs repetition on the forms repetition of the structure of the document is actually necessary, for people to quickly get what they want to get out of the paper also, right. Figures are kept differently tables are kept differently all of that.

So, that is a repetition of design elements in this case I am using the font to explain the repetition of the design elements and sure you can talk about other ways will repeat repeating the design elements also.

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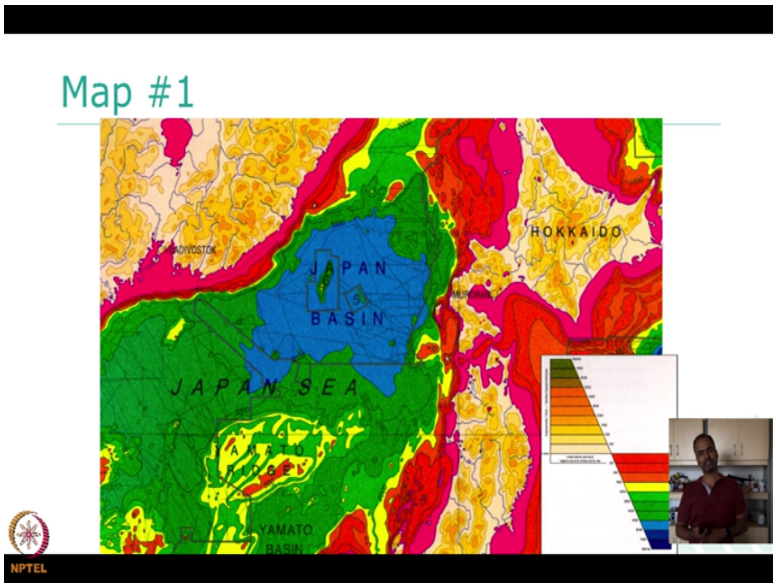

Here is some things about color; color in terms of just look at this map and think about what all it is representing and look at the next one.

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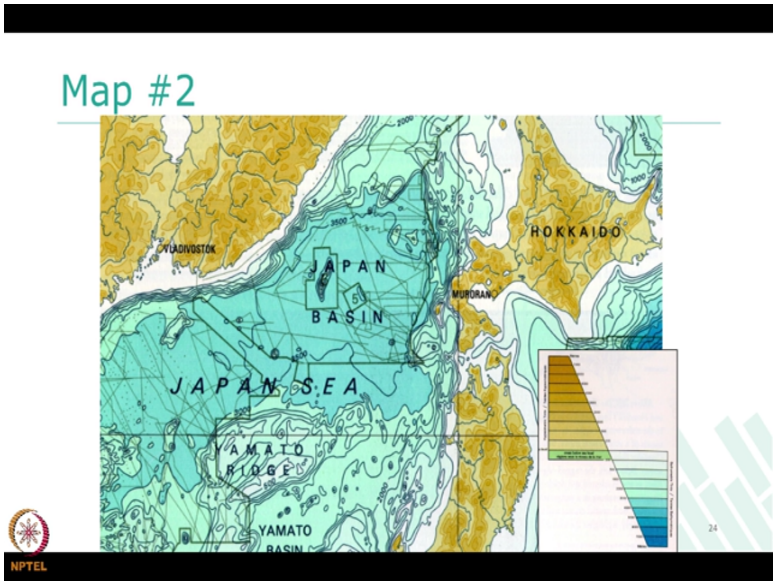

Which one would you prefer for understanding the map? Map 1 or map 2? map 1 of course is, is to the colors that they have used as many it is not the shades of the same

color therefore, it is hard to read it is also very appealing to the eye because appealing in terms of actually it is hard for me to observe the colors that are presented in this in this map. This one is very pleasing because they have just taken brown or shades of brown, blue and some shades of blue also therefore, and also their water is also represented here. So, therefore, you could also argue that water is connected to blue. So, there therefore, using some shades of blues are always going to be better.

So, continuing on this color scheme itself. It is very clear that using in such scenarios where you want to actually show information shades of color makes a lot more sense and that is why if you see in heat map kind of concepts where when the color is picked it is better to pick a gray scale, it is better to pick a scale which where you can actually do the shades of that color and show emphasis on some information that is getting more and more prominent.

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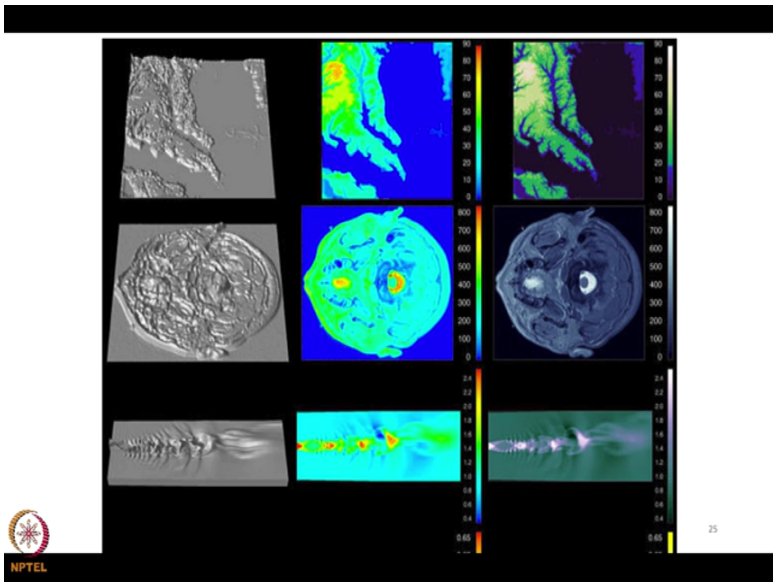

So, here is another view on this visual design itself look at these images on the 3 by 3 matrix left and top 1 by 1 to 1 by 2 to all the images right. So, if you look at these images and show you are connecting it to some of the things that you already know for example, the left hand top looks like it is a say map with some projections on top 1 by 1 and 2 by 1 looks like a brain which is one sort of the imaging of the brain and 3 by 1 looks more like a spinal cord of a of a person with some projections again on elevations on some things that needs more emphasis on and 2 by 1, 2 by 2 and 2 by 3 is a version of the same

thing continuing on the heat map kind of concept where it is showing a different color so to say and slightly more reddish when the information is information there has more emphasis on it and then the third column which is 1 by 3, 2 by 3 and 3 by 3 is another version of the same kind of brain let us take a land versus water map and the spinal cord. I will leave it to you for a second to think about which type of information presentation is actually useful and relevant in particular type of context.

Now, if you think about it, right so, the one on the left hand top 1 by 1 is actually that is relevant if you if you want to showcase information like let us take let us take places where you want to show that certain type of information is available so to say the projection, hills are the best way of explaining. The same way you will see it 1 by 3 also which is more like saying blue lines, blue edges with green mark green in the area showing plantation, showing forest, showing land all of that information is presented.

In the second row if you see again the 2 by 3 probably presents you with the most amount of information in that column which is which is giving you let us take if I were to analyze where the tumors are where the where there is any so to say anomaly in the brain scan you can capture that and again in the third row you will see that the second column provides you slightly more information say to say if you were to look at how the kneecaps are, how the fluid in the kneecaps are available the heat map is present in you say there is some kind of disorder there, some kind of thing that you should actually look at more carefully.

So, the point here is not to actually find how these are used and in which context it is what are these images the reason why I wanted this to be discussed here is different ways of information visual design is appealing is useful, is relevant in different types of context that is the point I wanted to get across. I hope that makes sense in terms of visual design, how information is presented. I hope that helps in getting a sense of visual design. Let me now walk you through certain grouping visual grouping that I showed you before which is elevator numbers and talk to you about few of the things that I have seen in this context.

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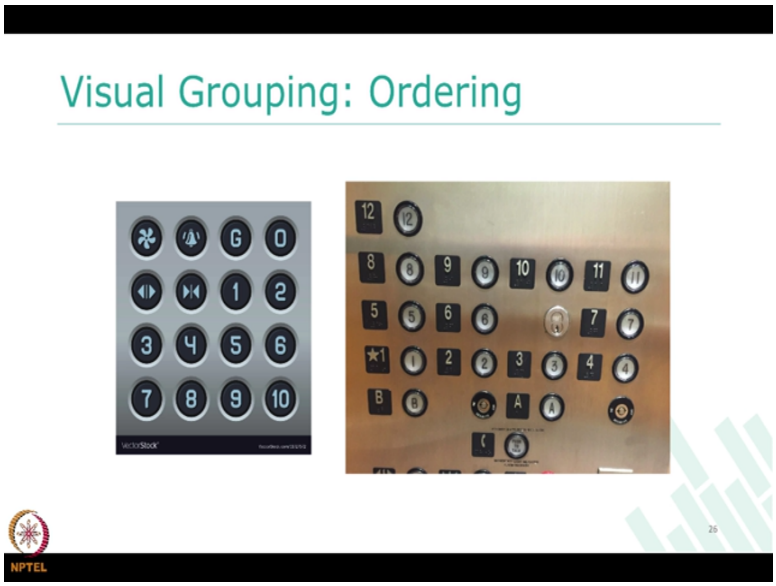

So, here is one way of presenting that information which is the grounds G 0 1 2 3 4 5 is going from left to right and the first it is a 4 by 4 matrix and the first 1 by 1, 1 by 2, 2 by 1 and 2 by 2 is taken for other purposes like fan well open the door and close the door whereas, the 4 on the other side is taken for G 0 1 2 and it also has 3 4 5 6 7 8 9 10 going from left to right. This is one type of the design right. So, I will show you more designs here look at this one this one even I was looking at and it was kind of interesting to see how they were actually decided to take this kind of an approach where you will see the user is the cognitive load of the user in figuring out where the button is actually higher here. So, let us go from bottom majority of it is from bottom.

So, let us see and it is also from left to right. So, there is some B which is probably basement and there is A, push to talk and then there are spaces in between. So, it is not a clean matrix let us take it is it could have been nicely put as 4 by 4 matrix the one same as in the left one and the information could have been presented exactly the easily and then there is also lock in between which is kept which is next to the 7 in the left. So, 1 2 3 4 which is in the second row from bottom 5 6 and there is a space and then 7 8 9 10 11 and then there is 12. So, essentially 12 went on the left hand top because there is a spot that is in the column as to say 2 by 3 which is an empty space. If only if 7 could have been moved here to the left everything could have been fit into a 4 by 4 matrix they essentially wasted all the space in the row of 12 both in terms of material, in terms of design everything because they had left some spaces in between.

So, I hope that is letting you to think about these kind of designs I generally take pictures when I see such things I have I have had one or two other interesting experiences even in the airports in India, where there is certain airports where there is an elevator to go from ground 0 to L 1 which is lower 1 or minus 1 so, to say whereas, there is no there is no escalator to come from minus 1 to 0, that is you can actually take an escalator going from 0 to 1 level over, but there is no escalator to come up from minus 1 to 0 which is you have to either take steps or find an elevator which is in a different location to come to the floor in the 0. simple things people make decisions like this and it causes so much of so to say work for the citizens for the passengers who are going to go there years after years after years in the airport because they have just made this decision of not having an escalator to go from minus 1 to 0.

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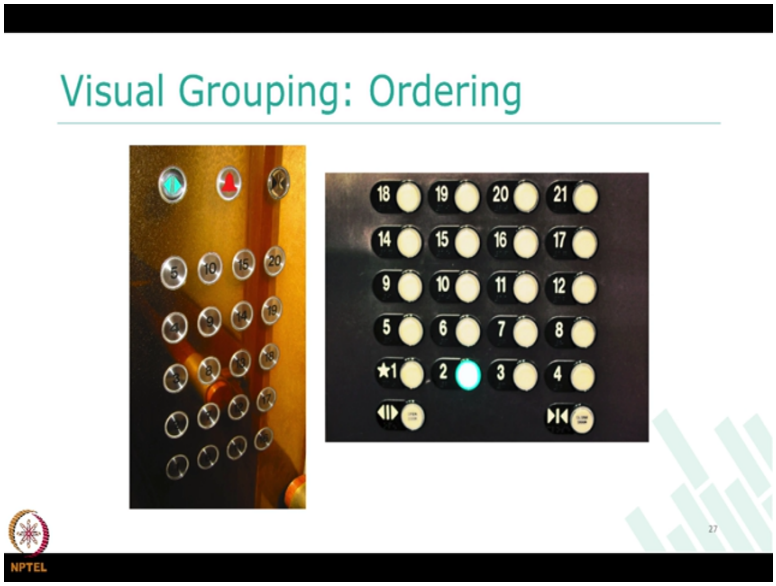

Here are some more examples of elevators. So, this is more so cleaner one which is again a 4 by 5 matrix, but interestingly the numbers go from bottom to top and continue like that, right. 1 2 3 4 5 is on the column one and then 6 7 8 9 10 is on the next column, right. So, again people using different types of elevators if you are going if you are going to find out these kind of things regularly different it is going to be hard to use these elevators, but this is at least a simple one which is 5 by 5 matrix 4 by 5 matrix.

Here is another one which is also 5 by 4 matrix, 5 rows and 4 columns and there is this button for closed door and opened door at the bottom and then 1 2 3 4 properly arranged

1 2 3 4 to 21 and you can easily guess there is no 13 in this is because there are some countries which do not want to have a thirteenth floor in the building. And, if you see on the left one there is 13, in the right one there is no 13, right. So, that is the these are all cultural effects on the design also meaning for finding a way to design you to also keep in mind the cultural aspect, but if you remember the lecture-1 or week-1 you will understand that there was design there was people the human and there was also this technology and the whole thing was captured in something called as organization or the context or you could also put the word as culture for that. So, that that is what is impacting the number 13 in the elevator board on the right hand side one.

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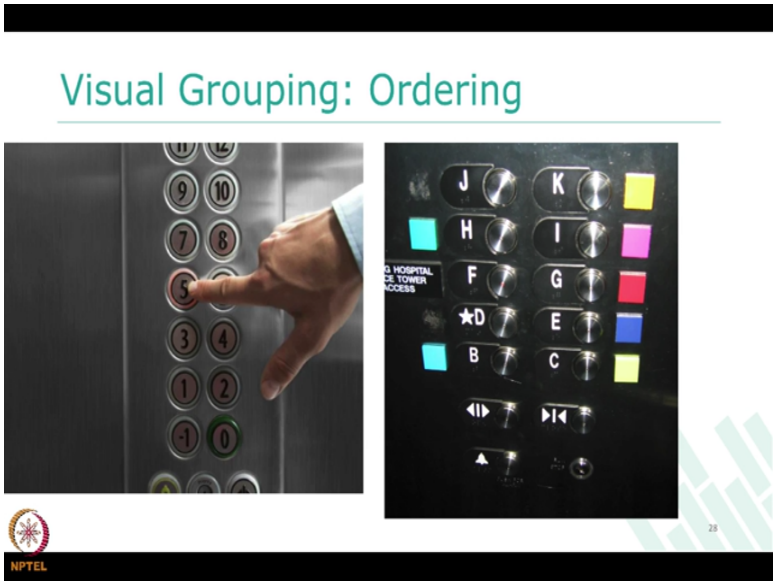

And, this is another one which is just two columns and going from bottom to up going from left to right bottom to up. So, that is the order in which this is there minus 1 0 1 2 3 4 and it goes about seven, seven rows in two columns and this is one of the other interesting ones that I found which is the they the floors are not numbered, but there are alphabets and alphabets are also presented here interestingly if you see here it says B C D E F G H I J K, I do not see an A and that is also some color scheme which is presented next to the buttons and D it looks like these the ground floor and B, C are probably the basement floors and of course, the color scheme if you look at it looks like this is a hospital elevator in the hospital and the color schemes are probably presented with kind of things that are done in that floor kind of doctors that sit in that floor.

So, lots of information gets conveyed in these kind of elevator buttons itself and I am sure you are getting a sense of how to keep looking for these kind of things when you are also taking an elevator not just elevator anything else, driving a car, going in an aero plane, going in a bus, walking on the corridors of buildings there is always something to think about in these kind of designs that you can have interact in your day to day life.

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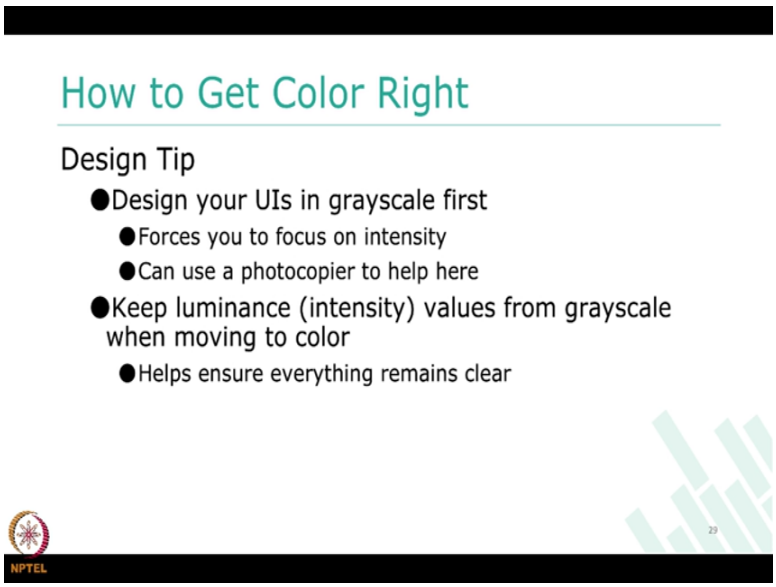

Now, let us spend some time on looking at how to get the color right. I think since we saw how the visual design how information is presented now let us look at how to get the color right. So, some of the tips that I would say is design. Generally designing over a gray scale is a is a very good idea. One, it forces you to think about the where to focus on intensity and of course, you should you should play around with different shades of gray to start with your design, but it helps you to also think through where the emphasis is going to be. A keep luminance intensity values for gray scale when moving to color helps ensure everything remains clear.

So, I will show you something about the color wheel also in a minute or two and then walk you to actually what does luminance, hue, intensity is all about in having. If you remember the map that I showed you in terms of the color visual, so, this one here what the intensity is very high this image has the intensity this red colors and shades of reds has intensity is very high and therefore, it is actually hard to digest the color.

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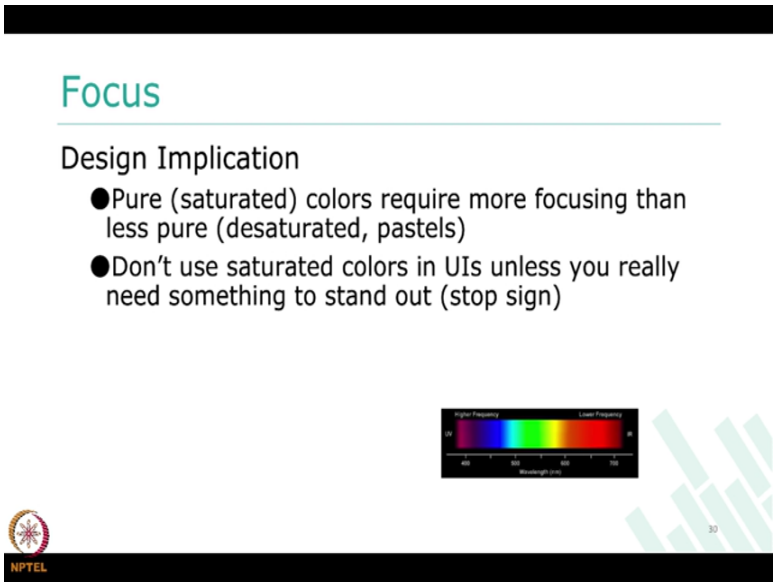

Pure saturated colors requires more focusing than less pure desaturated pastels. Do not use saturated colors in UI unless you really need something to stand out, alright. So, you want to use the saturated colors only when the colors are presented here at the bottom right, you want to use all these colors only it is really required. Again if you remember the colors that are presented here are the colors that was usually used in the map that I showed you right now. So, avoid using these colors because it actually takes away the focus a lot.

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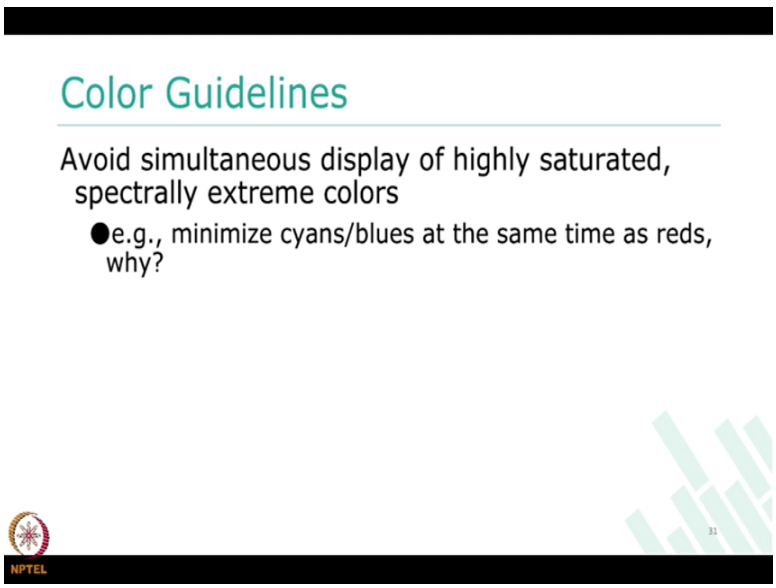

So, again avoid simultaneous display of high saturated, spectrally extreme colors same as in the map that I showed you. Minimize cyan blues at the same time as reds. So, why do you want to actually avoid these kinds of colors. So, that is about focus right, so, getting the focus in the colors, right.

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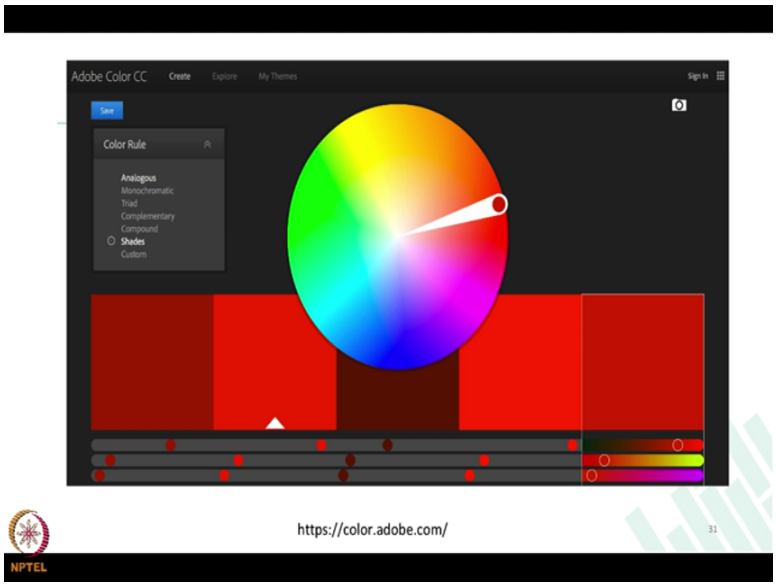

Now, this is the adobe base color wheel. So, what I would suggest you to do is I would ask you to go to this URL color dot adobe dot com and play around with yourself right which is monochromatic, triad, complementary colors, compound shades, a compound color shades and custom, right. So, these are all different ways by which you can actually get the color combination for your design that you are doing you can play around with this color wheel in terms of deciding on what color do you want take the hex code from here and present it use it in your design.

And, there are many ways to actually figure out which color is appropriate and one of the one of the services that is available is this out of a color of you and this color wheel is a theme adobe is only making it easier adobe is only a indicator of these kind of services available, but the color wheel is a concert where you could actually find out what color to use by presenting combination of picking combination of different colors that you want.

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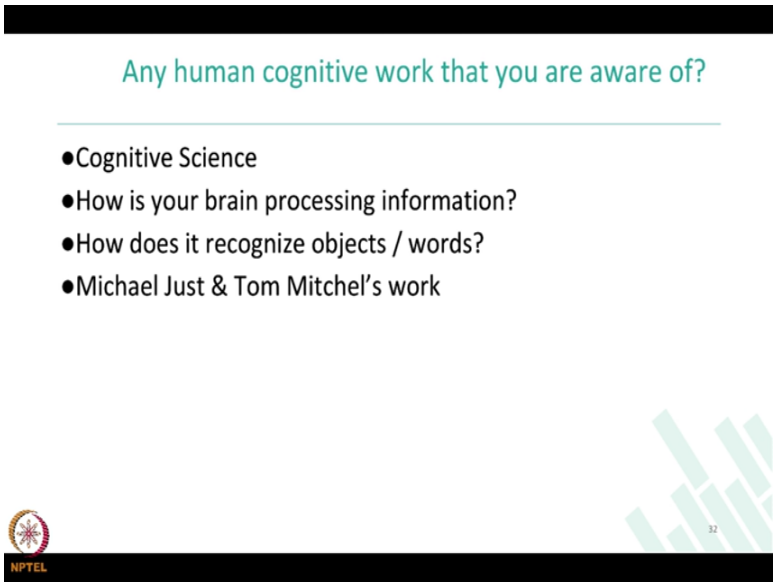

So, now, I am going to move on to a different set of topics like as I said fix law is the next one that I am going to be looking at. did does anybody in the class have any experience or understanding of cognitive work that you have seen? So, cognitive science is actually a important area and particularly if you look at human computer interaction cognitive science is playing a big role in the HCI domain and I know many faculty would were doing HCI, now are actually PhD is in cognitive science. That is what cognitive science. Cognitive science is about how brain processing information and how the brain actually captures information stores is all of that is cognitive science.

One of the big questions that cognitive scientists asked is how brain actually finds out the objects that are presented to. So, one of the work I will just briefly mentioned this if any of you are interested in taking a look at it please go look at Michael Just and Tom Mitchel's work well what they are trying to find out is they are trying to find out if an object is presented in front of you what words come to your mind, right. If let us take for example, I am presented with the ice cream what words come to my mind is something that they are trying to capture, that they are trying to predict that they are trying to find out if programmatically if a system could actually do it. Currently they are doing studies where they have kept sensors all around your head using which they are saying that we would actually predict the word if ice cream is present in front, cool, it will melt it is a summer season all of that.

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So, what I am going to request you to do is I am going to request you to go watch this video. This is a interesting video from the point of view of because I would request you to watch the video and then come back to the lecture here before you go to the next slide which is please watch this video it is an interesting video because where they are trying to find out whether this bird will make a mistake of clicking on coffee versus doomsday and the bird was asked eagle was asked to actually go get a mug of coffee, but you will see what happens when the bird does pick up a coffee.

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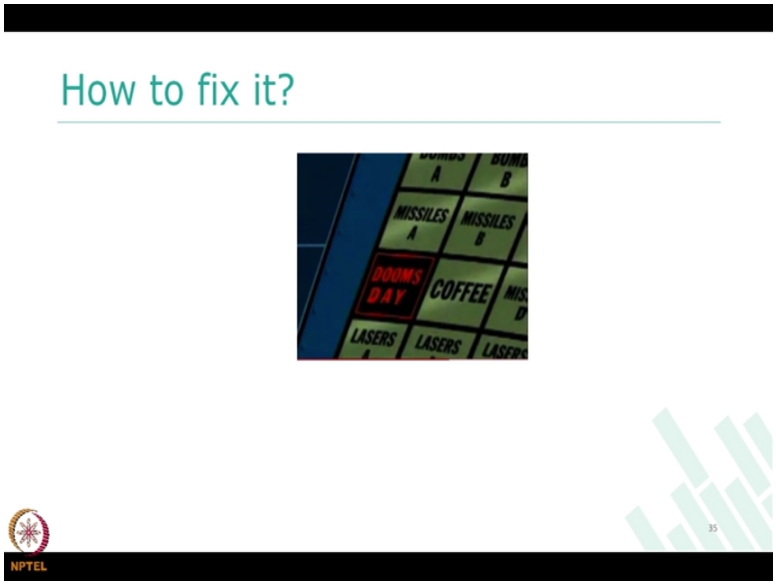

I hope you saw the video now, once you have seen the video tell me think about what went wrong, right? What are the things that went wrong? The things that went wrong are probably the bird was trained to actually pick up coffee, but the design flaw is that coffee and doomsday is kept close to each other. It is not only that they have kept close to each other if you think about from the point of view of usability or the usage of these buttons coffee is something the bird is going to pick up use very regularly and doomsday is going to be very rarely, right. So, the button that is a feature that is very rarely used and a feature that is very frequently used art kept together which is also a design flaw.

What can you do to fix it? right one approach is to just take it away take the doomsday button and keep it separately for example, in the movies you would have seen they this kind of doomsday or emergency buttons are kept under the table somewhere where the person can actually stretch his leg or hand and press the button some things like that whereas, coffee button is something that they would use very regularly. So, keep it in a place that is quickly reachable also.

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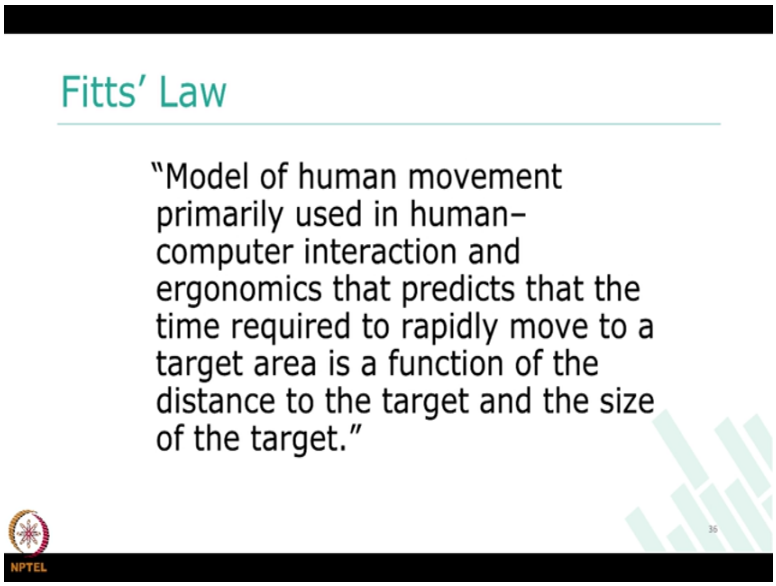

So, in this context only this idea of Fitt's law comes in, what does Fitt's law mean? Let me let this be through this definition of what Fitt's law is it is a model of human movement primarily used to human computer interaction ergonomics. Ergonomics is the idea by which if you would have seen a keyboards are designed I am sure there are some of you would have seen a keyboard which is also circular. The keyboards that you use

now are not the natural ways of actually your hand using it. So, therefore, having your design keyboard which is very so to say natural native to your hands is so much necessary. So, that is ergonomics that predicts that the time required to rapidly move to a target area is a function of the distance to the target and the size of the target. So, just think about the video that you just now saw even in that video the target area is the buttons, right.

So, the target area is a function of the distance to the target and the size of the target. Distance of the target the bird was sitting very close to it that is the distance and size of the target is the size of the button. So, the way you could think of is the coffee button being so frequently used it could be actually a pretty large button whereas, doomesday button is a very rarely used so, it could be a slightly smaller button to right things like that these are the ways by which you will actually figure out how to apply Fitt's law.

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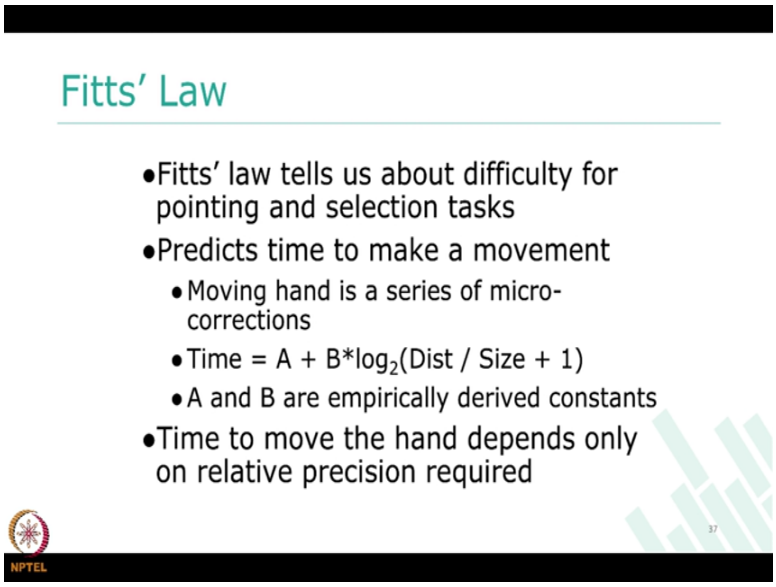

So, this is probably the only slide in the entire course where you will find an equation in this class. It says Fitt's law tells us about difficulty for pointing and selection tasks, predicts time to make a movement, moving hand is a is a series of micro corrections right. So, it is a moving hand is a series of many millions of points that are connected to get to the point to get to the target. A and B are empirically derived constants where time is the longitude log of distance size plus one. So, this is just a math function, forget about what it is. This is not necessary, it is only to say that it is a function of as in the like slide

it is a function of the distance to the target and the size of the target. That is what is in this function, distance and size. Time to move the hand depends only on the relative precision required right because it is the precision that is that you need because in the coffee button we want to be precise to clicking on the coffee button versus precise to be clicking on the doomsday. So, that is so, that is Fitt's law.

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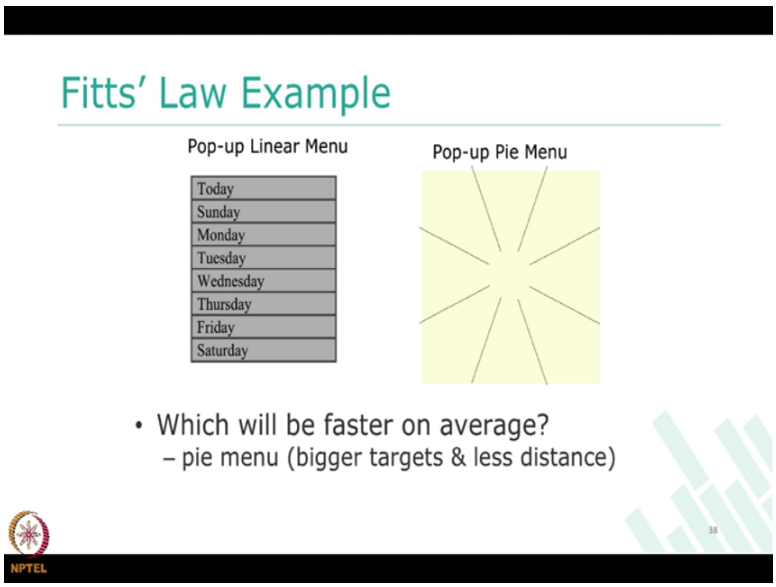

Let us see some examples of how we can actually where Fitt's law is being applied which one works better. So, just look at the left one which is a pop up linear menu from Tuesday to today till Saturday. So, that is let us assume that it is a calendar even that you want to create and that is the options that are presented to you. The one on the right does pop up pie menu where you can choose the same Monday to Friday using the pie menu. Which do you think will be faster, on average? I think it is very clear that the one on the right will be the faster right because it has long it has more space for us to select and it is easier probably to select it here, but the that is the that is the way pie menu would work bigger targets and less distance, right.

So, that is the reason that is the way Fitt's law is getting applied if you recollect what Fitt's law is. But, interestingly the way that the pie menu works now on the right hand side for the 7 options is ok, but unfortunately if this was 25 options it is going to be harder to do it in the pie menu, right and pie menus are very popular in some devices for example, if you would have used iPod pie menu is very popular there are some gaming

devices where pie menus are actually very popular even if you recollect the TV remote the main functionality. So, to say channel up and channel down and volume up and volume down sometimes comes in the pie menu form.

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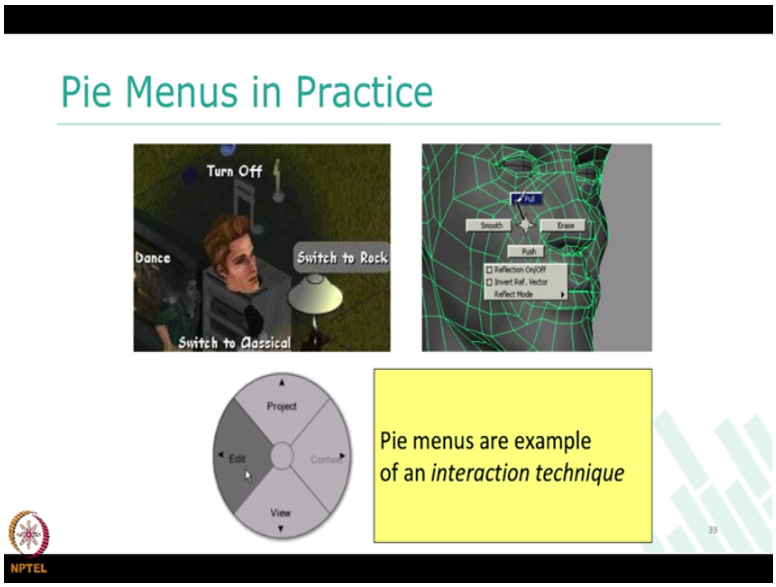

Here are some examples of where pie menus are in practice some games some places where you have seen the one on the right hand top is device where you will actually use to say erase, pull, smooth and push it is a tool where it is used and the left hand bottom is something like a TV remote also project, edit, view and context.

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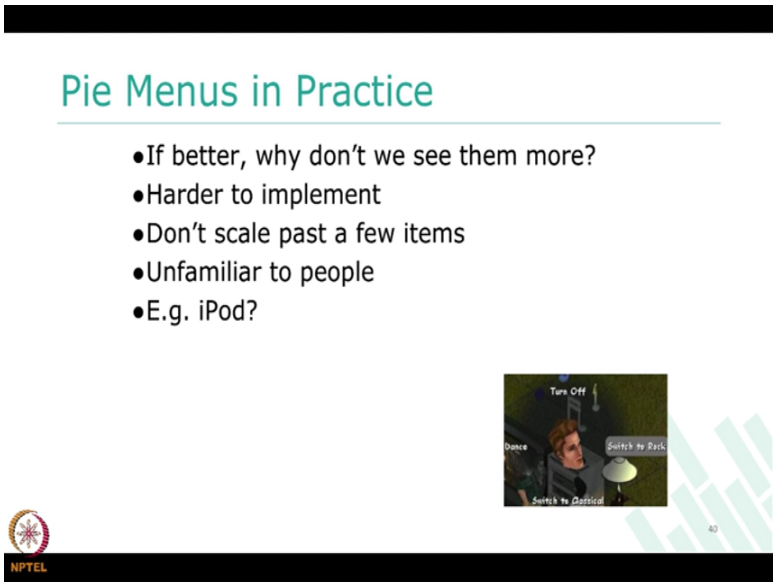

Pie menus in practice is better why do not we see more of them, right. So, because it is if by going back on the slide if pie menus are going to work well why is that we do not see them very frequently in the devices that you use it is because it is harder to implement. It is harder to implement because you need that much of space do not scale past a few items 7 is ok, but beyond 5, 6 or something it is hard to use unfamiliar to people, right. So, if you put this pie type of menu in all that all the devices that we see or use now then people are not going to I mean it is very unfamiliar for users. So, they are not going to use it well, they are not going to use it properly.

Unfamiliar devices are actually ways by which users I mean I think we have seen it this before also right the change in technology is very quick whereas, change in human beings is very very slow, right. So, that is the reason why if you bring in some unfamiliar devices users are going to take time in adapting it.

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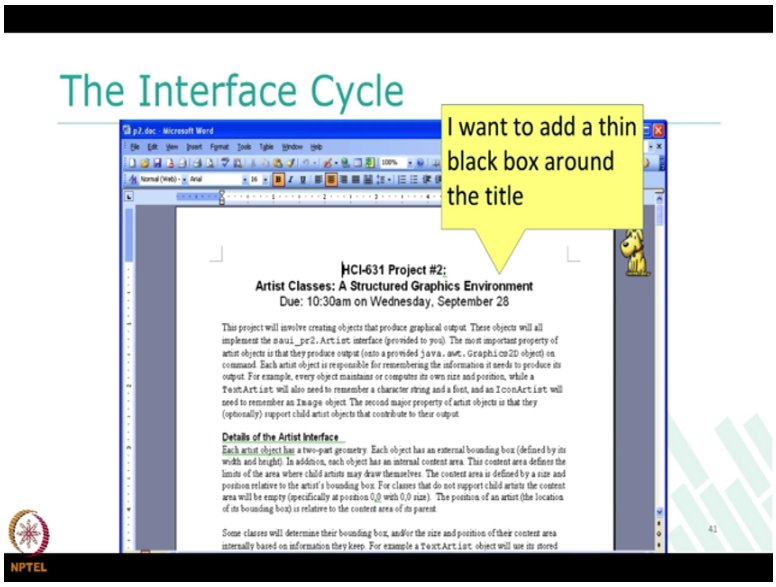

. So, that wraps up my Fitt's law. So, what I am going to do now is something called as gulfs and you would have may be talked about Norman in the first couple of lectures Don Norman who is popular for his HCI contributions and while we were talking about visual design I also wanted to mention about Edward Tufte. Edward Tufte E d w a r d Edward Tufte T u f t e is a is a person you want to go look him up, right. So, he does a lot he has a lots and lots of books on visualization and he does lots of lectures on

visualization also and I would highly recommend you to go look up Edward Tufte for anything more you need on visual visualization.

So, here is here is the task in front of us and I will tell you I am going to use this example to decide how to take it for take the topic of gulfs forward interface cycle right. So, what I am going to explain now is just think about this as a word document I want to draw a thin box around this title if you were to draw a thin box around this title what are the things that you would do, how would you go about doing it. Let you think for a second which is what menu will you click how will you go to the menu what are the options that are available what tool am I using and everything like that, right. So, those are the things that you will think about while deciding what to have in your box around those are the things that you will be thinking about having a box around the text.

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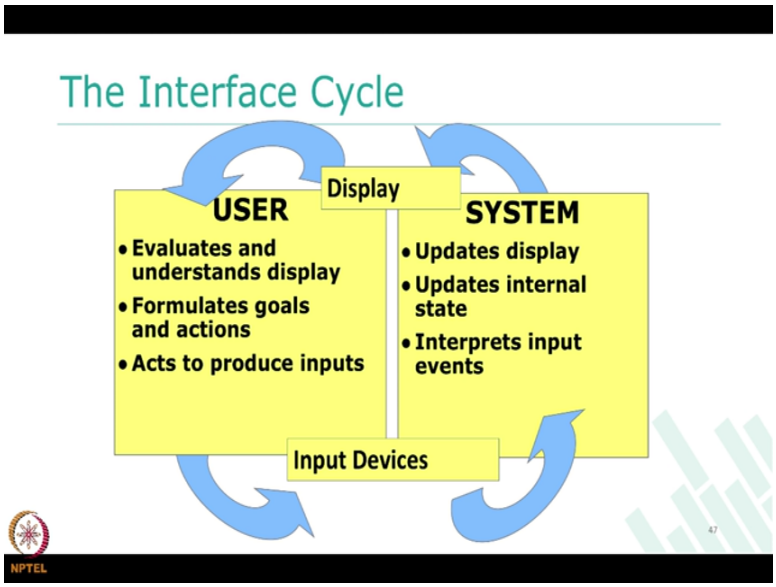

Let me now walk you through the how this whole interface, how this whole interactions between Microsoft word and the person deciding. So, now, let me walk you through this interface cycle. What does this mean? This is basically the how the interactions between the human beings, that is you and me, interacting with the Microsoft word in this case. So, we are trying to build the box around the text, ok; so now, our system you updates the display. So, let me put through put through everything and then I will walk you through what is working.

So, system and the user; a system is this updates the display, updates internal state and interprets input events. That is what system is doing updates, display meaning when you draw a line it is going to actually show that there is a line, updates internal state is when you click on a button let us take insert it knows that now the next one that you are going to do is options inside the insert, that is the internal state that is changing. Interprets the input events input events are things like clicking on insert in that a table that is the input event in the input event. So, system has to capture what the current state of the input is, use that to make some decisions and display decisions for the user.

In the user side evaluates and understands the display. Microsoft word is presented. I am going to look at what information Microsoft word is presenting to me I look at it, I evaluate it and then I make a decision on what to do. Formulates goals and actions, which is I formulate my goal as the thin box around the text, actions are given that I want to click on insert, I will use that to give my action input to the system acts to produce inputs.

So, depending on the devices depending on my actions that I want to take, I am producing inputs through the system for the system to react to it for the system to decide and make decisions and show me the updates accordingly. System is interacting with users through displays, user is interacting with the system using the input devices mouse keyboard all of that. I assume that is making sense in terms of the interaction between the system and the user.

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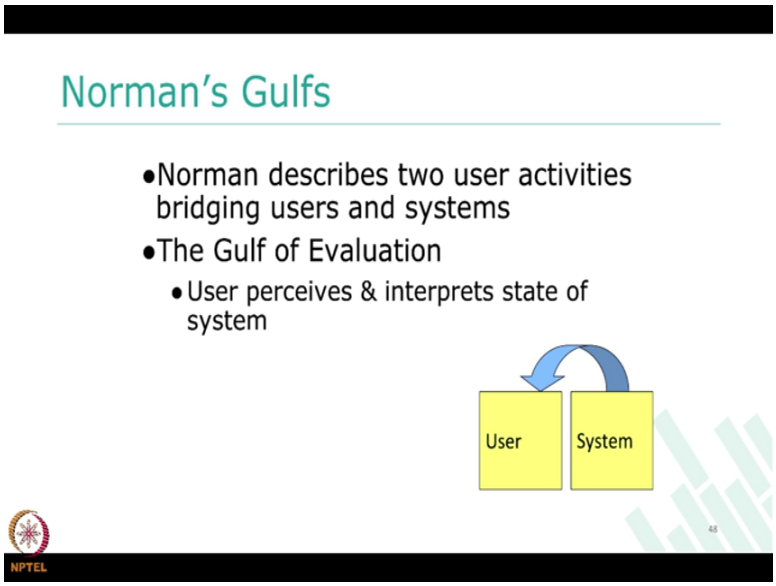

Now, let me walk you through the two curves of.

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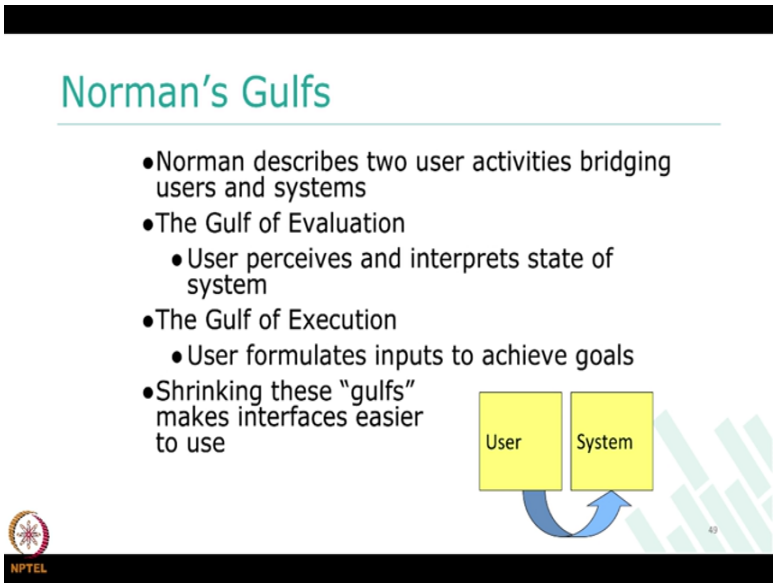

Evaluation and execution the main goal for a designer is to keep reducing the gulfs when the user is interacting with the system. One gulf is gulf of evaluation which is the user perceives and interprets states of the system. This is about user evaluating what is presented to him or her and making a decision accordingly. If the user is not able to evaluate the information presented or options presented and it is taking it is difficult for the user to make the decision then it is gulf of evaluation, gulf of execution is users

formulate inputs to achieve goals which is I am saying I want to draw the box on the line and if I am not able to execute what I want then there is a gulf.

Evaluation is user perceives and interprets the state of the system whatever the system is I am evaluating what it is. If I if there are mistakes in evaluation if there are I am not able to perceive I am not able to interpret the state of the system what is presented to me it is gulf of evaluation gulf of execution is I am not able to achieve the goals that I want to achieve through the input devices that I have. I assume that is able to make sense for example, in the Microsoft word if the options are presented when I click on insert if I do not understand it, it is more close to evaluation. I am not able to interpret the state of the system. If I am not for user formulates inputs to achieve the goals if I click on the button insert table and I am not able to achieve what I want then it is gulf of execution. The main goal that Norman argues is keeping to reduce these gulfs as much as possible.

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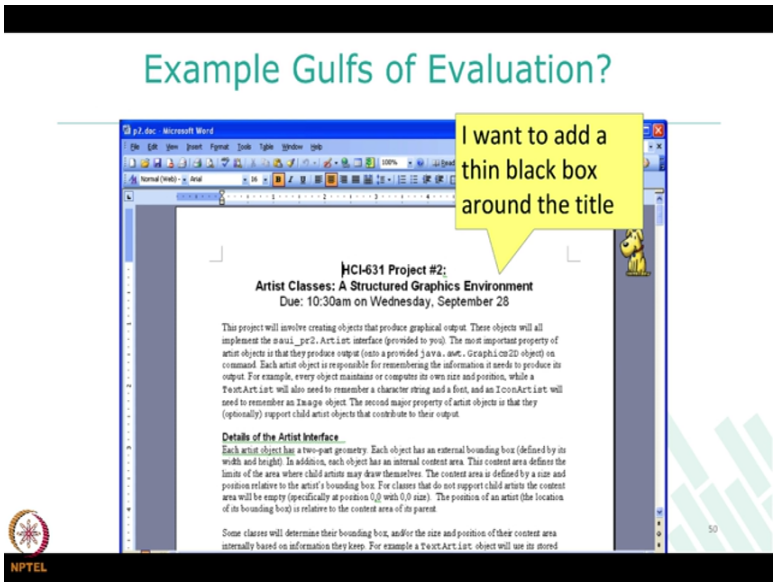

So, now can you tell me where gulf of evaluation is in this particular example? I let you to think about it.

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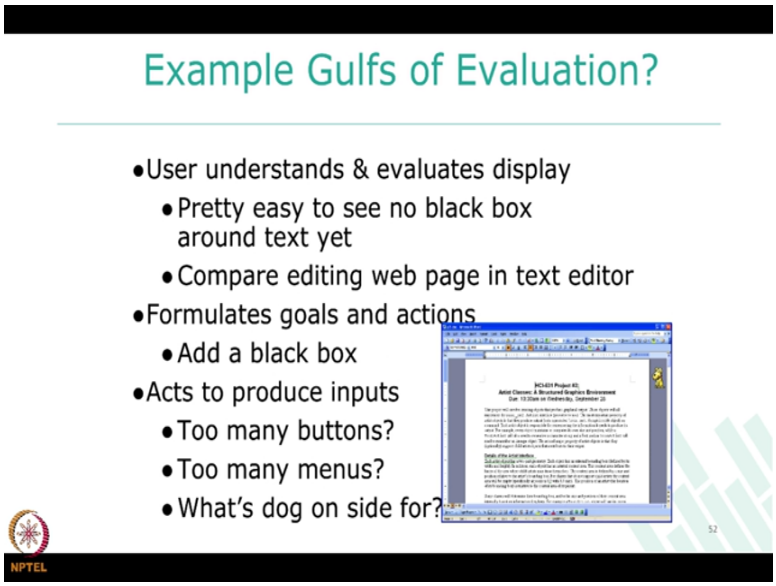

Gulf of evaluation; user understands and evaluates displays. Pretty easy to see no black box around the text yet, compare anything web pages to text editor. That is probably you could there are many ways to get the box around the text. It does not have to be only the Microsoft word I could use it by creating it as an HTML page and writing it few lines of code for it.

Formulates goals and actions, add a black box, acts to produce inputs, too many button, too many menus, what is the dog on the side for. So, that is gulf of evaluation ray there is too many menus, too many buttons, I am not able to give, I am not able to understand what the state of the system is, I am not able to perceive what things the system is presenting to me. That is gulf of evaluation I am not able to evaluate what the system is presenting to me.

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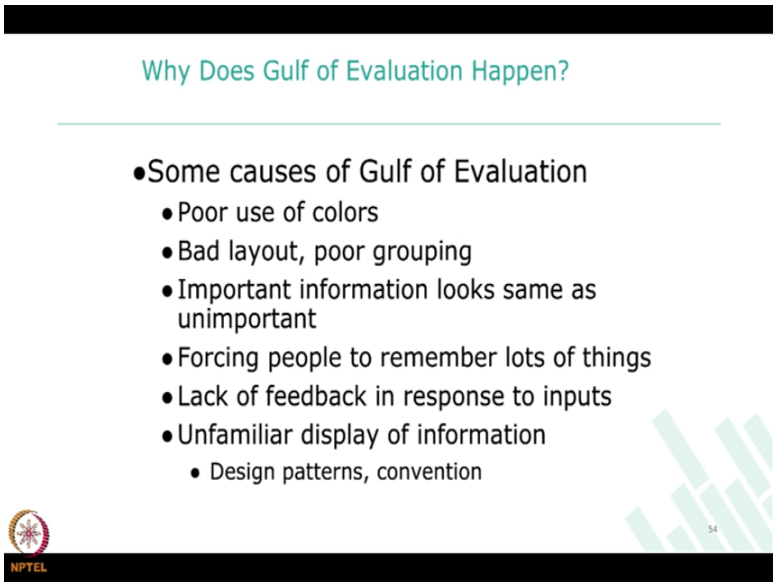

What are the main reasons why gulf of evaluation happens? Some of the big reasons why gulf of evaluation happens is poor use of colors, bad layout, poor grouping, important information looks same as unimportant. See I will connect you connect this to many things that you have seen until now. Poor use of colors in the mapping that will map that we saw now bad layout and poor grouping the grouping that we saw a proximity all of that the elevator examples that I showed you there are some poor grouping examples there. Important information looks same as unimportant you could just connect this to doomsday and the coffee button that was that we discussed.

Forcing people to remember a lot of things, the menus that are in the Microsoft word, it is forcing me to remember a lot of menus that are available. Lack of feedback in response to inputs; I am giving some input and I see that the system is not responding the way my mental model is designed. Unfamiliar display of information I do not know the design patterns that the system is presenting to me I do not know the conventions, but if you remember the multiple things, small multiple things what we saw before if you do not understand the conventions that the person is using for getting the flight on the location, you are not going to understand what the information that they are displaying is so unfamiliar display of information.

So, these are the some of the main reasons why the gulf of evaluation happens. Let us look at some of the reasons why gulf of execution happens.

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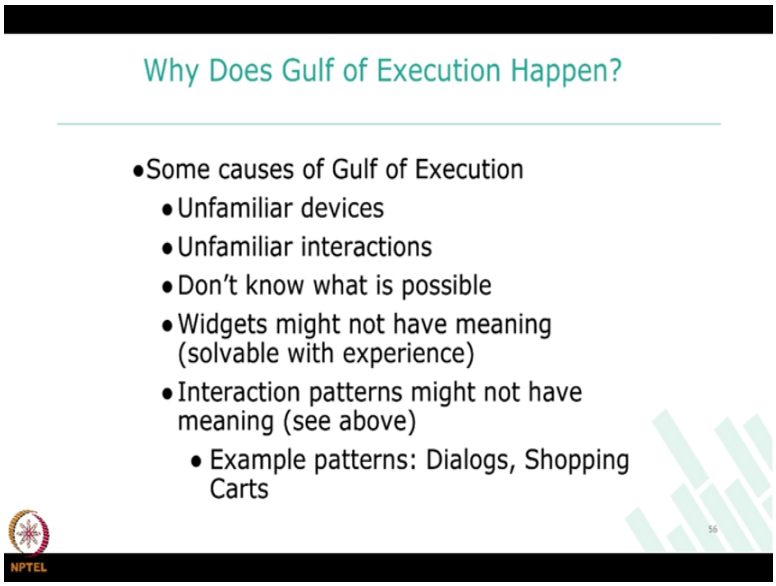

Unfamiliar devices, unfamiliar interactions because now it is about meaning understanding what is presented to me and trying to complete the task, complete the goal that I have. Do not know what is possible; I do not know how to get the black box I do not know I drew a box, but it is actually a filled color box, I want to change it into a transparent box, I do not know how to do that. Widgets might not have meaning for example, the dog that is presented. It was actually not a very good decision Microsoft word, Microsoft took the dog away in a short span of time after implementing it in one of their versions. Interaction patterns might not have meanings. For example, shopping carts in some locations right these are metaphors that the designers use in conveying the information to the users, sometimes they are not very easily understandable and that is why gulf of execution happens.

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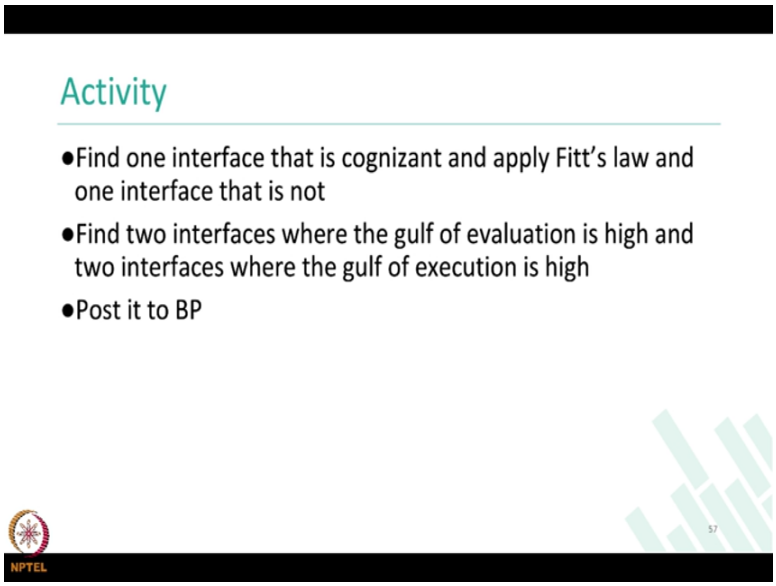

What I suggest you to do now is what I suggest you to do now is find one interface that is cognizant and apply Fitt's law and one interface that is not. What this will help you to do is this will help you to look for interfaces where you can see Fitt's law applied and not apply. Find two interfaces where the gulf of evaluation is high and the two interfaces where the gulf of execution is very high, right.

Again, please go back to the slides, think about what these gulfs are and then what I suggest is please post it on the mailing list what you find. So, I can also give you comments on whether what you found were appropriate or not.

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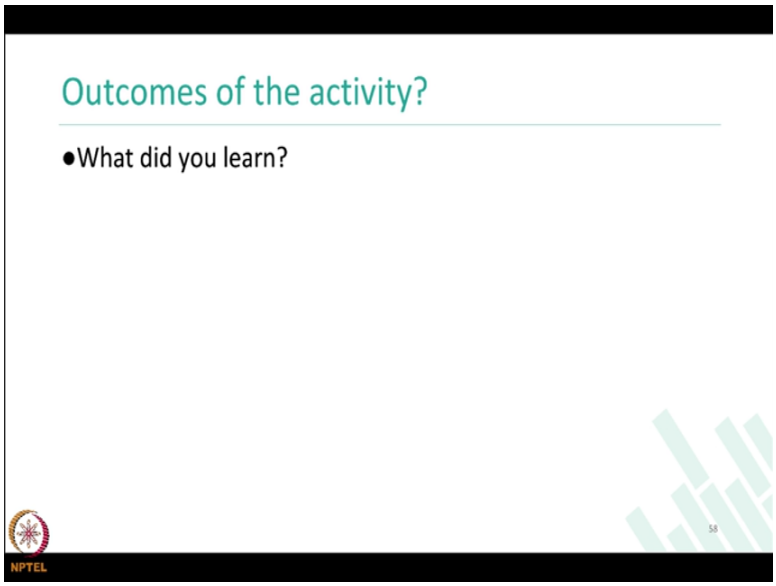

So, once you have done this I am sure I let you to reflect on the activity that you just know there or that you would do in the coming week to finish, to understand how these concepts like gulf of execution, evaluation, Fitt's law you have understood. With that I will stop the content on week-9.

We are going to add actually some projects. So, one another thing that we are planning to do in the next couple of weeks is to actually give you projects that students have done in the area of HCI where they have taken classes with me which the some of the projects are very good. What we are going to do is we are going to actually record about these projects and upload it for n on the NPTEL platform, so, you can actually get a sense of how these concepts are applied for doing a project and solving a problem.