User Interface Design
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Lecture - 11
Visual Cognition

Welcome students to the online NPTEL course, User Interface Design. In the previous class we started talking about the how we can translate the low fidelity design to high fidelity design through the implementation of visual communication part into it. So before that we talked about how to create the information architecture. From there how we can create the wire-frame and now we have to apply the graphics into it. So that is the visual communication part of the design.

So visual communication, when we have to do the visual communication part and we apply we move on from the low fidelity which is the wire-frame from the high fidelity visual design which is the GUI of the webpage or web application. So there we have to follow some visual cognition principles.

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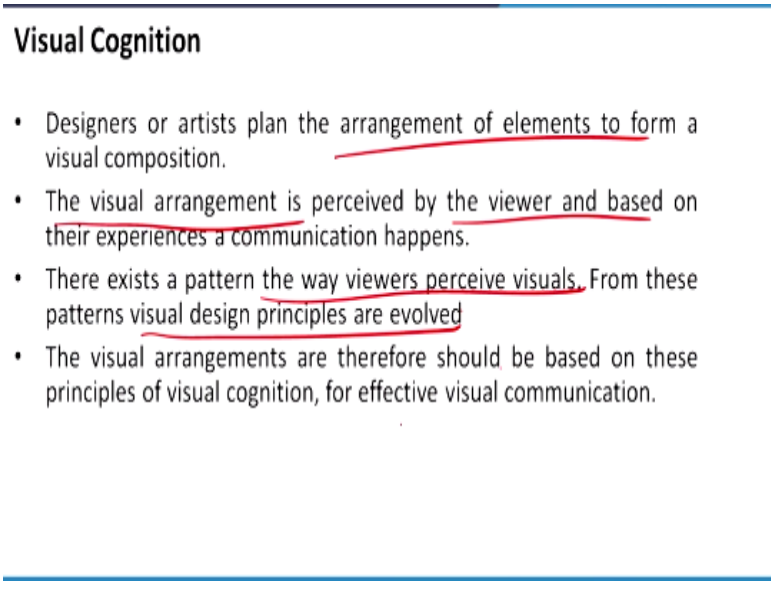

So how this visual cognition principles work. So first designers artist create a plan of arrangement of visual elements which form a visual composition. Now next phase is the visual arrangement or the visual composition is perceived by the viewer or the users and then they

create their mental perception which is called mental model and then they tally their mental model with their previous perception.

And then they perceive the visual pattern and from there, so the process of this perception is based on some visual cognition principles. So today, we will discuss about these principles and how majority of the users can perceive this visual composition. So there are some laws and also there can be some anomaly. For example it can be spatio-temporal deviation for few user groups and that can depend on the persona and scenario of the different user groups.

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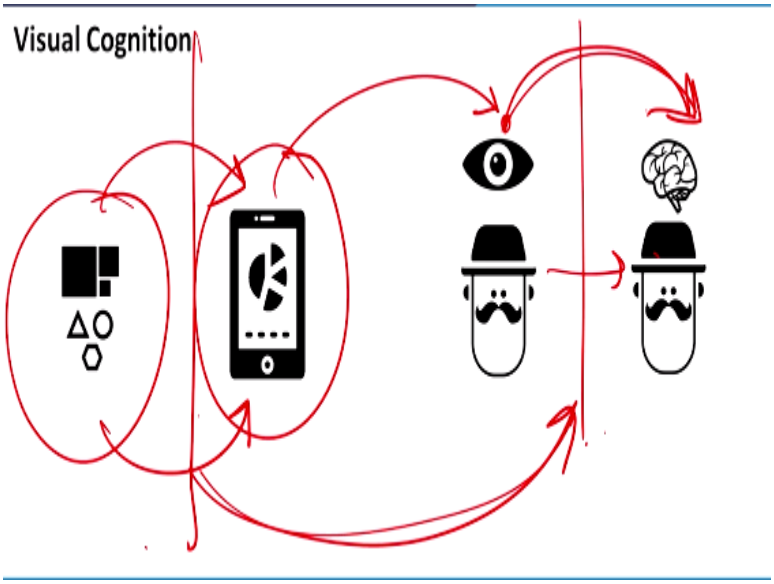

So this is how the process works. So there are elements of design and from there with application of the principles of design, designers can create the composition which can be a web application, which can be painting and that gets perceived, when users look at it they perceive and then there is a visual cognition process happens here. So designers when they are creating this design, they have to foresee what can be the process of cognition in terms of better design.

So if they can foresee this process after seeing their design what kind of cognition can happen for a particular given persona and given scenario and where there will be a particular task flow in the web application or in terms of any other communicative design. So designers here have to foresee what type of cognition should happen.

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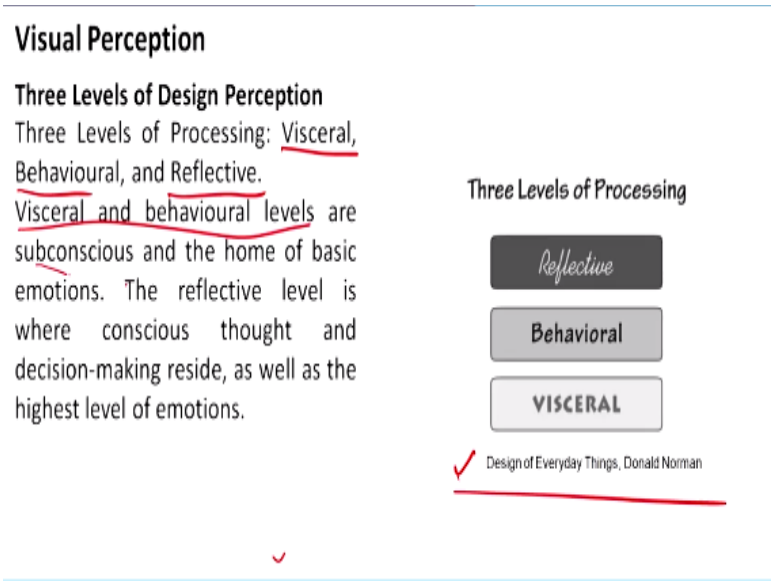

So that is why this principles of this visual cognitions are very important for designers to understand. So designer Donald Norman tells that there are 3 levels of perception. So users perceive the design in 3 different level. So these 3 different levels are visceral, behavioral, and reflective. So visceral and behavioral levels are the subconscious level which is most of the cases common for different user group and which might not vary for different persona.

When you are creating a different persona so these two levels visceral and behavioral level might not vary for different persona and might not vary for different users. But there is a reflective level which is much more and the next level where there is a cognition process is more. So there is a more cognitive load over here and then this reflective level of perception happens in the next level. So the visceral level of design is a visual part of design where all this, most of the people and throughout across the persona, people will perceive the design in a particular way.

For example if we look at the color red, for most of the people it will generate a sensation of danger and all other principles like gestures principles and visual cognition principles which are throughout across the persona which will be similar fall under this visceral level. Here the cognitive load is very less and we just after perceiving looking at the design people will perceive that in their mind.

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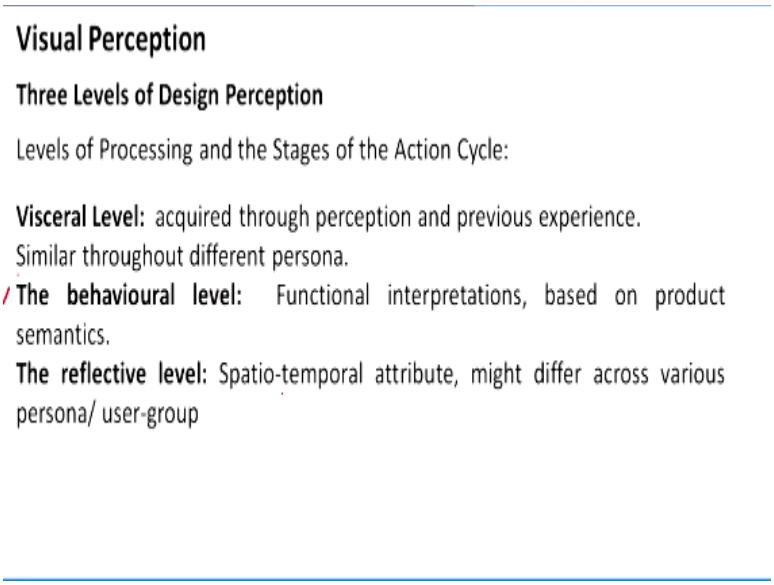

And the next level of design which is behavioral level and this is more of a functional attribute. So this attribute tells people how to use this design and how to interact with the design so the semantic part of the design is involved here.

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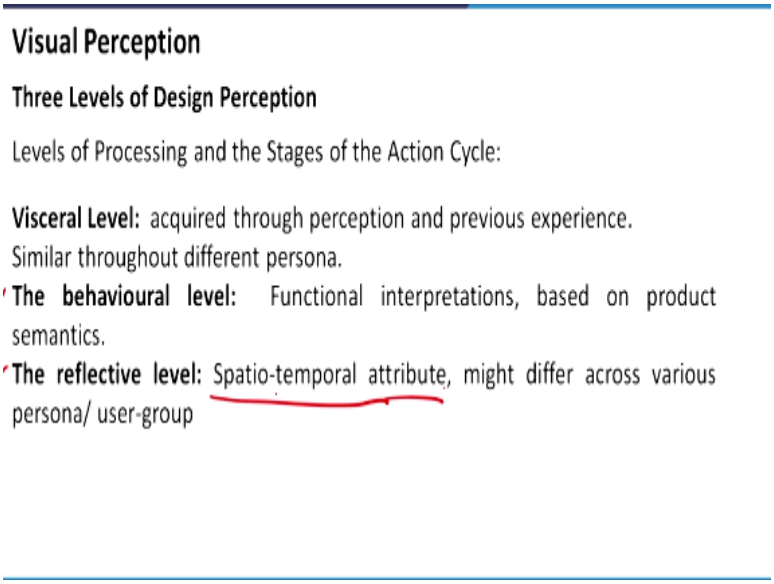

And the next level of design is the reflective level of design and which is contextual attribute which might vary based on the spatio-temporal attribute. So for example design style for a particular person might, the liking for a particular design style might vary for a person who are devoid of a spatial attribute. For example Indian persons visual liking might vary from a Scandinavian user. And it might also change overtime.

So what was the design style of 1920s which is beginning of modernism might vary from 1980s onwards which is mostly postmodern. So because of this level of design, reflective level, the design style changes and the perception of a design style for different persona will differ.

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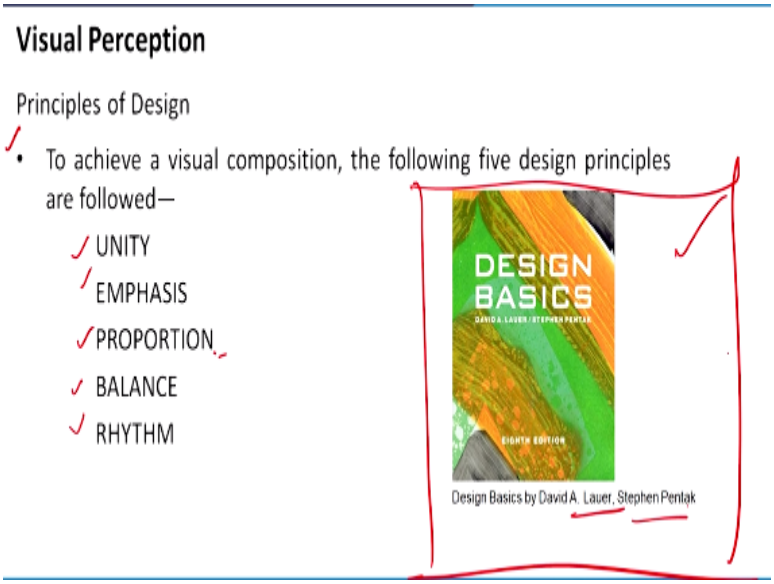

So first we discuss about the visceral level of design. So within this visceral level of design there are some design principle. So the basic design principles which is the 5 design principles, unity, emphasis, proportion, balance, rhythm is the design principles which will form within the, which will come within the visceral level of design. So I am not discussing this because this is very basic and most of you will already know.

So you can read this book by Lauer and Pentak, Design Basics. So all this 5 principles of design and how you can achieve this with the help of 5 design elements of design which is line, shape, color, texture and texture pattern. So there are 5 design elements, with which you can achieve this design. With the permutation combination of this 5 design elements this design principles can be achieved.

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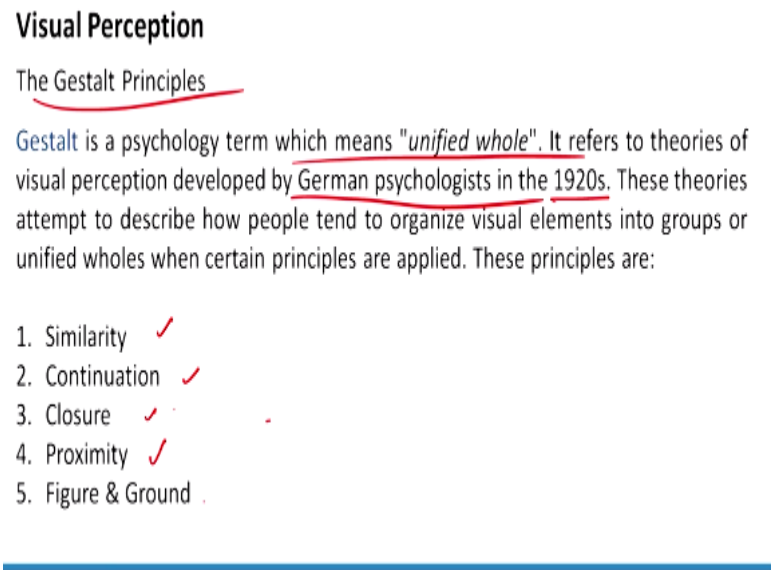

Now next we move on to the another design principle which will fall under the visceral level of design which is Gestalt's principles. The Gestalt's which is a German language which literally translation means shape and in this Gestalt's principle which is perceived as a unified whole and this is derived by few German psychologist around 1920s.

So there are 5 principles which falls under Gestalt's principles and which talks about how people will perceive certain composition as one. So this 5 principles are similarity, continuation, closure, proximity and figure ground relationship.

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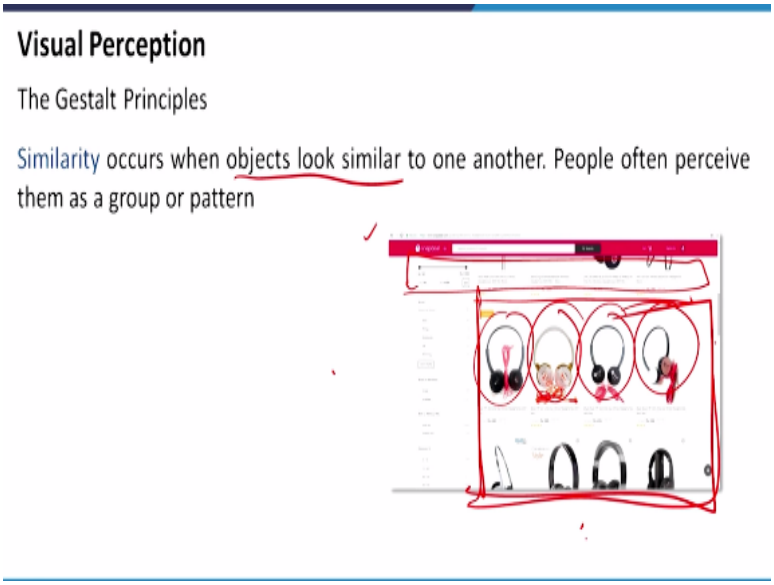

So first let us talk about the similarity. So this occurs when different objects look similar. They are perceived as one. So for example if you look at this e-commerce website when there are different products shown in the product search page, there are different product shown which looks similar and without looking at the details what people have searched over here if you just look at the web page then it will perceived as one and similar objects and it can be clubbed together.

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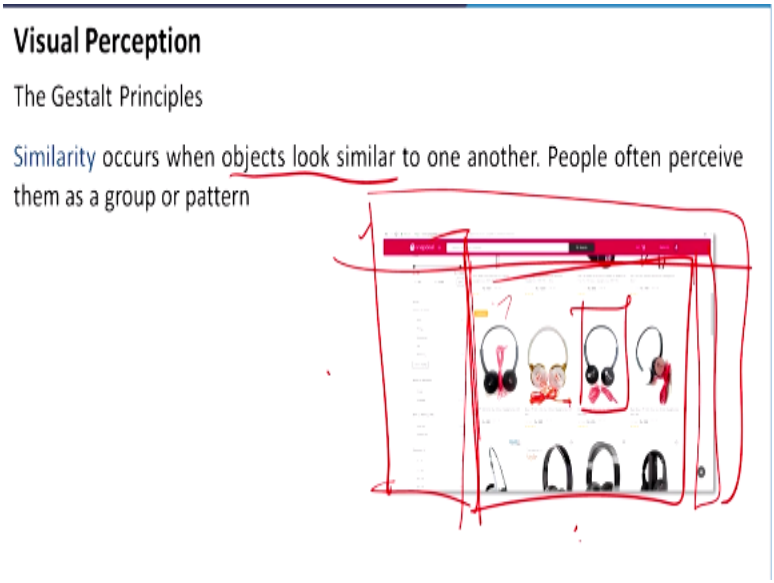

So if you just look at the web page over here and you psychologically divide the webpage into different fragments. So this can be the header and this can be right hand side information bar and all this part will be clubbed as one and then there is a scroll bar. This clubbing is happening because of the space and also because of the design but because of the product as well. But within that if there a different product comes maybe we will not psychologically perceive this area as one.

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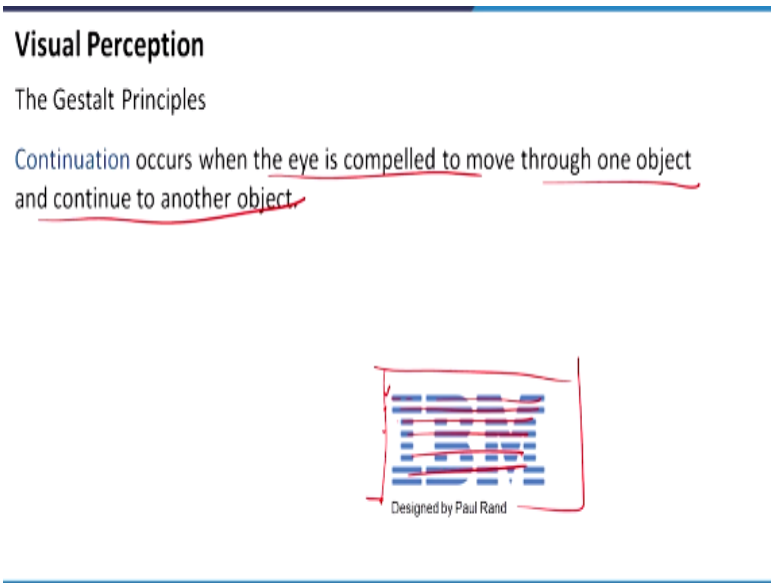

Now the next thing is continuation. Continuation occurs when the eye is compelled to move through one object and continue to the another object. Because of this the proximity and similarity of this rectangles, we perceive this as one and our eye is moving through this lines and then we read this as one logo. So here many Gestalt's principle can be applied together. So this example which is designed by a famous logo designer Paul Rand.

This is not just an example of continuation. This is also an example of proximity and this is also an example of figure-ground relationship and other Gestalt's principles together. But here we can see this lines are getting psychologically we create this lines and our eye moves and together we perceive this as a unified whole.

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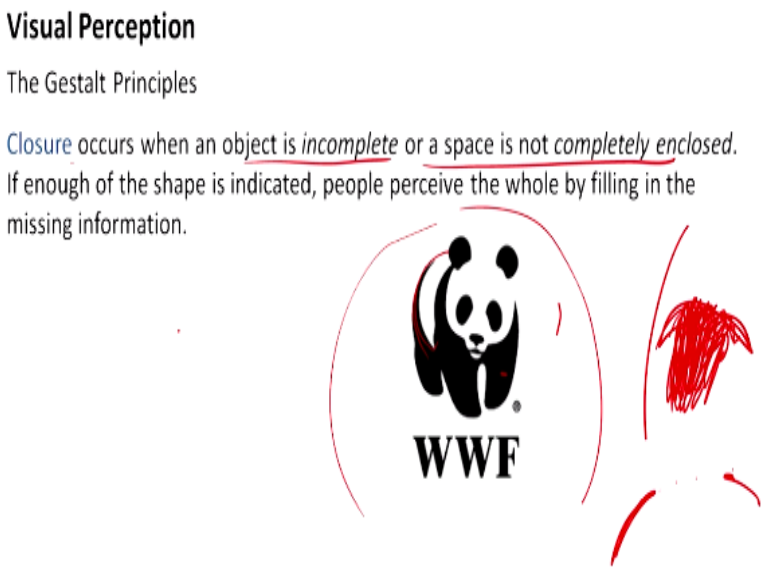

Now the next principle is closure. Closure occurs when an object is incomplete but our eye moves from one line to the another object and create and encloses this particular shape. For example this is WWF's logo, panda chi chi. And here when we look at this shape, this is just a composition of black and white, but psychologically we join this line and create this composition, complete the composition and we perceive this as a panda.

Otherwise if there is a line which exist and psychologically this line exist, so this is called a psychic line which is not a real line or gestures line. So there are 3 different types of line design. One can be a actual line which is a gesture line and then one is a actual line. Then another can be a gesture line. For example if I create this kind of pattern. So there is a gesture line around this. So this actually is not a is a very scribbled shape.

But here this will be called as a gesture line. But if there is no line over here but we just create these two line and psychologically connect this, this is called a psychic line.

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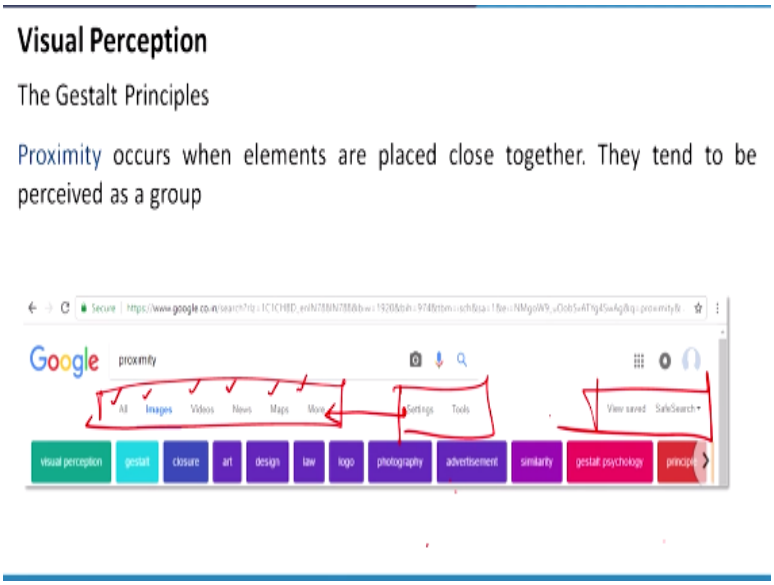

Now next principle is proximity. This proximity occurs when elements are placed close to each other and psychologically we connect this. This is happening because of the close proximity. Now if you look at the Google search bar and if you click at the image and this kind of web portal we will see and this is the top part of it. Now if you look at so this, all these elements are psychologically can be clubbed together.

So these are different attributes of information architecture where their functions are similar. So if you click on all, so all image, video, and everything will be there and then image, video search, new search, map search and other options are there. But this is a different state. This is just divided by the differentiation of proximity. Now this is another state which the functions will be different.

Then UI transitions and the users expectation when they click on this tab will be different just because of the difference of the proximity. But if you look at the font size, font color everything is similar and there is no other different design element which divides this tabs.

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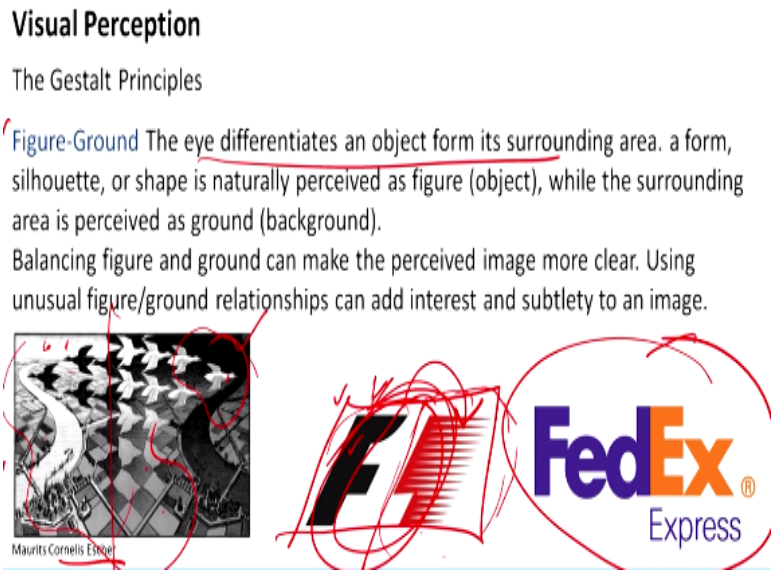

Now another Gestalt's principle is figure-ground relationship. So eye differentiate the object from the surrounding and perceive one object as a figure and the other part of the composition as ground. So first let us have a look at these two design. So this is a Formula 1's logo. So here there is a dilemma in the figure-ground relationship. So when we first read the letter F, so that acts as a figure and then this whole white acts as a background.

Now when we look at this design element which does not convey any meaning to the designer then this 1 acts as a figure and this F and this element which is just a design element but does not communicate any information psychologically. That acts as a background. So they create a dilemma of figure-ground relationship and this changes. When first we look at F which will be perceived as a figure.

Then we skip this white part and go to the red part which does not give an information and then we perceive this 1. And similarly here in the FedEx, first we look at and read the information which is there and this is the typographic logo and always the typographic logo strikes us first. So if there is a object which is in the logo which is something is written. So we read that first and if there is a image hidden within the text which will be our next level of cognition.

But within a page if the image is a very photorealistic image, for example if the image is more figurative than abstract then image will be read first and then the text will be of the next

hierarchy. But here because of this abstract arrow this is on the next hierarchy of the textual logo. So first we will read the text of this FedEx and then we see there is a gap between E and x which is talking about arrow.

So this gives the expression, metaphorical expression of FedEx is something to do with the movement and this is. Then this arrow conveys that this is a movers and packers company. Now here this is a famous painting by Escher. So here we can see a dilemma of figure-ground relationship. From here we start looking at the image and then the white part which acts as a background becomes a figure over here and the black part becomes the backdrop and here the white part becomes the backdrop and the black color becomes the figure.

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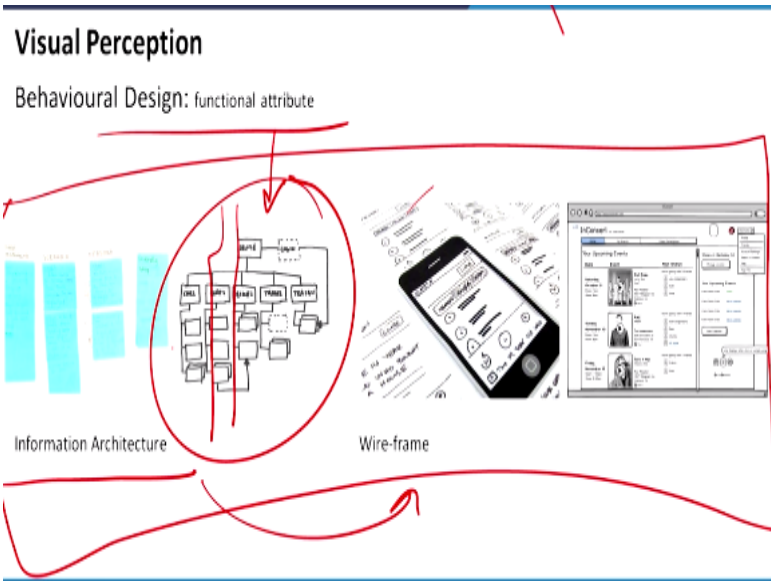

The next part is, the next level of design is the behavioral level of design. So most of it is functional attribute and whatever we have discussed earlier from information architecture to create the information architecture from there to create the wire-frame or the paper prototype, all these parts will be there within the behavioral design.

So mostly the UX part is taking care of the behavioral design and how we organize the information and how we create the information architecture, the hierarchy of the information that is the main component of the behavioral design, the functional part of the web application and how the different task will guide the different task of users through this information architecture

that is the behavioral part. And so this part which we have already covered which is the major part of the behavioral design.

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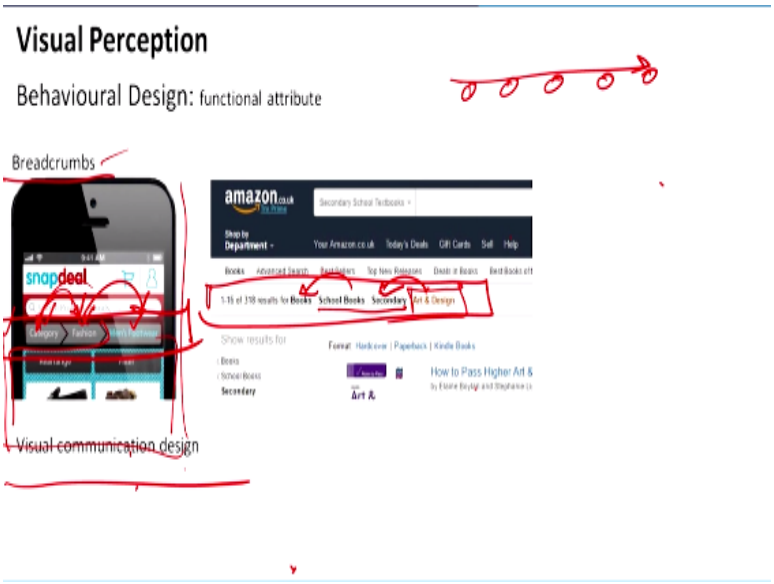

But there are some visual communication attributes which can enhance the behavioral design with the visual emphasis and all the principles which we are discussing in this lecture. So one of this behavioral design which can be a visual communication design component is the breadcrumps. Breadcrumps is terminology comes from a fable of Hansel and Gretel where they made their trail with the bread.

And initially they made with the stone and when they made with the bread and they got lost. So this part of this UI UX design is called breadcrumps which we can transfer this wire-frame into visual communication with the shape and position of this tabs. So this tells us that this is Snapdeal's mock design which I have designed. So this tells us that this is glowing. So we are right now in men's footwear.

Before that this is within the fashion and within the category we have to select which category is this and next level is the fashion and from there we came to the men's footwear. Right now we are at the men's footwear. So if you want to go back to the category so we have to click on this button. So this gives us a trail from where we have travelled. And this gives the information of the information architecture at which level of hierarchy we are in.

So if there are 3 breadcrumps we have gone 3 level deeper within the information architecture. So that information will be shown from here which is a visual communication design part. So another example of breadcrump which might not look like a typical breadcrump of iOS platform which might be as simple as and minimalist as this. So this is the breadcrump of Amazon. So it can be seen that this part is glowing.

So we are right now in art and design which falls under the school book secondary segment and which is part of the larger umbrella of books.

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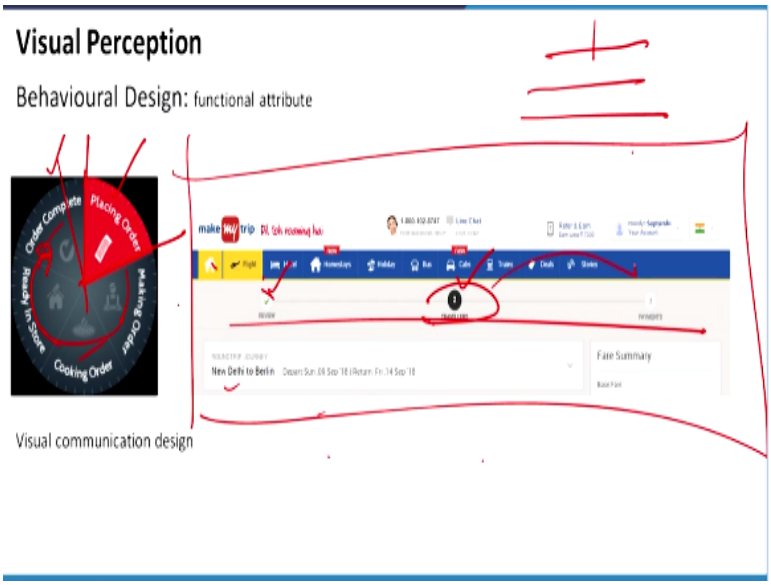

Now there can be another way to inform people, inform the user through this metaphorical design and other ways of visual communication design. So this is an part of Pizza Hut's UI portal. So this is what it talks about whether your pizza is ready or not and how long will it take to deliver the order. So that information you can take from here. But this metaphorically gives a sensation and visual sensation of a pizza and also it talks about the timeline.

So that is why it is designed like that. So this does not come from the UI UX part or the information architecture. This is a visual communication component of the design. So right now it is clear that this is in the process of placing the order and these are the next steps after which the pizza will be delivered. So this is MakeMy Trip's similar kind of timeframe which is

definitely not breadcrump but this is a timeframe just to give the information UI in which stage of the task flow.

So within the task flow there can be, this is also giving the information of in which level of information architecture you are in. So this tells you that you are in the second phase of information architecture. The first phase reviewing the flight is done. Now the traveler's information has to be filled in and the next process will be the payment. Now let us come to the next level of design which is reflective level of design. In reflective level, so this has a spatio-temporal attribute and this will differ from different persona.

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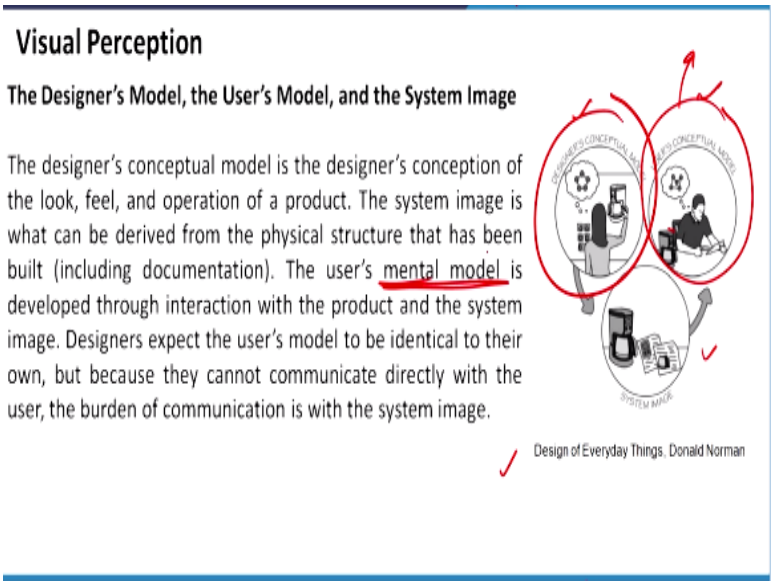

So this is the model which is given by Donald Norman in his book, Design of Everyday Thing. So he is talking about there are 3 different component to create this reflective level of design. So one is designers conceptual model. Another is user's conceptual model which is generally connoted as mental model of user. And another is the system image.

The system image is what it is created by different products or in this case the product can be web application and UI UX application and designers conceptual model is what designer create. And user's conceptual model is already what user have in their mental model. So this is a dynamic model.

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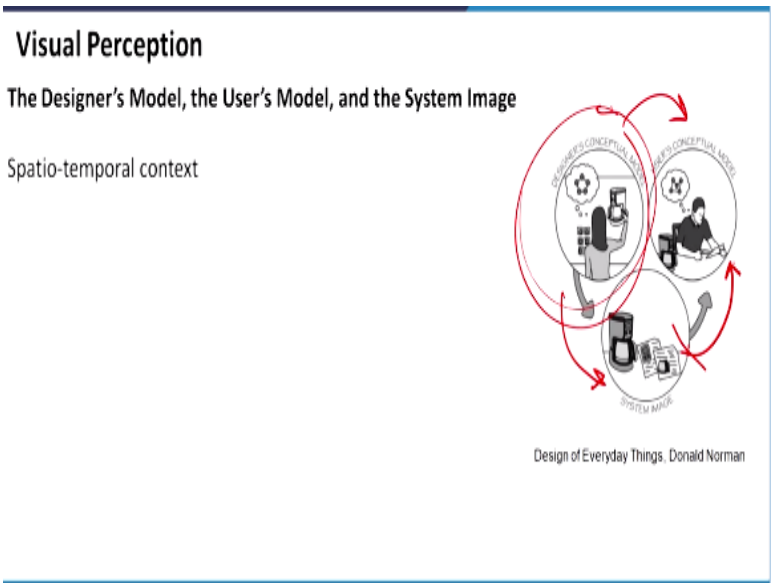

So whenever designers create something they have to respond to what user's already might have within their mind. So they have to perceive what is the mental model of the user and whenever they create this design this comes within the system model or the system image and that people see, when the design is ready that people perceive that and then this system image again change the visual user's mental model.

For example if there is a new product which is designed by designers conceptual model and when this product launches and this is available within the market, people see the product and then they create this product again has some influence to change the visual perception or the mental model of the user.

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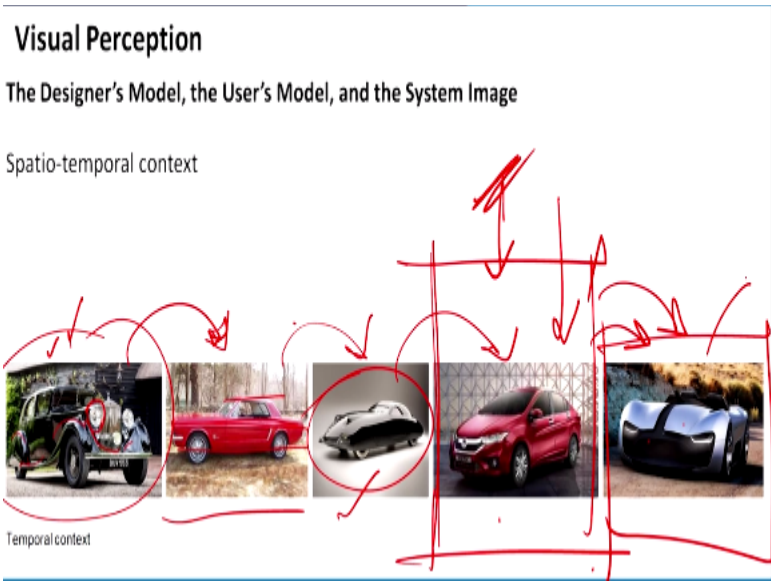

So for example if you look at this product of a car, so just after 1920s in post industrial revolution, this was the first model of Rolls Royce and that time this might be the perception of the mental model of a car. Now if we move on to the next level which is the first phase of modernism, this is the Ford Mustang car which is parallel to the Bauhaus Movement and the Israel Movement. So here we see a purity of the geometry.

Here in the first model we see lot of different elements are added and there was no visual need to create all these elements as a unified whole. For example there are different lines, curvilinear lines, the headlight is different and they are added together to create this design but in the Ford Mustang another parallel car was this Volkswagen Beetles which is totally circular.

This Ford Mustang has rectilinearity and then they come mostly in the primary color which is red, yellow and blue and along with black and white color and this has a similarity in the design which is in this case this is rectilinearity, in case of Volkswagen Beetles it is circular. The next layer, when the next time moved on and this is called streamlining and then aerodynamics was considered for the faster movement of the car.

And now we belong to this era so today if we talk about car, users mental model will be something like this. So if designer want to design a car for today's context they have to go with the mental model of today's car which is in this case will be something similar to this and people

will expect a car will look like this if it will be sold for today's time. And maybe in the futuristic concept car, so many of the companies are designing the futuristic concept car.

They do not look like today's car because they are designing for the futuristic car. So they have to have some, they have to extrapolate the design style and perceive something which will might come in the future and which will not definitely look like today's car. So they have to change the mental model and which will not, there is a intentional shift from the mental model of users of today so that it looks like a futuristic car. This is one futuristic car designed by Tesla.

So this intentionally does not look like this. And now if you want to design something for a set design or some cinematography and which depicts a era of the previous time and then the car and all the elements and the set should not look like today's time. You have to go back in the time and take that tribute of the visual style of that particular era and create that.

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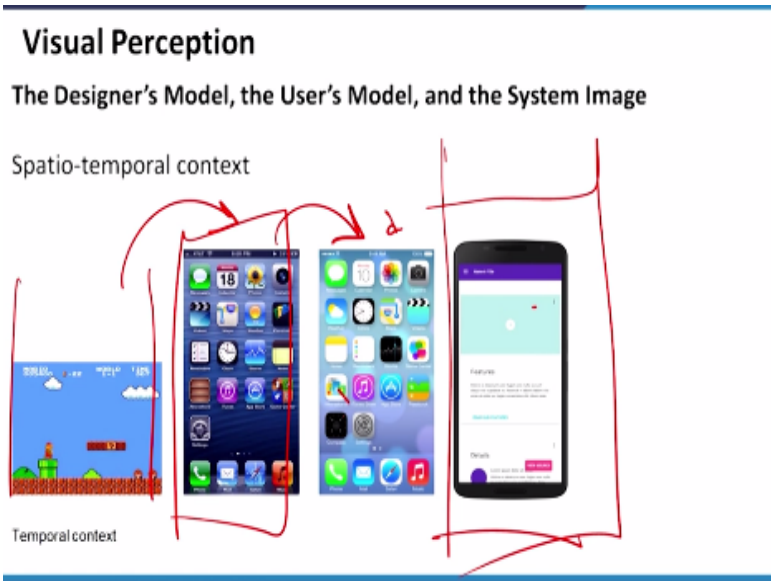

And similarly in the UI UX, so there was a time when first the pixilated image was there and one of the famous game was Super Mario. That was the style of that time's design and the visual style and next when the iOS launches the skeuomorphism style, so this was the initial iOS design. Then the next part of iOS design when the apple has, the next version of iOS which looks like this.

The improvised version of skeuomorphism and now it is the Google's material design which is much different and more minimalist than this. So this is more texture heavy and this is more color heavy in the design.

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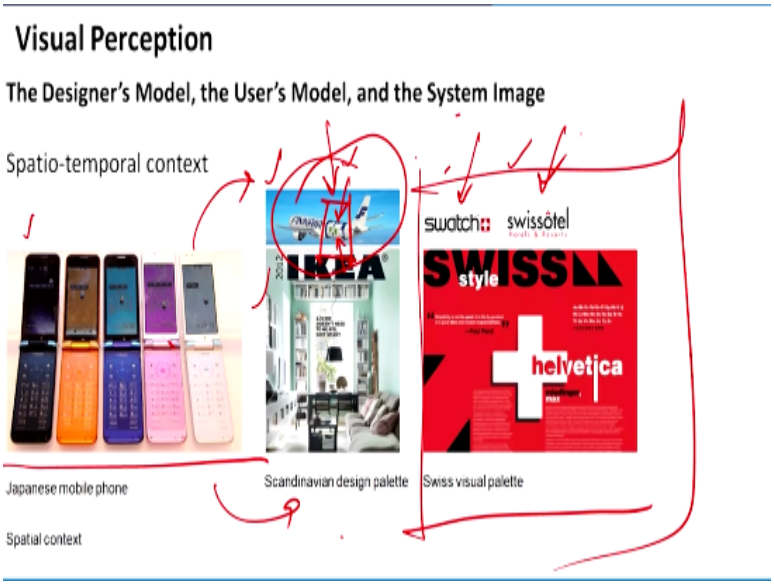

And similarly, it can also be especially different. For example if some product works in some particular area it might not work for the other area. So there is a different visual style for different continent and different country. So there is a Japanese visual style is substantially different from the Scandinavian design style.

Japan might have much more vibrant color in their visual palette which will work for the Japanese target audience but might not work for Scandinavian target audience. For them the color will be more subdued and less vibrant color will work better for them. So this is one of the two of this brands of Finland. One is Ikea and another is Marimekko which this company makes the print and they have branded the Helsinki and all the Finland's has a visual identity which is combined with the Marimekko's print.

So we can see the Marimekko print within the Finnair as well. And Helsinki has a visual identity which has 2 different color which is navy blue and this green. So within the city also they portray this color palette. So that has a visual identity of the city as well as the which is the capital of the

Finland and that also creates the identity of the country. And even if we look at Switzerland, the Swiss design company has a Swiss style. Swiss visual palette also have a particular style.

And many of the Swiss company they follow this color palette. This Swiss style was in the pre-modern era. This Swiss visual style evolved and this country is sticking to this style and even if for today's different logo they did not change the color for the brand which portray the, which comes from this country.

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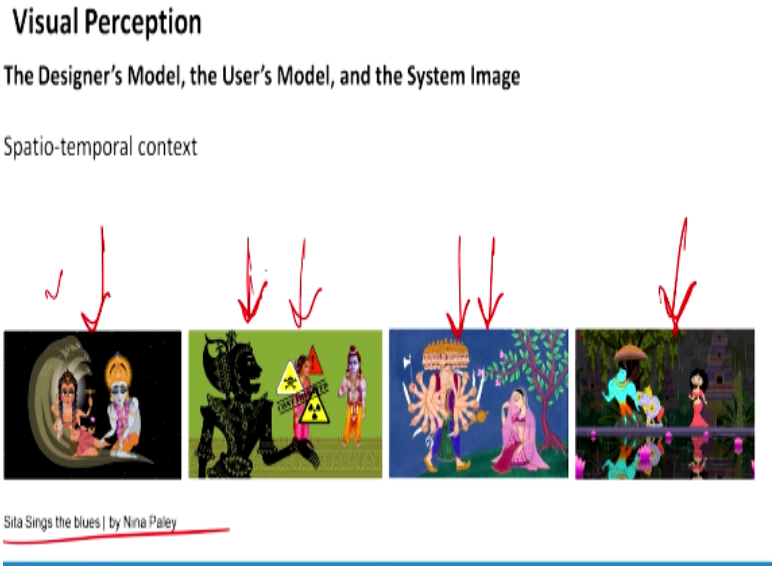

Now there can also be a eclectic mixture of all this spatiotemporal attributes and you might not need to stick to a particular time when your expression might talk about different timeframe and you want to talk about different spatial attributes. So this is an example I am giving from animation which is done by Nina Paley. And her interpretation of traditional story of Ramayana in today's time, she wanted to portray that.

And what would have happened if the similar story of Ramayana is there in today's time. And she was talking of the feminism and how Sita will react if Rama have done the same activity which she have done that time. So it is a different interpretation of today's interpretation. So she have added different visual style. One from Disney style which is there in, which is an American style. So there is also a parallel story, couple of America.

And there is a parallel story of Ramayana and these two parallel stories are together. So this is available in net. You can watch this animation. And another visual styles are taken from India which is miniature painting by Mughal miniature painting but this is not an exact depiction of Mughal miniature painting. And other depiction is here which is animated version of Indian, this is an Indian animated version. This is not a Disney style.

And another versions are taken from different traditional Indian style which is one style is this definitely Mughal miniature painting. The other style is taken from this chaya natak of Southern part of India. So she is also mixing the different parts of Indian traditional art. And also there is a pop style of Indian calendar art which is a very kish style and which also talks about the eclectic nature of different style. So there is a spatiotemporal connection of in the story as well and in the visual style as well.

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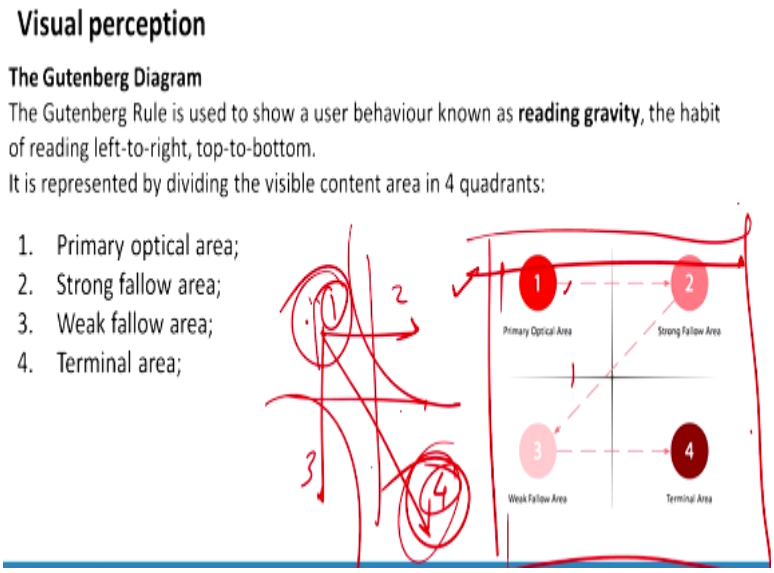

So another principles which we have to discuss how people read the visual information and visual and textual information when it is presented in front of them. So this is called Gutenberg's principle. So Gutenberg first just after industry revolution he invented the printing press and when he started printing different printed documents, first he printed, the Bible was printed first and there were many pamphlets and other posters.

Newspaper started getting printed after industry revolution. So he have developed a principle how people read, how people perceive when there is a textual information. So this principle is based on the people who read from left side to right side. So this will not be applicable for the people who is conditioned to read Urdu or Arabic which is read from right side to left on the opposite side.

So generally we read, the other people who read from left to right read from left to right and then from top to bottom. So there are two vectors. One vector is left to right. Another vector is top to bottom. So the resultant vector will be from this quadrant to this quadrant. So we are dividing the quadrants like 1, 2, 3, and 4 like this which is not the traditional way. From the first quadrant to the fourth quadrant will be the resultant visual vector.

So the primary optical area will be the first quadrant and the next emphasis will be on the fourth quadrant and second and third quadrant will be less highlighted than the first and fourth quadrant. So the most important information should be given in the first quadrant and the next important information will be in the fourth quadrant, the next will be second and then the least will be the third. Because first vector is from left to right.

So second will be more important than third quadrant. Now, if you look at the painting, so painter should use this principle in their benefit. So when there is a textual document, so it should be designed like this. For example newspaper, the most important news should be in the first. Then fourth should be used for other type of information which has some value and then second and third. If this is followed then it might differ in the visual composition.

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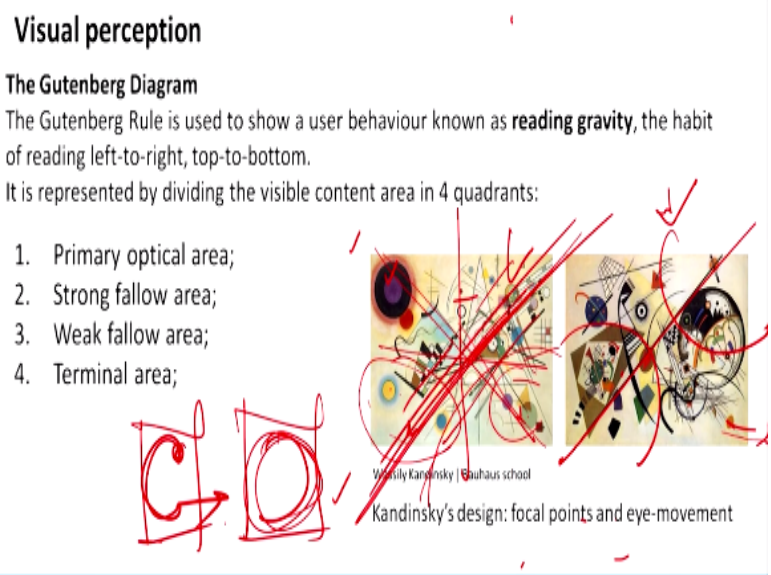

So this is a composition by Kandinsky which is part of Bauhaus Movement which is contemporary to their style movement and this composition does not convey any meaning. So this is only taking about, is an experiment of user's eye movement. So what he is doing is, the intention of this composition of the painter is to increase the attraction value and the attention value.

So attraction value is the value for which people the user get attracted to the composition and attention value is the value for which user spend more time in the composition. So if you look at the first composition, this first quadrant is heavy and this definitely has a strong focal point. Now if we look at the, if we go by the Gutenberg's principle this quadrant should have been really heavy. But he is not doing it.

He is making the second quadrant heavy and then there are lot of circle and which if we look at, so this yellow and blue has a higher contrast. So this quadrant becomes the next heavy quadrant and he is leaving the fourth quadrant in the less visually heavy composition. If he makes this quadrant more visually heavy then people might go to the next composition and will not stay in his painting.

Now another principle he is applying, he is creating lot of line which goes against the visual vector. So these lines if there is a emphasis of this line then it will cut down this visual vector and

eye will travel in this direction which will not let the user go to the fourth quadrant. So this is one composition and another composition what he is doing is again following the same principle and he is making second and third quadrant heavy so that they do not go to the fourth quadrant and move towards the next composition.

So there is another composition pattern which works from here is the reverse C composition. So if there is a C composition people will start looking at it and will go to the next composition. If there is a reverse C composition, eye will rotate here. So in many painting you will see this reverse C composition where it will start from quadrant 1, quadrant 2 and leave you to the quadrant 3 so that you go to the quadrant 1 again. But if you leave it to the quadrant 4 then it might move to the next composition.

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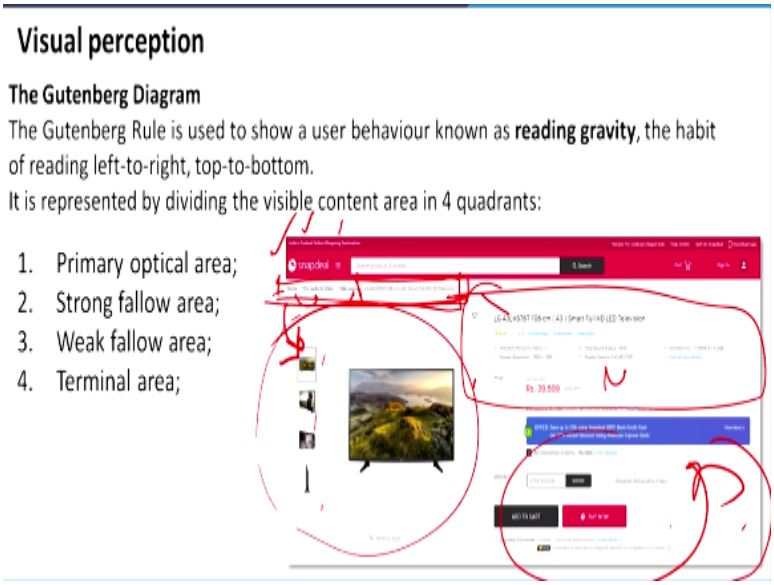

Now let us look at in the web application, in web application it should be absolutely opposite. So the intention of web application is the task has to be done faster. So if there is a, there are many products which are competitive products. For example Snapdeal has many competitive product, competitive product in the sense I am talking about the final product which is the web application.

For example Amazon and other e-commerce website so which are the competitor of Snapdeal. So for example in order to become successful, Snapdeal has to give a very smooth transition of

the task flow. So the intention has to be within the least amount of time people have to fulfill their task so that their frustration level and the user experience will be better and the frustration level will be less.

And if they are stuck in some process, they might leave the web application and go to the parallel web application which is the competitor. So for example there is a color which is Snapdeal's color which is there repeated in the fourth quadrant which is the final function of this task flow. So within this page which is again within the breadcrump you can see within home the TV, television and the user have launched into the final product which he wants to purchase.

So first action will be here which starts from the first quadrant which after giving this information he comes to the first quadrant and look at the TV and inspect the product and then he looks at the details of this and the price and then there is two option, add to cart and buy now. So a Snapdeal definitely want to promote buy now than add to cart so buy now is highlighted and has a much attractive color which has a connection of the Snapdeal's color.

And add to cart will be not commercially viable for them. That is why the color of add to cart is different and more subdued. These are the things which can be achieved through the visual communication and it is not part of the UI, the information architecture. And the buy now is almost in the fourth quadrant and it has lot of white space which is negative space and giving this and highlighting this color.

So if you look at this tab which is buy now which is surrounded by white space and a neutral color and add to cart is actually fading within this white space and sometimes can be perceived as a background and this by now can be perceived as figure. So they are promoting this user to click on the buy now button.

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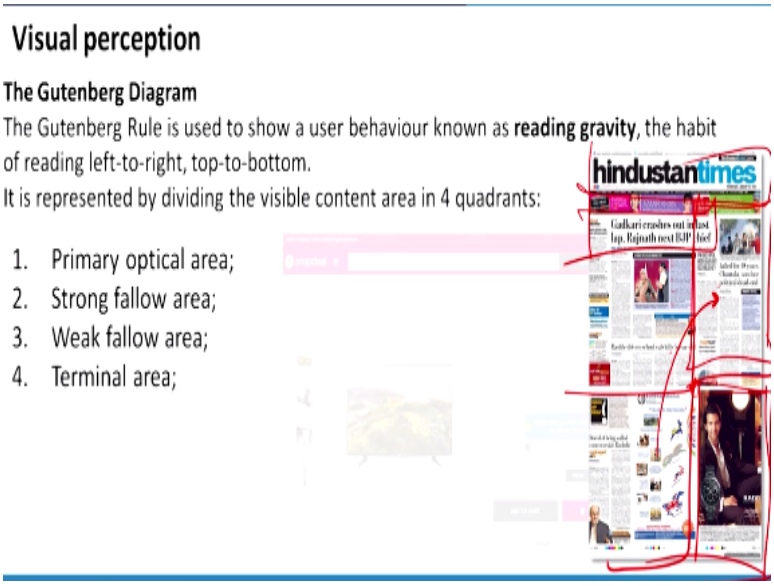

And if you look at this newspaper which is a very good example to follow Gutenberg's diagram. So here the most important news will be definitely in the first quadrant just after the logo and the name of this newspaper. But in the fourth quadrant, in the newspaper, this fetches the highest money because everybody will look at the fourth quadrant before turning the page. That is why in every newspaper if you look at, the fourth quadrant is used as the advertisement.

Because that fetches the highest amount of money. And advertisement people also check how many people have read this advertisement and taking action based on reading this advertisement. So and the fourth quadrant will be dedicated for the advertisement and then in the second and third quadrant you will see, second quadrant will have much more important news than the third quadrant.

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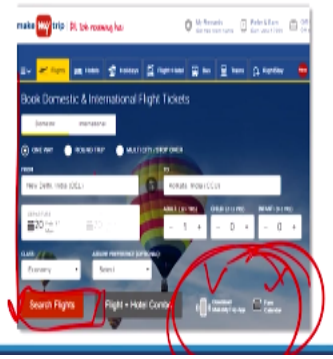
Visual perception

The Gutenberg Diagram

The Gutenberg Rule is used to show a user behaviour known as **reading gravity**, the habit of reading left-to-right, top-to-bottom.

It is represented by dividing the visible content area in 4 quadrants:

1. Primary optical area;
2. Strong fallow area;
3. Weak fallow area;
4. Terminal area;



Another example is MakeMy Trip. Also there is a similar action which is there and mostly here they have followed the top to bottom sequence of Gutenberg's diagram and also this is search flight button is here but in this quadrant they have used again for promoting the download MakeMy Trip app to promote their webpage. Now to validate this, right now we have eye trackers.

And many of the designers have validated whether the Gutenberg's principle which was evolved around the industrial revolution, whether it is valid in today's time or not. So eye tracker is one of the possible solution which we can see whether our design is working the way we want or not.

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Visual perception

User's eye fixation and visual cognition

Eye- tracking

So there are two types of eye trackers available mostly. There is also another type. So the first type of eye tracker is a desktop mounted eye tracker. This is the eye tracker which tracks on the information GUI of desktop display. Another kind of eye tracker is the mobile eye tracker which tracks the information in the 3-dimensional spatial information. And there can be another type of eye tracker which can be combined with the virtual reality or augmented reality devices.

For example HTC Vive and HoloLens. So this is an eye tracking testing by Sunsilk's poster design.

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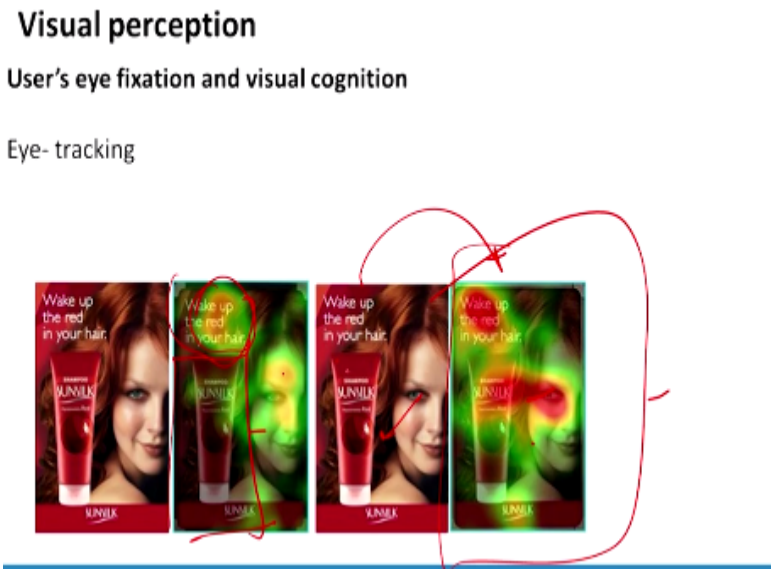

So in the first version of Sunsilk's poster the model was looking at the user and then Sunsilk product was there. So they have done a eye tracking testing and this is a heat map generated by the eye tracker. So eye tracker gives the heat map and it tells the warmer the color is the user have spent more time and more eye fixation is there in that region. So they have looked at the face of the model and they have just made the information in the first quadrant.

And they have actually missed the product. So after in the next iteration, the model looks at the product so that gives the cue to look at the product and so this model's eye is actually directing the user's attention towards the product. In the next version, just by changing the eye direction it works much better and many people look at the poster and grasp the information which designers wants to give.

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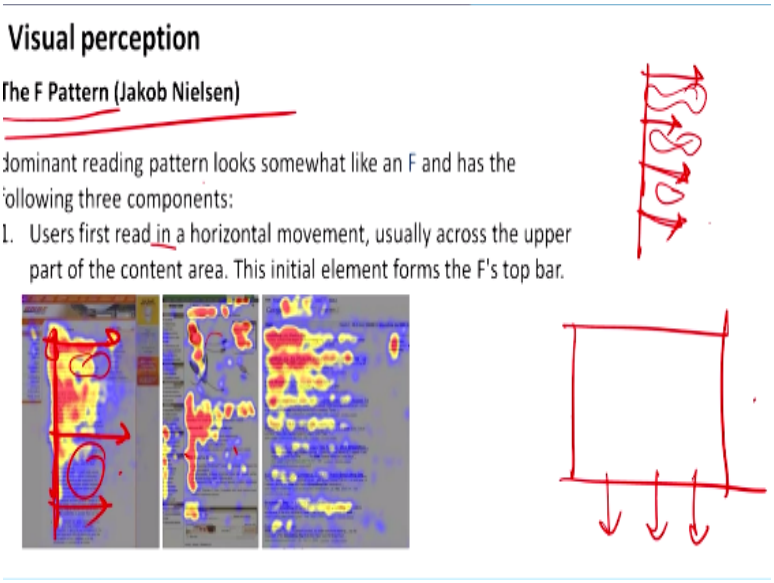

So there is a design pattern which Jakob Nielsen one of the famous designers have evolved after doing several eye tracking testing on the web content. So he have checked this Gutenberg's principle how this principle is right now in today's time work in the web application and mostly he have tested it with the text heavy documents and which is the infinite scrolling and this text heavy document is not static web page.

So you can scroll down and read the text which does not fit into the display system. So he have evolved that this F type pattern the way people look at. So that creates a F type heat map pattern. So they start reading from here and then they go here and then they start coming from top to bottom and again after sometime they again scan the text. So they might skip few of the information and few of the information here and they keep on going like this.

So this F pattern is not just like this. So depending on the infinite scrolling it can have many spokes of the F. So people sometimes miss out few information and then they start reading this from left to right. So this is the pattern evolved from and these are the eye tracking heat map generated from this testing.

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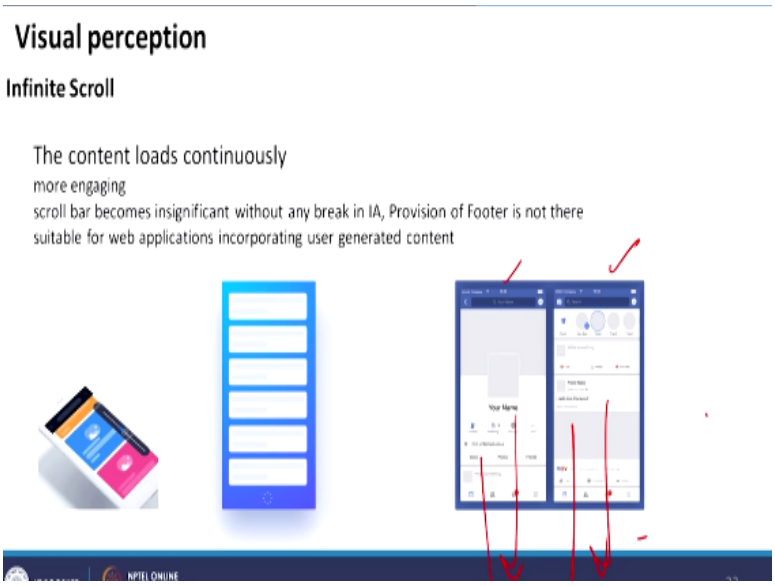

So from that we can design two different style can be there in terms of visual communication design. One is infinite scroll. So there are some pros and cons of the infinite scrolling. So the infinite scrolling is what he have tested and the F pattern evolved in the infinite scrolling. So infinite scrolling is when the content loads continuously. And you can infinitely scroll based on the amount of customer generated or the user generated data.

So these are mostly suitable for a dynamic webpage when the user has the capability to load or change their webpage. For example Facebook. So Facebook's timeline can be infinitely, you can infinitely scroll down and this infinite scrolling is more engaging and people might, user might skip some information and then they can look at some information which is more relevant, which they feel more relevant and they can infinitely scroll.

And this has much more, it can engage people for longer time because they lose track from where they are and this is a one line information architecture so there is no break in the information architecture and they keep on reading that. So this provides a lesser option to have a footer. So footer should be omitted so that they keep on reading the information and then this UI page will be more engaging and more attractive and engaging for them.

But this has some cons. For example the scrollbar sometimes become, the size of the scrollbar become insignificant. The size will start differing because when you go down into the

information the scrollbar will be smaller and it will be difficult for you to go into the top because there is no breadcrump and other break in the page. So for example this is Facebook's timeline. You can go down and keep on reading what happened in the timeline in the previous information.

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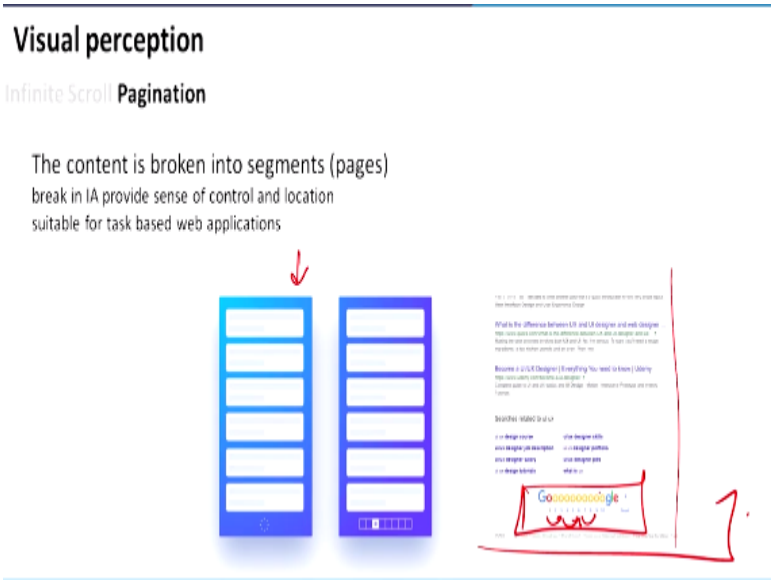

And another kind of navigation can be the pagination where you break the infinite scrolls into different page. So graphically it can be represented like that. So in infinite scrolling the information will keep on coming like that and in pagination there will be just one single page and if you click on to the next page you can navigate to the next information set. So this has a different information architecture.

So when you go to the next page, you shift in the information architecture. This is not linear, but this gives a provision to go back to the previous information and this also give the provision to bookmark a particular page and you can track the information in a much better way. For example it can be Google search engine. So Google search engine could have been also like infinite scrolling. All the search can come one after another. But Google have created this pagination.

So the user will know in which page they are. So in the next class we will talk about the style of design and how they change based on different timeframe. So we will discuss the contemporary

design and visual design movement and we will also talk about the typography and how to incorporate the different visual style and typography in the visual communication design.