Introduction to Psychology
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Lecture - 09
Perception: Form Perception

Now, let us talk about Form Perception. Now, Form Perception basically is dependent upon reorganization of figure from the background.

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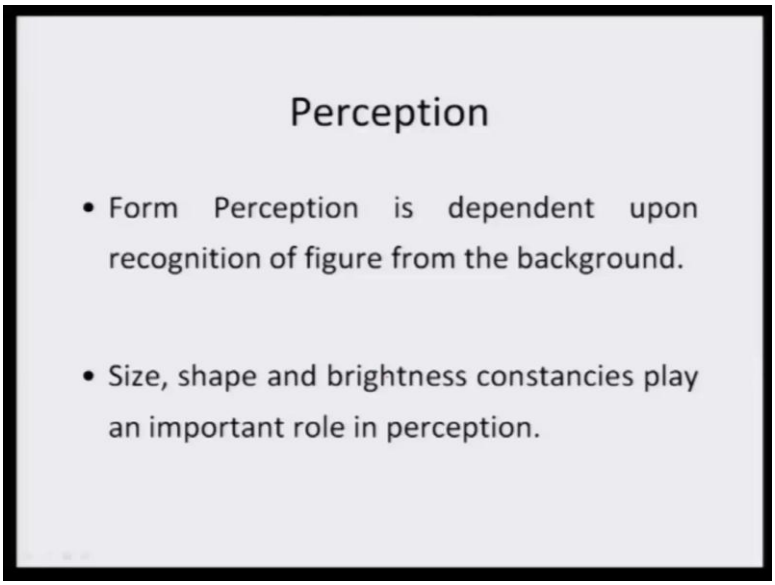

And this basically would mean that certain type of constancies will work – size, shape and brightness. That would mean you would come through it in few seconds from now, that depending on the situation the size of the object might change, the shape of the object might change, the brightness, the contrast, effect might change, but then we have a tendency as human being to maintain mentally degree of constancy in terms of shape, size and brightness and that helps us perceive situation much better.

Now, in terms of depth, in terms of height, we always have the monocular and the binocular cues inputs coming from only one eye is the monocular cue and input that comes from both the eyes they constituent the binocular cues.

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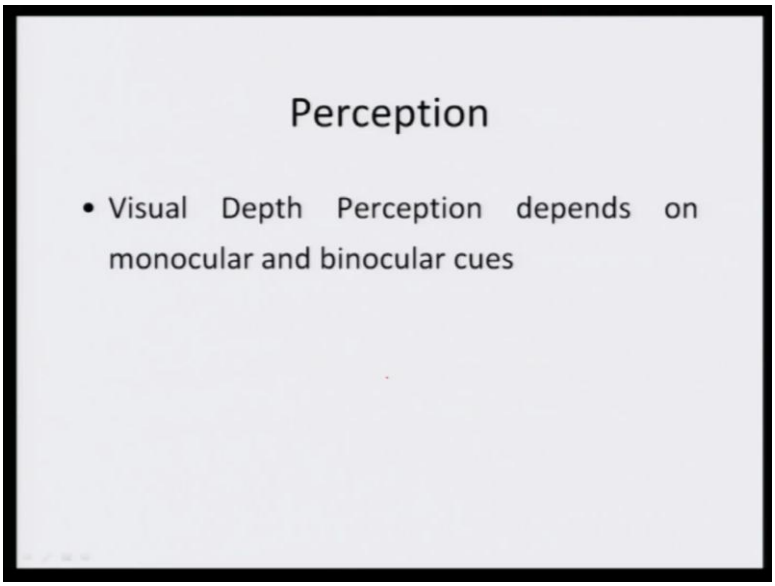

Now my monocular cues they basically depends on linear perspective, clarity, interposition, the pattern of shadow, texture and the relative movement.

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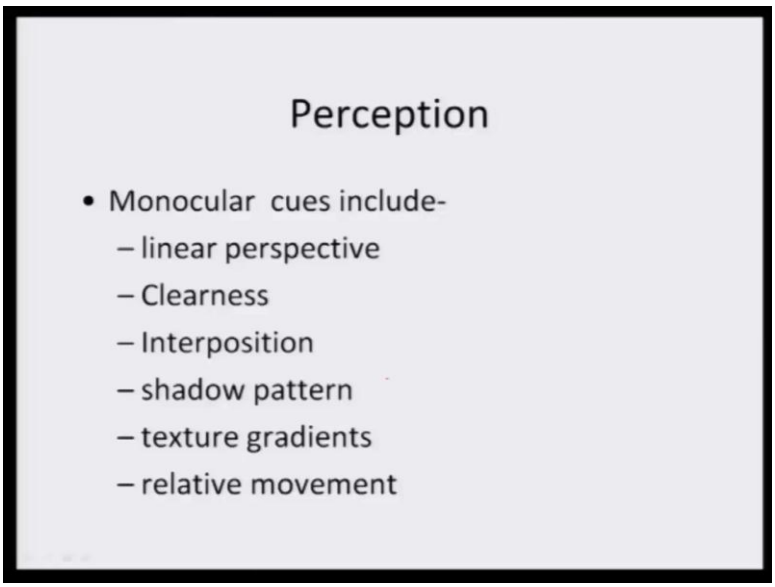

What we would do now is that all these 6 important ingredients of monocular cues; we will talk to them one by one, trying to take possibly the best example.

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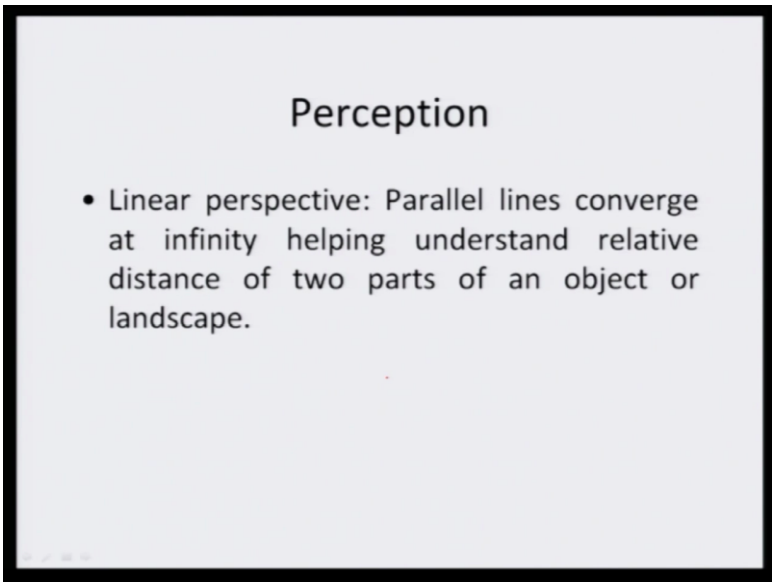

So, let us come to Linear Perspective when parallel lines they converge at infinity they help us understand the relative distance of two parts of an object or they even help us understand the whole landscape. Look at now this vary image.

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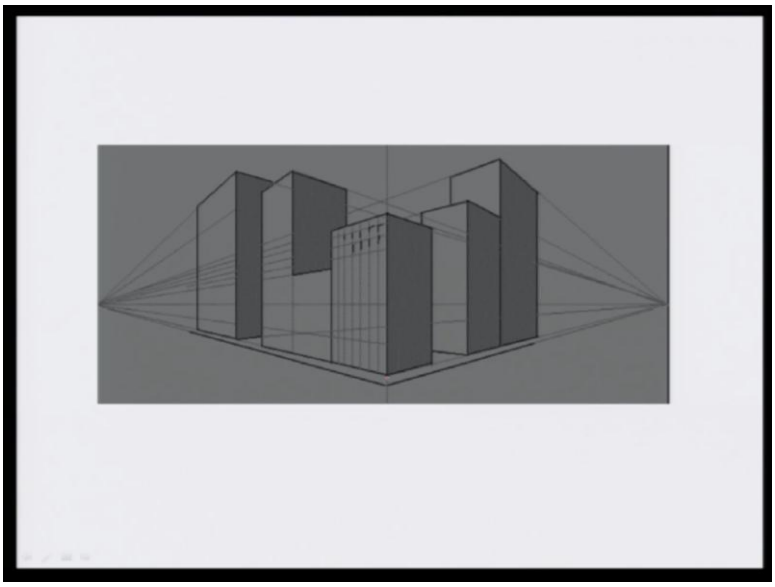

Now imagine the point where now the straight lines converge, you are standing at that very point and you are looking at the urban landscape this is what is the meant by linear perspective. So, what actually happens you have the converges of the lines and this converges of the lines helps you understand your position and the position of the objects

in your landscape and accordingly these monocular cues they help you understand the shape, the size and of course, depending on brightness and contrast you even can make out about the distance of the object from yourself.

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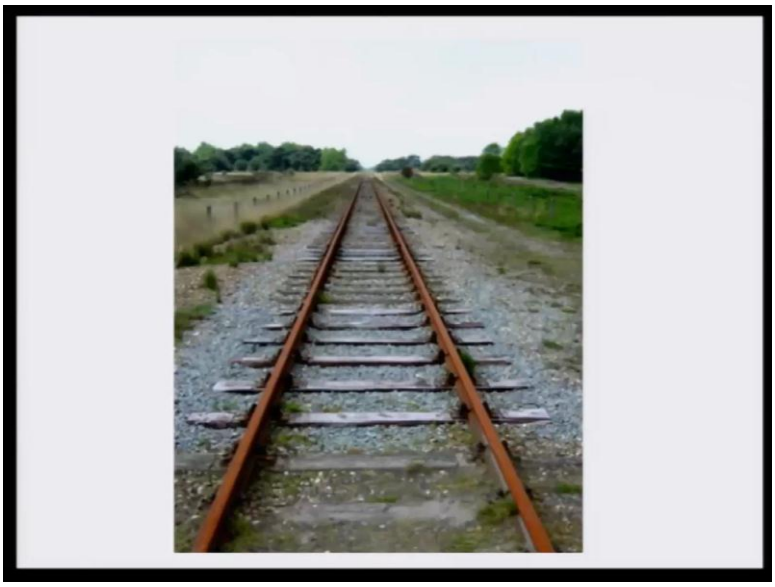

Now, look at this vary image. Now this is a very usual railway track that we have been seeing right from our childhood days. Now what happens when you look at the two parallel bars, the two tracks you stand in the center then you realize that they are wide apart they are separated apart, but then when you look at it now at a distance you gradually realize as if the distance between the parallel bars they somehow tend to converge, they tend to come closer to each other. Now based on the monocular cues what we have been saying is that when you look at the object where you are and whether the parallel lines they converge or not that decides what you are looking and how you perceive the world around you. The first was the example of the urban landscape; the second is the example of again a modern infrastructure that is a railway track.

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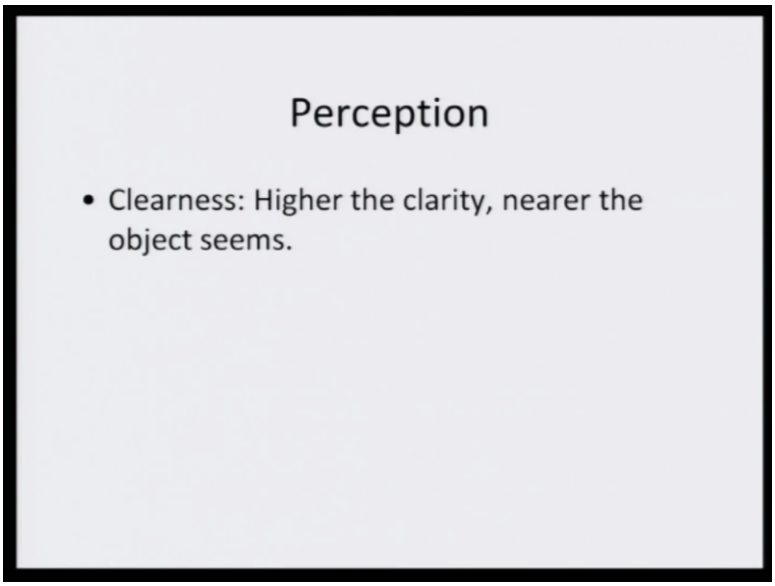

Now, we come to Clarity. If you are looking at an external environment and the more and more clearer things are - you always tend to realize that those things are near to you, things which are very far off from you will now compromise on the degree of clarity.

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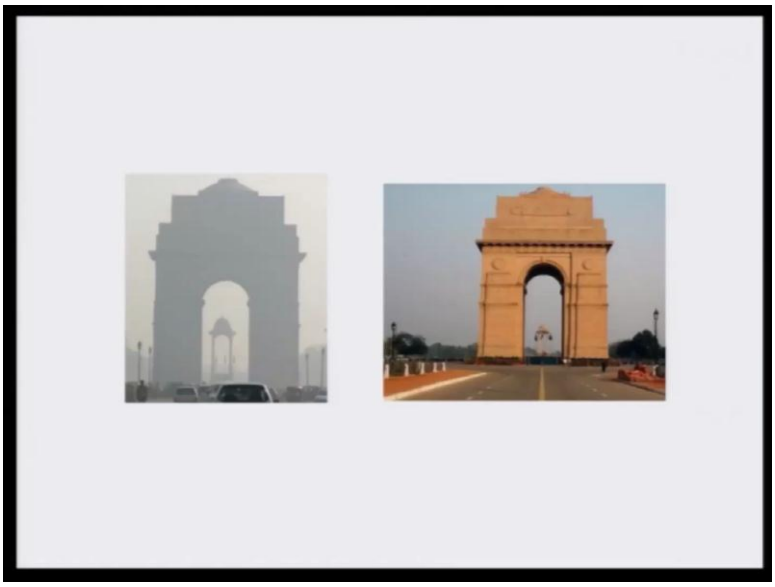

Look at this vary image now and you compare both of them. The first is where you see the structure and you see the structure with much more clarity and you can sense that the object is much more nearer to you; the structure is much more nearer to you. In the other case of course, you realize that the clarity is compromised with and with the compromise

in the clarity you will realize that the image on the right tells you that the structure is nearer to you, the image on the left tells you that the that the structure is far off from you. So, in terms of monocular cues how clearer is the image that is generated that would tell you how far or how nearer you are to the object.

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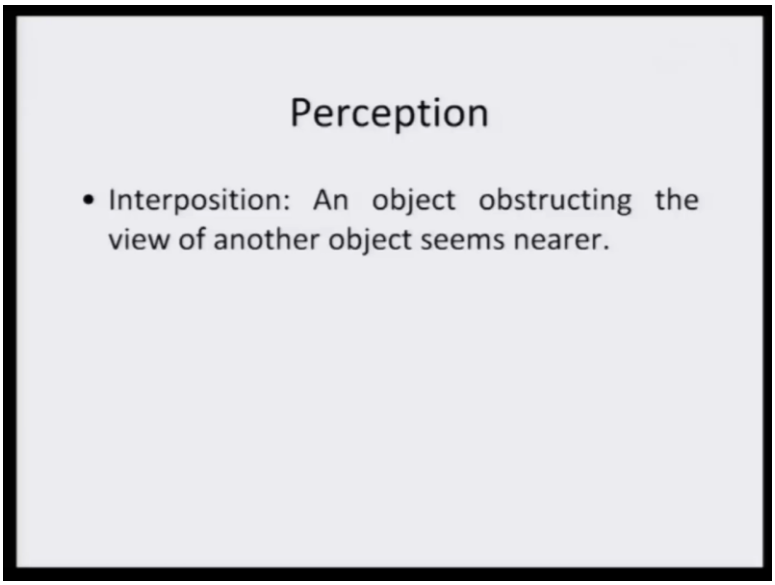

The third is the Interposition, Interposition is when you have two or more objects in the same visual field and one object obstructs the view of the other one.

Now, the object which looks very nearer to you would be the one which will block the clearer perception of object at the back.

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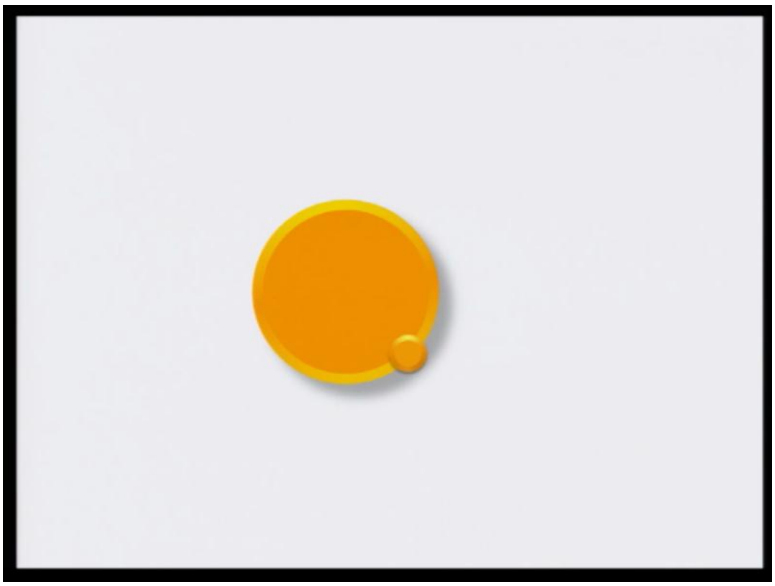

Now look at these two circles if I ask you how distant you are from these two circle it is very difficult for you, you will perhaps say that I am at a equidistance. Now look at the movement pattern, now if I ask you which is nearer to you, you can very easily say the one which is the smaller is nearer to me, why is it nearer to you? Because monocular cue tells you that this colored disk is nearer to you is the one which blocks a part of the disk which is at the back. That means, unless this very object will be now nearer to me it cannot now work as interference in a clearer perception of the object at the back. So, this is interposition. Now the position of the object is which is nearer to you is the also the one which blocks clear clearer perception of the object at the back.

Same is the situation here now.

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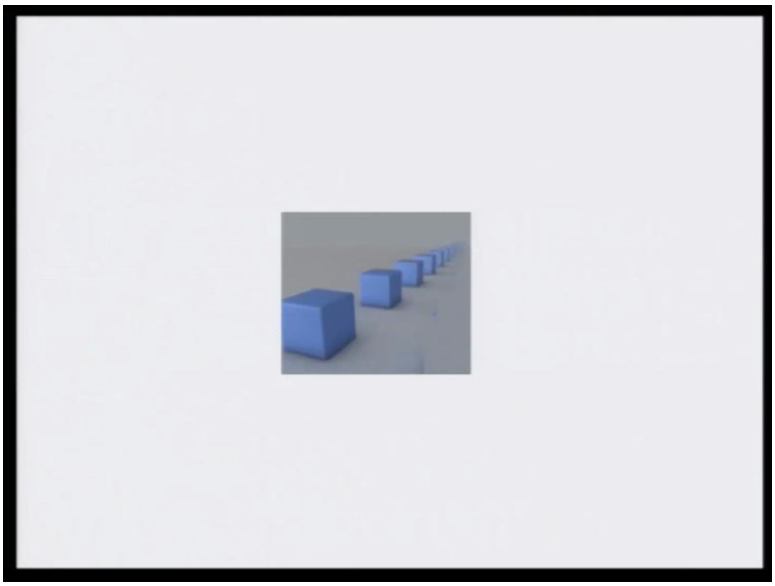

Now, we come to the Shadow pattern.

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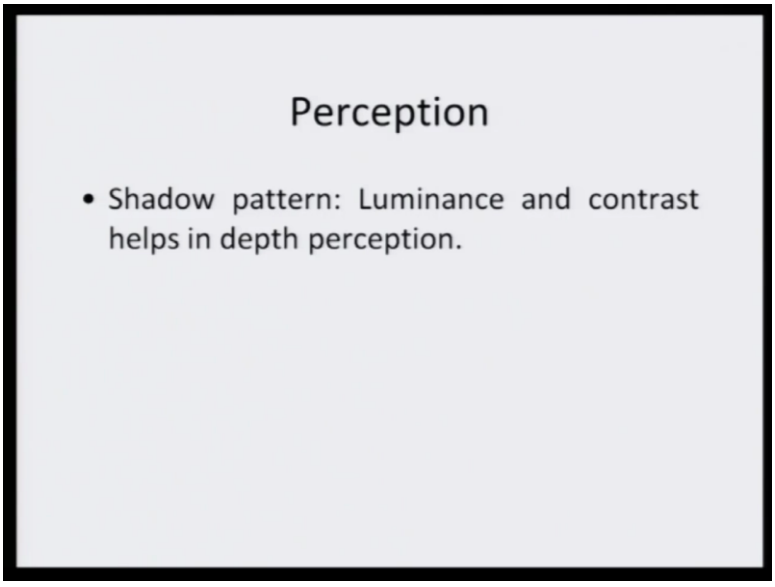

Shadow, you know wherever you have light you will always have shadow if an object is put there. So, luminance and contrast they help us understand the depth and because it helps us understand the depth. So, if you inverse the phenomena you can say that this also helps us understand the height of the object.

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Now, look at this vary video. This is now the aerial image of IIT, Kanpur. Now this video did show you the aerial image of various structures of IIT, Kanpur campus.

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And right now when you look at the lecturer complex of the IIT Kanpur, because at a certain height you see that one structure creates or casts a shadow of a type; this change in the luminance pattern it tells you that find this object is little above the background and if it is above the background this means this would have particular height. So, it is basically the pattern of shadow, the luminance, the whiter area and the shadow the darker

area the contrasts that you are able to establish that will help you understand how high is the building that you saw right now when you were looking at the aerial view of IIT Kanpur campus.

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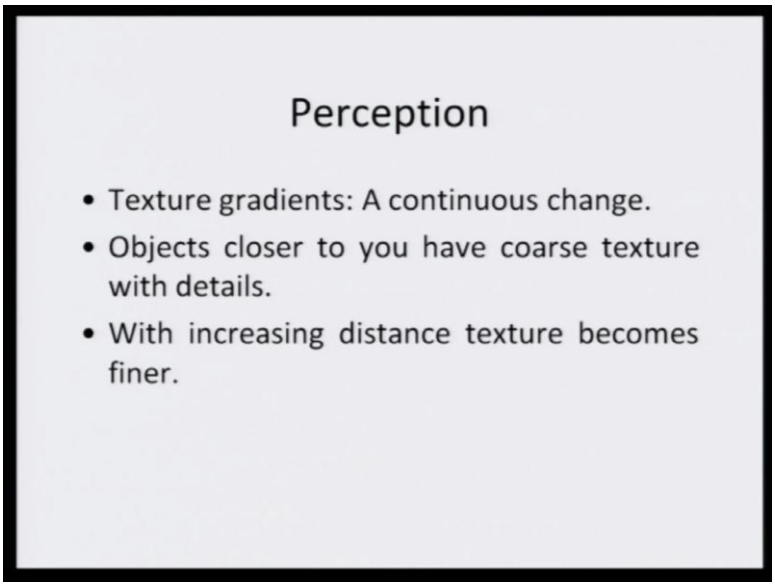

Another interesting feature that is part of the monocular cue that helps us understand the world is Texture gradient. Now texture gradient basically is supposed have a continuous change, the objects which are closer to us will have a coarse texture with much more details and if the distance increases the texture becomes finer. Look at this vary image now.

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Now the object at the bottom if you look at it, it has much more clarity. The texture has all the coarse details and you can very easily say that this is nearer to me, whereas if you move upwards you realize that it is not so nearer to me, now the distance has increased a bit.

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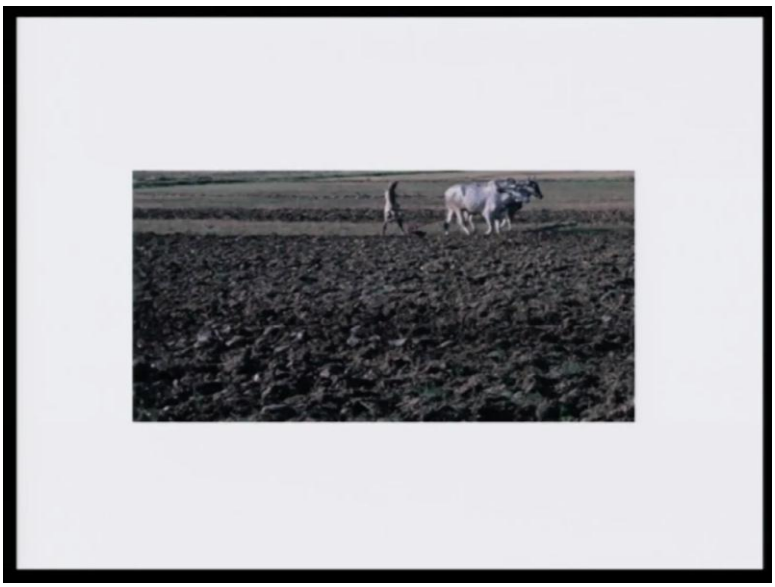

Look at this vary situation, you have a farmer ploughing the field and when you look at now the pattern of soil there you would realize that things which are nearer to you if you are standing at the start of that very point, the starting point you realize that the coarse

texture is very very clearer to you. But when you move at a distance where the farmer and the bulls are you realize that it becomes more finer and this gives you a feel that well things which are nearer to me in terms of texture gradient, you would realize that things which are nearer will have much more coarse texture details. Whereas, things which are at distance there you do not have that, the texture does not have that coarse details and therefore, you realize that the texture becomes more and more finer.

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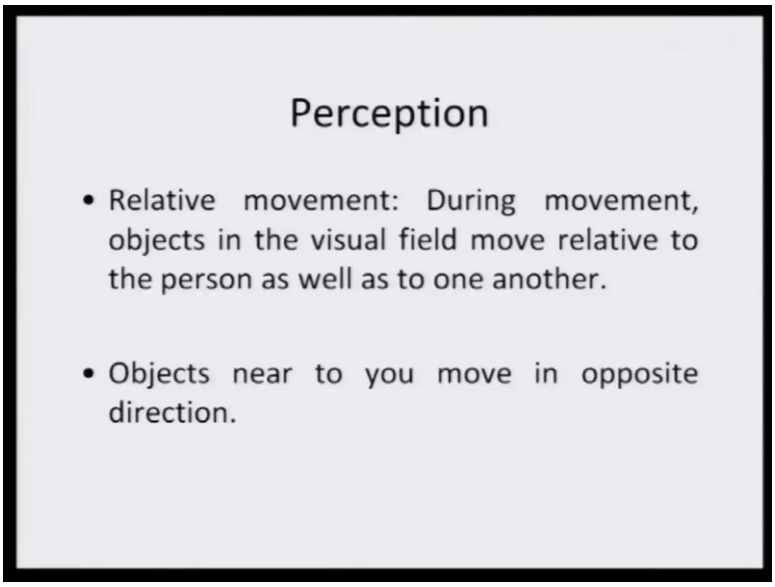

We now come to relative movement. Now movement you all understand relative movement basically means that during movement when you look at objects in the visual field, you look at your position and the relative position of other things in the environment. Now look at this vary video.

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Here you have the iron bars and the vertical bar which is too close to the car to the one who is looking at another objects that are nearer and far off, you find that they seem to now cross you very fast compared to you now the objects the field and the objects in the field and the background where you see the hill and the trees. All of these now vertical iron bars seem to cross much faster, whereas the remaining part of the back ground seems as if they move very very slow. So, this is what was being explained right now.

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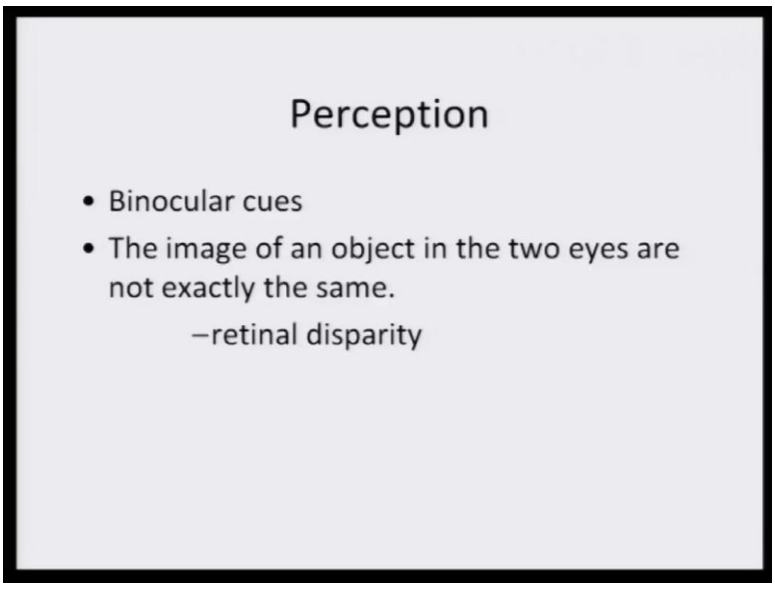

Having discussed monocular cues let us now look at the binocular cues. Now a binocular cue basically is a situation where cues come from both the eyes. So, the image of an object now that falls on both the eyes the left and the right eyes they are not the same. You remember right on the very first day when we were looking at the visual pathway, even there when the child was looking at the colored disk the two hemispheres of the brain did not have the full representation of the colored disk, there was a division left right division. So, that clearly means that right from the level of the eye till the level of the brain the signal that goes to the left side of the eye and the brain is not equivalent to the signal that goes to the right eye and the right side of the brain, the right hemisphere. And because the image of the object that falls on the two eyes they are not the same it creates certain degree of disparity and this is called as the retinal disparity because there is a disparity at the level of retina the image that is generated on the retina.

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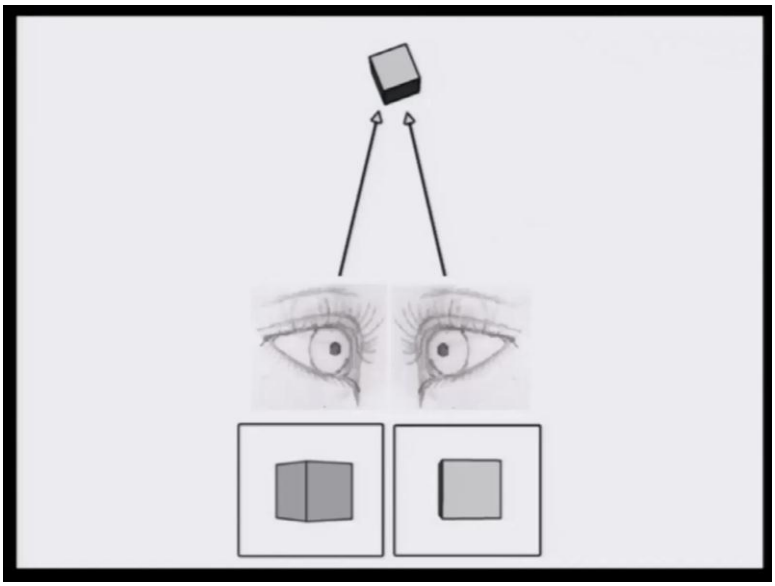

So, if you are looking at a cube you can sense, right now on the top you have the cube the left and the right eyes and what the left and the right retina creates the image of that cube you can see line sketch demonstrating it, this is what is meant by retinal disparity.

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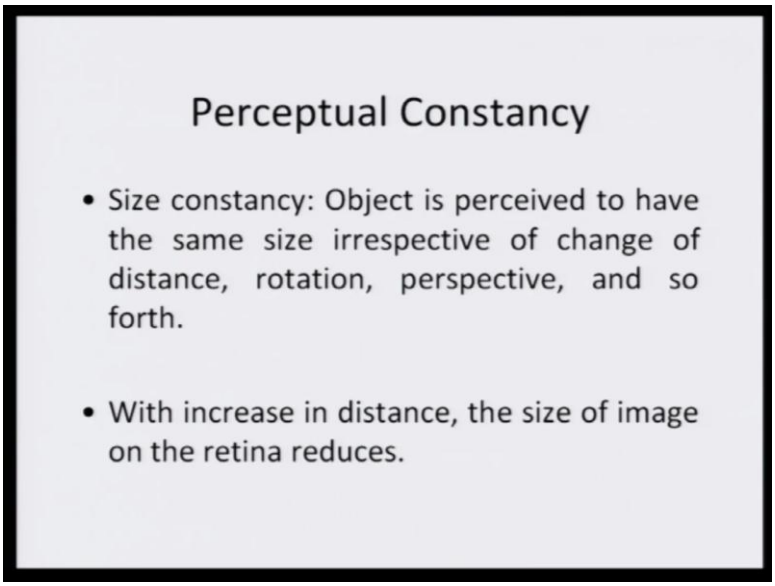

Now, despite this retinal disparity what is very interesting is that we do have now the ability as a human being to maintain certain degree of perceptual constancy. Constancy in terms of size of the object, constancy in terms of shape of the object, and constancy also in terms of brightness of the object, and this helps us commit less and less number of errors even though things are dynamic in our world. So, let us first look at size constancy.

Now, objects are perceived to have same size irrespective of the change in distance, rotation and perspective. So, with increase in distance the size of the image on retina reduces.

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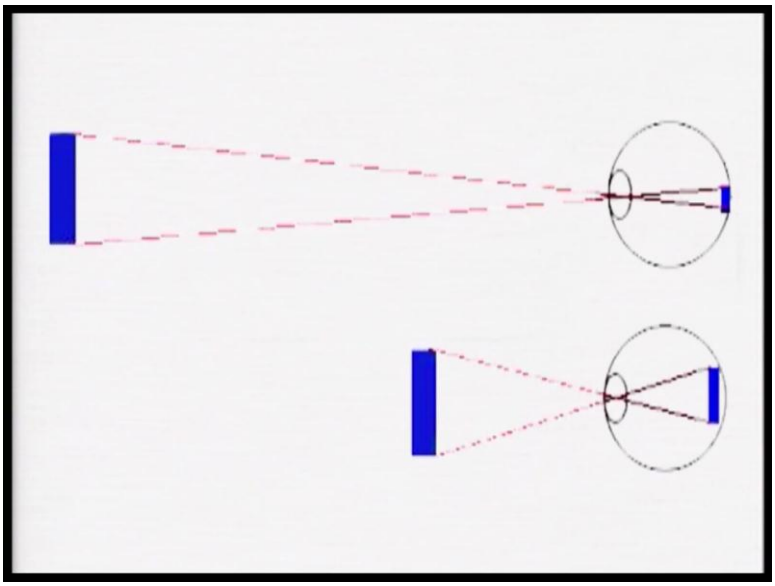

With increase in distance the size of image on the retina always reduces. So, you can see here the two objects that you see now they are of the same size, the blue blocks that you see on your screen they are of the same size, but when the image gets casted on the retina you see a change. For blue block which is far off from you from the eye here shown on the top you find it that the image that is generated on the retina is smaller compared to the image of the object that is very near to you.

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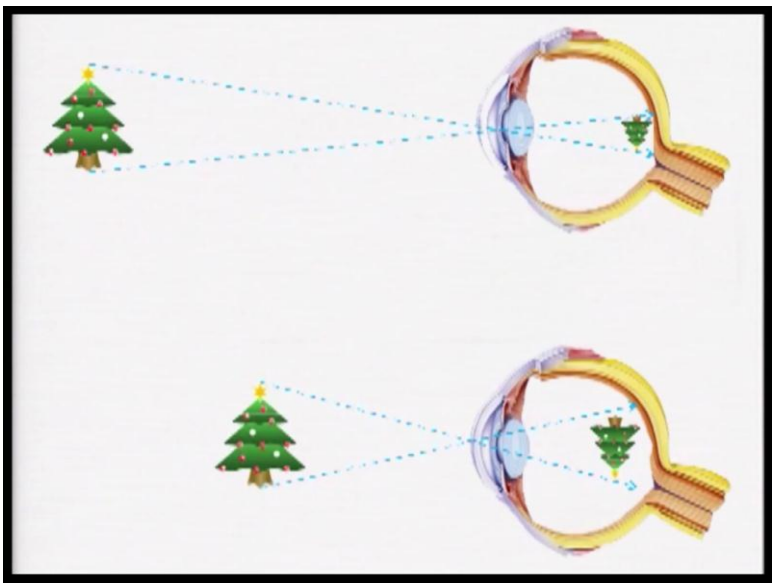

So, nearer objects will have bigger images on the retina, far off objects will always have a shorter image on the retina, but then the beauty of human perception is that we still maintain the size of the objects that we see and remember this will be always be true for familiar objects, if you are not familiar with the object, if you have never seen this object this is a novel thing for you then, now you will get rid of this size constancy.

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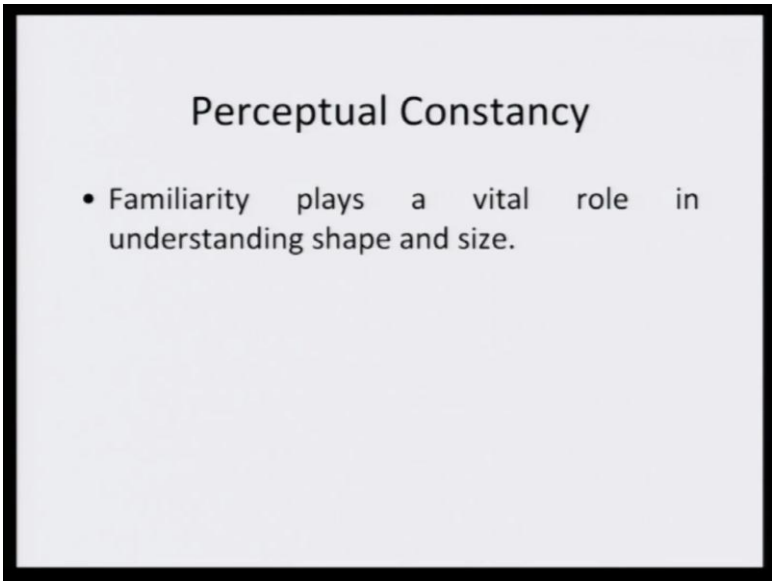

Now, in terms of perceptual constancy familiarity plays a very very important role. So, if you are familiar with an object you know what would be the shape and size of this very object and therefore, despite the fact that in reality the shape and the size varies you always maintain a constant shape of that very object.

Look at this video now. You will find how the shape changes, how now from the varying distance the entire thing that is actually available now that you are eyes sees changes, but then in our real life we do not consider these changes to be significant and therefore, we always maintain the size constancy.

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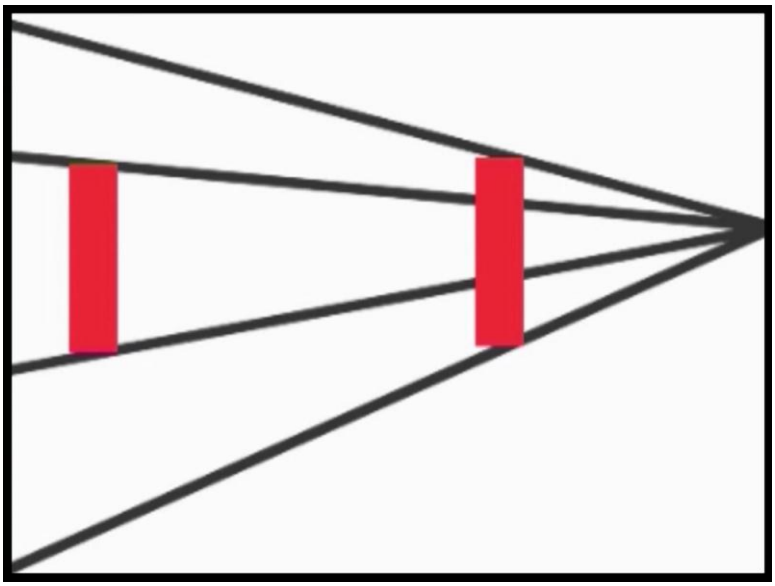

Look at your screen now you see a red bar. Now another red bar has come exactly out of this earlier one, both bars are of the same size the moment you put these lines now. The right red bar which is close to this line of convergence of the black ones seems bigger compared to the red bar which is on the extreme left hand side. Now in reality although we know, right now we have seen now that these two bars are of the same size now if you reply it this is what you saw both bars are of the same size, but then the moment now you add the perspective here you realize now that they are not the same. Let us take another example.

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Look at the human sketch here and you again just like the red bar here now the same image is taken out, but the moment you have the added background there you realize now with respect to the perspective that the man running in the front seems to be smaller compared to the man at the back. So, this is now the interesting dynamics of understanding the whole process. Some reality plays a vital role in understanding the shape and the size.

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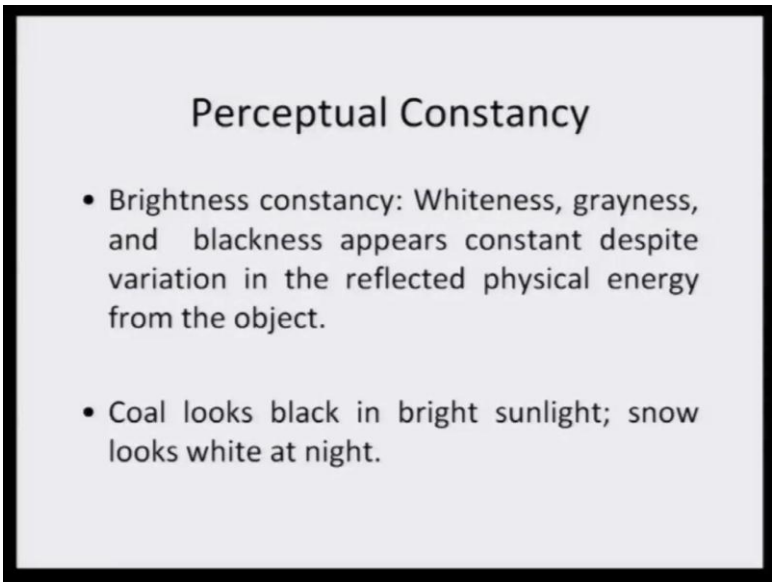

We now come to brightness constancy. Now whiteness, grayness and blackness they appear constant despite variation in the reflected physical energy from the object, this is an interesting truth of the world and therefore, when you look at coal which is black in a bright sun it looks more black compared to when the light is dim. And similarly if you look at snow in the night hours it looks much more white compared to daylight condition this is the truth, but when we look at coal and snow or for that matter any object which is you are familiar with we tend to maintain constancy in terms of whiteness, grayness and the blackness of that very object.

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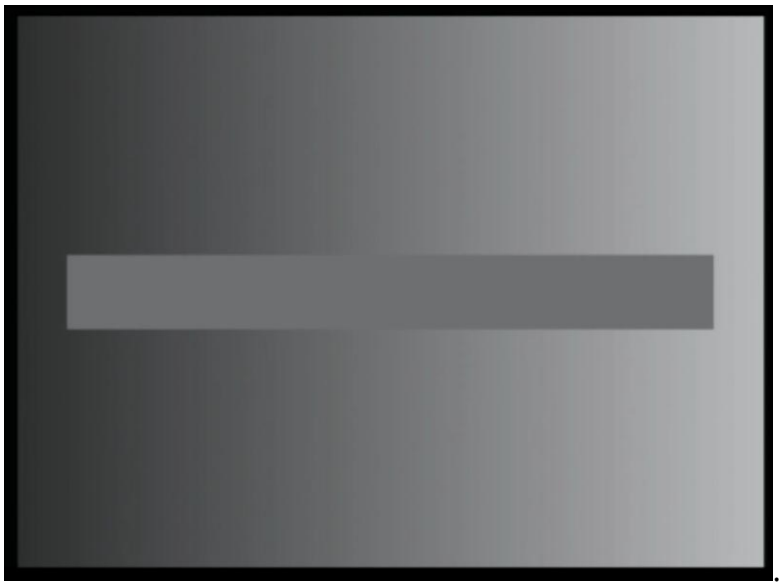

Now, look at this various strip if I ask you what color do you see here on the center of the screen and you will say gray if I ask you is this a uniform pattern, answer is likely to be yes. Now if I change the background, now look at this background now suddenly you realize that the spread of gray is not uniform across this screen and this is not uniform because the background has changed. Similar example was being coated right now, that the coal is black, but the coal is far more black if the you look at it in a bright sunlight condition and similarly snow is little more white if you look at it in a dark condition.

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Now, look at these two colored circles if I ask you what is the color of these two circles and you say this is gray, exactly like the strip that you saw. Now the moment I change the background and I change the brightness level now, the whiteness, the grayness and the blackness has been tampered with and this gives you a feel as if this you are looking at a three dimensional object. Remember this screen is two dimensional, the sketch is two dimensional, our retina gets a two dimensional image, but when we mentally construe it we perceive as if we are looking at the third dimension as well.

Designers, all artists, they create the similar type of now situations to give you a feel of depth and height. You just see here on the figure on the left you can have a depth perception, you feel as if now piece has been taken out of it, a cavity is there, on the other side you see a bump - one that gives you the feel of depth the other which gives you feel of height. So, this is now depth perception and height perception which basically depends on the whiteness, grayness and the blackness in the situation. Remember one thing that this has been deliberately done, if this is not done then we as human beings have a tendency to maintain constancy and therefore, irrespective of change in the degree of light emitted back from the object we try to maintain constancy. Things which are a brighter to us will always remain brighter things which are darker to us will always remain darker and that now does not allow us to commit big blunders.

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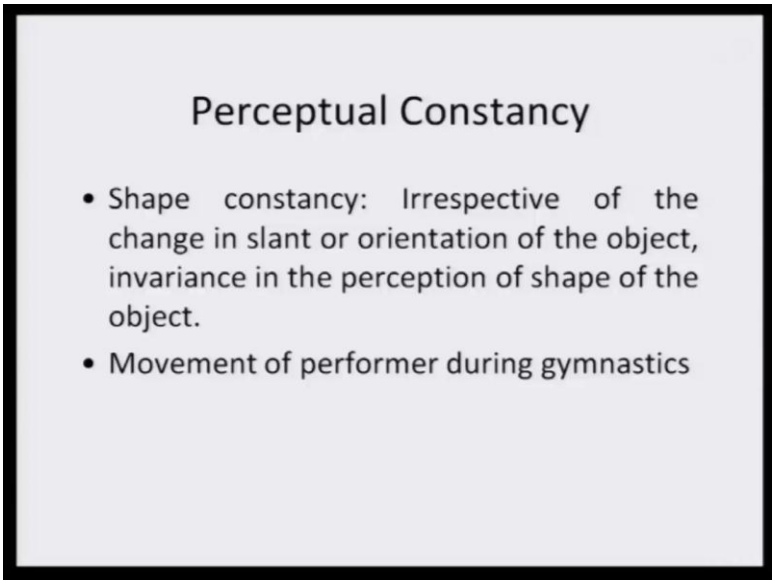

Similarly, the third constancy which is again important is constancy in terms of shape. Now irrespective of the change in slant or orientation of the object, we always perceive them to be of the same size. So, if I take an object in my hand for instance I take this object in my hand the size that you see right now the moment I change the slant the size, the shape will not remain the same.

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But then as human beings what we do is we know that this is the actual size of the object, a cell phone will be of this dimension the length, the width, the thickness and that is it.

Now, you keep on changing the slant, you keep changing the orientation, the mobile phone will remain mobile phone. The visual perception will not vary. The best example of this is when you look at the field of sports, when you look at the movement of a performer during gymnastics his body position constantly changes at a very fast pace, the slant, the orientation, everything changes, but then you know that this athlete is say for instance 5 feet 7 inches tall that is it. The shape and the size constancy will be maintained. Look at this vary video, these are some of the finest movements that human beings are capable of performing, all these requires extreme degree of coordination.