Interaction Design
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Lecture – 04
Interaction Models and Interaction Paradigms

Hello and welcome to week 2 of this course on interaction design. Let us begin this week by doing a quick recap of what we have already learnt about the course.

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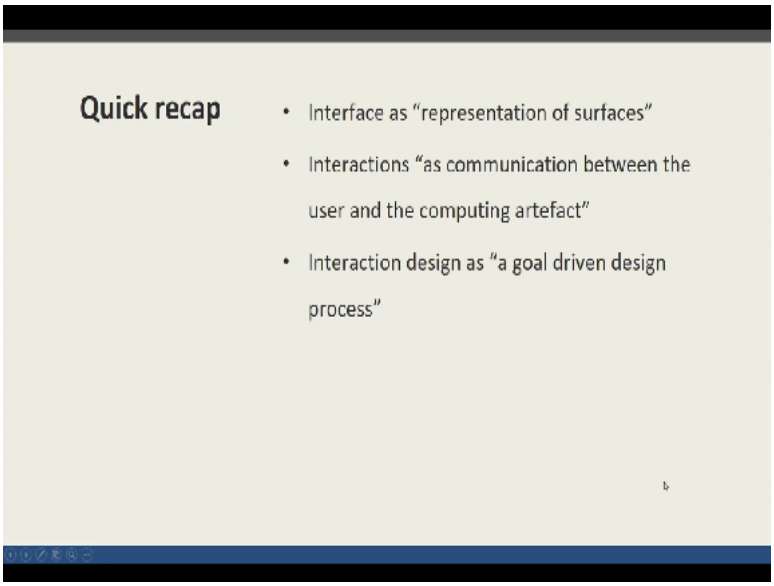

So we begin by raising certain interesting questions. The first question that we raised was what is an interface and then we followed up this question with other questions like what is interaction and how do we define the interaction design process. So in the first session, we had 3 different questions that we were trying to answer. As part of question 1, which was, what is interface? We had seen interface as a medium to communicate between 2 different black boxes.

The first one being the machine or the computer and the other one being the human being. In absence of this interface, there is absolutely no possibility of communication between the computer and the human being. We have also learnt that interface is about representation of surfaces. Because if you remember the first phrase that we were dealing in terms of interface, it is a surface between 2 surfaces.

And we had modified that phrase of a surface between 2 surfaces by understanding that representation of the surfaces play a crucial role. So interface is not just about surfaces, it is about how do you represent those 2 distinctly different surfaces. And then we had the second question where we were raising what is interaction and we understood it across a historical timeline where in 1901, it was understood in terms of reciprocity and then later in 1960s, we started understanding it as a symbiotic relationship between the computer and the user.

Then later on it evolved into an understanding of a kind of a communication between the user and the computing artefact. So we had also advanced our understanding of interactions. Then later on in the session, we had understood that how interaction design is a goal driven exercise. And that is where we moved on to session 2 in the last week where we had seen relevance of goals in the interaction design process.

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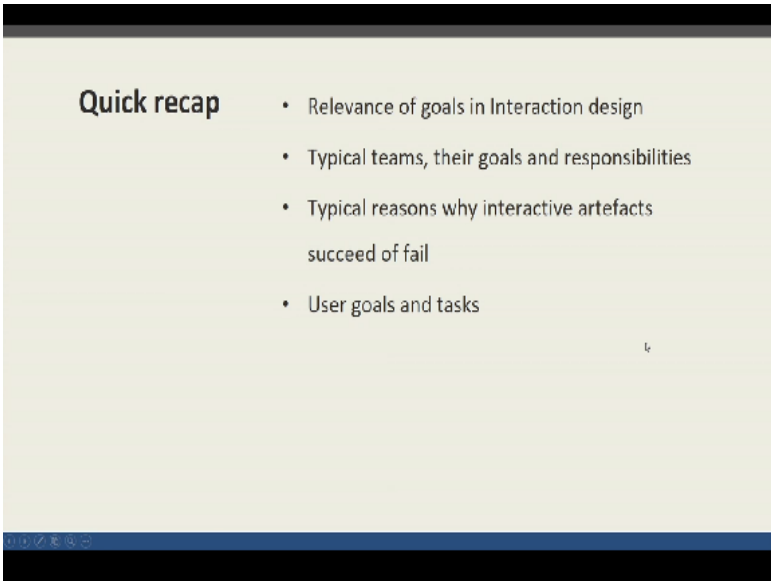

We had also paid attention to typical setups in a professional environment like a company or in an organization or in a design studio where interacted products gets developed or designed. So we were aware of typical team members, their roles, responsibilities and goals in the interface and interaction design processes. We have also paid attention to typical reasons why interactive artefacts succeed or fail.

And we have also given a lot of emphasis on understanding user goals and user tasks and how

both of these things are different. That was the mid half of the last week. Later in the week, we had understood certain concepts around implementation or system model.

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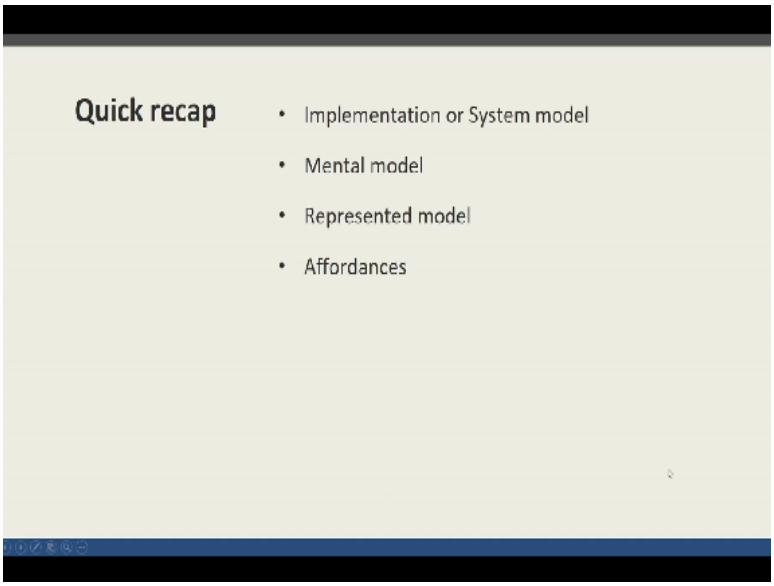

Then we had understood what is a mental model, represented model and the part of discussion on affordance was also carried out. Now in week 2, we are going to keep some of these concepts along with us and move forward to further increase our understanding of interaction design. The concepts we are taking forward are around the mental model and the implementation model.

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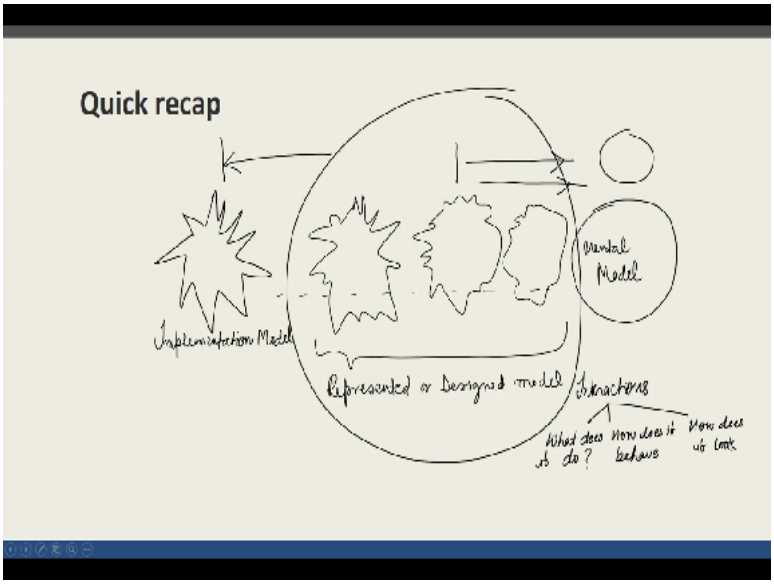

And if you remember this continuum which we had shown in the last session that on one side of the continuum or the scale was the mental model. While on other side of the continuum was the

implementation model. I hope you remember this slide from the last session. So this was the implementation model. And in between these 2 models, were 3 or 4 different variants. Let us draw those again, okay.

And we were calling these, all of these represented or designed model and if you remember when we were talking about mandate of an interaction designer, we were saying that while the interaction designer is conceptualizing interactions and the represented model, the mandate is that the represented model should be closed to the mental model of the user. And not the other way around.

Because if it goes close to implementation model, it may fail due to several reasons. So while you are designing an interacted product and you are thinking about represented model, you are thinking about different interactions which are possible, you must think about mental models and your goal is as a design team member or a designer himself is to go as close as possible to the mental model.

Now here comes one interesting question. How do we conceptualize these different models? So if you recall these models are about the interactions which is about how the interacted product, what does it do which is about what does the interacted product do? How does it behave and how does it look? So if you remember, these represented models are about the interactive artefact and there are, 3 different questions are important that what does the artefact do?

How does it behave? And how does it look? So it is very important to have some assistance, have some inspiration in terms of conceptualizing these different represented models and that is where the topic of this week becomes highly relevant. This week we are going to deal with interaction model and interaction paradigms. Let us first begin by knowing what an interaction model is?

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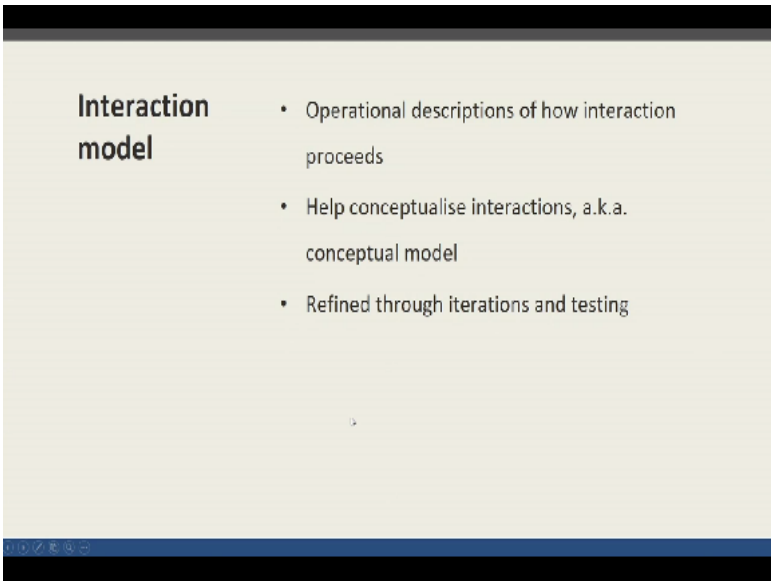

So if you look at your screen, you will find that an interaction model is an operational description of how interaction proceeds. Since it helps conceptualize interactions, it is also known as conceptual models in many of the books. And if you remember that continuum where you had mental model at one place and implementation model at other place.

And there are so many represented models in between, you will get a sense that designing or conceptualizing the represented model is a highly iterative process and every time you create an iteration, it is better to test it. And then improve further on that iteration. So interaction model gets refined through iterations and testing. Let us find a more nuanced understanding of interaction model.

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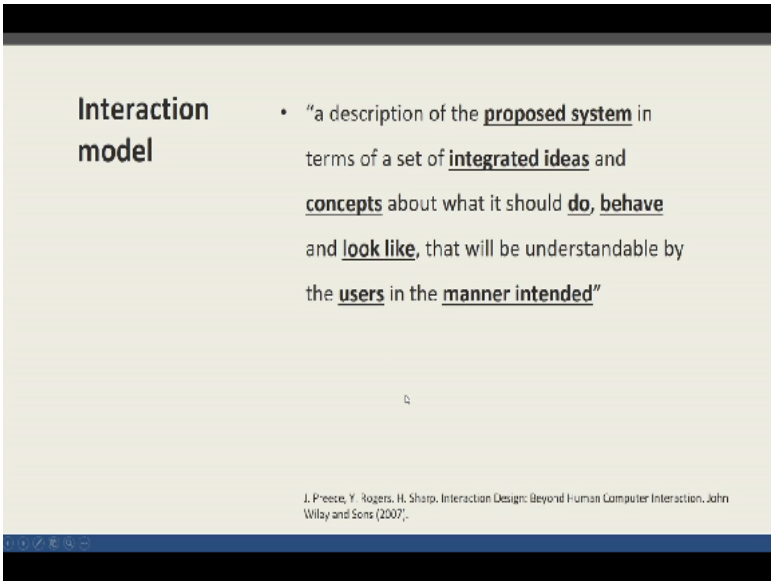

It says a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended. Now when we say that it is about the proposed system that is what we mean by it is about the proposed represented model. It is about the proposed interactive artefact. How that interactive artefact, what it should do?

How it should behave? And how does it look like? And all of these 3 different treatments about its objective, about its behaviour and about its look and feel, all of these 3 different treatments by the designers have to be accomplished in such a way so that they are understood, they are easily understood by the users in the manner intended.

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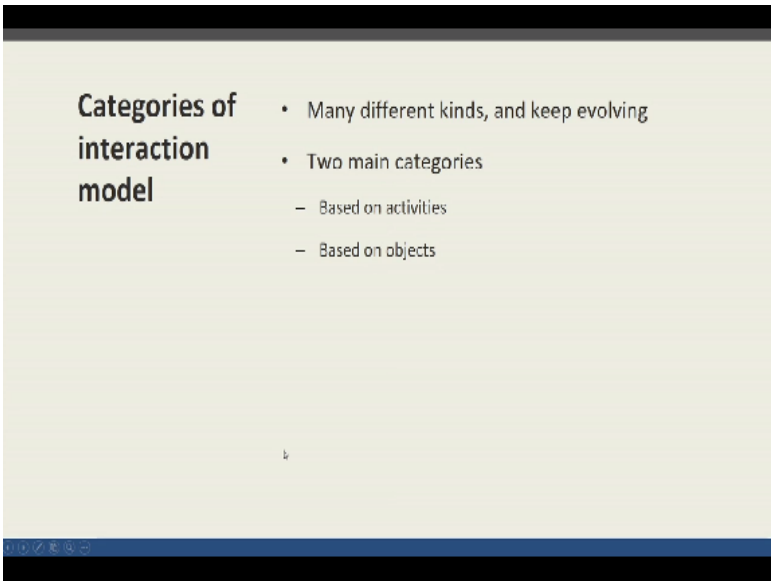

While there are many kinds of interaction model, we come across 2 main categories and also if you see that this, these models keep evolving. A lot of people who are researching into the domain of human computer interaction and interaction design, they keep proposing new models. But essentially if you see there are 2 main categories. The first one is based on activities. And the other one is based on objects. Now let us see few interaction models which are based on activities.

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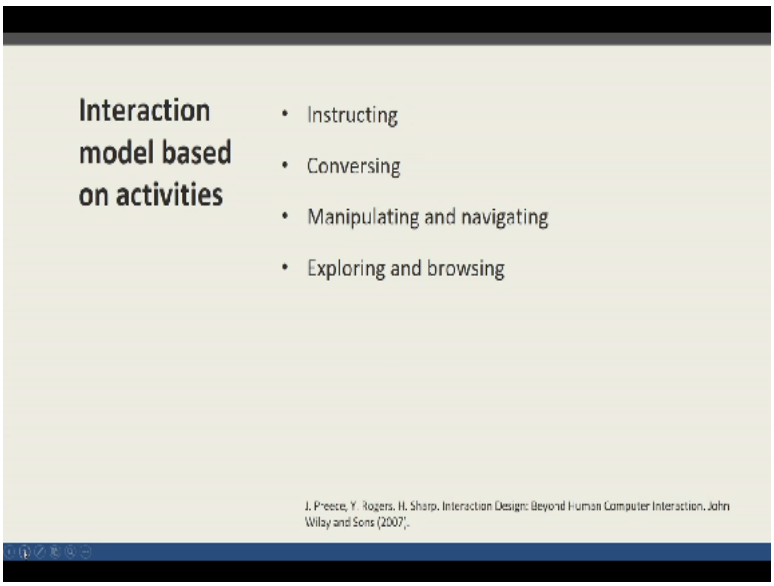

So you have 4 different interaction models which are based on 4 different activities or you can say group of activities, okay. So the first group of activities involves instructing the computing machine or instructing the interactive artefact, that is the first set of activity. The another set of

activity involves getting in conversation with the interactive artefacts. So that is the second set of activity that is what we are calling conversing.

The third set of activity involved manipulating and navigating through the interactive artefact, okay. So manipulating the objects and navigating to the virtual spaces is the third set of activities that results in a different kind of interaction model. And the fourth set of activity is about exploring and browsing. So you see that we have in this categorization, different set of activities which are resulting different set of interaction models.

First let us look at the set of activities which are about instructing the interactive artefact.

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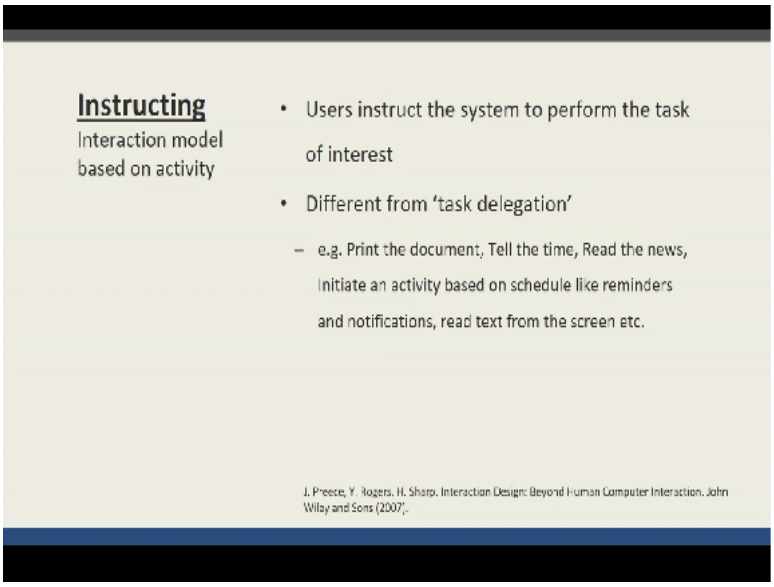

So in this set of activities, what is covered is the following. Where users instruct the system to perform the task of their interest, they are different from task delegation. Let us read through some of these activities. For example, if you were to print the document, and if you were to ask time from your mobile phone.

If you were to read the news and if you were to initiate an activity based on a certain pre-specified timetable like reminders or notifications and if you were to read text from the screen, all of these activities can be performed by instructing the computer, by instructing the computationally empowered interactive artefact, that was the first definition if you remember. So

all of these activities can be performed by instructing, by issuing instructions to the interactive artefact, okay.

And they are much different from task delegation, not really delegating the task, you are instructing the artefact itself to perform the task. So it is very much different from task delegation. Most of the students get confused between issuing instructions or delegating the task. So that is why there is an explicit mention of the fact that it is very much different from task delegation. Now what does it result?

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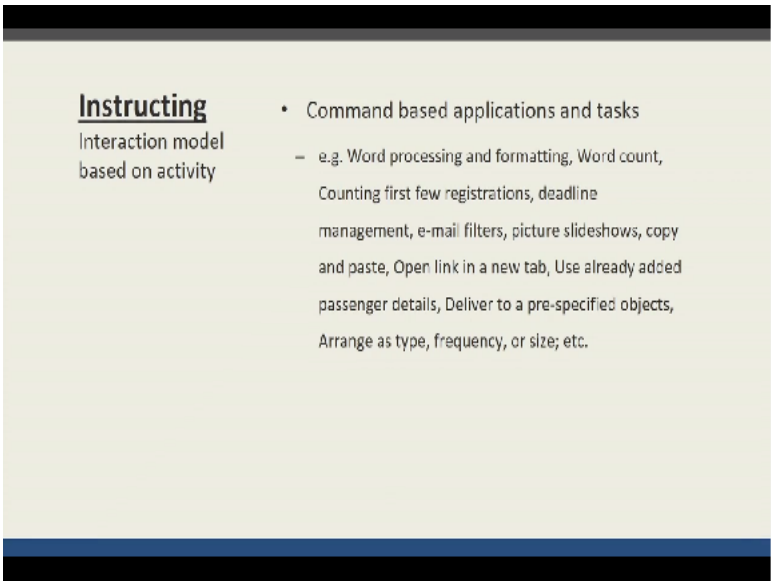

It results in command-based applications and tasks and there are several which are listed on the slide for your convenience. So for example, word processing and formatting, word count, counting first few registrations. Often it happens that you were to reply to a call for registration and first few numbers are either early bird registrations or there is some discount.

So all of these tasks counting first few registrations, deadline management, email filters, pictures, slideshows, copy and paste, open link in a new tab, use already added passenger details, deliver to a pre-specified objects, arrange as type, frequency, or size. You might have done this most of the time on your desktop when you are trying to organize several of those files which are there in your document, folder.

At times, you might have issued instruction to the computer saying you arrange all my files on the basis of the type and the result is that your folders get arranged fast and then followed by your word documents, followed by your text files and followed by your music. So it is one such task where you are instructing the interactive artefact or the computer itself to do that task, to perform that task for you.

So what are the benefits of interaction model which is based on instructing or set of activities which are about issuing instructions to the computer, what are the benefits? We have the following benefits.

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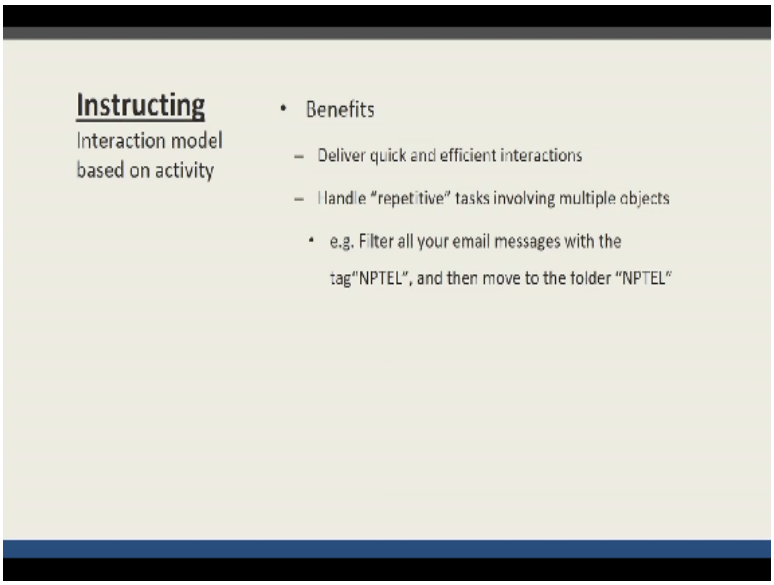

It is known to deliver quick and efficient interactions. You must have noticed yourself that there are often almost non-noticeable occurrences of errors when you are categorizing things or when you are organizing your files by issuing commands to the computer. And it is very important, it is very efficient in terms of handling repetitive task which involves multiple objects. So example could be, filter all your email messages with the tag "NPTEL" and then move to the folder "NPTEL".

You might have been receiving emails from NPTEL and if you were to across all your emails which are like multiple objects, if you were to perform a task like filtering, that comes under the interaction model which is based on an activity like instructing. So what are the pitfalls? Assume

that the task that you are doing is pretty complex. It is not just about one-time organization of so many files.

If you were to issue commands to the computer about a complex task, there would be times when you may get confused and similar things would happen to all other possible user groups as well.

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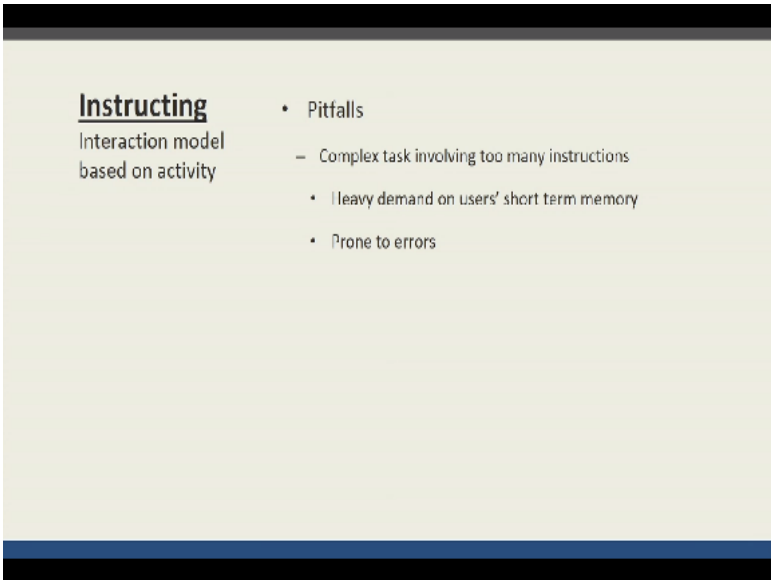

So it puts having demands on user's short-term memory when the task that you are trying to accomplish is complex and involves n number of instructions. Under those conditions, it would put heavy demand on user's short-term memory and in fact, if that is happening, then the entire interaction is prone to errors. Let us consider this by means of an example.

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What you are seeing on your screen is an automatic vending machine which is becoming a common place object these days and if you look at this vending machine, there are so many things that it can dispense. So it can dispense a packet of chips, it can dispense a huge variety of cold-drinks or/and other soft drinks and then you have an entire column almost from the top of the machine towards its bottom that is about the manuals, that is about the different choices that a user can make.

So look at these different choices one after the other. So in the first section, what you have to do that you have to insert a note straight into the opening and there is a variety of notes that you can insert. There is a second point that you have to input or type the number or the code which is corresponding to the item of interest that you want to receive from the vending machine.

Then the third is that if there is any change, you may want to collect the change as well. And the fourth one is pretty redundant in the sense that what it shows is just a visual where a person is consuming the item out of the dispenser. So essentially there are 3 different steps which have to be followed to get access to one of the many items which are kept in the dispenser.

Now even if these dispensers are becoming a common place object, they are pretty hard to use because if you remember this is about telling the computer, do this for me and if you were to issue a number of instructions which are at least 3 in the case of the dispenser, there are chances

when users are either confused or they commit errors. We have another example as well.

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These days if you move across railway stations and metro stations, you would automatic ticket vending machines. Look at the amount of information which is pasted on those machines. Just enormous amount of information and you are supposed to carry out a number of instructions to get a simple ticket out of these machines. So no wonder these machines also stay unused most of the time. The second model which is based on another set of activities is about conversing.

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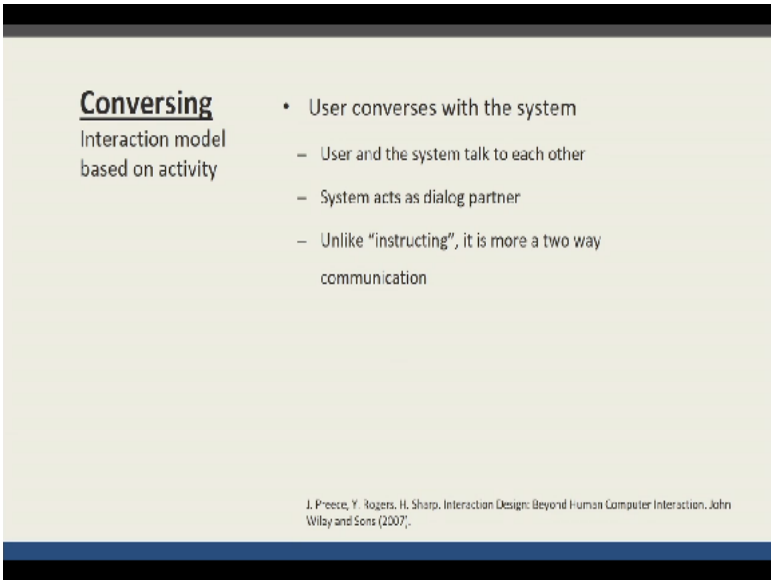

So here the user converses with the system. User and system, they almost talk to each other and system acts as a dialogue partner because its, if they are talking to each other, there is a dialogue

management happening between the system and the user. So system acts as a dialogue partner. Unlike instructing which was the first set of interaction model, it is more a 2-way communication.

Remember when it comes to instructing, you are only issuing instructions to the artefact or to the computer. You are not receiving instructions from the machine. You are receiving feedback of course. That something is happening and this is the time when you need to issue the second instruction but it is pretty much a one-way communication. In case of interaction model which are based on conversing, it becomes a 2-way communication.

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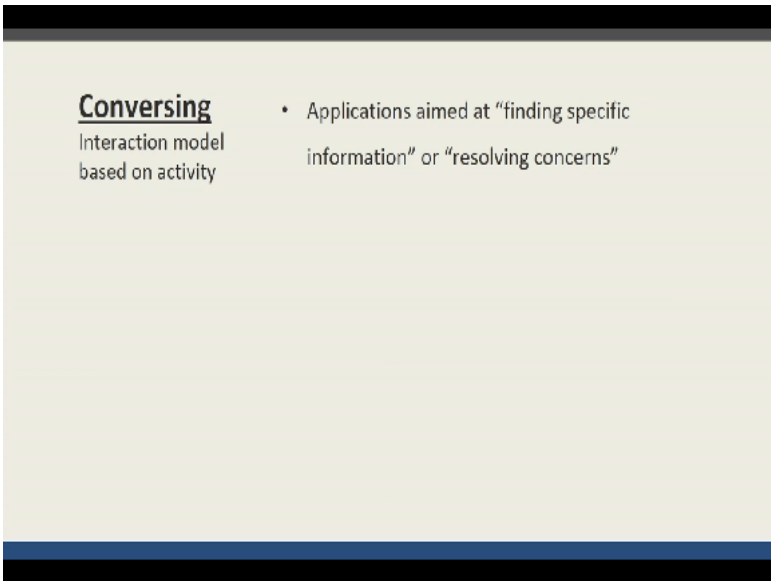

Applications aimed at finding specific information or resolving concerns are mostly the result of such interaction models.

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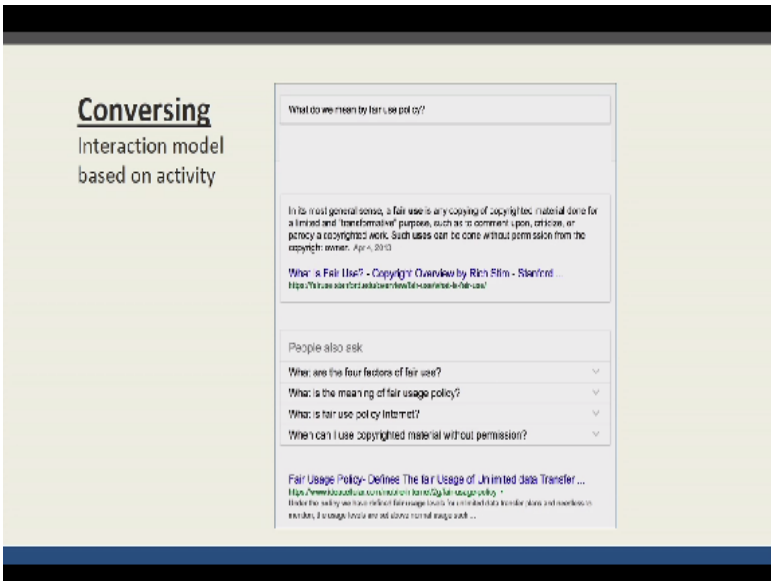

Let me give you an example to help you in this and this interaction model. What you are seeing on your screen is a natural language enabled search engine. Now just look at the language that is being used to know about a particular topic. So what do we mean by fair use policy, it is a question which is asked in simple plain language and it is a, that is why it is a natural language and instead of searching for fair use policy or something like * fair use * policy, you are actually asking the question in a very natural way as you would have asked to any other human being.

So this is a natural language, conversation between the user and the search engine and look at the response from the search engine as well. It is also responding you as if it were a human being. So it says in most general sense, a fair use is any copying of copy right material and so on and so forth. And then it is saying that, you know, people are also asking about these many questions. So it is, if you look at this search result page, it is like a conversation between the user and the search engine and the language of communication is the natural language.

It is how you would have communicated with any human being. So in this particular interaction model, the set of activities that you are performing are around conversation, are around engaging into a dialogue with the computing or interactive artefact. Now there are advantages to these interaction model as well.

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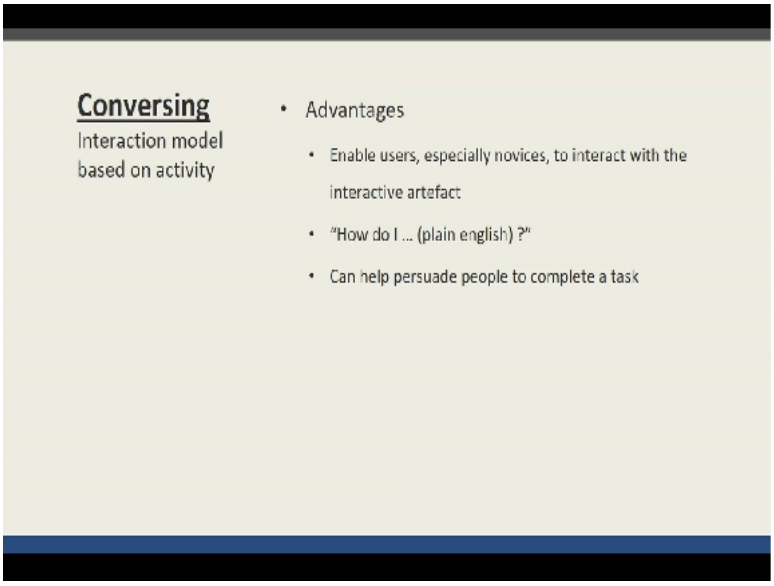

It enables users especially novices. Even kids can ask very simple questions to natural language enabled search engine. So it enables the users, especially novices to interact with the interactive artefact. You need not to be a frequent user nor an expert user. If you are interacting with computers through conversation or interacting with interactive artefacts, let us call it that way, through conversations, so even if you are a novice, you can use an interactive artefact very easily.

And it is a simple plain language. How do I do this? You know, what does it mean? How does this get performed, you know? It is a simple plain language. All the questions that you can raise, you need not to know any special language. You can use the language that you have been using anyways.

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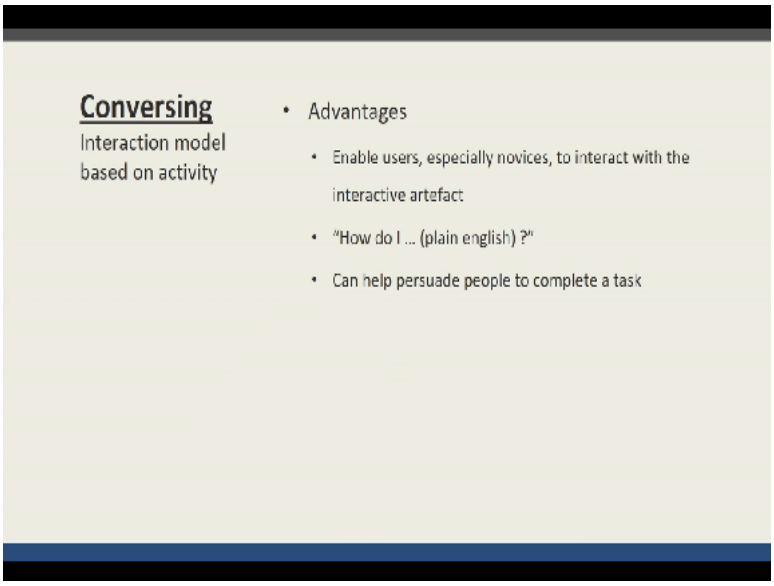

And since it is about the conversation, it can help persuade people to complete a task. Remember the case for novice user. They might not have an understanding of how does the interface work but if the interface can talk to them, then it can persuade them or it can lead them to the successful completion of that task that is what we mean by when we are saying it can help persuade people to complete a task. So there are disadvantages as well.

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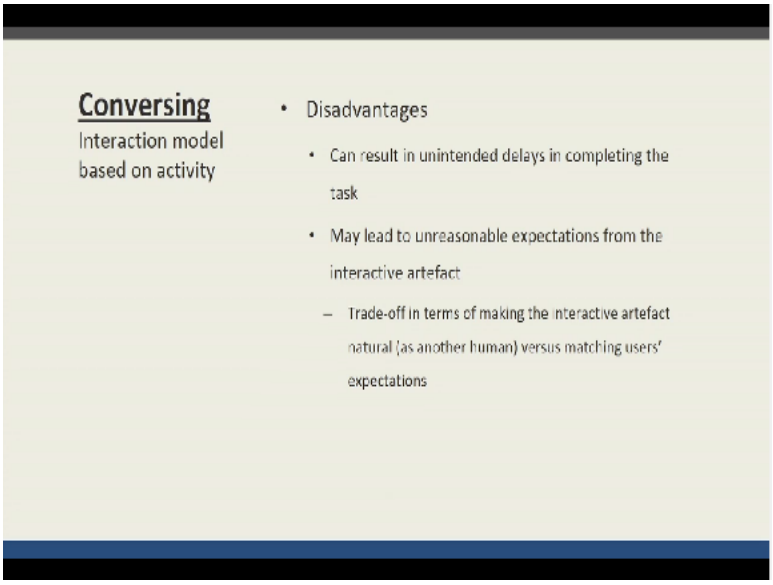

It can result in unintended delays in completing the task. Sometimes the conversation may not go as per the expectation. This happens most of the time when you are engaging in conversation with speech agents or spoken dialogue systems, basically the interfaces which are talking to you. Sometimes that conversation does not lead to any fruitful outcome. So it can result in unintended

delays or cascading errors in completing the task. It may lead to unreasonable expectations from the interactive artefact.

There is a trade-off in terms of making the interactive artefact natural, human like versus matching user's expectation. If you are making a machine or interactive artefact behave like human beings then the users would also have expectations which are very much similar to what they would have real human beings, okay. So that is why there is a chance of mismatch in terms of expectations between the user and the interactive artefact and this is a tradeoff that we all have to balance. Error recovery may be very difficult at times.

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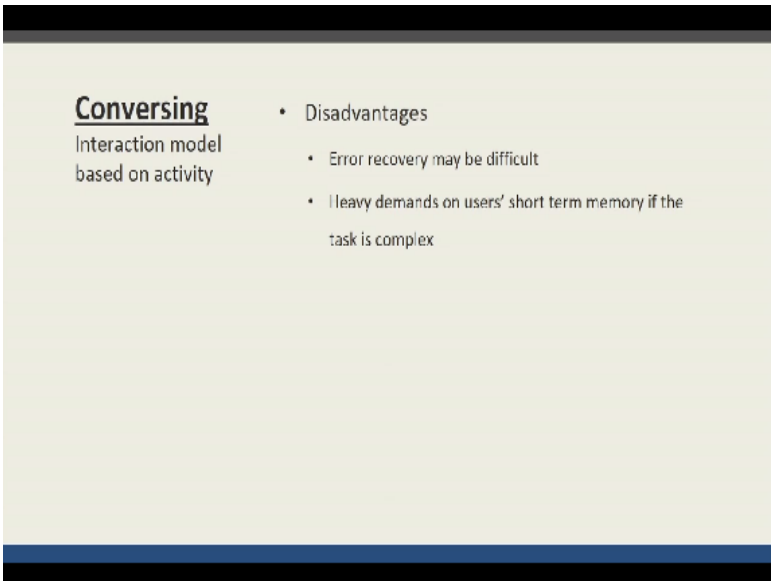

So when you have unintended delays, either the conversation is delayed with no specific direction or users are going to commit errors during their conversation or interaction with the interactive artefact. Heavy demands on user's short-term memory, the task is complex. Again similar thing as in case of interaction models based on instructing and you have to issue either a number of instructions or remember or recall a number of things to complete the task.

There would be heavy demand on user's short-term memory. The third interaction model in this series is based on the activities of manipulation and navigation.

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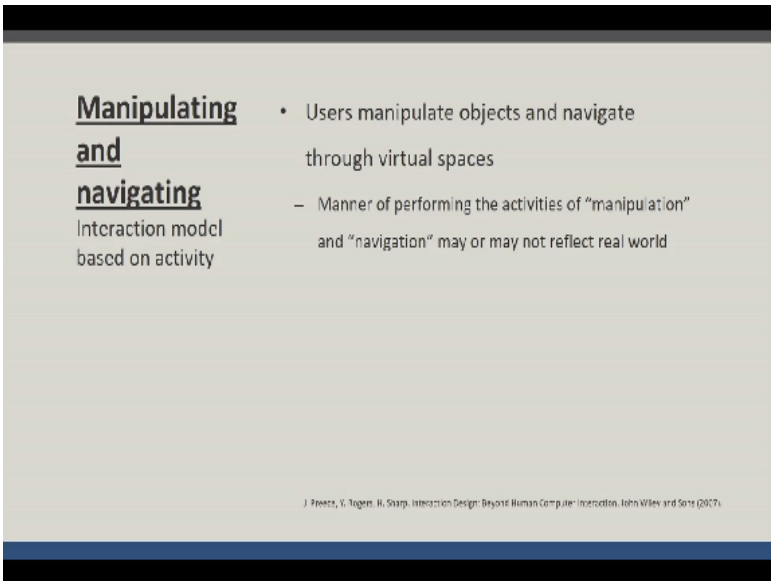

In this interaction model, users manipulate objects and navigate through virtual spaces as designed by the designers. So it is imperative for the designers to understand a very critical point of this interaction model. The manner of performing these activities, what are these activities? Manipulation and navigation, the manner of performing these activities may or may not reflect the real world scenario.

As designers, this is a very critical point which we must be aware of. Let me illustrate this point by means of an example.

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What you are seeing on your screen is a hard product. It is a product from the physical space. It

is an equalizer. Next to it is the graphic equalizer and you can very well see that the designer who has designed this graphic equalizer, the digital equalizer, he has literally transferred all the properties of the physical object from the physical world into the interface design of the graphic equalizer.

And as we are seeing that in this interaction model, I am going to move to the, to the previous slide once again. That the manner of performing these activities of manipulation and navigation may or may not reflect the real world. So in this example where the graphic designer has chosen to design the exact replica of the physical equalizer, the manner of performing the activities of manipulation and navigation.

In this example, it is based on the real world. Let us see the other example. The other example is about when the manner of manipulation and navigation, these 2 activities, the manner in which these 2 activities get performed by the users, that particular behaviour is not real replica from the physical world. So see the next example.

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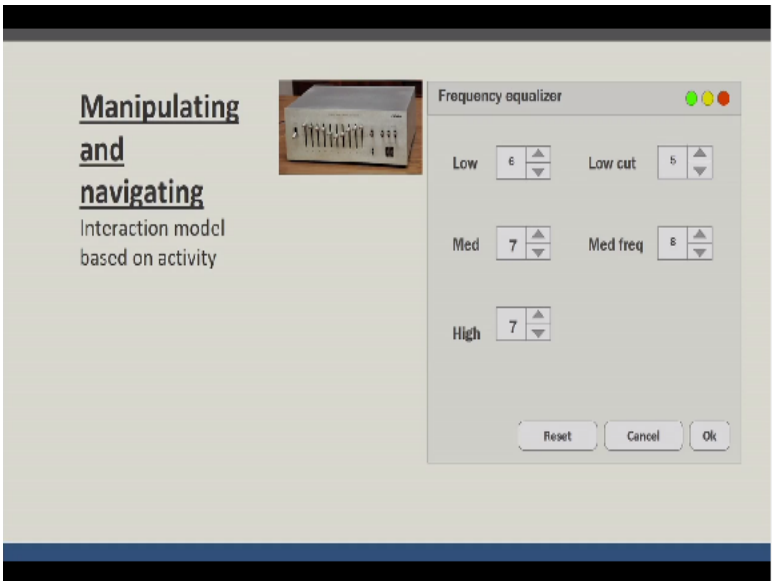

So here once again you have the same graphic equalizer, the hard product from the physical world and the graphic designer instead of choosing to literally reflect the hard product from the physical world, he has done something different. He has given numbers and the numbers can be increased or decreased as well as the users can type this number on to the given space.

And these are the same parameters, same frequencies, low, medium, high, low cut, medium frequency. So these are same parameters but there are 2 different ways of designing it and how these 2 designs differ? Because in one design, you have an exact replica from the physical world while in other design, you have a modified version from the physical world product.

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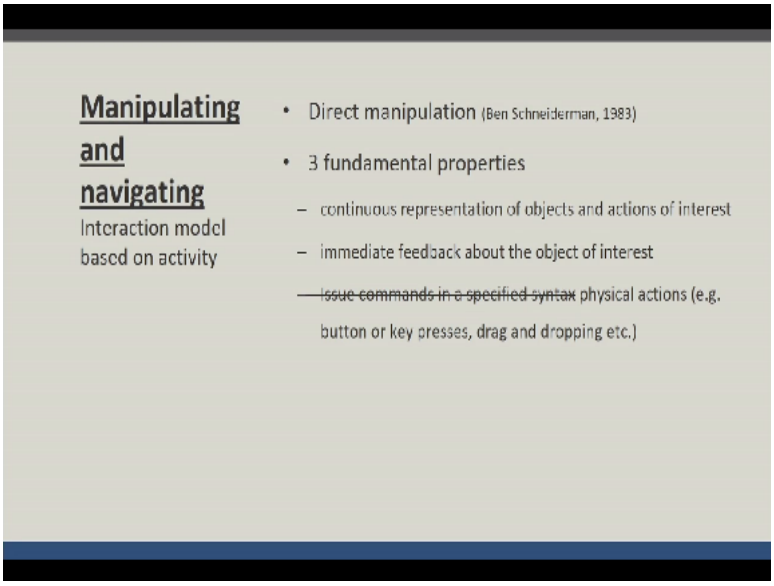

One of the very interesting interaction model is direct manipulation model. It was given by Ben Schneiderman in 1983 and it has fundamental 3 properties. What are those properties? So continuous representation of objects and actions of interest. So you have a continuous representation of objects. They are visually present before you unless as a user you dismiss them, okay.

So the screen does not change unless you decide that the screen should change. So the continuous representation of objects and actions of interest that is exercised by the designers in direct manipulation interaction model. And there is an immediate feedback about the object of interest. So whatever a user does on the screen, there is an immediate feedback to his actions.

Also the users are performing these actions not by issuing commands in a particular syntax as you would have seen in command line interfaces, you are required to issue commands by typing them in a certain syntax, that is not happening here. What is happening here? That you are, as a

user, doing physical action. So for example, these physical actions are performed in terms of button or key presses, you know, drag and drop, cut and copy.

So you are doing physical actions. You are not really writing commands in a particular syntax. So these are the 3 fundamental properties of direct manipulation interaction model which is given by Ben Schneiderman in 1983. Now there are advantages that Schneiderman is proposing.

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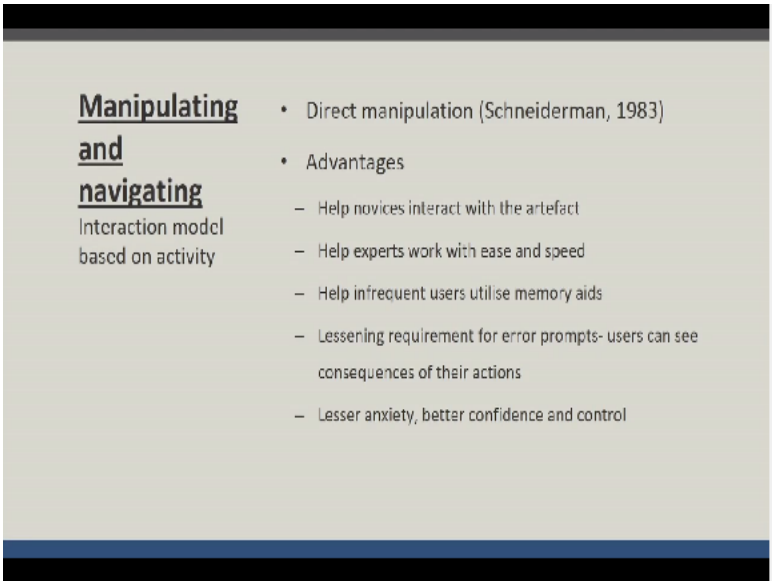

It helps novice users interact with the artefact. When you are borrowing some inspiration from the physical world, novice users were new to the machine or who are new to the interactive artefact, it brings familiarity. So they find it easy to interact with the interactive artefact. It also helps experts work with ease and speed. So these are the 2 different extremes when it comes to user groups.

You have user groups which are about novices and then you would help, and then you have user group which are of experts. So an interactive artefact as an interaction designer, one must try to strike a right balance across this scale of expertise. Your interactive artefact should be easy for the novice users to learn and to master. It should also give shortcuts enough affordance to expert users, enough alternate ways to expert users so that they can perform their task easily and with dexterity.

Now it should also help infrequent users utilize memory aids. So these are the 3 different advantages in direct manipulation interaction model. The fourth one is that it lessens requirements of error prompts. Users can see consequences of their actions. So whatever you are doing, it is happening in front of you. You are visually noticing every possible action that you are performing on to objects and different enteritis on the screen.

And since you can see that, you can see the consequences of those actions, there is a less requirement to bring before you prompt and dialogue boxes, okay. So that is also one of the advantages of direct manipulation interaction model. When all of these things are happening, the fifth advantage is that users are performing their activity is using this interaction model with lesser anxiety, with more confidence and control. So these are the 5 different advantages proposed by Ben Schneiderman.

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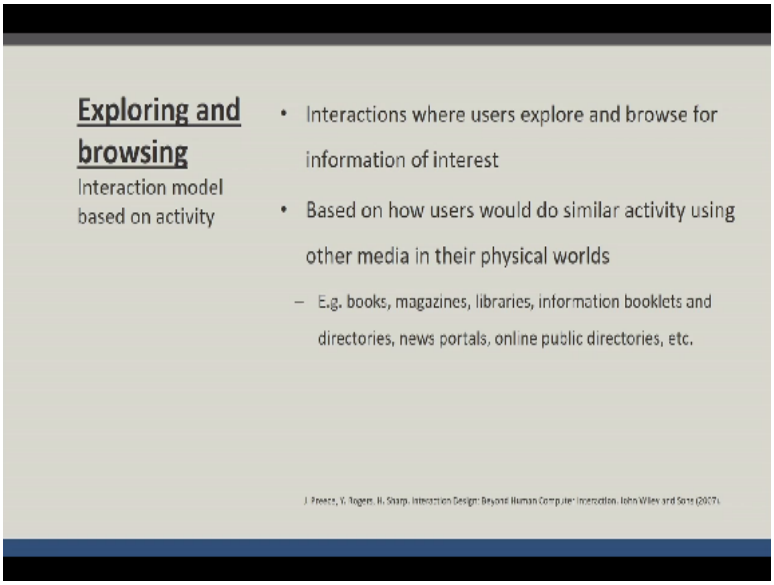

The fourth interaction model is based on the activities around exploring and browsing information. Many a times there are interfaces which lets you just explore and browse for an information of interest. There are several examples of these interfaces. If you were looking for books, magazines, libraries, information booklets, directories, news portals, online public directories, job directories, a lot of these, the basic activities that you are performing as a user are browsing and exploring an information of interest.

So based on how users would do, singular activity using other media in their physical world. So there is an attempt to draw analogies by looking at entities in the physical world as we are moving across the interaction models. This is something which I am sure you can observe right from model 1 which was based on instructing to model 2 which was based on conversing, then on manipulating and navigating to this model on browsing and exploring.

There is an attempt to start drawing analogies from entities and different objects in the physical world. So while you are trying to design an interface which is around letting people find information, there is a need to kind of also look at how they would have done it otherwise in their physical worlds.

So you must draw inferences or you must draw this inspiration from physical world when you are designing interactions which are around browsing and exploring information of interest. And when there is a lot of information, it becomes necessary to start categorizing that information. So there is a lot of emphasis which has to be paid while designing interactions in this interaction model.

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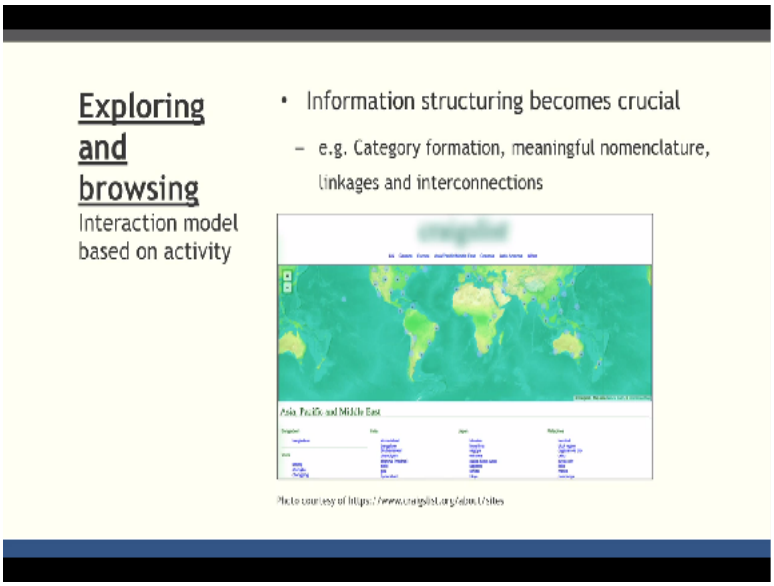

As you can see on your screen, there are several of these information portals and directories where there is an explicit mention of categories of different content types and then it becomes easier for the users to find a specific information of interest. So in this interaction model, one of

the major activities that an interaction designer needs to perform is information restructuring and organizing, okay. We also call it information architecture.

Categorizing information, meaningful nomenclature, linkages and interconnection across different data points is a very explicit exercise needs to be performed.

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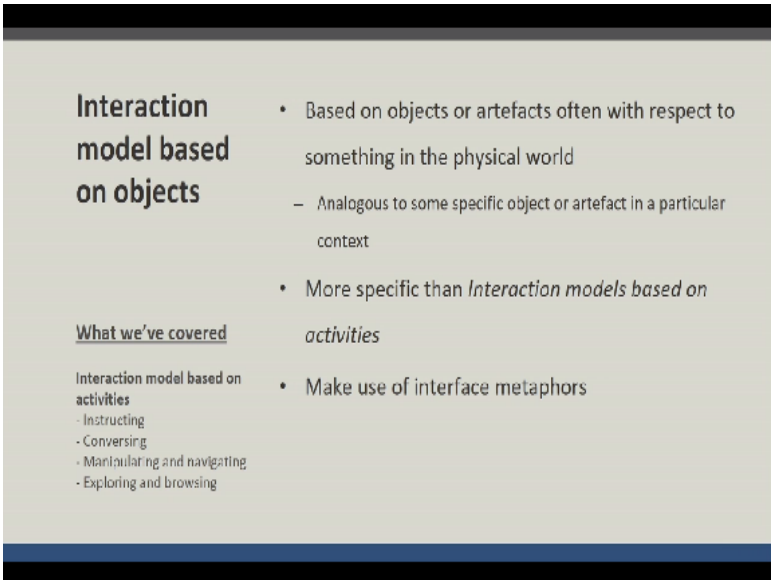

Now we are moving into the second category of interaction model which is based on objects. So in this particular interaction model, the interactions are based on objects or artefacts, often with respect to something in the physical world. Remember what I have just said in the earlier slide that when you move across these interaction models, there is an increasing attempt to look at the physical world, to draw analogies from the physical world. And now we have the interaction model which itself is based on objects from the physical world.

So it is based on objects or artefacts often with respect to something in the physical world. It is analogous to some specific object or artefact in a particular context. We would soon see few examples which would help us understand these 2 lines. Analogous to some specific object or artefact in a particular context. We would soon see example to understand that. It is more specific than interaction models which are based on activities and it makes use of something very interesting which is interface metaphors.

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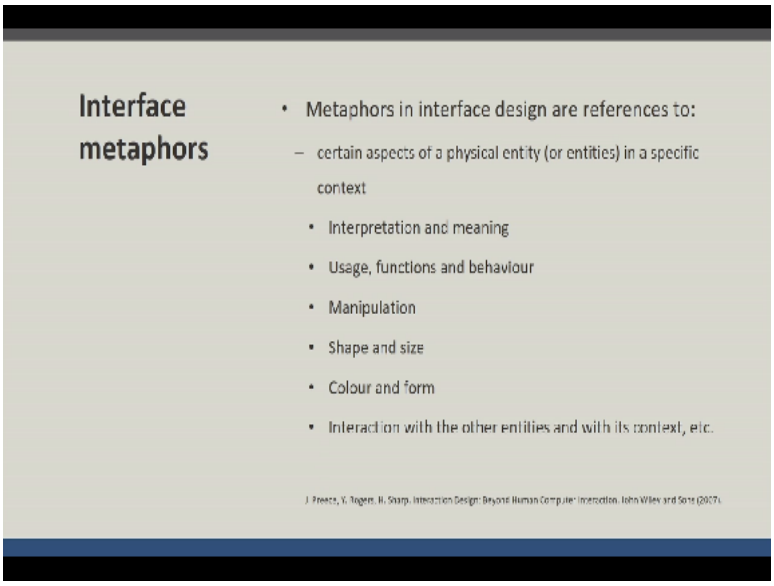

Now let us see what are interface metaphors, it would help us understand this interaction model which is based on objects. So first let us go through interface metaphors. Metaphors in interface design are references to certain aspects of a physical entity or entities in a specific context, okay. Interpretation and meaning. You know these aspects could be how that physical entity is getting interpreted by different people in the environment.

So it is interpretation and meaning, its usage function and behaviour. How people are manipulating that? So it is manipulation. How does it look? You know, what is its shape and what is its size? And interaction with other entities and with its context. So there are so many of these aspects of physical entities in a specific context, in their environment of usage and deployment, that needs to be considered when it comes to interface metaphors.

So interface metaphors once again are references to certain aspects of a physical entity or entities in a specific context. These aspects could be interpretation and meaning, usage, functions and behaviour, manipulation, shape and size, colour and form, interaction with the other entities and with its context. So we are interested in knowing how people make sense of, how do they interpret certain entities or set of entities in their physical environments? Let us see this example to know this point.

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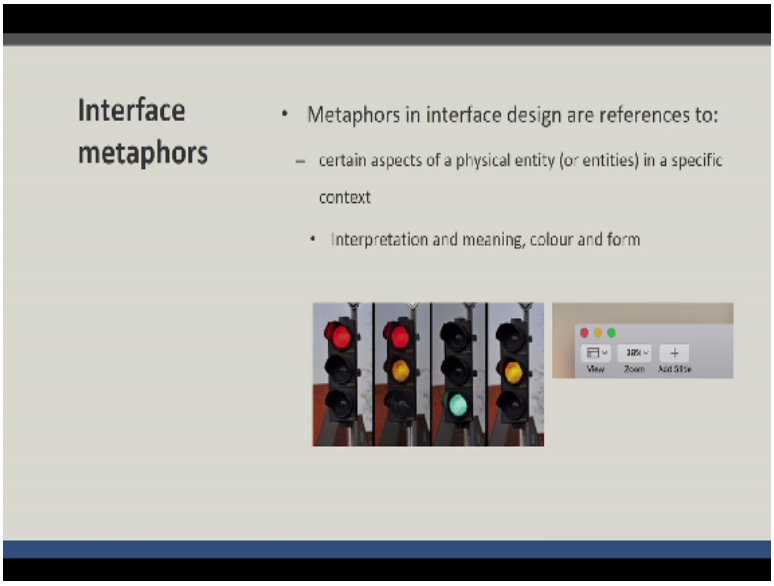

And their colour and form, may be the other aspect of such entities. So we all have seen these 3 traffic signals. They have 3 different colours, red, yellow and green. And all these 3 different colours suggest a different meaning altogether. Red colour in particular suggest you to halt. Yellow colour in particular says that you are ready to go. While the green colour suggest you that now it is your time to go.

It is your turn to go. So all of these 3 colours have a different meaning and have a different suggestion to their users. Now you might have seen that in interface design also, we use these 3 different colours for different reasons. So the image next to the signals is the image that is captured from an interface design. Here also you see the red button is meant for a message like that you are closing or you are doing something which has to be done with enough care because you might lose your data.

Just like if you pass a signal with red sign on, you need to be very very careful because it could be lethal. In the same way, the red colour in interface design is meant to suggest that once you are exercising this button, you would lose your data if not saved. You are doing something which is critical to the functioning of the interface. So red button or red colour is being interpreted in that sense.

Then comes the yellow and then comes the green. They all have different meanings. They all

have different level of criticality when it comes to actions that you are performing in the interface. So you see that here we are borrowing, as interface designers, we are borrowing the metaphor of traffic signal and applying that metaphor into the interface design. Now comes the another aspect which is about usage functions and behaviour.

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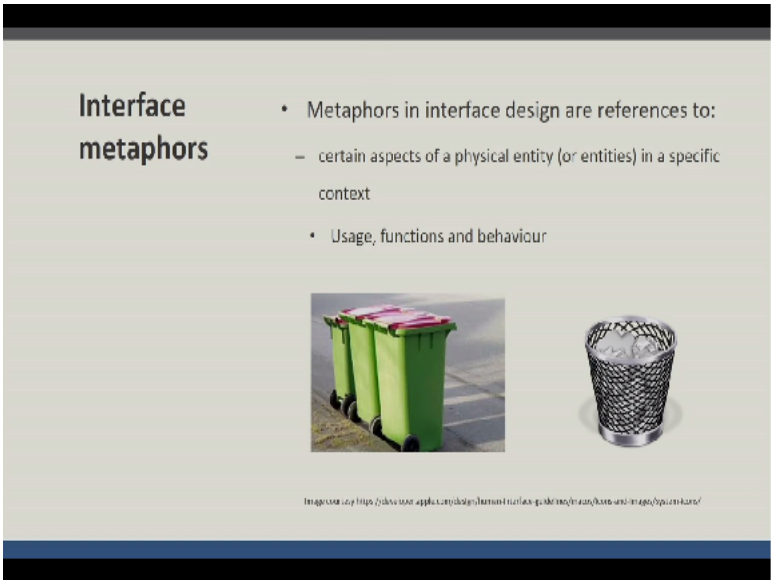

We all have seen the use, function and behaviour of something like a trash can. It is meant to collect trash and it is meant for its disposal and recycling. So in the same way, if you borrow this metaphor into interface design, you create something like a trashcan which is a normal feature in all the interfaces, something like a recycle bin or, or a trashcan and even it goes to the extent that you end up using the same nomenclature as well.

So if you were to borrow this metaphor into interface design, you create something like recycle bin or trash bin. So this is also one example where the metaphor of trash can from the physical world is getting translated into something like recycle bin or trash can in the virtual world or in the interface design.

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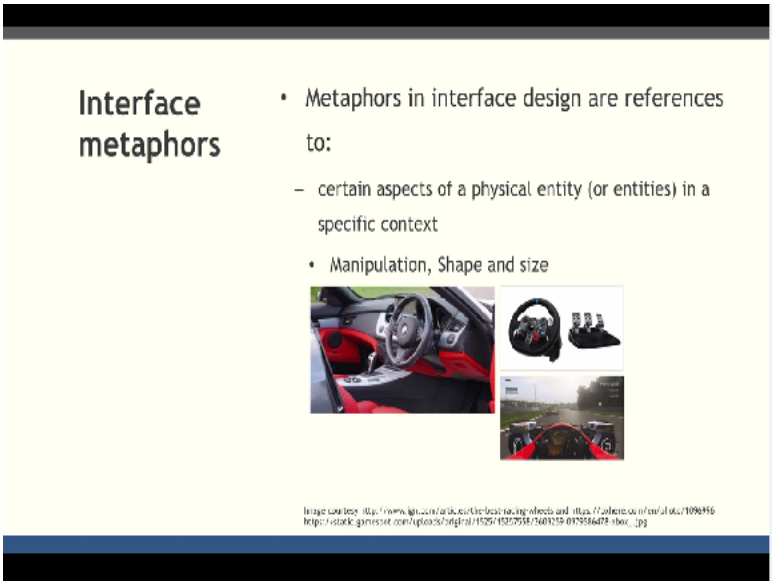

When it comes to manipulation, shape and size of the physical entity or set of entities in their physical world, gaming per se has adopted it literally in many essences. So for example, what you see on your screen is a console, is a car dashboard where you have steering wheel and other controls that would be helpful to drive the car.

In the same way, if you were to transfer this knowledge of physical world of something like dashboard into interface design, you end up creating something like gaming consoles for different racing games and they look exactly, literally the same as their physical counterparts. So here, the metaphor of a dashboard, of a car dashboard is brought back into the interface design quite literally.

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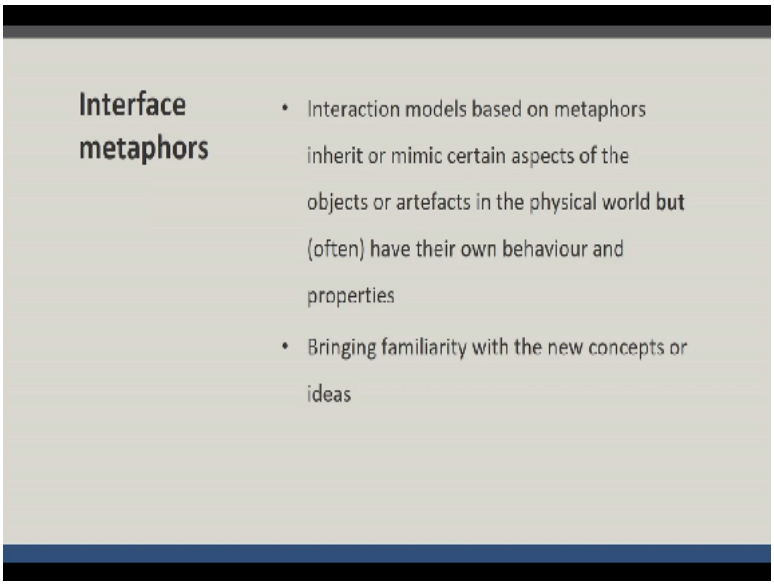

So interaction models based on metaphors inherit or mimic certain aspects of the objects or artefacts in the physical world. But often have their own behaviour and properties. They help bringing familiarity with the new interface or new concepts. Let us look at the examples once again. The familiarity of a traffic signal is brought back into interface design as 3 different colours suggesting 3 different messages.

The familiarity of something like trashcan in terms of usage, functions and behaviour is brought back into interface design in the form of a trashcan or recycle bin. Another familiarity of a car dashboard in terms of how you are going to manipulate it, what are its shape and size, what are the proportions, is brought back into interface design in terms of gaming console. So that is why we are saying that interaction models which are based on interface metaphors, they help bring familiarity with the new concepts and ideas.

And they are, definitely, they are either mimicking certain aspects of entities from the physical world but something that we need to be aware of that often they have their own behaviour and properties. Interface metaphors are extensively utilized in interface design, okay. So be it scroll bar, toolbar, setting, something like desktop, windows, files and folders, a nomenclature like internet highway, numbers, you know accordion menu, cut and paste, drag and drop, calendar, so much of utilization.

I mean, enormous utilization of metaphors in interface design. What does it essentially do, as designer, it helps us to conceptualize interactions with the interactive artefact. As users, it helps us to make sense of new concepts and ideas. It helps us to articulate and describe different activities that we have performed with the interactive artefact. So it enables a way of describing computing artefact and nomenclature for describing activities that is very very important.

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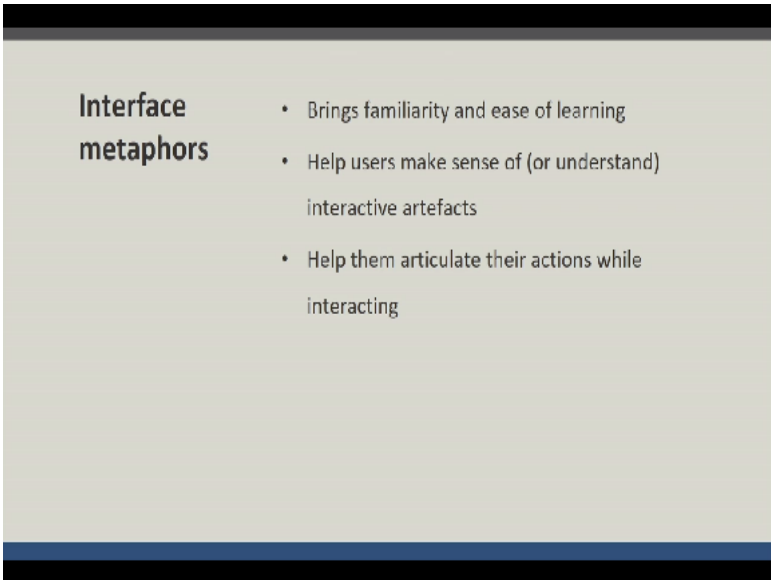

Brings familiarity and ease of learning, something that we had already understood. It helps user make sense or understand an interactive artefact, help them articulate their actions while they interact.

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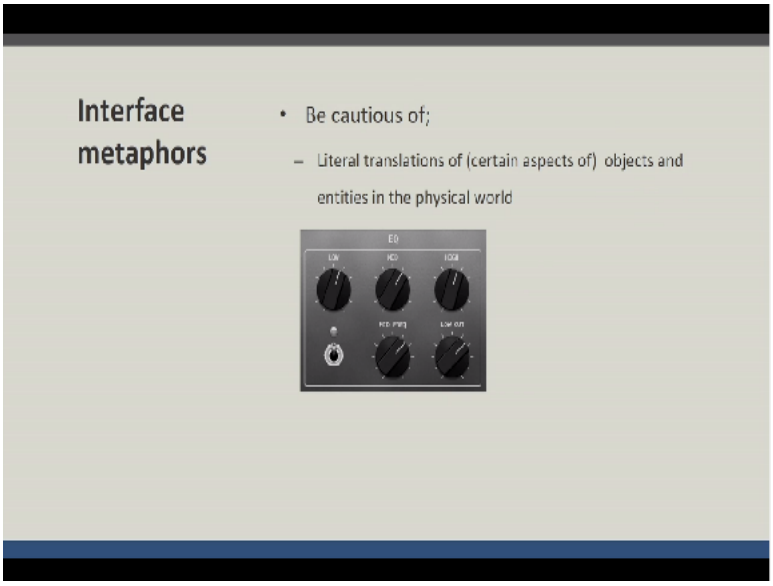

Now there is something that we need to be aware of as interaction designers. Interface metaphors seems a very interesting topic and you already know that it is so widely utilized in the interface design but as interaction designer, there are few points of caution that I would like to detail. The first one is decide whether you want to literally translate either the entities or their aspects from the physical world.

Whether that literal translation is really required. Something that you see on your screen is not hard product. It is an interface of some kind of a equalizer where you have knobs which you can, knobs and dials which you can turn and which you can turn clockwise to increase the value, turn anticlockwise to decrease the value. There is a switch just like the switch in the physical world. If it goes down, you are making it on. If it goes up, you are making it off.

So you have to decide as a designer, how literally do you want to translate aspect of entities or objects from the physical world.

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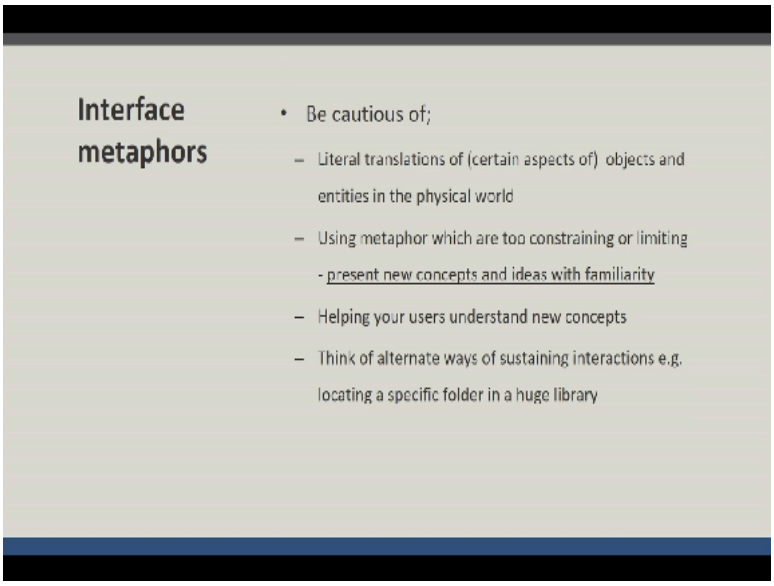

You also need to see that once you are designing interaction models based on metaphor, are they becoming too constraining or limiting. So for example, are they going to present new concept and ideas with familiarity. That is where this slide is very very important. Let me show you once again. Interaction models based on metaphors inherit or mimic certain aspects of the objects or artefacts in the physical world that is something that we begin with and understood that yes,

there is an analogy which is drawn from the physical world.

See the other point. That they often have their own behaviour and properties. So that is why there is a word of caution for interaction designers that even if you are using metaphors in your interface design, you need to be very much aware of the fact that a good metaphor when used enables not only familiarity but also enables learning of new concepts. So it should not just end up being too constraining or limiting, it helps your user understand new concept.

It is very important that you make sure that you have enough affordance, you have enough alternate way. You also need to be cautious of making sure that by using interface, you are helping your users understand new concepts and you need to think of alternate ways of sustaining interactions. So for example, it is very interesting, let me explain you it for the. You are drawing analogies from the physical world and you are bringing them into the virtual space of an interface.

Something like folders and files, their analogies from folders and files in the physical world. Now it might happen that you may be required to find a specific file out of a sea of files on your desktop. So you would end up frustrating your user. So you need to provide alternate ways. So not just use of interface metaphor, not just use of interaction models which are based on metaphor, you have to also imagine and enable alternate ways.

Because at times the anxiety that user may have with hundreds of files in their physical world, they might carry the same anxiety when they are dealing with so many files in their virtual world. So that is why you need to have alternate ways to enable or sustain interactions even if you are using interface metaphors. So that brings us summary of today's session on interaction models.

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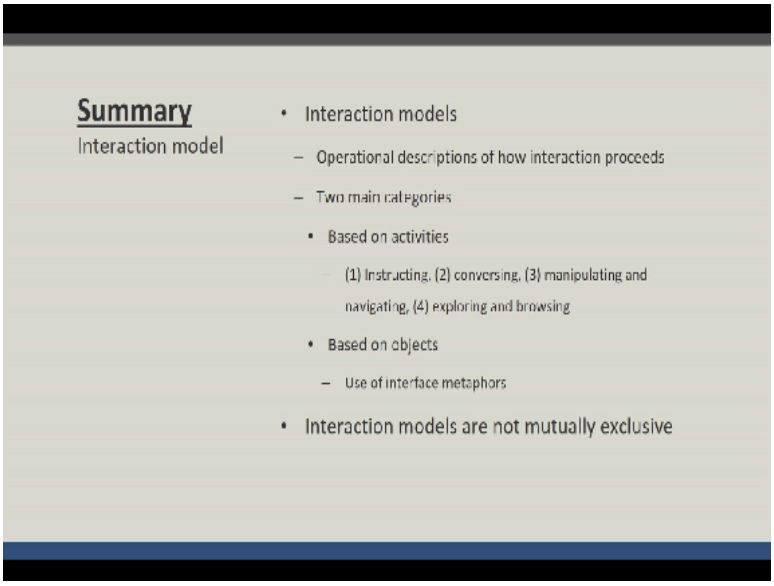

Interaction models are operational descriptions of how interaction proceeds. There are 2 main categories which we had seen. The one based on activities, the first one instructing. Second one, conversing. Third one, manipulating and navigating. And fourth one, exploring and browsing. Then the second category is interaction models based on objects and there is an extensive use of interface metaphors in these models.

There is one important point which I would like to leave you with that when you are thinking about interaction models, they essentially serve one purpose that they help you conceptualize interactions with the proposed interactive product, okay. So you might be wondering, you know, whether I should use this interaction model or that one?

Whether I should use instructing or conversing? Whether I should use manipulation or navigation or browsing and exploring? It is here that we need to understand that interaction models are not mutually exclusive. In the same interactive artefact, you may be required to use 2 or 3 different interaction models depending on user needs, requirements and goals. Thank you.