Introduction to Cognitive Psychology
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Lecture – 18
Introducing Concepts and Categories- 02

Hello friends, welcome back to this section on concepts and categories. We will continue this section from the earlier one by revising some of the things that we did in the earlier section of concepts and categories. So, the things that we studied in the section on concepts and categories, was we looked at what is a concept and what is a category.

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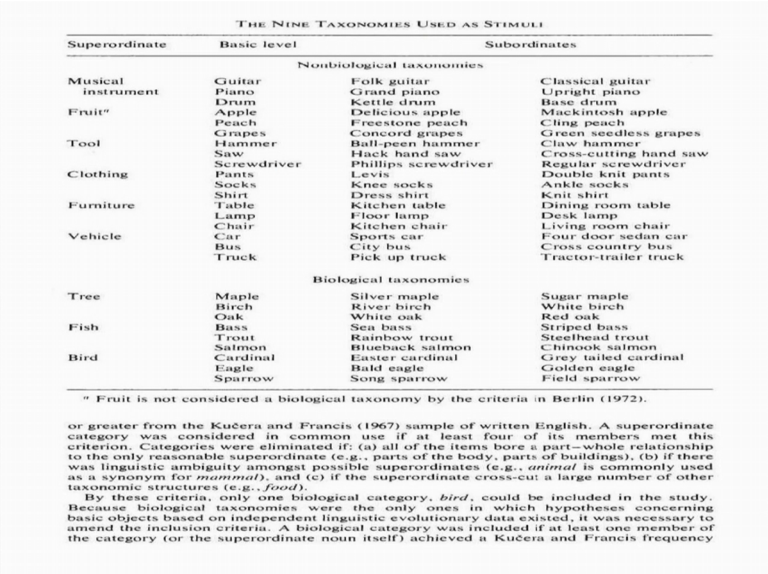

THE NINE TAXONOMIES USED AS STIMULI

Superordinate	Basic level	Subordinates	
		Nonbiological taxonomies	
Musical instrument	Guitar	Folk guitar	Classical guitar
	Piano	Grand piano	Upright piano
	Drum	Kettle drum	Base drum
Fruit*	Apple	Delicious apple	Mackintosh apple
	Peach	Freestone peach	Cling peach
	Grapes	Concord grapes	Green seedless grapes
Tool	Hammer	Ball-peen hammer	Claw hammer
	Saw	Hack hand saw	Cross-cutting hand saw
	Screwdriver	Phillips screwdriver	Regular screwdriver
Clothing	Pants	Levis	Double knit pants
	Socks	Knee socks	Ankle socks
	Shirt	Dress shirt	Knit shirt
Furniture	Table	Kitchen table	Dining room table
	Lamp	Floor lamp	Desk lamp
	Chair	Kitchen chair	Living room chair
Vehicle	Car	Sports car	Four door sedan car
	Bus	City bus	Cross country bus
	Truck	Pick up truck	Tractor-trailer truck
		Biological taxonomies	
Tree	Maple	Silver maple	Sugar maple
	Birch	River birch	White birch
	Oak	White oak	Red oak
Fish	Bass	Sea bass	Striped bass
	Trout	Rainbow trout	Steelhead trout
	Salmon	Blueback salmon	Chinook salmon
Bird	Cardinal	Easter cardinal	Grey tailed cardinal
	Eagle	Bald eagle	Golden eagle
	Sparrow	Song sparrow	Field sparrow

* Fruit is not considered a biological taxonomy by the criteria in Berlin (1972).

or greater from the Kučera and Francis (1967) sample of written English. A superordinate category was considered in common use if at least four of its members met this criterion. Categories were eliminated if: (a) all of the items bore a part–whole relationship to the only reasonable superordinate (e.g., parts of the body, parts of buildings), (b) if there was linguistic ambiguity amongst possible superordinates (e.g., *animal* is commonly used as a synonym for *mammal*), and (c) if the superordinate cross-cut a large number of other taxonomic structures (e.g., *food*).

By these criteria, only one biological category, *bird*, could be included in the study. Because biological taxonomies were the only ones in which hypotheses concerning basic objects based on independent linguistic evolutionary data existed, it was necessary to amend the inclusion criteria. A biological category was included if at least one member of the category (or the superordinate noun itself) achieved a Kučera and Francis frequency

And how does this concepts and categories really work and so, the basic definition that we looked there is concepts are kind of mental buckets, where you filling things where you filling items, instances or events and categories are basically a process of organising knowledge into this bins which are called concepts. We also looked at concepts as nodes which was explained in terms of the semantic idea or semantic memory idea or the hierarchical model of semantic memory.

So, basically then forming a concept allows us to ease out and form in organisation scheme for world knowledge, and categorisation is the process where we take in a new instance and go ahead and fill it into buckets; mental buckets, which have at the top level

or which are described through the concepts. So, basically the bucket is described through the concept and categorisation is a process of filling up this bucket.

Now, we also looked at some of the models of categorisation in the last class and so, one of the model was the classical approach to concept formation, where we looked at something called the necessary and sufficient condition, and what that concept said or what that model said is that there is something called the necessary and sufficient condition which every instance of a concept or a particular; mental bucket should have to be categorised as a concept.

And so, there were critics to it one of the famous critic being that this necessary and sufficient condition is not always validated, and the idea of cognitive economy which says that looking at every instance or looking at every a idea of necessary and sufficient feature in in particular in all instance will not be enough.

We also looked at the prototype view and the exemplar view; where in the prototype view we looked at how a prototype is formed and how this prototype helps us in categorisation and we saw that the prototype views scores on to the classical approach of categorisation on several aspects. And what is a prototype then so, it is basically an idealized a version of the concept and so, the idea is that the prototype may or may not be an actual instance, but it has mental averages or mental summaries of all instances which belong into that particular category or under that concept.

Similarly, we looked at also called the exemplar approach, where we looked at how exemplars of a prototype are basically used for categorisation, and we looked at that there is something called basic level of categorisation or basic level of organisation above which there is a super ordinate level, and below which there is a sub ordinate level.

And looking at the taxonomy or looking at the example here the basic level here is the one out of which the concept is formed. For example, in the first case at the musical instrument is the super ordinate node or a higher node, the basic level is the guitar and within the guitar the sub ordinate node is the classical guitar or some other form of folk guitar or classical guitar.

So, basically then what the exemplar view said or a basically suggest is that there is a basic level of categorisation, and from this basic level of categorisation you have a higher level categorisation or a higher level node and a lower level node. So, this is basically a summary of what we did into the last class.

Now, let us continuing with what we looked at the theories of a concept and categorisation; let us look at the next theory of categorisation. And so, the next view which explains what categorisation is done how categorisation is done and how concepts are formed is the schemata view?

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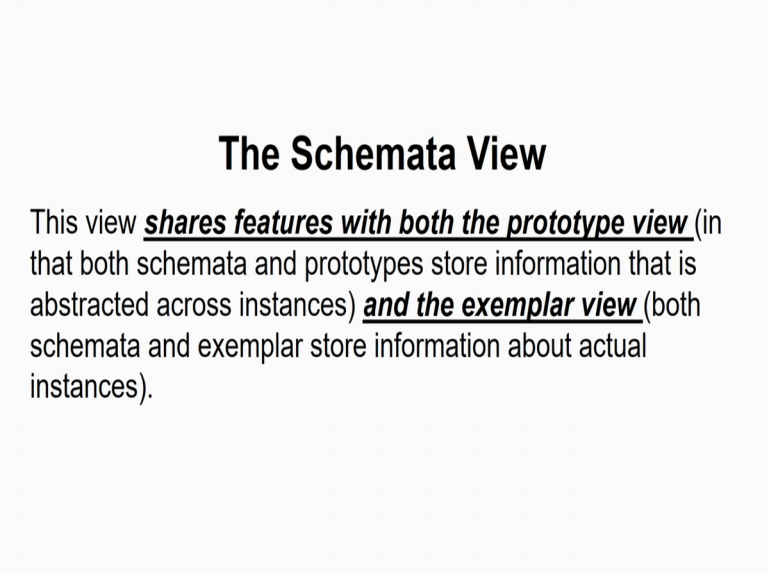

And what does this view says. So, this view says that it shares features from both the prototype view in that the schemata and prototype store information that is abstract across instances, and the exemplar view that the schemata are examples of store information about the actual instance. So, what does I mean by this, what do I mean by this. So, basically what it says is that this view the schemata view is actually a mixed view and so, it borrows the good parts it borrows features from both the prototype view as well as the exemplar view.

And so, how is this schemata view the idea of schemata view similar to the prototype view basically it is similar because in both the schemata and prototype the information are abstracted across instances. So, basically what happens is schemata says that the schemata view is similar to the prototype view because here forming a concept or

forming the way of categorization is done through looking at an abstraction. And this abstraction is generated across instances. So, looking at the mental summary or mental averages and how does it come close to the exemplar view. So, basically what it does is that whenever we are doing this categorization or whenever we are looking at this mental average, this mental average has at the end of it or has at the top node of it the in example of the category.

So, basically all in all the schemata view is a mixture of both the views or the prototype and the exemplar view and so, it says that we in the schemata view, it is suggested that the categorization happens through a abstractions or prototypes, which are made from or which are generated from a number of instances looking at a number of instances and these are mental summaries and also this average or abstraction that we are looking at is an actual instance, which basically means that.

As the prototype view says that the prototype may not be an actual instance, but the schemata view says that the prototype that we are forming the abstraction that we are forming or the one definition the one form across which we are categorizing actually exist, which means that it is an actual example of it and this is how it is close to the exemplar view.

So, we seen the idea of what is a schemata and what is a script in our chapter on memory, and so, there we saw the schemata is basically a way of looking at or organizing knowledge organizing world knowledge and. So, schemas are basically kind of organization scheme, under which world knowledge is fitted whereas, script is basically a routine for a particular schema or a particular schemata.

So, this idea of categorization then uses the idea that people make mental schemas or people make this mental bins or basically mental bare bone structures on basis on which this categorization is done, and how is this bare bone structure really made. So, it is made in terms of abstractions, it is made from abstractions of various incidences of the concept and these prototype that is made or these bare bone structure, which is made has an actual existence on to it and so, this is how the schemata view differs from both the views that have been we have studied up till now.

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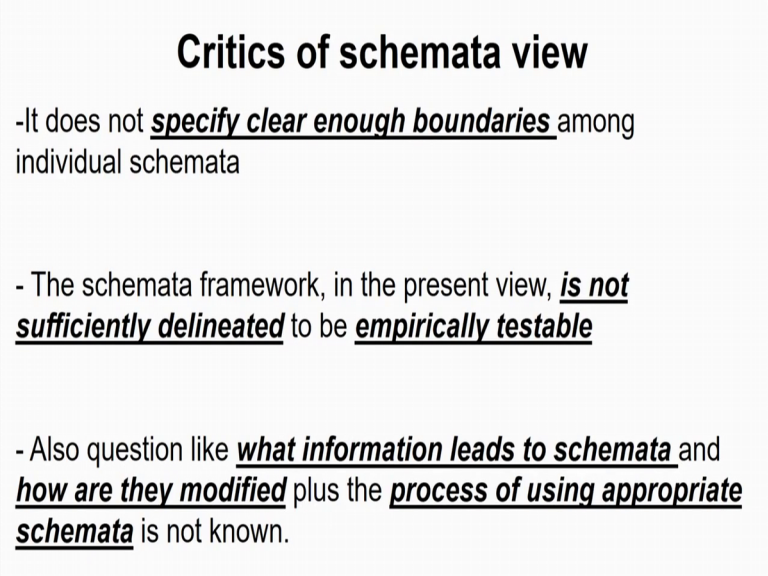

Now, the thing is that schematas are frameworks of knowledge that has rows slots and variables on to it. So, basically it has the schemata that the bare bone that we are talking, it not only has spaces for categorization bit it also tells you how the categorization is done or basically how what are the slots for categorization, what are the variables, which decide how the categorization is done and the various rows that each factor play in categorization. So, that is what a schemata is all about and in the schemata view the categorization is done through something called a hierarchy structure.

So, as in a prototype you see that the some factors or some features have a higher role or a higher similarity and the other feature features do not have a similarity. So, similarly based on how similar items are a hierarchy of closeness to the actual concept or closeness to the actual prototype is done, and this is how the schemata view really works. Now there are several problems with the schemata view, which is there in the first stage that it does not clearly specify the boundaries among various schematas. So, as we saw the schematas are actually bare bone or they are actually structures on which items are categorized into. So, and these structures are developed or these bare bones are developed through an idealized representation or through looking at various instances of what of a particular object or particular type of event which exist.

Now, if that is true then how does two schemata differ or what is the difference between what is the clear boundary between two schemata is not actually very clear. And so, this

clear cut boundaries is does not exist or is not specified by the schemata view. We always have fuzzy boundaries for example, what would happen is that if an item is classified in particular schemata it could also be classified under some other schemata and. So, what would have happen is the dog, if it is classified under the schema of an animal it also gets a categorised into the pet animal or a mens best friend and. So, there are no clear cut boundaries of how this categorization or what is the distinction or what is the boundary line between difference schemata.

Now the other problem is this schemata view is a in the present view is not sufficiently delineated to be empirical testing. So, if we do not have clear cut boundaries, if we do not have were a schemata view begins and bare it ends, if we do not know that then we cannot go ahead and do empirical testing to this idea. Because since we do not know where the schema starts and where it ends and what is the boundaries between two schemas empirical testing, observable testing cannot be done and so, that is another problem with it since we do not know the boundary. So, we cannot define the boundary conditions if we cannot define the boundary conditions, then data cannot be collected and so, they cannot be tested.

Now, also questions like what information leads to schemata, and how they are modified plus the process of using appropriate schematas are not known. So, how was this schema form first of all, what leads to the formation of a schema or what kind of information are gathered before the formation of a schema that is not very clearer. So, what kind of a information get amalgamated and makes the schema is not clear and also if a schema is made and an instance comes in or a event comes in which does not fit the schema how is the present schema modified.

For example, let us lake the example of a dog now the idea is that most dogs are lovable creature and. So, supposedly we have a dog and so, we have a schema of a dog the schema of a dog a schemata for dog is it has four legs it barks it is a pet animal and so on and so forth. Now there comes the dog which actually goes ahead and bites someone, and so, this dog is not no more lovable although it has a characteristics of the particular schema or a particular categorization. So, how do we fit this dog into it or a temperamental dog for that example let us take a chiwawa, which is a very very temperamental dog now how do I fit a chiwawa into the idea of the dodgiest dog that is there pomeranian is the most lovable dog or you have golden retrievers which are very

lovable dogs. So, chiwawa is a very very temperamental dogs. So, how I fit it and so, the schemata which is of a dog how does it get modified what is the way in which modified. So obviously, that is not present plus the process of using appropriate schemata is also not known.

So, when we are classifying the dog in a wild life and when we are classifying the dog as a dog in a home, what is the process that we using for classification to these two classifications that also is not known. And so, the process of using appropriate schemata of when a dog becomes a wild life animal, and when they become a pet and when they become mens best friend, that is also not clearly defined in a schemata view. So, how does this schema changes from one context to the other or one moment to the other that is also not available; and so, that is a big problem with the schemata view. So, next on is the knowledge based view.

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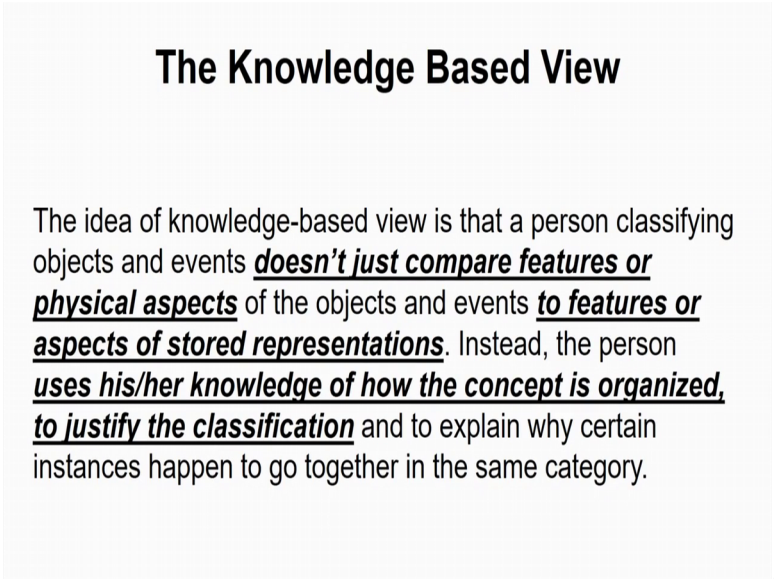

And. So, what does view this view says the idea of the knowledge based view is that a person classifying objects and events does not just compare.

So, what does this view say this says that when people are comparing people are making classifications or categorizations, they are not doing physical comparisons, but they are also thinking about the way in which a particular category is organized. So, it is a two part process they are not just going ahead and looking at features and when people are categorizing, they are not just looking at features of an item physical features of an item

and then going ahead and comparing it. What they do is they are also mentally thinking about the organization process about how the organization process work and what is the organization scheme. And that is what it says is that people just do not compare features of physical aspects and objects, to the features of the aspect to the stored representation instead the people also use his or her knowledge of how the concept is organised to justify the classification right and. So, what is the meaning of this the meaning of this is that people are not stupid.

So, when they are doing some kind of the categorization, they just do not do the categorization as the machine would do by just looking at certain aspects and matching certain aspects. So, they are not looking a. So, it is close to how what are template matching model is and perception. So, people just do not look at certain templates or people just do not look at certain features and go ahead and make the comparisons, and based on the comparisons classify different new instances of any element of any concept into a particular category.

What they do is they also think about why the organization has to be done why is he categorizing it, and then why is he or how is he categorizing the whole or how is the whole process of categorizing going on and why does he do that? To explain why certain instances happen to go together in the same category; so, this is basically one of the thing. So, what happens here is that people just do not do physical comparisons, they think about the physical comparisons of objects and they do the categorization processes. And that is why things which do not belong together are categorized. For example, let us say we have a five item is given to you and a categorization scheme is named.

Now, these items are a child a dog a your variables a laptop, and a some money now how does these five things classified together or they are categorized together. Now absolutely looking into it just from a third person perspective, you would not think that they have anything in common, what is a child has common with the laptop and some valuables that you have and some money that you have.

So, none of them are actually in any category sought to propose any form of category. But then if I give a name to it for example, things to be saved when in a fire then it make sense to you. And so, what people do is they do not just look at these four things and do the categorization, they also think how they are related to each other and this thinking of

the organizations scheme then leads them to make the classifications and so, this is what we were actually talking about. So, people then think about the organization scheme and justify the classification. So, in this case the four items can be classified together, how they are classified together by looking at the fact that these are the things that needs to be saved when a fire is there. So, most previous views of concepts fail to answer.

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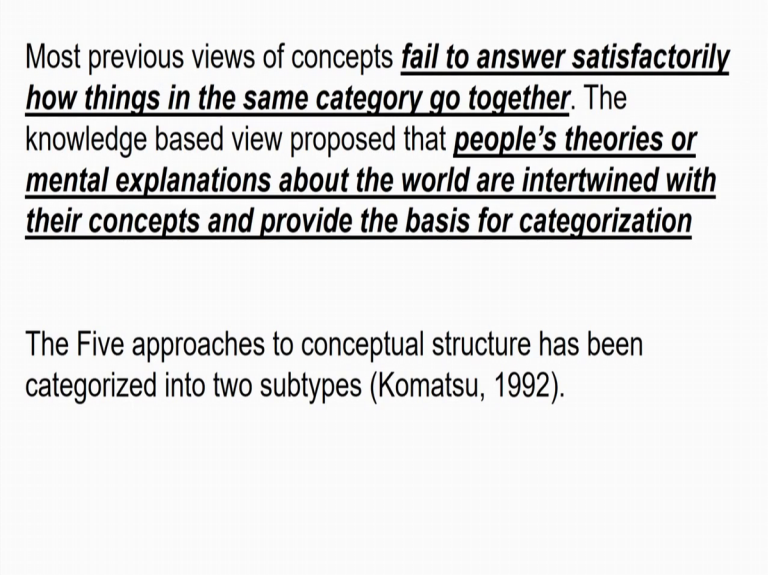

So, most previous views of the concepts, they fail to answer satisfactorily how things in the same category go together.

The knowledge based view proposed that peoples theories or mental explanations about the world are intertwined with their concepts and provide the basis of categorization. So, up till now the theories that we have looked at they do not look at instances or they do not gives the satisfaction, and answer of how people from different categories are categorized together right.

Or people which are which have very low similarity how they are classified together, but this theory the knowledge based theory they say the people have their own theories and mental explanations about the world, and these theories and mental explanations help us in forming concepts and helping us categorized. And so, the most weirdest of elements together, then can be given a theory for categorization and can be categorized together. So, here this knowledge based view gives us the scope to categorize the most non-natural

or most asymmetrical objects into a kind of a symmetry, that is does the find kind of a thing that this particular idea of categorization help us.

Now, the five approach to conceptual structure, the five theories that we have looked at they can be divided or categorized into two sub types, and this sub types were provided by komatsu in 1992. So, what are the two categories? So, the five categories that we have looked at up till now, they can then the or the five different models that we have looked at till now, they can be clubbed into two basic categories. What is it the first category is the similarity based category and the other is the knowledge based category.

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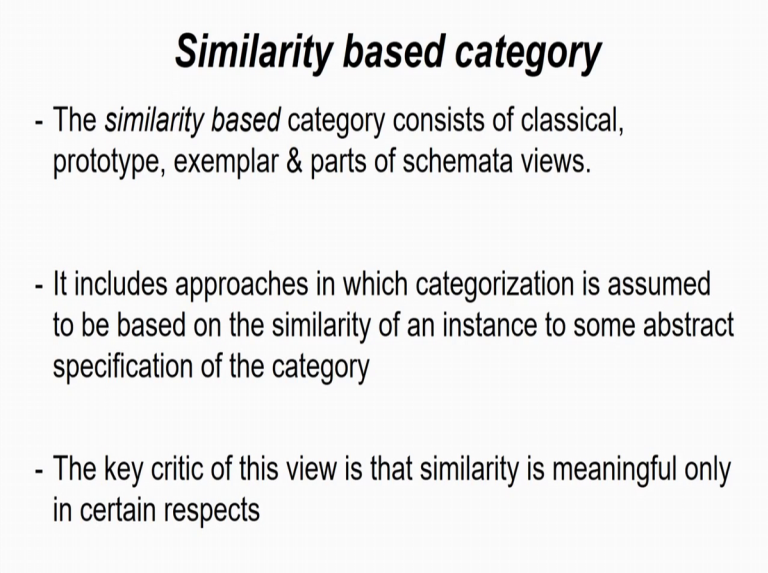

So, in the similarity based category we can classify the classical approach, the prototype approach and the exemplar approach and parts of the schema view can be these models can be put into the similarity based category.

So, what does it say it include approaches in which categorization is assumed to be based on similarity of an instance, to an abstract abstraction specification of the category. And so, why these four models or why this three models and part of a model is similar as I said, the schemata view hold or it possesses parts of the prototype view and parts of the exemplar view right and. So, basically how they are together or how they are clubbed together the idea, how they are clubbed together is that all these views are similarity based systems. So, they talk about that conceptual categorization or concepts are formed

or categorization is done based on how a new instance or how close a new instance is or how similar a new instance is to the available concept.

The more similar it is the more easily it is categorized into that bin, otherwise it is taken to some other bin or it is pushed out of that particular bin. So, the more similarity you have to a particular concept the higher the chances of being categorized into that particular concept. The more close are animal looks to a dog the higher the chances that it should be categorized in a dog category, the more close animal looks like a cat the higher the chances that it will be classified as a cat right and so, is similarity based view.

So, the, that is why and so, the problem with this view then would be that a typical incidences, will not be part of it for example, if I have a three legged dog or if I have a dog such as double bern. Now the double bern dog has a very very long tail and so, for its own survival sometimes the tail is chopped off and so, if it does not have a tail right how do I go ahead and classify.

So, this view says that I will not be able to classify the double bern into a dog category right; why because it does not has the absolute similarity that we are looking at and. So, this view is based on this idea of abstracts specifications of a category, the idea that things which are classified into a category should have things or should have properties which are similar.

Now the key critic of this view of the similarity is meaningfulness on the in certain aspects. So, basically the similarity based view is meaningful in certain respects only. In certain other respects they are it is it does not generate any meaning. So, in for example, in arithmetics or in those sciences this view will be very nicely looked at. Because problems can be categorized into certain formulas or certain mathematical problem could be a keen to certain other mathematical problem it means lend a solution to it and so, we can looked into it.

For example integral most integral indefinite indefinite integral, could be classified into a certain way of solution to it. But then the for certain other kind of solutions were a new approach is needed, some kind of mental knowledge is needed or some kind of work on the mental knowledge is needed or some kind of work from the person who is categorizing is needed, some effort from the person who is categorization is needed there this this view will fall.

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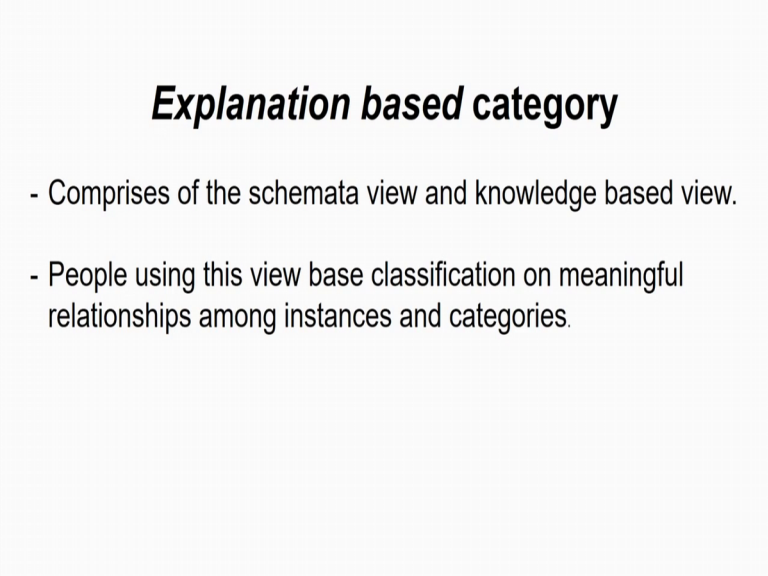

Now, the other category is the explanation based category and. So, what is this category it comprises of the schemata view and then knowledge based view. So, it as I said the schemata view a part of it is a prototype view part of it is the exemplar view right and. So, the half part which is exemplar view then falls under this category. And so, this view as comprise of part of the schemata view and the knowledge based view right and.

So, what does the meaning of this or what is the proposal of this explanation based category? The idea is that people using this view they base classification on meaningful relationship among instances and categories. So, people who use this kind of a explanation based view, they do not look for explanations or they do not look for similarities, rather categorization is done in terms of meaning of how things are related together in meaning.

And that is why the previous example that I gave you in which a dog a child a some valuable that you have and certain amount of money that you have are not clubbed together, because how they are clubbed together because they are things that you are going to save and so, that reason the a man a dog and pet could also be classified together because they form a house hold right and so, this how they are classified together. But then looking at in terms of similarities dog is equal to a man neither the man is equivalent to a bed neither he is equivalent to some other house hold items or chair for example, and so, the explanation view suggest that with meaning or through

meaning people can do categorization and so, categorization the property of categorization or concept formations can also be done on the basis of meaning.

Now, up till now we have looked at the five models and combination model of how these categories are generated or how these category concepts are generated.

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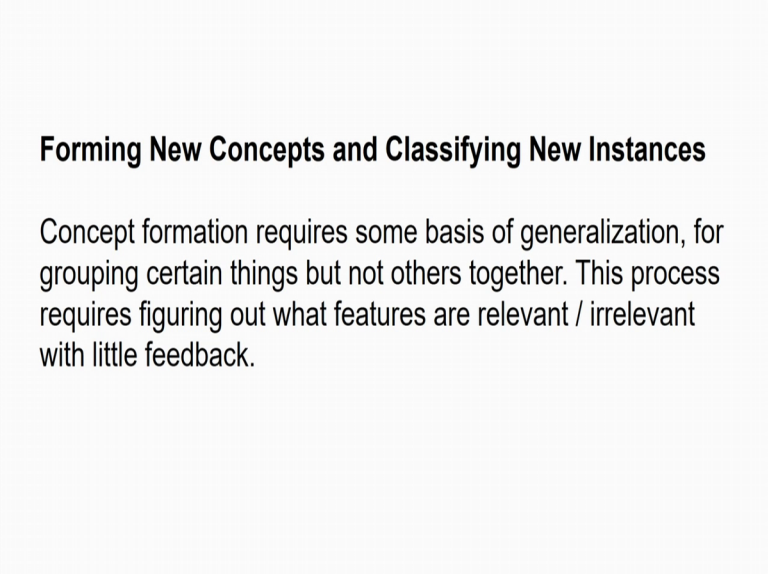

We will now look at the fact of how a new instance new concept and classification of new instances are done. What is the way in which people found new concepts and new categorization and so, study was done by bruner which we will use as a reference here. So, concept formation requires some basic level of generalization. So, when we are using a when we are making a concept some kind of features have to be generalized or all these instances all instances of a particular category have to be looked at and some commonality or some generalization has to be looked at for group grouping certain things, but not others together now the process requires figuring out what features are relevant irrelevant with a little feedback.

So, basically in terms of concept formation we should be a focusing on generalizations, we should be focusing on commonalities and we should also be looking at those features which are relevant to us and those features which are not relevant to us, and only once we can do these relevant non relevant kind of an identification can we go ahead and then make concepts or newer concepts.

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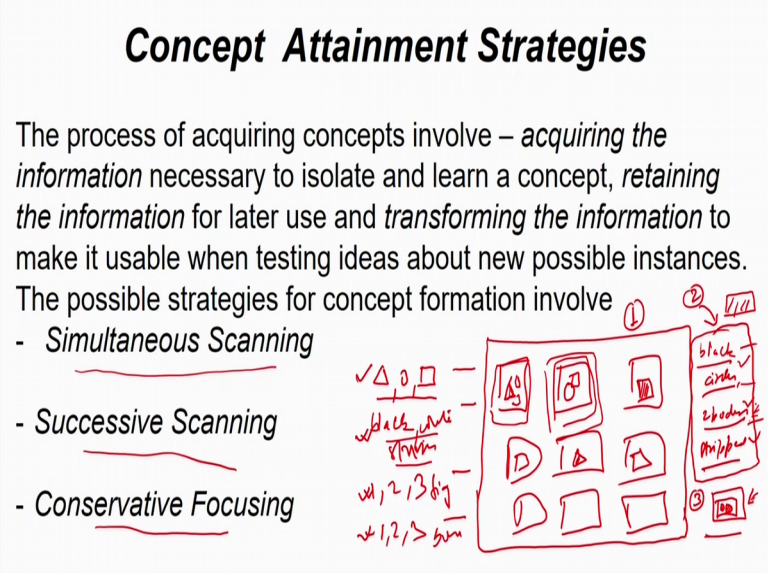

So, how do I make a concept or how do I attain a concept. And for that purpose the process of acquiring a concept involves acquiring the information necessary to isolate and learn a concept relating to the formation of later use and transformation of information to make it usable when testing ideas and new possible instances. Now to show how new concepts are formed a study was done by Bruner and others and so, bruner gudenau and Austin in 1956 they did a study.

And so, what was a study like. So, it was a very simple study in which they showed people Bruner Austin and gudenau they showed people a displayed like this right and. So, display had certain cards on to it. So, certain cards were there and the display had a card this kind of. So, I am just drawing a part of the display. So, this kind of things are cards were there and these card cards had certain geometrical figures drawn on to it.

So, either it had a triangle it has a circle it has a square or it had a rectangle. So, basically then each card had one of these features. So, either it had a triangle it had a circle or it had a square. So, each card has a either a triangle circle or a square on to it.

In addition each card also had black white and stripped colour on to it. So, each card was either black white or stripped kind of a. So, basically the card was either black in colour or the figure was black in colour, the figure inside was white or the figure inside was stripped that kind of a thing was there.

So, first feature it had a number of three of these either a triangle circle or square, it had black white or stripped figures, then it had either 1, 2 or 3 shapes into it. So, it could have a single triangle, it could have two triangles or it could have three triangles. Similarly it could have one square one triangle, it could have one square one rectangle I am sorry not a rectangle one square one triangle one circle and that kind of a thing in addition it also had boundaries around the shape.

So, each card then had either 1, 2 or 3 boundaries. So, 1, 2 or 3 figures and 1, 2 or 3 boundaries. So, the variation was that these were the four variations, these were the four aspects which varied between the cards right. So, most people were shown this kind of a system in which each card has either 1, 2 or 3 boundaries, it had either 1, 2 or 3 figures, it had the figures classified as black white or stripped and it had either a triangle a circle or a square on to it and so, this kind of figures were shown to people.

Later the experimenter gave a definition concept the experimenter ask the people a defining concept or it gave a definition of a concept that things like black circle and two borders stripped figure. So, he said that I am thinking of a black circles a figure with a card with black circles two borders and a stripped figure right.

So, black circles two borders and stripped figure and the experimenter said that in terms of classification. So, subjects were asked to classify of how many of these cards, actually match the concept that this experimenter gave me. So, first people were shown this kind of cards and later on they were given a explanation like this of the concept. So, this is the concept the person the experimenter is thinking of a concept which has black circles in it has at least does not say at least it says two borders, and then it says it is stripped in nature and so, this kind of a thing was given.

So, these cards were either black white or stripped in nature and. So, then after this the third step was so, this is step number one this is step number two, in step number three people were shown up positive instance. So, two borders two circles which are black one and other stripe. So, this is the a positive instance right and this was shown to people, and then people were asked to look at this positive instance think about this concept and later on go ahead and verify how many of these or what are what all cards actually match this kind of a inclusion criteria inclusion criteria for categorization.

Now, people each time the subjects went ahead and tested, these cards each of these cards for inclusion criteria a feedback was given to them whether it was true or not, and so, this is what the experiment was. So, very simple experiment number of cards were shown to people these cards varied on four variables, one it had a triangle each card has either a triangle circle or square on to it, then it the cards were either black white or stripped, third it had 1, 2 or 3 figures on to it and it had 1, 2 or 3 borders on to it later on a concept was given by the experimenter saying that I am thinking of card with black circles two borders and stripped figure.

So, that is what I am thinking about and then a positive instance card was shown to subjects and later on subjects were asked to go ahead and match this instance or basically tell the experimenter, which of these cards follow or which of these card match this particular concept that has been given and. So, when the experiment was done Bruner and others found that there are three ways in which people, went ahead and attain the concept or did this particular kind of a matching task. People either you simultaneous scanning, successive scanning or conservative focusing.

Now, in simultaneous scanning what people did was all hypotheses were tested the same time. So, people went had and tested a black circles of people compared number of black circles to number of borders and number of stripped figures at the same time right. So, they verify all the hypothesis all the points which have been given in one single instance and that is called simultaneous scanning. So, simultaneously they verified all the hypothesis or they verified if the target card matched or the target card had all these features or not. In successive scanning what people did was they first match whether the target card whether the card which we were matching to the concept had a bad circle a black circle or not. If it did not have a black circle it was left behind and then next card was moved on to.

So, that is how people looked at. So, one hypothesis the time. So, first they verified whether people whether the cards had black circles, then they went ahead and verified whether the cards that they got from the first verification with black circles whether they had two boundaries or not, and once that was done from that group they looked at whether black circle cards with two boundaries best stripped or not. And that is how they did and this is called successive scanning in conservative focusing what people did was they selected the positive instance they looked at the positive instance and then they

started comparing this positive instance to each card. So, what they did was they compared.

So, they were not testing hypothesis, they were not eliminating hypothesis they were looking at the positive instance and comparing the positive instance with each instance of the card. And so, what Bruner gudenau and Austin came up with is that this is how people attain concepts and these are the strategies of attaining concepts.

So, they said that there are three ways of attaining of concept one is called the simultaneous scanning in which you go ahead and compare all hypothesis the same time, then there is a successive scanning in which one after another the multiple hypothesis are compared one by one and then there is conservative focusing, in which what you do is the standard instance is compared and this comparison is what basically leads to the idea or leads to the matching and in this comparison what we do is one feature at a time is compared to the target cards.

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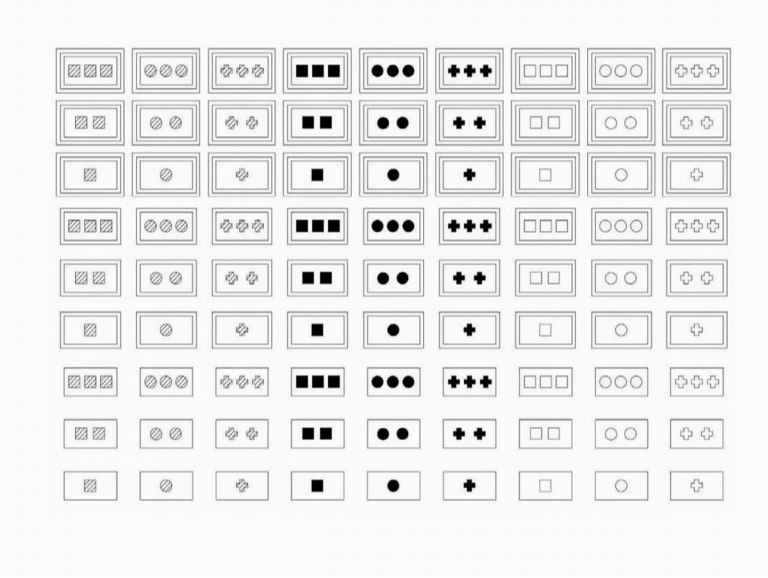

Now with this so this is what I was talking about and. So, as you see there was stripe figures, there was darker figures I mean black figures, there were white figures number of boundaries number of signs in to it and. So, these were the cards which for use and so any instance was used and. So, this instance was how it was tested.

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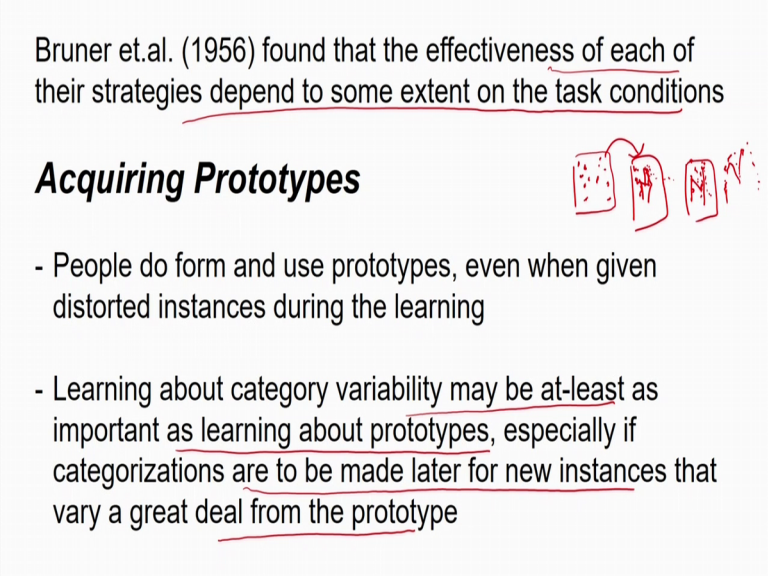

So, Bruner and others 1956 found that the effectiveness of each of this strategies dependent somewhat on the extent of the task conditions. So, the question is which of this strategy is better, which strategy should be used and which strategy should be used when. And they found out when the strategies were not complex.

So, simple strategies for example, arithmetic problems were very simple or very straight forward strategies people should be suing the simultaneous scanning, but as strategies become more and more complex as a more and more complex, items have to be clubbed together or categorized together people should be using conservative focusing. So, is basically the cards that has been given to you the idealized condition that is been given to you how difficult it is. The more difficult the more complex it is the more conservative focusing we use, the more simpler it is the more successive scanning that we use or simultaneous scanning that we use.

So, another question was how do we acquire the prototype in our concept formation. So, basically the card that was positive instance that was given is actually a prototype. So, how do I get a prototype? So, people use in a form prototype even when given distorted instances during learning. So, going back to the chapter on perception where we looked at a study by Keyl and Posner where they gave people various random patterns of the letter m and so, what happened is there were low distortions and high distortions pattern

of a low distortions and high distortions versions of the letter m. So, remember if you if you remember from that chapter.

So, this is how a M would look like and. So, this was the prototype which was never shown to people, what people were shown was distortions of it. So, for example, this is one distortion which people were shown, and the other distortion could be this. So, several distortions were shown to people, and this distortions were high distortion these were low distortion because if you join together it will form a M or in this case, it forms a M like this and the high distortions versions were also shown to people.

So, people if given both high distortions and low distortions people. And it was found out that people work better or people make prototype better in terms of moderate distortions. See if people are shown low distortions and they ask to make a prototype or people are shown high distortion in both these cases the prototype that they form are not very convenient.

But if low mediocre distortion or modern distortion the items are shown to them or modern distortion instances of the actual prototype is shown to them they can accommodate a large variation. So, even if a large variation of the test stimuli has a large variation into it, people who shown distortion model distortion cards or modern distortion versions of the original prototype they are able to still classify the test card into their prototype.

Now, learning about category variability, may be at least as important as learning about prototype. Especially if categorisations are to be made later and new instances that vary a great deal from the prototype. So, category variability is another thing how much there is a variation in the category. The more variation in the category the more distorted or the more bigger the prototype would be or the dimensions of prototype would have the bigger the prototype abstractions would be and the higher lower the category variability, the more stronger the prototype is or the more contend the prototype is. So, with category variability this prototype also varies.

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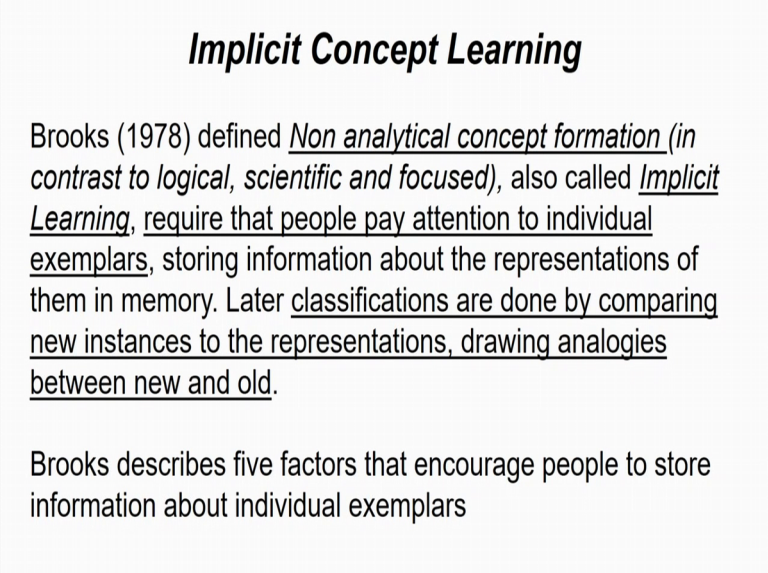

Now, Brooks 1978 they defined something called non analytical concept formation in contrast to logical scientific focused (Refer Time: 41:30) and they call this as implicit learning. And they require people to pay attention to individual exemplars storing information about representations of them into memory. So, what brooks and others they found out that people just as we saw in prototype, acquiring of how people acquire prototype what people do is people use implicit knowledge or people use non analytical knowledge to form concepts.

Now, even from the high distortions of dots of a name or hard low distortion verses of peoples were still able to make the prototype of m, which basically means that people are able to use implicit knowledge for forming a prototype and how does it (Refer Time: 42:14) because people pay attention to individual exemplars.

So, people take all these distortions and look at this distortions and they pay attention to it and from that they store information about the representation of that particular things of that particular abstraction in memory. Now later classifications are done by comparing new instances to the representations drawing analogues between the old and the new. So, what if a number of variations of the dot pattern is presented to people, where from some are high distortions some are low distortions people will look at all of them and then store the mental prototype, and the later on if still variations of later variations when they

come in, the people compare these variations with whatever has been store into memory or comparing to the prototype which has been stored into memory.

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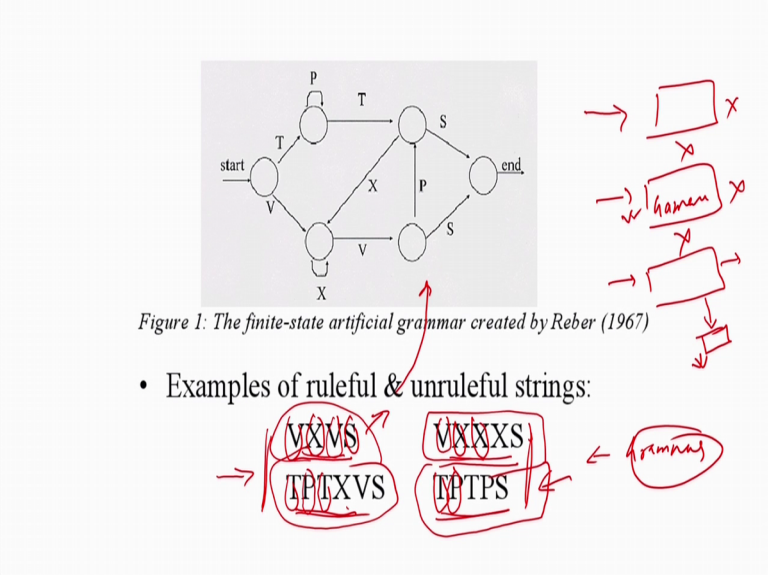

So, in Brooks example what brook did was Brooks presented people with examples like this and. So, these were words that were presented to people and people were ask to remember these words. Now there was one rule which was there and that what the rule was that some of these words followed a certain kind of a grammar right and. So, these words which are here these I am sorry these are not words these are letter strings. So, these letter strings are presented to people, and people are ask to remember this letter strings or to predict how these letter strings are actually formed.

Now unknown to people were the fact the some of this letter strings followed or certain rule a certain way of doing it or certain language grammar for example, some of these words which are presented here follow a grammar and. So, as you can see this is the grammar this is the structure of the grammar. So, a certain rule has been followed in some of these letter strings and in some of these letter strings that rule has there not been followed. For example, one rule is to start here and then you can have a T to start with or you can have a V to start with.

So, we have a T or a or a V to start with, and then you can either have a P, a number of Ps into it and. So, this is one in which we having a number of Ps or you can have a number

of x son to it and. So, this is the one which has a number of x s. So, start with a v a number of x s.

And then you can proceed to either a T. So, this is a T or you can proceed to either a V. So, this is this is either a V and from there this T then follows an s and. So, this is one the one which follows this logic right or it can from T it goes to an S and the s then comes back to X or it proceeds to the end. So, basically what the experiment was all about is that in this case these letters some of these letters string followed a grammar and some of these letter strings were random pattern which was there.

And so, people were not told some of these people were not told that they followed a grammar strict kind of a grammar and some of the people were told that the letters strings that we are using followed a kind of a grammar on to it right and. So, later on they were asked to. So, some people some of the people were told that a certain rule is there from which this letters strings are generated and some people were told that there are no rules to it. And so, later on participants when who learnt better strings that followed grammar rule made few errors then control participants.

Now, the thing is that participants who were told that they follow a grammar rule, they perform made more errors in terms of retrieval then a participants who did not follow this grammar rule. So, if told about the rule a people were told that there was a rule which was followed people who retrieved back or learn this strings they made more number of errors and people who were asked to just learn the rule.

So, three instances; in one instance people were not told anything and they were asked to learn these words. In instance two people were told that see a there is a grammar rule and this grammar rule is not followed for making these words and so, each new instance then follows these rule right. And the third group was there where they were shown this rule right and they were not ask to learn anything, they will not steady anything about that whether it follows a grammar rule or not they were shown this prototype.

They were shown this thing and they were asked to classify what happened is what was the result the people who were just shown an exemplar, people who were shown this particular instance and they were asked to classify based on this instance or basically remember this instance based on prototype, they perform the best. What when people were said that a grammar rule is there and you have to deduct the rule and based on that

do the categorization, they perform poorly and of course, the people who were not said anything about the rule or if any the rule exist implicit rule exist for learning this word strings they perform the worst.

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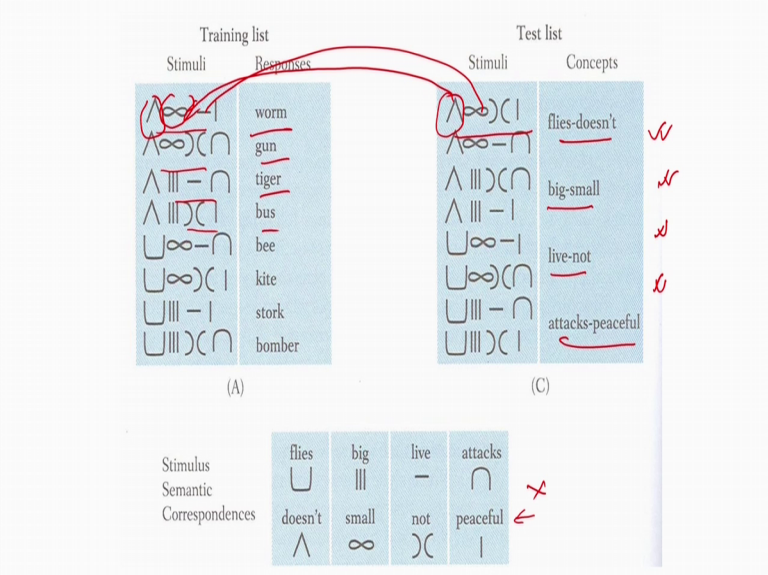

So, that is how the result of this example turns out to be.

Also in another example in another study people were shown this kind of a heliographies and a particular word related to this heliographic and. So, what was the thing here? People were first shown that this is the test stimuli and this is the response. So, this means worm, this means gun, this means tiger, this means bus and later on they were asked questions, but showing this kind of a stimuli whether this flies whether this is big or not, whether this is live or not and whether this is attacks or not this kind of questions were given.

Now unknown to the people where the fact that each of these heliographies that you see actually mean something actually mean a particular thing in English a particular word in English right and. So, when people were not shown, people were not told that this kind of meaning exist, they perform better they made this idea better and they could just go ahead and relate this this implicitly this particular heliographies to a particular concept, but when people were actually told that a certain heliographies mean actually something the number of errors (Refer Time: 49:09)

So, people who were just shown this and later on tested on to this heliographies, they performed better why because they implicitly made some kind of connection implicitly made some kind of a connection of what this thing means, what this thing means and so on and so forth. But if they were just told that there is some kind of a rule which is there and they perform much verse.

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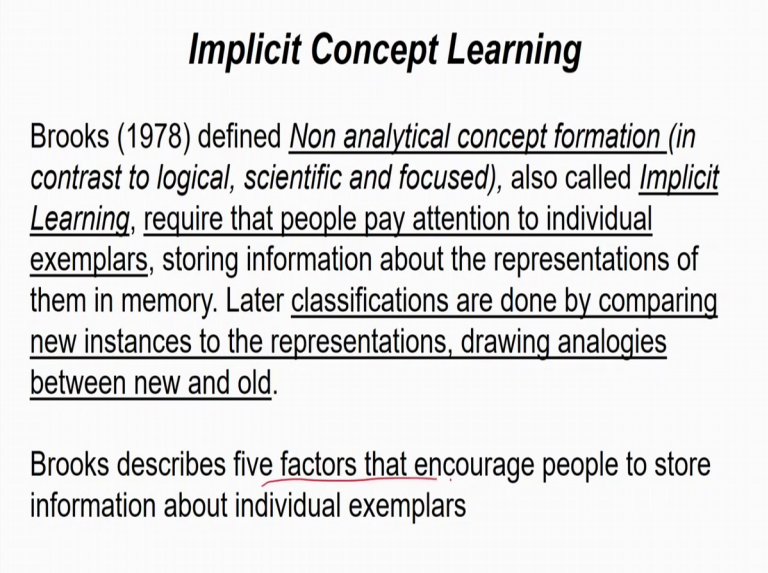

Brooks then describes five factors that encourage people to store information about individual exemplars, and what are these five things. So, Brooks says that first of all people are better of in making concepts and categorization, in terms of exemplars and is. So, he is he stated that there are five factors which encourage people to make more exemplars.

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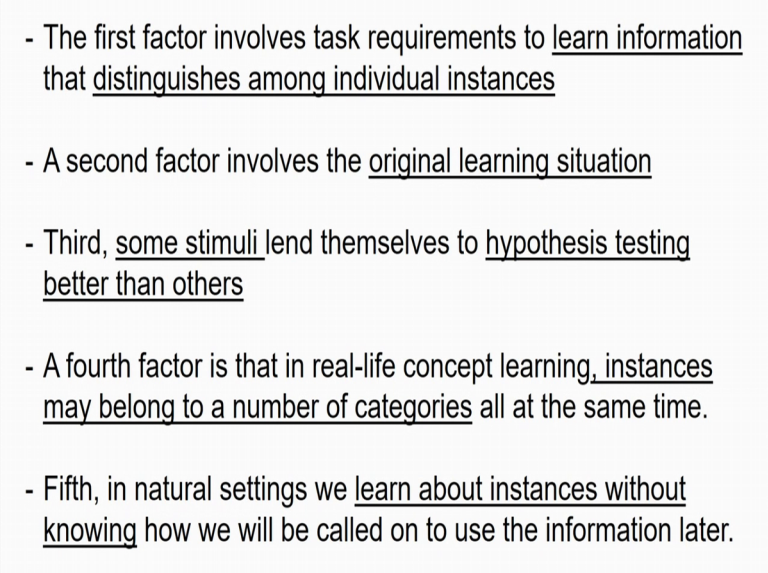

And what are these the first factor involves learn information that distinguishes among in the in among individual instances. So, if the task requirement is such that it makes people to learn more information that distinguishes among individual instances. If the variability is more and people learn more about individual instances, they are better of making learning through or concept formation through the process of exemplar or using exemplars as method for categorization. Also second fact factor is the original learning situation.

So, more closer the original learning situation is the more varied original learning situation is, the higher the chances that people will use exemplars for making categorization. Also some stimuli lend themselves to hypothesis testing better than others and. So, what happens is there are different kind of stimuli for example, some dogs would be called the dog or would be much better example of a dog then some other kind of dog which are not better examples of a dog. And so, what would happen here is that since some stimuli lend to better hypothesis and some do not a good example a good way of categorization would be using the exemplar.

Similarly, a fourth factor that in real life is that in real life concept learning instances may belong to number of categories. So, what will happen is, a particular instance can belong to a number of categories for example, the dog could belong to the animal category to mens best friend category to the house hold category and so on and so forth. And so, if

that happens if the dog is sharing so many categories there are so much overlap and exemplar is the best way or exemplar should be the best way of categorization, and the fifth is that in natural setting. We learn about instances without knowing, how we will be called to use for information later and so, most natural instances the immediately we do not come to test a particular instant or make a concept or categorized something using a concept.

So, we learn a particular we see a particular instance of something, and then we make a concept out of it, but immediately we are not given the task of a categorising something according to that concept. It may happen that some period of time may exists or some period of time may lapse before we get a instance of that category; and so, in those cases exemplars are best example or exemplars are the best way to go ahead and categorize.

So, this is the end of this section and in this particular section we saw how concepts and categorization really work, and what are the various theories which help in categorization and concepts, and in then also look compared across the different categories. We also saw how concept attainment is done and what is implicit concept.

The idea is that people use implicit knowledge for concept formation and so that is another interesting thing that we looked at. And at the end we also looked at the exemplars are the best way of forming a concept. So, in the next lecture when we meet we will talk more about a different kind of memory or since we are still continuing with the memory example, in the next section we will talk about a different kind of memory.

Thank you.