Language, Culture and Cognition: An Introduction

Dr. Bidisha Som
Department of Humanities and Social Sciences
Indian Institute of Technology, Guwahati

Module - 02
Part - 01
Lecture - 04
Categorization

Welcome to module 2 part 1.

So, a quick recap is in place. So, in module 1, we had three lectures; part 1, part 2 and part 3, where basically the message that we have had, based on the historical aspects of the this field and how it grew from philosophical perspective and so on. So, the conclusion we have sort of reached in the 1st module is that language is a higher mental function like other faculties.

Language is not something to be treated as separately, something to be treated as part of the you know outside world and so on. So, language is innate, it is one of the higher mental faculties. Similarly, cognitive revolution ensured that language is now going to be studied along with other mental faculties.

So, not only is language one of the faculties to be noticed or one of the faculties to be studied as a mental faculty, as a mental process, also at the same time language will be studied in terms of its relationship with other mental faculties. And also of course, the in terms of the brain structure and how the brain functions are associated and so on and so forth.

So, that in order to arrive at a holistic understanding about how the human mind really works so. In fact, this is how the goal of the stated goal of cognitive science is. So, to this end, our point of departure as we have already seen will be the theoretical position of embodied cognition.

What was embodied cognition? A quick recap again. Embodied cognition looks at the mental processes as a result of constant interaction of the physical body and the human mind and the external world and so on and so forth. So, this is not symbolic in a sense, it

is not a language processing is not just a symbol manipulation system, but also a matter of interaction, at various levels of the human agent.

So, continuing with our journey, we can now move on to topics. So, first topic that we will look at, that will analyze this relationship between language, mind, the environment, the brain and so on and so forth. The first topic that we will look at is the topic of categorization.

Categorization as a process and how this process is… has linguistic manifestations, it also has certain roles that plays, it plays, in psychological level and so on and so forth. And what are the what are the parameters, what are the some of the most important factors and how there are changes and what are the main issues related to this concept, this is what we will look at.

So, this is the roadmap: concepts and categories, then we will look at the theories of categorization, within that, we will have primarily look at three types of theories: classical, prototype and exemplar theory and then we will move on to see how prototypes actually are not just a linguistic factor, are not just a mental factor, but it also has repercussions in the culture, in the day to day lives in the society. So, how do they interact?

So, those things we will be discussing in detail and then also we will go… move on to show how contested are categories, how contested categories can be, how there are lot of disagreements and what are those factors that are responsible for those disagreements across categories or even within categories. How categories change over time, over space, over you know many factors. So, is it something that is fixed, is it a stable mental representation or is it not stable, how if it is not stable, what are the factors that make changes and so on and so forth.

So, this is roughly the roadmap. So, first and foremost the basic notions: Concepts are mental representation of a group of things or experiences or people or you name it. The word ‘concept’ is a very commonly occurring word in day to day language as well as in scholarly work. So, what is a concept? the notion the idea of a concept is very common one. We use it all the time, we use it in day to day literature, we use it in scholarly work we use it in academia in various discipline of academia and so on.

So, let us just take a very simple example: the concept. Let us say we take an example of a concept of ‘IIT students’: this could be a concept. So, if we can easily talk about a concept like IIT students. What does it mean? What does it …what are the repercussions of using this word as IIT students?

The moment you say this word, the moment, you are discussing this word; there are certain notions that come to your mind. What are those notions? You can have various features let us say. So, one could be you can have various features associated with this concept. So, it could be ‘brilliant’, it could be ‘hard working’, it could be you know it could be also associated with ‘well paid job prospects’.

And you can go on adding to this concept of what is the idea of an ‘IIT student’. The word IIT student is very a significant concept in Indian context because as we all know that to come to IIT to do an engineering course, the students have to go through a very tough examination, which is the JEE; which is one of the toughest examinations in the world, as a result of which the students which who come into IITs to do engineering are often the best in that group.

And then they have to work really hard to achieve their goals and at the at the end of it they, many of them, get placed in very high very well respected, very high well paid jobs. So, this is roughly the idea that you have about a concept. So, what does it basically mean? these are the features that you associate with a concept.

There are.. there is a concept and it has associated features. So, in simple terms, these are the meanings of the word ‘IIT student’. Similarly you can have many other such concepts simple concepts like let us not even have IIT students, let us just have ‘students’. So, the moment you say student we associate a particular age group, a particular you know set of things that students do, they study, they you know they prepare for exams, they write exams, they you know they look for a higher placements and so on and so forth.

So, this is these are associated with a concept which are typically may used as what we typically understand as the meaning of that concept. Now, this is where the idea of categorization comes in. So, the basic basis of concept is categorization; how did we put all these things together, how did we put brilliant and hardworking and job prospects and this and that. And we have basically created we have categorized a particular group of entities as IIT students. So, this is what is categorization.

Categorization is at the heart of creating concepts and categorization is not just a function of language; it is actually a system a mental function that is beyond that is not just linguistic, it also is non linguistic. Because why we say that, because categorization as a feature as a mental feature is not typical to only humans; this is prevalent across the animal kingdom. All animals are capable of doing some amount of categorizing, may be not as much as humans or maybe not as nuanced as humans, but they do categorize.

Remember we looked at the prairie dogs having language, some sort of a language, a complex signal system that actually have differences across the kind of predators. So, if it is a human, they have one set of signals, if it is a non human predator they have another set of signals and so on and so forth. What does it basically mean? It means that prairie dogs are able to categorize entities in terms of the threat perception.

How, what is the level of threat from the incoming entity. So, that is what we mean by categorization is not just human and as a result of which it is not just a function of language, it is a mental primary mental function that is typical of most of the neural beings. So, neural beings have evolved to do best fit matching.

So, whatever you see or whatever you experience, whatever you listen everything gets categorized, everything gets put into separate boxes, in some sense. So, that is what all neural beings have been designed to do. why? Because it is necessary for survival as we will see in a short while.

So, dependent on the current context and dependent on the goal of that particular context, neural beings, all sorts of neural beings, do this do go through this particular process of categorization. So, remember we also looked at the reality as it is there a real world out there that is irrespective that remains real irrespective of human intervention or the reality changes dependent on the human perception.

How much how the humans look at it, how humans choose to talk about it, does reality change. So, this the there is a philosophical debate even in this case, in case of categorization as well. So, certain philosophers do not agree that human categorization is actually important or any neural beings' categorization is important it does not really matter.

Because there is a physical world out there which is not dependent on our intervention, on our basically messing with it. But even though it is possible that there is a real world in the sense of the physical world the sun and the moon and the earth do not change even if we start naming them differently or start looking at it like them differently they do remain as it is. But there is no privileged way of categorizing. So, every being has their own way and there is no one which is better than the other.

So, as a result of which categorization as a process is extremely interesting to look at and also from the perspective of cognitive science because cognition understanding and the our interaction with the world based on then understanding is almost entirely dependent on categorization, as to how do we box things together.

So, categories that brings us to categories. So, we looked at concepts that concepts are made up of features which roughly translates to meaning in language and at the basis of concept is categorization as a process. So, once we have a categorization as a process now the next automatic question is to ask what are categories.

So, a number of objects, events, emotion, relationships you name it all these things can be grouped together as belonging to a set of some sort. So, a group of emotions can be considered as you know as ‘happiness’. So, happiness does not really mean only one thing, happiness can mean even you know you can even have tears of happiness, you can have you know you can smile you know then you can have a broad grin as an indicator of happiness and so on and so forth you can dance as a as an indicator of happiness.

So, a lot of things can be grouped together. So, this grouping together of various entities it can be objects it can be events experiences people and so on this particular process. This is a very simple process to if we look at it from the surface level, this is what is called categorization. So, basically this is a process that organizes. This organization is extremely important not only as a matter of intelligence in humans, but also in terms of machines which we will see later on.

So, this categorization ..so, how does it happen? what do we do to categorize? It is very simple to say that ok fine we put things together. So, I am putting all these machines that I have on in front of me as together as something called ‘gadgets’. I call all of these the computer screen the keyboard the pointer and so on and so forth they all are grouped together as they can be grouped together as ‘gadgets’.

What are we doing here? What we do in while we process this, while we are busy doing this process is we are grouping them based on some criteria, that criteria is more often than not based on similarities. It can be similarities in structure, it can be similarities in purpose, it can be similarities on various other grounds. In fact, that is where the problem arises as we will see later.

But for now, let us just understand that while grouping things together, we depend on certain criteria which is again based on some sort of a real or perceived similarity. So, this is the process which is called categorization. Now, this idea of categorization and having categories in the world of objects, of things, of emotions and all that, these were not really big deal when if we look at it historically.

So, again if we go back to the Greeks like everything else we do, it was not really a it not even a debate it was not even a thing to be discussed about, it was taken for granted. So, even though we really talk about Aristotle as the father of as the person who gave us classical theory of categorization; it was not really exactly a theory. It was something that really was there it was understood to be true a priori truth; however, that thing changed that changed.,

The idea was problematised to a large extent much later in history. So, looking at it from a processing point of view and sticking to humans because this course is only about human language. So, we will stick to humans mostly. So, human beings categorize all objects and events they encounter. This is a process that is continuously happening with us all the time, it is not it is not conscious ,it is an unconscious process.

Every time you encounter something new in the environment it can be human, it can be emotion, it can be an object, it can be an event we are busy categorizing we are immediately busy putting it in separate boxes, kind of best fit match process, through a best fit match process we will categorize our experiences.

The reason we do it primarily is for action and survival. Action and survival: action let us come to action later, survival is a primordial instinct. Even when we were cave-dwellers we had to we had to immediately categorize an incoming animal, of some sort, as whether it is it can be food or we will be their food.

This was something that was as basic as that our existence dependent on that. So, an approaching predator we will have to be categorized as a predator and something that should be you know either killed to survive or just run away, fight or flight whatever action you have to take depends on your categorization and your survival depended on it.

Right now at this point of time may be it is not so much, most of the time, sometimes it may, but most of the time it is because for action. So, starting from the cave days, the action has changed, but the fact that there has to be an action on the basis of how we categorize the new entities is… that remains constant. So, it is necessary for action as well as survival sometimes. As I said it is an unconscious process and a remarkably fast cognitive process.

,Remarkably; we in this course we will see most of the processing timings we will be looking at in terms of milliseconds. So, that is what we mean by remarkably fast cognitive process, the moment we see before we realize we have already and we have already taken a ground we have already decided what it is.

So, this is an example of a very simple thing that have the that can happen to anybody at any given point of time. You see a tiny speck in the sky and you are not hearing any sound that is associated with aeroplanes typically anybody who lives near anywhere near airports will be will probably not have a much of a problem because the sound will be helping you out.

But for others if you see a tiny speck in the sky you might take a few milliseconds to decide whether it is a an aeroplane or it is a bird. Or you see a rope on the road and if you live in places like where I live it, can very well turn out to be a snake it depends of course, if you live in a humid and you know tropical weather you will encounter snakes more than just a rope.

So, you need to categorize, this is what we mean by you know encountering things in the real world and immediately having to decide what it is. So again, similarly you can see a fog and a smoke you have to decide what it is. Of course, if you are in a places like in a metro city like Delhi or in you know any other such cities, it could very well be smoke, but in Guwahati for example, in the in where I live most often more often they are not it turns out to be fog.

So, this is what we mean by constant engagement with the world and as a result of which we need to categorize. Categorization is a constant process. In this course we will stick to we will use the word a conceptual category more often. Because categories have representation in the brain which is what basically what the concepts are. So, we call them conceptual categories.

So, this is a thing that is backbone of thought as we have just seen. We since we talk about we need to talk about things in a way that gives us you know in order to even talk about a an object or a thing we need to categorize it first. We need to talk about an elephant, you need to understand what an elephant is and everybody should the people you are talking to also more often they are not should share your understanding what an elephant means.

So, elephant is not only a large animal, but it also has many other repercussions. Again you know dependent on where the idea of elephant in a particular given look, in a particular given cultural, social, natural in universe it has different meanings. So, these things this particular process and the result of that process, which is the process is called categorization and the result is conceptual categories.

Now, this thing, this set of things are fundamental to language as well as to thought. So, this is what is identified with meaning, as we have seen in the beginning. So, this is very very this is very crucial, we will look at conceptual categories and of course, this is associated with meaning. So, these two things are related so, conceptual categories is a result of the process mental process. And when we come to language, when it is associated with language as an output that is where you associate it with meanings. However, this is not an entirely linguistic process it is a concept it is a cognitive process. So, one very interesting thing about this processing is that the ability to categorize is universal, because it is a mental it is a cognitive process.

However the result of that process is not same. As I had been just showing you; so, if it is dependent on how you categorize an animal like elephant, could be somewhat similar in the states of Kerala and Assam in India, but not the same as you know same as in and in a country where elephants are not so commonly visible. Elephants are not, they do not invoke any other feeling anew and it does not generate any emotion in you, so on and so forth. So, the result of the categorization is not uniform and that is exactly where we will delve dive into in this course, in this particular segment.

Now before we go into the details of categories and what are the differences what are the theories. Let us look at how we acquire categories there are of course, many theories the most commonly cited processes that are part of creating categories and how do we acquire categories has been given by Lawrence Barsalou and I quote there are five steps to acquiring categories.

So, the moment you encounter a particular object, first thing that you do is creating a structural description of the entity. For example, you can have, I am pretty bad at drawing, but let us say something like this, I know it does not look like a chair, but let us just think it is a chair.

So, now you if you, in case you enter into a room and you see an object, this is the object that you encounter. What you are doing first and foremost is you are creating mentally you are mapping a structural, you are creating a structural description in your mind and then you look for, in your already existing categories in your brain, you look for anything that resembles this particular structural property structural similar description.

And then you look at what is the closest match. So, for example, this chair is very is a proto is a commonly visible sort of a chair; however, sometimes we have something called ‘designer’ things these days it is the time of everything having designer.

So, designer food, designer dresses, designer everything, designer lifestyle as well. So, so, the let us say there is a designer chair in the room and it does not look anywhere close to the typical chair that you are that you are used to seeing. However, what you still do is you map the description and then you try and match the basic properties basic structural properties of the entity and you match it with the existing categories and you think of it could be a chair, it could be a stool, it could be you know something else and then. So, kind of you go for the most similarities and then draw inferences from that entity that ok this seems best fit to be a chair and then you store that information of the new entity into the already existing category of chairs in your brain.

This is apparently how, this is the theory that Barsalou has given, this is how we acquire categories. This is not only in case of a concrete object like a chair, it could also happen with various kinds of abstract entities; abstract emotions, abstract things like you know democracy, you know liberty, freedom, so on and so forth. So, what does it mean? So, whatever are the basic features of an entity..we take it out and we map it on an existing

category and we see what is the best fit, where did the where does it match best and then we add it to the existing category and we that this is how we acquire categories and this is how we expand our existing categories by adding more and more members to it.

Now moving on to the theories of categorization; so, there are two most well-known theories; one is called the classical theory classical model of Aristotle that is that has to do with categorization and of course, the prototype model. Now as I said the classical model is not exactly a model.

It was sort of understanding that was taken for granted, that things are part of a larger group everything is part of a larger superimposed group of a set. And that is because they share certain similarities and those similarities are based on features. So, this is something like this.

If something is X, one is X it has alpha, beta, gamma and delta features. So, if it is a chair if an entity it is a chair it will have you know certain kinds of arrangement of the surfaces, it will have legs to it will have legs to support it and the purpose of the chair is for humans to sit on and so on. So, this is what we mean by our category has features, every category has features.

And the next automatic next step is if one is X it cannot be Y, because if an entity is a chair, it cannot be a table as simple as that this is this was almost taken for granted that the classic example, we have from this theoretical standpoint is that how do you define a MAN, who is a MAN, what is a MAN let us say.

So, a man is a featherless biped. So, there are two categories there are two ah features here; one is featherless one is biped. So, if you remove this it becomes a bird if you remove featherless it becomes a feathered biped is a bird featherless biped is a man is a human man is a category that includes both man and woman and children and everything.

So, similarly if there is a word like ‘uncle’ it is not any particular uncle it is a category of people who qualify to be plus male, of older generation of the person who is speaking and of course, minus direct linear descendant. If it is a plus linear descendant it would be the father. So, it is not it is a non-linear antecedents or not sorry not descendant antecedent.

So, somebody who is genealogically be who has come before you. So, these are the features. This is how category classical category categorization theory defined categories. So, a category called uncle is a set of these features; these are the features, these features are called necessary and sufficient. So, for example, an uncle could be you know you can have a have an uncle who is very who is jovial. Similarly, you can have another uncle who is a very reserved he does not talk much somebody who is an adventurous, somebody who just wants to sit in the sit in his home and study all day, all kinds of possibilities exist. But as far as Aristotle is concerned or the classical theorists are concerned, these are not important features these are not necessary features.

What are necessary? Necessary features are those that are the core values of a particular entity, core values of a particular category. So, these are the code necessary and these are sufficient. You do not need, there are many other peripheral qualities that many uncles might have, but they are not necessary this much is sufficient. So, this is how the classical theory of categorization really looks at objects that are grouped together as belonging to one category.

So, objects are either part of one category or it they do not fit. So, you say items are either fitting into one category or they do not fit into that category, simply by virtue of having those conditions or not having those conditions so, that is nothing that can be both a human and a bird for example, right.

So, this is very clear cut, very simple clean cut distinction that there are objects which have which share a range of objects or things that or people or everything that share a certain set of features, which shared by everybody, every member of that category and those features are very small in number and they are sufficient, they are necessary and sufficient.

So, very clean and very simple, these are the implications of that theory what are the implications and that is exactly where that problem arises; what holds a category together is that all members of a category share the same features the same necessary and sufficient features we had just seen. So, all uncles have to be in plus male all uncles have to be older generation and they have to be non-linear antecedent' all uncles have to qualify for all this character all these characteristic features.

Hence all the members share all the criteria. As a result of which, all members of a category will have equal status. So, no uncle, no instance no particular token of uncle, is better uncle than another uncle for example, or no man is more man than a another. So, there is no deep, there is no hierarchy there is no gradation among the members of a category all members have the same status.

Now, obvious implication of the second point here is that categories have very sharp boundaries. So, there is a very clear cut division between what is and what is not part of a category. These are the serious implications of classical category. Now, when we talk about man or an uncle or a chair things are very simple.

However, things get a little complicated later on if we look at certain things that are more abstract in nature. These changes actually happened pretty recently. Classical model was fine for a very very long time, but it was a speculation based understanding, there was no empirical research at that time.

So, this continued; however, as we have seen cognitive revolution brought in a large amount of changes in academia in various academic inquiries scholarly enterprises and there were many new disciplines that came out and empirical studies actually became the flavor of the day. Lot of empirical data, in terms of all sorts of academic disciplines started pouring in. One particular domain which is important for us in this particular domain is the area of cognitive psychology.

Cognitive psychology saw a lot of changes around this time with lot of empirical data, with lot of experimentation happening, there was a lot of real life data collection based on experiments. So that empirical data, once we had those empirical data there are new questions that were being asked and that also affected the domain of categorization. So, it was Wittgenstein again and then Eleanor Rosch which who pointed out the problems with the classical model.

Wittgenstein was the first one to literally puncture a hole in the classical theory. His famous example is that of a GAME, what is a game? how do you define a game? In India if you ask somebody tell me about what is a game.. more often than not people will give you they will start with cricket because cricket is like a religion in India.

So, it is the game of course, now after the Olympics more people are you know tuned into other examples of games, but still there is a there are differences. So, let us say examples of game unlike cricket, football that is one group of games, then it similarly you would agree all of us would agree that ring around the rosy is also considered a game.

Ludo is also a game of dice even to quote I quote this is not my word. So, 'games people play' are also called games. And much later much much later after the after Aristotle's time and after Wittgensteins time as well, we have something called 'video game'. There is no doubt that video games are games.

So, how do you categorize? How do you define a game? Do we say that a game has many participants? Do we say that games are for competitive purposes only or do we say games have an entertaining purpose? Games are based on some kind of an outcome, there is a clear winner. In that case ring-around -the -roses may not really qualify.

Cricket and football on the other hand have two groups of players there is a set of rules and there is a particular kind of an outcome. Cricket now is as a competitive sport as well as it is almost like an entertainment and so on. So, it is very difficult to really define what a game is, there can be a set of rules which may or may not be applicable to some other instances of the category game: that is one problem.

Similarly, if you ask let us imagine an alien comes into onto the earth and you have they do not have any understanding of what a game is and you have to teach. So, Alien asks you: 'what is a game?' they have no idea they do not they are serious people, they do not play. So, we have to tell them what a game is, what game will you teach them.

Will you teach them snake and ladder will you teach them Ludo? will you teach them any other board game? or will you teach them an outdoor game? will you teach them something, that is strongly competitive or will you teach them something that is more of entertainment and less of competition? that requires or something that requires more physical prowess or something that requires more mental agility like chess? What would be the one game that you will pick up?

This is where the problem lies, this is exactly what Wittgenstein pointed out. So, games are.. all instances of games may not share all the properties that we might think as a defining criteria for 'games'.

Thus, this particular category of game does not fit in the classical model because all members of this category do not share all the features. To take care of this problem, Wittgenstein proposed the idea of 'family resemblance'. This is a very important standpoint that is a departure from the classical model.

So he says that family resemblance is something that is more important rather than having a set of 'necessary and sufficient features' because, what binds just like in a family what binds people together in a family is like some sort of a resemblance. They might be having similar kind of hair, similar kind of you know features, facial features, similar kind of height or whatever, but that does not also mean that all the members share all the features, then they will be identical people.

So, that does not work. So, family resemblance is a metaphor that Wittgenstein gave to understand categories like games; there might be some features that are shared, but not all features. So, this is what binds the …members of a family may resemble each other without sharing all the features this is very very crucial point of departure that Wittgenstein made.

Then we have after Wittgenstein we have Eleanor Rosch and she and her group have contributed immensely in this particular domain of understanding from cognitive psychology perspective. So, her work showed that, categories not only have you know they are not only they do not always share all the properties, they even have some psychological …there is some kind of a psychologically real aspect, reality aspect for the speakers.

So, what is a category it is not just what is a how you create a category out of certain things also has a psychological aspect to it, is not simply an inherent set of properties. So, her famous work from Dani language in New Guinea on the color terms color terms of Dani language. So, Dani language has only two color terms one is called 'mola' the other is 'mili'. So, mola takes care of all the colors that are considered light and warm and mili on the other hand has all the colors that are dark and cool together.

So, now if you ask the speakers, the Dani speakers, to choose what is the best example of either of these colors remember they have only two colors. So, only two colored terms, linguistically only two colored terms where they group various colors into one set. So, mola is a category and mili is a category they are not colored terms in that sense as we understand.

So, if you ask Dani speaker what is an… give me an example of a mola, mola for example. So, they will they might have different focal colors, for somebody it is yellow, for somebody it is red some for somebody it is something else. And there is also individual differences that Rosch found out, which means that categories can have good examples and not so good examples, they can have bad examples and really bad examples.

How is that possible? How is that possible? It is simple as we have just seen in the case of category of games cricket is a very good example of a game. May be snake and ladder is not so good example of a category. Similarly, if I ask somebody: 'ok give me the names of some birds', you might ..you probably chances are very high chicken will not be picked up, penguin will not be picked up, emu will not be picked up.

So, there are certain members of a category who are better examples of that category and some members even though they technically belong to the category, but they are not so good examples of category. So, as far as classical theory goes, penguin and emu and chicken all of them qualify to be called a bird. But in a real life scenario when humans interact with each other and they talk about those categories they may not favor chicken as a bird, but prefer robin, as a bird or a parrot as a bird and so on. Similarly what Rosch showed. So, there can be good examples of a category there can be not so good examples of a category this is a very significant point where the new theoretical perspective was different from the older perspectives.

So, this is questioning the hypothesis that all members share all properties. If all members shared all the properties; that means, all members are same, there should not be any hierarchy, but as we see, there are good members and there are bad members of a category. So, which means all members do not share all the properties.

Similarly, the process of categorization also involves human perception, imagery, learning, organizing that learning and action and so on and so forth. So, there is a lot of give and take between the object that we categorize and how we perceive it. Because ultimately the categorization has to do with human's action as we have already seen.

So, perception and action play a very significant role in creating categories or talking about categories or learning about categories and so on and so forth. As a result of which, this is the categories are not based on any inherent criteria, as classical theory would say. So, classical theories …the properties are not really inherent in the classical sense. Of course,

properties are there, but they can also they also take care of the humans interference, the way humans interact with a particular object or the way we categorize it.

So, these are the primary issues that the later scholars have found out with the classical theory. As a result of which, we now have a theory called the prototype theory or the prototype model. Prototype model says that the members of a category might share some features; however, not all members share all the features.

Some members share all the features, some member have all the features and they are called the best examples. So, if a cricket is a best example of a game in the Indian context, it is because it, more or less,… shares all the it has all the criteria that are used to categorize it as a game. So, it has participants, it has two sides, it has a it has some rules sets set rules, it has somebody who is an umpire who so, basically who overlooks the entire process, it has some outcome. And it is it depends on it requires physical prowess as well as mental agility it also has some kind of a reward system and so on and so forth. So, that is why cricket is a good example or let us say the best example of game. So, the idea that is where the idea of goodness of exemplar comes from.

So, depending so, cricket has a higher GOE goodness of exemplar dependent on the GOE factor some members are better examples of a category and some members are not so good examples of a category. So, as a result of which there is a there is a hierarchy. As a result of this again categories are have fuzzy and expandable boundaries. So, classical theory cannot answer as to why video games could be included into the category game. So, easily, but this particular theory does answer.

So, there are prototypes of a category and there are many other members as well. So, prototype of a category is the one with the highest GOE, somebody some member who has all the features, but other members are also there. So, that at as a result of which the boundaries are fuzzy, boundaries are not rigid.

So, you can include more and more members. So, if there is a resemblance family resemblance you include more members; that is how we could include video games, we could include games people play and so on and so forth into the category of game similarly many other categories.

So, as a result of which these are the implications of the prototype model. Now, this model, this come this has come from cognitive psychology, the domain of cognitive psychology where Eleanor Rosch and group worked. Now, this was taken up this theory was taken up in other disciplines as well.

So, in philosophy John Austin are said that or words are organized around the 'sense' of words. So, when we talk when we have certain sentences or words or phrases that are kind of grouped together as a part of you know belonging to a higher category, they are grouped around the sense of those words.

So, he gives an example of 'healthy', there are there is a prototypical sense of the word healthy and there are some non prototypical sense of the word healthy. So, the word healthy basically means somebody having a healthy body, healthy body and healthy mind, that is this is disease free and so on and so forth this is the prototypical meaning of the health of the word healthy.

However there are peripheral words there are also non typical non prototypical senses who are also grouped together with the idea of the sense of the word 'healthy'. So, what are those non prototypical senses they are healthy exercise, which basically means exercises that will lead one to be healthy.

Similarly, healthy complexion so, which is a result of being healthy, somebody having a good complexion which is a result of being healthy. So, these are the non prototypical senses. So, that is how in the domain of philosophy John Austin uses the idea of prototypes.

So, prototypes are used not only in psychology, but also in philosophy and of course, then comes the domain of linguistics. George Lakoff is one of the one of the one of the most important figures in this domain. George Lakoff says that even linguistic categories can be understood to be organized in terms of prototypes. How?

Gives many examples so, we take the example of 'noun' here. So, in that in any textbook for children in the school textbook the first thing that you learn the grammar that teaches you is now what is a noun, what is a verb, what is an adjective and so on and so forth.

Language teaching always starts with the teaching of grammar and that too with the categories like this. So, what is the category 'noun'? How do we categorize a 'noun'? A

noun nouns are words that are used to describe people, places and objects. It seems very harmless it seems very unassuming very simple kind of an explanation.

But you see even here you can see the prototypical use of the categorization process. So, these are these people,, places and objects are the prototypes of nouns. Sometimes there are many nouns which do not really fit into these things there are things that are all nouns, but not neither people nor places nor objects.

For example beauty for example, a constitution for example, institutions, education these are nouns, but they are neither plays nor objects nor people. So, this is how Lakoff says, even in case of you know grouping something as simple as a 'noun' we are still going by the human mind is still using the idea of prototypes while defining a simple thing as noun.

Similarly, for learners when you teach whether it is a first language learner or second language learner. So, the learner, primary level learners, when you start teaching them what nouns are of a particular language of let us say for English for example. So, chances are very high we will start with words like water, bread, school, bank, simple things, simple nouns first.

And then gradually move on to complex more lesser less prototypical nouns like finance, institution, morality and so on and so forth. So, according to Lakoff even language even grammar; grammar is considered to be objective, grammar has nothing to do with you know human subjective intervention, but even there are prototypicality that is imbibed into it.

So, this is how we can actually look at the differences in the form of a chart; this is, this needs a bit of editing which I will do later. So, classical model so, you can see all members are share the same set of features, the when the prototype model, they do not require to say share the same set of features. The best examples have all the features the others may not. So, clear and rigid boundary, on the other hand there is no clear and rigid boundary and so on and so forth.

Now, Eleanor Rosch, as we said that classical theory was not based on any empirical evidence there was no empirical data collection that was happening. It was just based on speculation. But with the beginning of cognitive psychology, with the advent of cognitive revolution and experimental studies lot of empirical data started coming in. So, there were

lot of experiments that Rosch actually carried out. So, there are many types of experiments that she carried out. One was the production of examples.

So, what were the tasks that she gave? She gave the task: subjects were asked to list members of a category. As I was mentioning a little while ago, that you if you were asked to give 5 names or 10 names of birds, as simple as that, or ten names of tool, what are the tools that you can that you typically use and so on.

So, often the frequent frequently named are of objects of the of this category are taken as the best example. So, what you will see is more often than not, most people in any givens given scenario will give certain names as the in the first to first five numbers and then the 6, 7, 8, 9, 10 will be certain others. So, there is a consistency, the of the or in the order of those items in the list.

So, typically there will be a bird and bird will be bird in the category bird there will be parrot there, will be robin, there will be sparrow and you know so on and so forth. So, these are. So, the ones that are mentioned first in the list in the first in the top part of the list are considered the better examples of that particular category.

Hence the order is very important, and this experiment she carried out within cultures and as well as across cultures. The findings are very interesting. What she found was within a particular culture the list remained almost similar. The better examples the best examples of birds in a particular given culture within the culture are similar. So, more people agreed on having robins and sparrows and parrots as birds and within a particular culture; however, the when you change from one culture to another ,this order changed.

For example, dates might be considered a typical fruit in Tunisia, but not so much in let us say, in England. So, where a apples and you know oranges would be considered a typical fruit and so on. So, this was one example, one set of experiments which is called the production of a ‘production of example’ given a category name some members of this category, name some birds, name some tools and so on. And depending on the order we realize what are the typical examples in that particular given ah set up.

Second set of experiments that she carried out is called direct rating. So, subjects rated how good an example of a category an item was. So, there were list of items given and the subjects were asked to say is it a good example of this item? So, is robin a bird is it a good

example of a bird or is are dates a good example of fruit, category fruit and so on. It is basically doing the same study in a different way. So, here also the study showed a remarkable consistency within culture within a particular culture most people gave similar ratings to similar members of a category.

However, across culture there was a significant amount of difference. Another set of experiments that she carried out was called the ‘reaction time experiment’. Now what is a reaction time experiment? This is something we will see a lot of it in the, towards the in towards a later in the course.

Reaction time basically means that time the subject, the participants in an experiment takes to react to a certain given stimulus. So, you see a picture on the screen and you have to decide whether it is a fruit or it is a non fruit. So, the moment you take to react with an yes no answer or with a key press is the time is the reaction time.

And this is always measured in milliseconds. So, this is the study she carried out. Subjects took part in a judgment task of sentences involving different members of a category. So, sentences remained more or less same this was a matrix sentence: ‘a robin is a bird’, then the same matrix sentence would also include a different member of the category ‘a chicken is a bird’ it is as simple as that.

So, you read a robin is a bird and then you read a chicken is a bird and emu is a bird and so on and so forth. And what they found out was if the sentence included a member of a category who is a typical member, prototypical member of the category like robin the reaction time is always shorter always lesser than when the member is not a typical member of the category. So, chicken is not a prototypical bird hence you will take slightly longer to read the sentence as opposed to ‘a robin is a bird’. This is almost common sense, but this is what Rosch showed through her experiments. Another set of experiments that she carried out was prime target sort of paradigm priming paradigm what priming paradigm does is before the actual target stimulus comes to the screen there is a prime.

Prime has the role of preparing the subject for what is coming next. So, if you look at you know prime is a ‘fruit’. So, there is a there is the word ‘fruit’ that comes on the screen on your computer screen first and then there is a sentence like ‘is apple a fruit?’. So, the word ‘fruit’ is already preparing your mind to expect fruits in the next segment.

So, this will… this is the same the same way the kind of results we have already seen in case of priming also. So, using prime as a fruit and target ‘is apple a fruit?’, this will also speed up the reaction time in case of the prototypical fruit rather than a non typical one. So, if we have for example, same example if we can take, we have fruit in the as the prime and then ‘is elephant apple a fruit ?’ it will, the subjects will take slightly longer to react.

So, these set of experiments, with these set of experiments, she had actually many others also, but I have included the most cited ones, most common ones, the most well-known ones, to show that every category has good members and not so good members and that is not just at the level of language, but it also is at the level of how you process that information.

So, when you process the information of ‘robin is a bird’ you process it much quicker as opposed to ‘chicken is a bird’. So, this is not just a linguistic way of categorizing things, but it also is a mental process where your is a psychologically real thing that is what a Eleanor Rosch talked about.

Exemplar model on the other hand is yet another model slightly different from prototypical model. Here the members are categorized on the basis of a comparison between the new object and an already existing memory of that object. So, here there is the scope of differences. So, your a memory might be different compared to another person’s memory and so on.

So, after comparing it with exemplars from each relevant category, the object is put into the most relevant category. In fact, this is how Barsalou also said, but Barsalou did not give it a very subjective look. For instance, when you see a rectangular piece of wood with four legs it can qualify to be both a table and a bed.

So, you go back to your you know already existing criteria and all the exemplars of that particular category and then you match it. Depending on what is the best fit match with your memory and after comparing it with different attributes, for example, length and width and you know how it overall how it looks and so on. And you finally, categorize the object under one category.

This is what the exemplar model… exemplar theory talks about. Off late there have been many other changes. So, for example, till now what we have seen is that classical model says that there are necessary and sufficient features. Prototype models does not really negate the existence of features, but it says that all members need not share all the properties.

Similarly, exemplar model also sticks to the set of properties that are there, but there might be there is a hierarchy there are some good examples and there are some bad examples. So, basically categories are stable categories are stable abstract representations are in our mind, which has certain features and which has members and the boundaries are, more often than not, fuzzy this is what we have seen till now.

However off late there are more questions that have been raised and Lawrence Barsalou has given up given us some an idea of the Ad Hoc categories. Categories are not always stable, there are also possibilities that categories might be created 'on the fly'. For example, if we dependent on purpose for example, you have a category called 'things to take on a hike' or you know 'things to take for a picnic', 'things to take on a vacation' depending on where you were going for vacation things will change.

Things to take on a vacation in summer things to take on a vacation in winter so on and so forth. So, here what Barsalou basically tries to show is that categories can be created they can be Ad Hoc they can they need not always be very stable categories. So, for example, if you take things on a trip you can, you know, clothing to take on a vacation, they can be of various types of clothing's.

You do not need to be having only one particular type of thing. Things to take on a trip will not necessarily fit into any objective criteria you can take you know, on a trip you can take sunglasses, you can take hats, you can take you know sticks to help you out with the rock climbing and so on and so forth.

So, they are dispirit items they are different items clothing item you know, medicines and various kinds of things put together based on entirely based on the purpose for which they have been put together. So, purpose and goal gives a very strong reason to create categories, which is of course not fixed. So, this is where a very important theoretical position comes in. so, but even here remarkably even here the categories also will have a prototype effect.

So, there are kind of clothes that you cannot take or will preferably not take on a vacation or you know there are preferably… there are preferable dress codes, preferable items, preferable kinds of shoes and so on and so forth to take. So, even when you are creating a category, which are not stable, the category based entirely dependent on context and goal even then there can be a prototypical effect.

So, as a result of which there are new challenges. So, Ad Hoc categories use goal driven criteria and thus challenging the stable aspect of the category formation. So, categories are not stable, but variable depending on many factors like goal and context.

Now, context is a very complex notion to tackle in terms of in terms of category formation. So, because context automatically brings in the cultural context where it has to be used where in the context where the categories are to be used and that really literally opens the Pandora's box.

So, what is the, for example, what is the prototypical drink taken in a break? Very simple, very harmless question, but it is not, it will not elicit the same answer in different cultures. In India for example, if you ask anybody 'what do you take', 'what kind of drink do you take when you take a break?' more often than not it is 'tea' [chai] 'chai break'. In fact, there is a word called 'chai break' or tea break in India.

So, this is the typical drink that you take, but if you go to US more often they are not it could be coffee or in certain other in certain European countries it could be black coffee very very typical drink to take in a break. Similarly, 'what is a typical fruit?' a simple question what is the typical fruit? It will change dependent on the cultural context dependent, on the environment dependent on where you were talking about.

Even the idea of 'summer': what does the what summer you know the idea of summer that we have in India versus what you have in Europe is very different. Of course, nowadays there is a lot of homogeneity even in India people put pictures in Insta and Facebook you know ''summer is a good time summer is a happy time, but more often they are not in India in countries like India summer is not exactly a very very happy time, it is the heat can be oppressive.

In fact, the idea of summer as a time to go out and enjoy in the sun was probably responsible for the, for people dying of heat wave in France may a few years back. So, in

India, you know the heat waves are considered a part of summer, an integral part of summer in the northern part of India. So, but not so much in not so much in the European countries and so on and so forth.

So, context matters a lot about in terms of creating categories. Now we have seen dependent on goal and purpose categories and members of a category might differ. Then we saw that dependent on the environment the culture and so on, categories can differ not only that that is even individual variation possible that is what.

Again Barsalou showed that there is only about 50 percent of overlap of features among participants when asked to list properties like bird and chair. Something as simple as that, something as concrete as tangible as a chair if you ask 2 different people, 10 different people to list features about what are the features of a chair, there will be only the as he found out. In fact, it was not even 50 percent it was about 47, 48 percent of overlap across participants.

So, there is a 50 percent agreement among the participants as to what are the classical features, what are the typical features of a chair. So, you can see that there is even individual differences not only that he found out that the same participant might list different features on different occasions for the same task, for the same object, same while categorizing the same object.

So, the story so far is that categories have features; not all members share all the features, that is where we are today. The members that share the most features are the prototypes of that category and this is irrespective of what kind of category. So, it could be an ‘Ad Hoc category’ as well as a stable category categories can be stable categories can also be Ad Hoc like things to take on the trip and so on.

Category boundaries are expandable, they are fuzzy and categories prototypes can change across culture and goals. So, even though there are prototypes of a category, it can change dependent on the culture, dependent on the goal and so on and this variation is also seen at an individual level. So, we see already the idea of categories which was taken for granted, as an a priory truth in Aristotle’s time has already become problematized in modern time; it is not any more a simple harmless concept.

So, prototypes in culture this is at the theoretical level.

Now, we move on to the how it really shows up in real life prototype in real life. So, intercultural understanding is one place where we see these prototypical differences in prototypical members of a category as to how it can create some misunderstanding, this it can create debates and so on.

So, abstract domains like emotion, personal relationship, political concepts and etcetera, etcetera create a lot of misunderstanding across culture. For example, the very idea of freedom… how do you define freedom, where do you limit freedom, it can actually create lot of debates. In fact, that is what is happening in today's world.

Similarly, a simple thing like relationships: what you know what is taken for granted in certain cultures is not taken for granted in certain other cultures and so on and so forth. Why should this be important? Ok, fine languages are different, cultures are different and hence those are cultural ideas as coded in the language is also different. Why should it be important?

It becomes important one of the one of the places where it becomes important is when one has to learn a language. It can be a second language foreign language and so on and so forth. So, when they are… the when you are teaching a language to for a another person who as a foreign language, there you are not only teaching a language as in a coding system, but you were also teaching the associated knowledge system, associated cultural practices of that particular language.

So, that is when it becomes a very crucial factor as to bridge a gap between the prototypicalities across the cultures. An example of this is given by Donald Qi in his study in by using the word 'propaganda'. So, the study went like this there was a conversation happening between native speaker and nonnative speaker of English native speaker was a Canadian native speaker of English, the non-native speaker was a Chinese speaker of English and they are discussing a particular segment of sentences like this.

So, a sentence like 'the stories written in the newspaper today are not entirely factual they are largely made up for certain political purposes for me they are lies and sheer'. So, there was a gap here. Now, the native speaker that is the Canadian speaker of English said I think the word 'propaganda suits best here.

The what propaganda is suitable in this particular scenario because propaganda basically is something that is more often they are not is made up of lies and they are not factually correct and so on and so forth. Often used by certain groups with vested interests. Often being the political purpose for political purposes and so on.

To this, the non native speaker that is the Chinese speaker, this non native speaker is the Chinese person here in this study. So, the Chinese person, the Chinese speaker says, 'but propaganda is not a negative thing at all propaganda can be neutral. Propaganda does not have to be lies, it actually a can give you information, propaganda can mean giving information. For example, in China it is considered a neutral item, because the government has a department that gives information to about all the ongoing policies and so on and so forth to the public and this is what we understand as propaganda'. So, you see something as simple as a word like 'propaganda' can have such drastically different understanding across culture and this becomes, this is a very simple example of how it can become difficult to teach English to that person because he already has a different notion of the idea of propaganda.

Similarly there are ideas about certain other domains like color terms and kinship and so on and so forth. So, basic color terms is another domain where as we have seen Rosch had worked in terms of Dani language and also another group of people who worked, most notably is Berlin and Kay study, ah very very famous they worked on color terms across languages to find out if how languages differ in terms of focal colors, how many terms of language, how many color terms languages have and how they differ, you know what is the range across the spectrum and so on and so forth.

And they saw that the variation is arbitrary. Now focal colors are the best example of a color category in a language. So, what is yellow there is a focal color 'yellow' in the spectrum that goes from let us say red to orange red and orange and yellow and so on. So, where exactly is yellow placed in that in this particular thing for me this could be yellow for me this is 'the yellow' for some people this could be the yellow so, this is what is the idea of focal color.

Similarly I for me blue could be this focal color blue, but for another person this could be the blue that really stands out the typical blue is that. So, this is where languages differ. Now, he found out that their work found out that the worlds languages differ enormously

in terms of the basic color terms basic color terms can differ from having 2 terms to 11 terms. So, Dani we have already seen has only two colors ‘mola’ and ‘mili’ color terms, but English has 11 focal color terms.

So, that is what the that is the range of color terms that world’s languages offer. So, there is a there is also a sequence of the emergence of focal colors. So, if you have only if the language has only two focal colors, this will these are the two if you have then when you have three gradually red is incorporated and then in the evolutionary sequence, you will have yellow blue and green then followed by brown followed by the other colors. So, this is how the evolutionary sequence of you know emergence of focal colors have been proposed by Berlin and Kay.

So, focal colors are universal conceptually even if now their study found out that languages may have two focal two color terms or they may have eleven color terms; however, that does not mean that it anyhow, in any way limits people’s understanding of colors. So, even if there are very few numbers, but then understanding the conceptual level, languages people do not differ really.

Even if there is no name for a color in language, they can still identify the focal color in that particular language. So, for example, Dani has only two brightness based color terms. So, you already know that colors are based on the names based on hues and brightness. So, in Dani it is brightness based color terms, we have already seen mili and mola.

So, this ..the focal points are black and white. So, there are no color terms for many chromatic colors like yellow, blue, green and so on and so forth red they do not have any names they are all they are all put together under two these two categories. So, Rosch conducted studies in this community and succeeded in teaching them both basic and non basic color terms.

Here comes a very significant finding, because if you have the in terms of the relationship between language and cognition. So, if you have, if a particular language has only two color terms, does it mean the question is does it mean that community is not able to differentiate between say yellow and red and blue and green and so on and so forth does it mean that they cannot.

The studies found out that even when there are no words for blue and green; the Dani people can still distinguish, they can still find out the for the colors in on a chart. Similarly, you could even teach them the color terms of the terms that they do not have. So, the she ended up teaching them both basic and non basic color terms.

So, this not having color terms in your language does not also limit your possibility of acquiring them and so, this means that the findings of Rosch and Berlin and Kay point toward the to the fact that color cognition does not depend on color terms. The more on this we will see in the in the next part and we will move on to the next segment in part 2.

Thank you.