Natural Language Processing
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Lecture - 31
Wordnet; metonymy and word Sense Disambiguation

We continue our discussion on words and disambiguation, and Wordnet. We have remarked many times, before that words and disambiguation is the holy grave of natural language processing. If this problem is solved, we solve a range of problems in natural language processing, including machine translation, information extraction, question answering, and so on and so forth. And for disambiguation equation, the senses has to come for repository of a senses and word net happens to be award sensatory project. So, we continue and on the slide, we have written word net, metonymy and word sense disambiguation; metonymy is a relationship, which expresses metaphors so we will spend some time, describing metonymy which definitely is an extremely complex phenomenon to handle.

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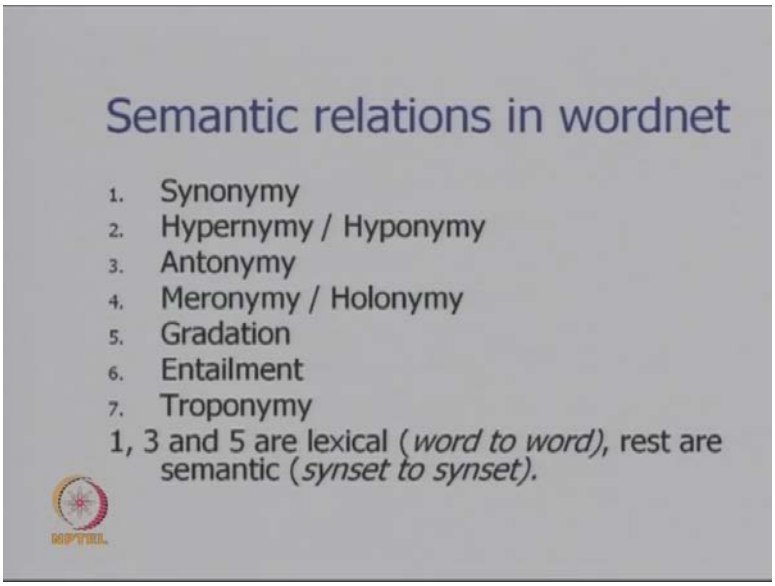

So, proceeding further, we see that the semantic relations in wordnet are Synonyms, which are words with similar meaning, and they appear, in what is call as the same in set. The next most important relationship is hyponymy or hyponymy, which is generalization specialization relationship, where we establish relationship between concepts, which are

specifics upsets of or instances of a more general concepts. Antonymy is opposition relationship, this is typically between words meronymy, is part of relationship Gradation, is a, an Antonymy kind of relationship but with graded meaning, Entailment is for verbs, Troponymy is also for evolves.

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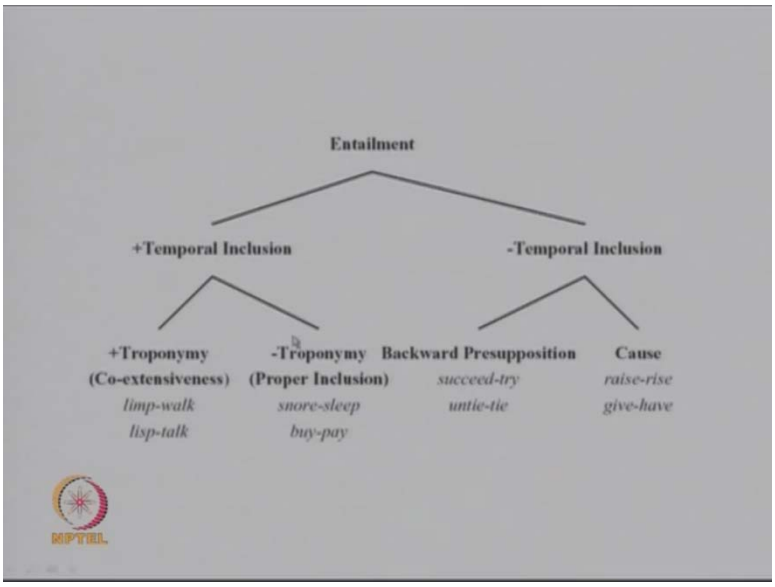

So, we have discussed on these relationships, we just remind ourselves of this, rich relationship called Entailment, which is between verb concepts, verb insets. So, Entailment can be with temporal inclusion or without temporal inclusion, with temporal inclusion, we have 2 kinds which is Troponymy and minus Troponymy plus Troponymy means co extensiveness, and minus Troponymy is proper inclusion. When, we have no temporary inclusion, then again there are 2 cases; one is backward presupposition, and the other is cause, so the example of a plus Troponymy plus temporal inclusion is limp and walk. So, limping and walking are coextensive events, when somebody is limping is also walking, lisp and walk, somebody are lisping and some are talking.

So, plus Troponymy, plus temporal inclusion is example simplified by limp walk lisp talk, in plus temporal inclusion minus Troponymy, we have proper inclusion. So, snore and sleep, there is a period, when sleep is attendant with snoring, and in that period snoring and sleeping are co-extensive. But we cannot say that snoring is completely co extensive with sleeping, because they do not always occur together, so this is temporal inclusion, but minus Troponymy, so snoring is not a manner of sleeping, unless sleeping

which is a manner of walking. Buy and pay also have plus temporal inclusion but minus Troponymy, in the sense that buying and paying are not temporarily co extensive.

There is this whole situation of buying, where paying happens to occupy a small segment, so that is why, this is plus temporal inclusion but not Troponymy, because paying is not a manner of buying. When you come to this part of the tree, then we have minus temporal inclusion, so the 2 actions not such that, one is temporally included in the other, so succeed and try for example, the temporary sequential, so once succeeds after trying, so try and succeed have backward presupposition relationship. So, success would mean that there was a face of trying, so this is backward presupposition similarly, untie tying and tying, anteing and tying if we say that, you are untying, your shoe lays, that would mean that the shoe lays was tied before.

So, this is backward presupposition, untying backward presupposition try. So, this is not the temporal included, but backward presupposition similarly, cause and minus temporal inclusion, example is raise and rise, somebody rises, if he is raised and give and have somebody can have, if something is given to him or somebody can give something, if that something he has so this is the cause relationship with, without temporal inclusion. So, Entailment is an extremely rich relationship, which introduces as it is parts Troponymy, backward presupposition cause and also proper inclusion, so we proceed further.

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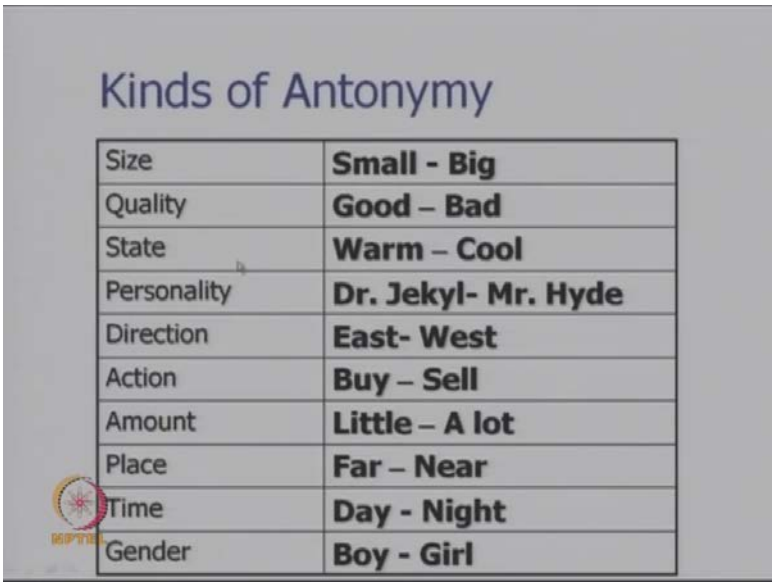

Now, we discuss Antonymy, Antonymy is opposition in meaning, this kind of opposition also is sensitive to the word, its properties size and so on. So, for example, size Antonymy small big, quality Antonymy is good bad, state Antonymy is warm cool, personality Antonymy is Doctor Jeckyl Mister Hyde, direction Antonymy is east west, action Antonymy is buy sell, amount Antonymy is little a lot, place Antonymy is far near, time Antonymy is day night, gender Antonymy is boy girl. So, there are different kinds of Antonymy, which when stored in the word net, make the word net richer.

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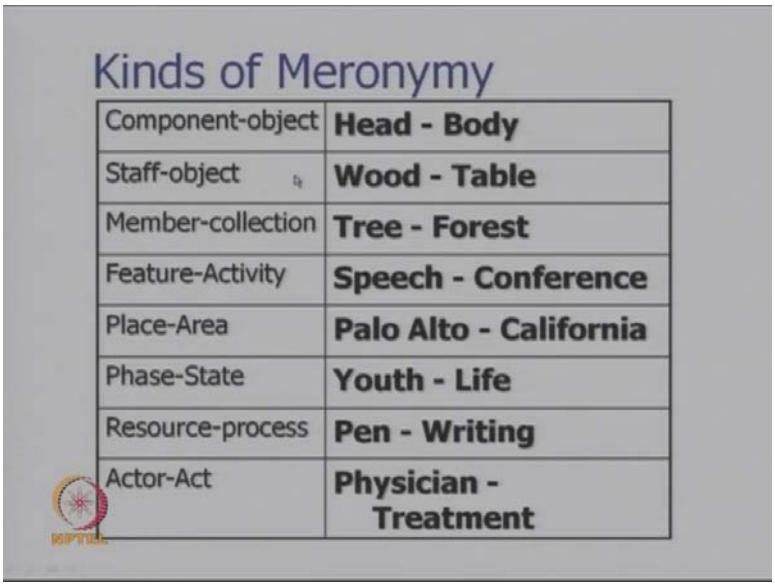

The different kinds of meronymy also, meronymy is part of and whole of relationship, so for example, component object is head and body, head is a part of the body, Staff object wood table, table is made of wood, Member collection Tree-forest, tree is the member of the Forest, feature activity speech is a feature of conference, place area palo alto California, Palo Alto is a part of California or situated in California, phase Youth. Youth is a phase of life resource process; pen is a resource for the process of writing actor act a physician treatment.

So, physician is the actor, treatment is the act, so meronymy is the can be of many different kinds, the first one is example of meronymy or part of relation, which is understood normally. So, meronymy can take the shape of part of, that is physical part of, made of member of, feature of, situated in phase of resource in, and actor act. So, meronymy again is semantically a complex, and settle relation. And if a machine is down, with the ability of detecting and processing meronymy, it is enriched in its capability, of natural language processing.

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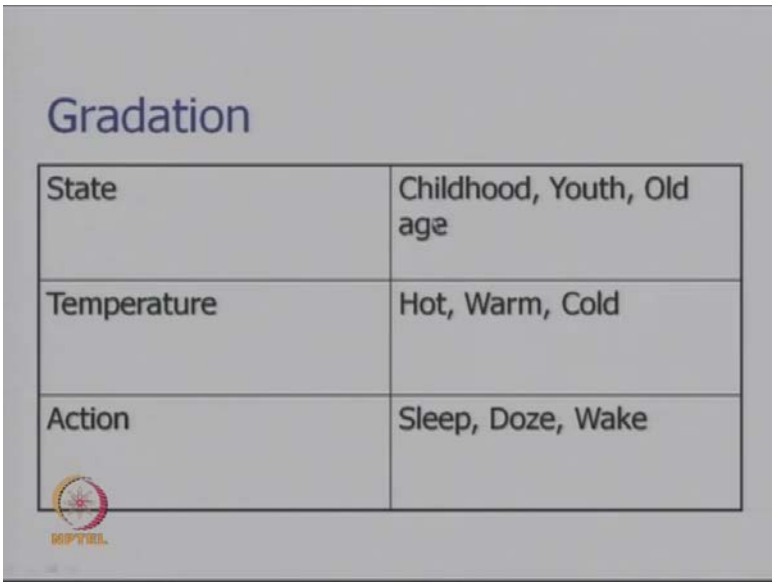

Gradation is a spectrum on antonymy, for example is given here, state gradation includes childhood youth old age. So, childhood and old age are antonymous to each other, so ends of the spectra, youth is a stage in between. There can be temperature variation, hot and cold are opposite ends of a spectrum, warm is a stage in between action. Sleep and wake are antonymous, opposite ends of a spectrum, doze which is half asleep; half wakeful state is a mineral ground. This is a middle stage between sleeping and waking.

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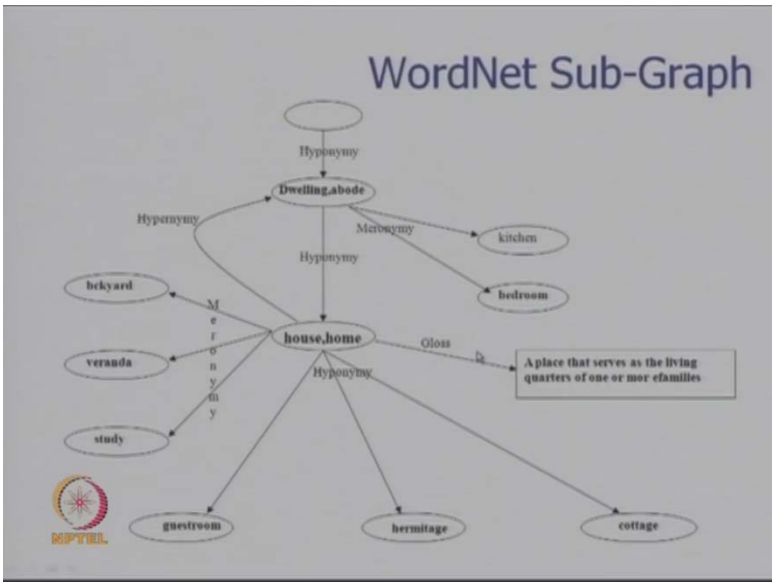

So, when these relationships are established, the word net assumes a graph like structure. And we see here a part of the word net graph, house home is a node in the graph, which has hypernymous relationship, with dwelling abode, in the sense that in the sense that house home is a kind of dwelling, abode in dwelling abode, the meronymy is are kitchen bedroom. So, kitchen, bedroom are a part of dwelling abode. Similarly, in house home, there are parts like backyard verandas, study, then house home has a hyponymy, like guest room hermitage, cottage.

These are kinds of house home, and the gloss is the small epithet describing, what the concept is a place that serves as the living cottage, one or more families. So, this is the graph structure, which is word net defines, and the moment we are understand these to be a graph, we can I think of computational algorithms, to navigate on the graph. And they produce different kinds of relationships, and two different kinds of processing, all based on words the senses, and the relationships, with each other. So, this becomes an extremely, useful resource for natural language processing.

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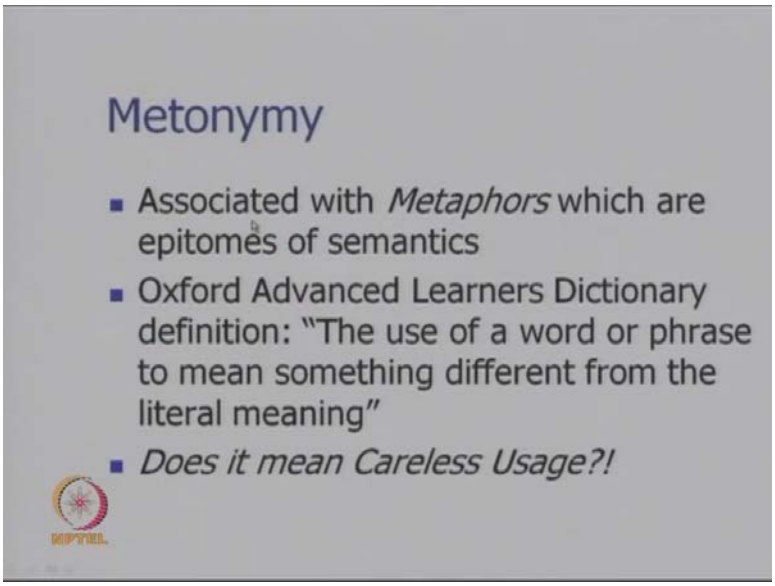

So, we proceed further and now, we take up a complex and rich semantic relation, which is beginning to be inserted in lexical researches, like the word net. This relationship is called as metonymy, this is associated with metaphors, which are epitomes of semantics, Oxford Advanced Learners Dictionary definition is that the use of a word or phrase to mean something different, from the a literal meaning.

And it does not mean careless usage, though there is a question here does not meant to say not anybody or everybody can produce metonymy. Metonymy is a distallation of lots of wisdom, which involves understanding a domain, understanding a particular subject or topic, and also having a powerful grip on the usage of language. And the words, and the meanings so metonymy is the product of knowledge, and language expertise, continuing with the slide. Again we repeat the definition of oxford advanced learners dictionary, the use of a word or phrase to mean, something different from the literal meaning.

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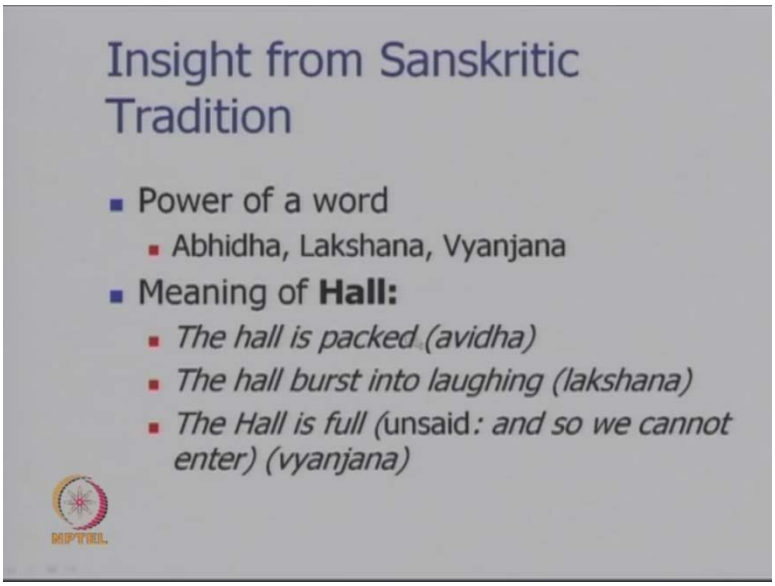

Now, there are lots, of insights from our traditional Sanskritic tradition. To understand metonymy, we have to understand, different enhances of a word, the power of a word is expressed by these 3 terms Abhidha, Lakshana and Vyanjana. So, we exemplify these concepts, through the word hall, the hall is packed, this is avidha. Here we mean the literal meaning of the word hall, the hall as a physical entity is packed. There are lots of people in the hall, this is avidha, the hall burst into laughing, this is lakshana, it does not mean, that the ones and the sealing of the hall broke or the doors, burst open or the windows fell apart.

This means the people in the hall burst into laughing, so by the word hall, we point to, the people who are sitting inside the hall the audience, that is sitting inside the hall. So, this is the [fl] example, the word hall is pointing its to own content, then there is this example the vyanjana, where we say that the hall is full, and what is unsaid is, and so we cannot enter, this is vyanjana, the hall is full, and so we cannot enter. So, if these part is not safe, then there is a vyanjanathmak, where is a vyanjanathmak means of this word hall.

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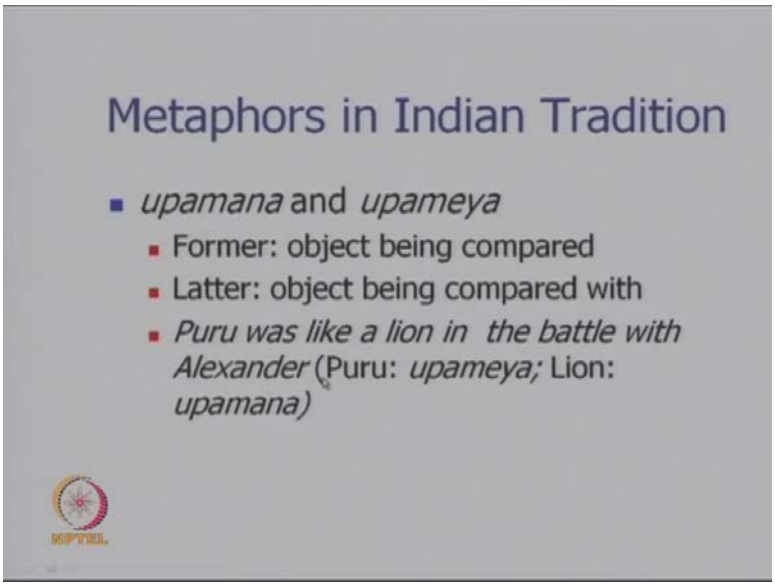

Now, Metaphors in Indian tradition have been studied extensively, and there are 2 technical terms, upamana and upameya. So, these two are terms to understand metaphor and the former means the object that is being compared, latter means the object, which is being compared with. So, if I take this example Puru was like a lion in the battle with Alexander, here Puru is upameya, because we are comparing Puru with something, Puru is the entity being compared. So, it is upameya and lion is the entity, with which we are comparing, upamana, upameya and upamana.

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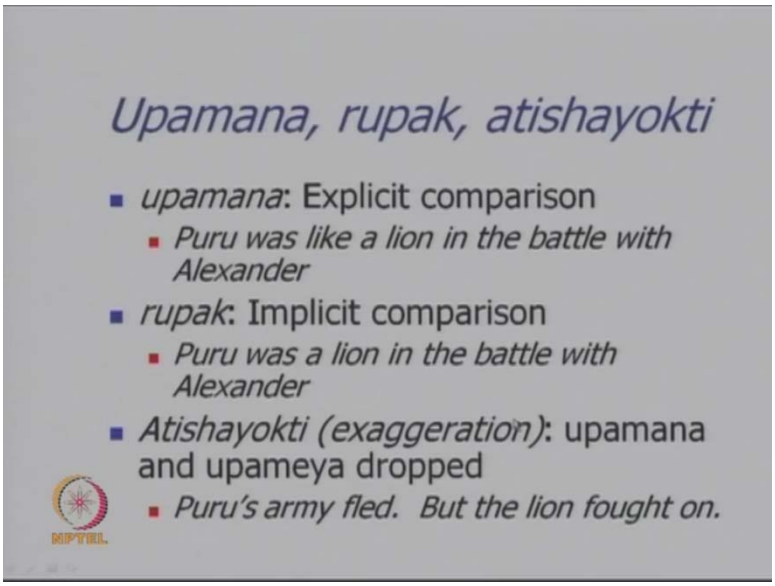

Now, these 2 entities gives rise to a 3 phenomena which is [fl], so [fl] is explicit comparison, Puru was like a lion in the battle, with the Alexander, here nothing is left in the imagination. The whole comparison is brought to the four, and the hearer does not have to exercise, his imagination. Puru is the person being compared, and lion is the entity with which the comparison is taking place, [fl] the other hand, which is implicit comparison. If we drop the word like, then we have say, Puru was a lion in the battle with Alexander, so it is not as, if Puru suddenly gave up his property of being human. Puru did not give up being human, and suddenly assume, the shape and property of lion, no that is not the case, Puru was a lion in the battle with Alexander means, Puru behaved like a lion in his courage and valler in the battle with Alexander.

So, what is being compared is not Purus physical features but his property of courage and waller, and the skill in involved, so these properties, are being compared with properties of lion. So [fl], we drop the comparing propositions like in [fl] or exaggeration [fl] and [fl] both are dropped, so we have these 2 sentences, here forming a, this course, Purus army fled but the lion fought on. So, in this case Purus army fled, there is no comparison, with anything here but there is a comparison here. But the lion fought on, here lion is the entity with, which Puru is being compared, and this is an example of [fl] because the co referential word Puru, it is co referential with lion, let us been withdrawn. So, theses are 3 different kinds of [fl] in Indian tradition, which has been studied by means of Indian studies by means of Indian literarily instruments.

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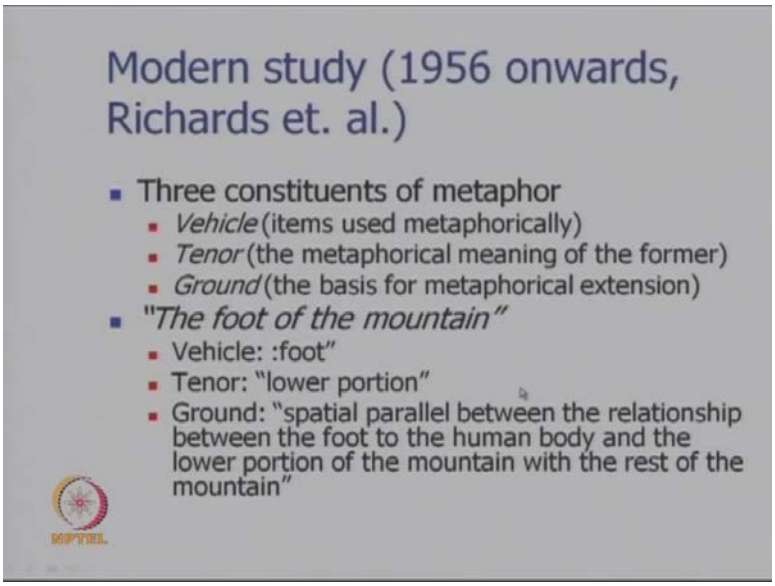

We see Modern study of metonymy in 1956 onwards, by Richard et al and they proposed, they point out that there are 3 constituents of metaphor, that is what is called a vehicle, item used metaphorically, the metaphorical meaning of the former, ground the basis for metaphorical extension. Let us understand this by means of an example, if we take the feet phrase, the foot of the mountain, here the vehicle his foot, because vehicle is the item used metaphorically, the word foot is being used metaphorical.

The tenor is the metaphorical meaning at the former, now the foot indicates the lower portion of something, something whose foot referring to, so the foot of the mountain is the lower portion of the mountain. So, Tenor is the metaphorical meaning of foot, and ground is the spatial parallel between the relationship, between the foot to the human body, and the lower portion of the mountain, with the rest of the mountain, this is the basic for metaphorical extension. So, foot of the mountain is the lower person of the mountain, and foot of human body is also lower portion of human body, so vehicle tunnel ground, are the constituents of metaphorical situation.

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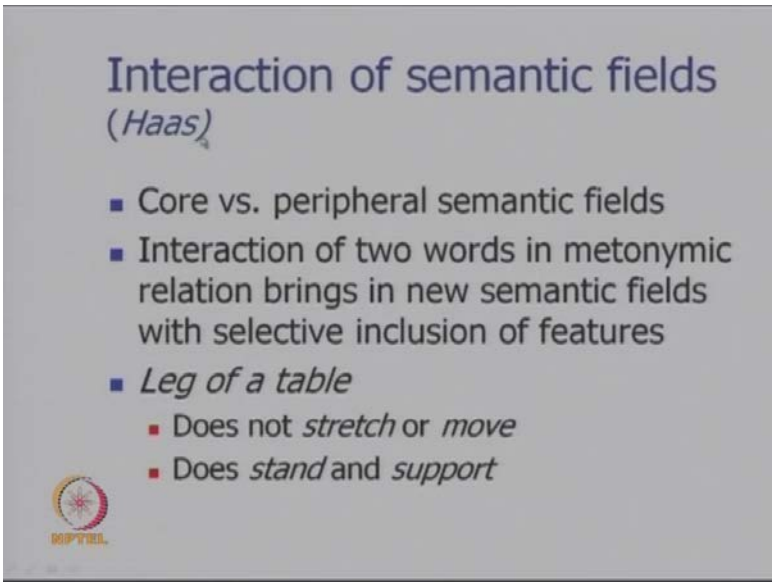

Now, Haas, who is a well, known a semanticist, studies metaphor, and proposes, that there is a complex interaction, of semantic fields, where metaphor is produced. So, there is this core versus peripheral semantic fields interaction of 2 words in metonymic relation, brings in new semantic fields with selective inclusion of features. So, that is the whole point of metonymy relationship. For example, if we consider the phrase leg of a table, so leg of a table and leg of an animal, there are limited portions of comparison, between the 2 leg of an animal, and the leg of a table. Leg of a table does not stretch, where as legs of an animal stretches moves and so on but the metaphor holds. Because these entities have one point of similarity, which is that both of them support of an structure, suppose of a animal, suppose the animal's body and leg of a table supports the piece of furniture. So, the comparison stretches to an extent but stops at a point that is the essence, of the metonymy.

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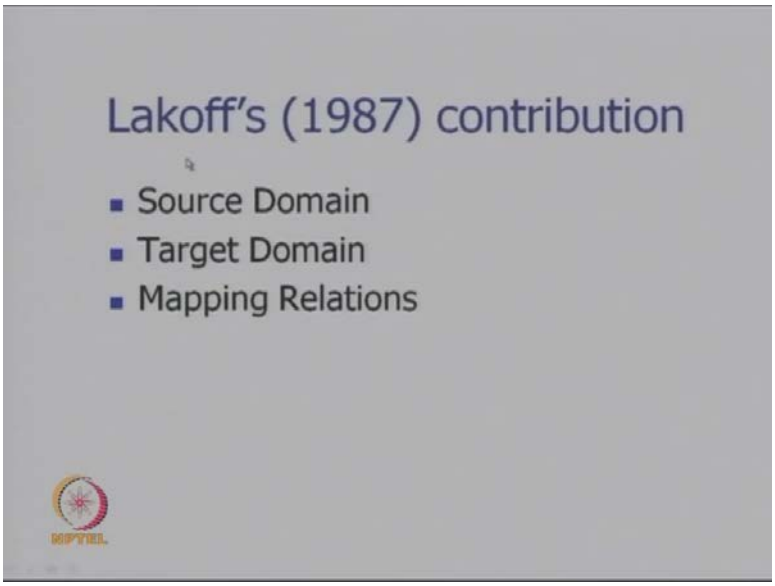

Lakoff contribution in 1987 was in terms of studying the source domain, target domain, and mapping relations, which produce metonymy.

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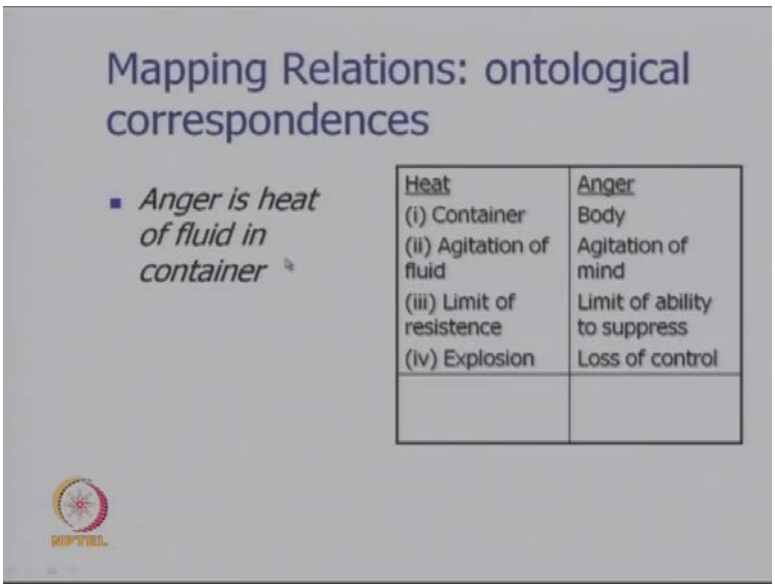

So, let us see what this means, and this mapping relations have ontological correspondence. So, here we take this statement, anger is heat of fluid in container, this is the sentence, anger is heat of fluid in container. So, let us see there is a correspondence being established between heat and anger, and the correspondences are as follows container for heat is body, for anger, so heat is inside the container, anger is inside the

body, agitation of fluid matches to agitation of mind, limit of resistance maps to limit of ability to suppress, and explosion is loss of control. So, we see how a metaphorical situation is created, by comparing heat and anger.

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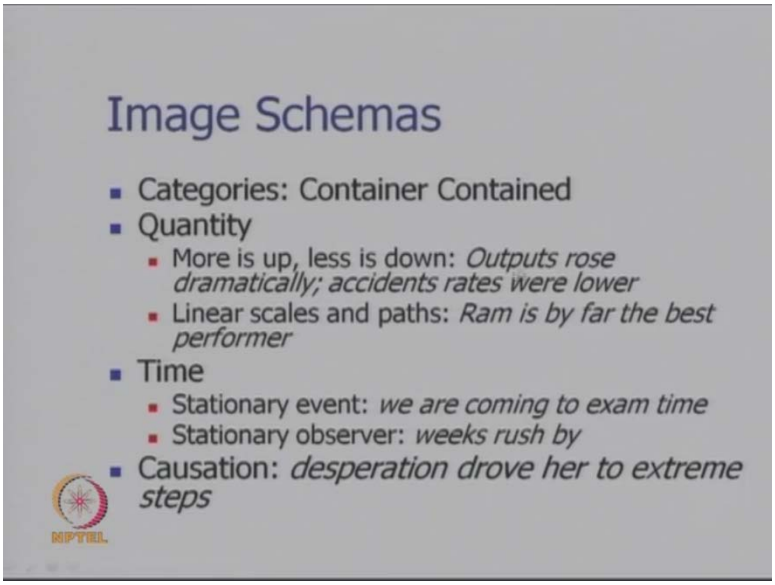

Then, there are what are called image schemas, so image schemas are very rich, situations describing different kinds of metonymy. So, there are categories like container and contained, suppose we discuss metonymy in terms of quantity, so more is up less is down, this you realize is a metaphorical situation. Whenever, we referred to something increasing, we appeal to the image of something moving up, something going up, when everyone to describe a situation of decreasing, we appeal to the metaphor of down, required quantity going down.

So, why did the case that more is up, and less is down? This is a metaphorical convenience, a metaphor for a situation which is invoked for effective speech, and writing. So, for quantity the metaphor is created through more is up, and less is down, so the example sentence is outputs, rose dramatically, accidents rates were lower, linear scales and paths are also created, through imagery ram is by far the best performer. This by far look at this phrase here, by far, far is a distance measured, or fire is a time measure, and this is a linear scale. So, when we say ram is by far, the best performer we have in or mind, and image of a raise, where ram is ahead much, ahead of others in a particular situation.

So, a correspondence is established, between a rays and the situation being compared. Similarly, time can produce metaphor stationary event, so it is as, if something is stopping and waiting, time does not wait, we know time always flows forward. But we have this metaphoric image stationary event; we are coming to exam time; we are coming to exam time. So, as if we are moving to the examination time, examination time is stationary, and we are moving towards it, though in reality what will happening is that, the examination date is coming towards the last, the stationary observer weeks, rush by weeks flow forward, weeks rush forward.

And we observe that we rush by causation desperation drove her to extreme steps. So, in expressing causation we invoke an imagery, desperation drove her to extreme steps, as if the image is of somebody, who is running towards the precipies of a hill, and jumping down out of desperation. So, as if a physical entity is pushing somebody, towards an inhabitable tent inhabitable end, so as if desperation is the physical entity, which is causing this, again this is a metaphorical situation for effective speech.

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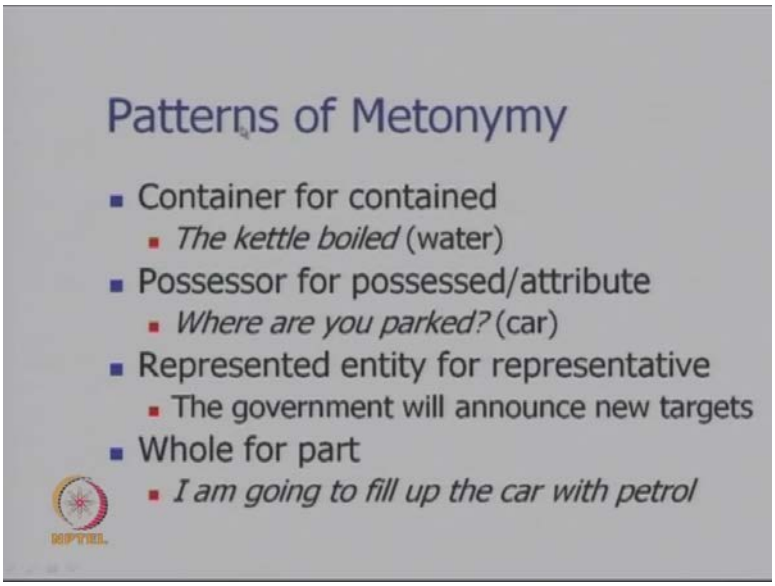

So, patterns of Metonymy, metonymy is created by means of following instruments, so we could substitute container for, contained and create metonymy a metaphorical situation. For example, that kettle boiled, what actually boiled was the water in kettle, and when we say that the kettle boiled, we mean that water in the kettle boiled, possessor

for possessed or attribute, where are you parked, who is parked the person or the driver is not parked, what is parked is that car.

So, here that is a substitution of the possessed, by the possessor, where are you parked, you means that owner of the car, where is your car parked the sentence is where is your car parked, instead of that, where are you parked. So, this, leads to a bit of gravity but also a colorful speech, represented entity for representative it. The government will announce new targets, it is not that, the government which is an abstract entity, announces new targets but it is the officers, the representatives of the government, who announce the new targets.

So, here what is happening is that government, government representatives are being substituted by government. Similarly, whole for part, I am going to fill up the car, with petrol this is also figure at speech, we are not going to fill up the car, with petrol. But we are going to fill up the petrol tank of the car, with petrol, petrol tank a part of the car. So, what is being done here is that, we are substituting car, for its part, which is the petrol tank, so whole for part that is producing, metonymy.

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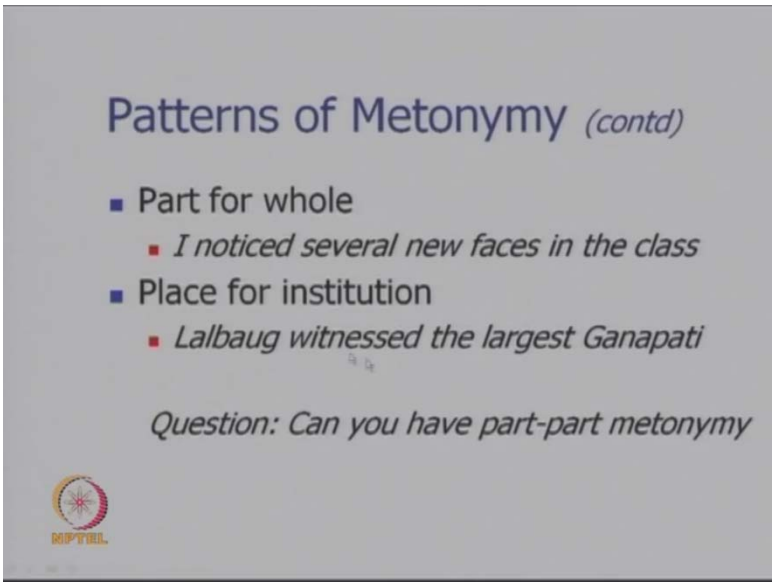

Part for whole also can happen, I noticed several new faces, in the class, what we noticed is persons in the class but in a more colorful way, we say I noticed several faces in the class, the faces of persons in the class. And here we are substituting, part for whole, place for institution Lalbaug witnessed the largest Ganapati, here Lalbaug witnessed, the

largest Ganapati here, phrase is Lalbaug is a famous location in Mumbai, and this is substituting, the institution which organizes this festival of Ganapati. So, an interesting, question which, arises here, is that of part for whole, and whole for part creates figurative speech, creates metonymy. Now, the question is, is it possible to have a part Metonymy, can you search and substitute a part of a physical entity by another part of a physical entity. For example, can you substitute nose by eyes, eyes by ears to create figurative speech or metonymy so try these exercise.

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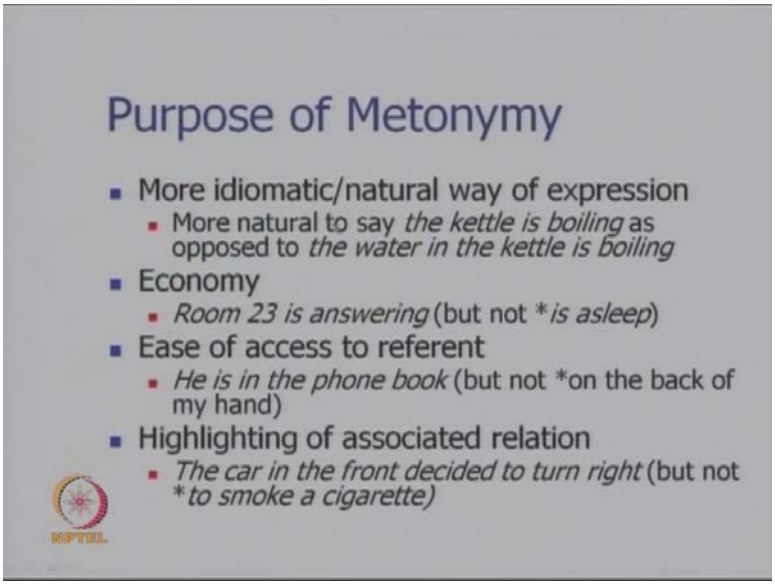

Now, what is the purpose of metonymy, why do people used metonymy, the purpose of metonymy is to create effective speech effective expression. So, we have a more idiomatic or natural way of expression, it is more natural to say, the kettle is boiling as opposed to, the water in the kettle is boiling. That would make things, too explicit for, effective speech, and its reception, metonymy oscillates to economy, here is an example room 23 is answering that means, the telephone in room number 23 in a hotel is ringing, and the occupant of the room is answering, not really room number 23. But these leads to an effective expression a colorful expression and it immediately catches the attention of the hearer. Next also, understand one important point, that important point is, that we use metonymy as an instrument, for effective colorful speech, an expression, and this engages, the attention of the hearer immediately.

So, that the content is delivered, very effectively, so the purpose is indeed to create a forceful expression, and to catch the attention of the hearer or the reader immediately with force, and effectiveness. So, when we say room 23 is answering the hearer will automatically, be interested in paying attention to the sentence. The purpose of metonymy is also ease of access to reference for example, he is in the phone book; he is in the phone book does not mean that the person is in the phone book. But the persons address, and the phone number is in the phone book ease of access to reference. That would be in that, instead of saying his number, we are saying he which is a effective way, of poiting to the person, highlighting of associated relation, these also a purpose of Metonymy.

The car in the front decided to turn right, the car in the front decided to turn right, the car is an animate involuntary entity, it can make decision. It does not have the power of decision making but what is being expressed is that the driver in the car or the owner of the car, who is sitting in the car, decided to turn right. Now, notice some of these expressions, which are with star, star is disguish. And natural language processing, means an incorrect expression, so room 23 is answering is but you currently room 23 is sleepy, they might thought to mean, that the you might want to me that the person in room 23 is sleeping. But it will not be very correct idiomatic, to say that room 23 is sleeping.

Similarly, he is in the phone book, but he is on the back of my hand, where we mean name is on back of my mind, or he is address is on back of my mind, he is not correct, we will have to say the whole thing. His address is on the back of my mind, here the car in the front decided to turn right but it will be wrong to say, the car in the front, decided to smoke a cigarette that would be funny. So, car in the front decided to turn right, car in the front decided to smoke a cigarette no, the second expression is not acceptable.

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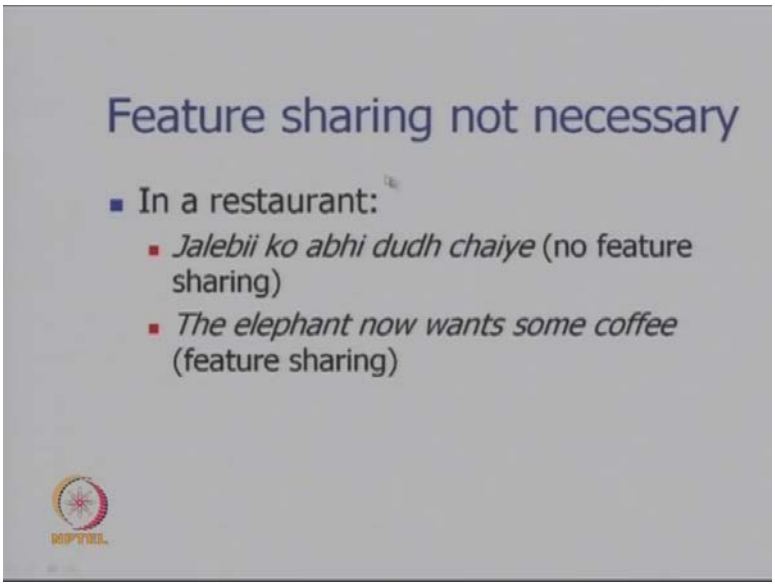

Feature sharing though is not necessary for metaphor creation, so in a restaurant for an example, one could hear a statement like [fl] [fl] [fl]. So, the meaning is that a, an eater in the restaurant, who was eating Jalebii, now wants milk. So, a particular waiter is indicating to another waiter, to bring the milk, to this border to this restaurant, who is eating Jalebii. Now, Jalebii can want milk, Jalebii is a form of Indian sweet, this cannot want to milk, but the person, who is eating Jalebii is, wanting the milk. Now, see that Jalebii and the person eating Jalebii have no feature sharing, they have no future sharing in come out but still an effective communication is created, by means of this metaphor.

The elephant, now wants some coffee so here, it is not the case is that elephant is sitting in the restaurant, and is demanding some coffee, if presumably; the fat person is sitting in the restaurant. And he now wants some coffee, before that presumably, he has ordered many things, and has not behaved, with the waiter, in a decent way; the waiter is irritated and would like to refer to the person, as an elephant. So, this also again a, is made quite colorful by invoking metaphor, where there is reference to elephant, to be in this fat perceive. So, this were some discussion on metonymy, and the purpose of metonymy is create comparison situations, and to create effective colorful speech.

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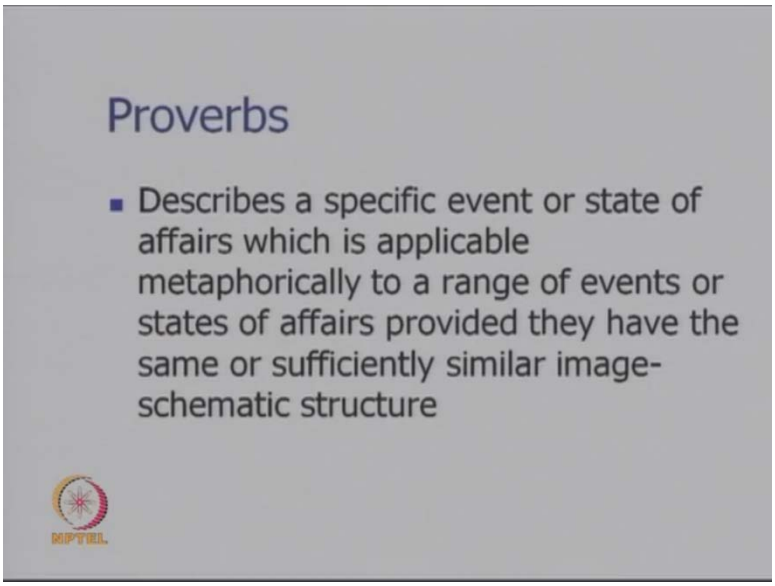

There is an another category of the statements, which are proverbs, they describe a specific event or state of affairs, which is applicable metaphorically, to a range of events or states of affairs, provided they have the same or sufficiently similar, image schematic structure. So, for example, a proverb like cut your coat, according to your clothes, that means, to spell within your veins is a metaphorical situation, this is a proverb, and what is being used is that, a correspondence between cloth and income, and cutting the coat and spending is established.

These, correspondences are established, so proverbs typically referred to metaphorical situations, to create an effective piece of wisdom, in Hindi for example, a proverb like [fl] which means a dancer, finds fault with the floor, saying that the floor is Croat, and there for the person, cannot dance is a proverbial proverb situation. And here dance refers to a particular activity, and [fl] that means floor is croen is the act of finding faults. So, having described the semantic relations of which, metonymy is a kind, and metonymy is very complex semantic relation, whose processing requires lots of syntax semantics sycons and fragmatics machinery.

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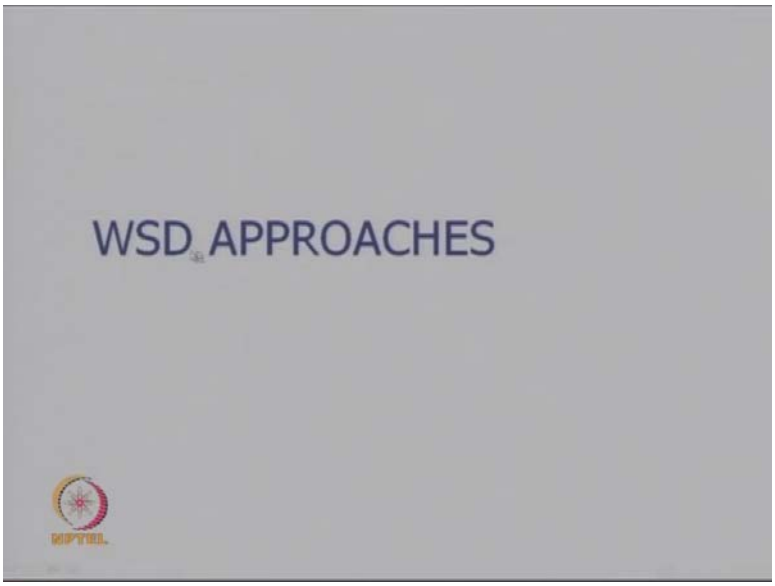

We now move on to version disambiguation which is facilitated by the word net version disambiguation approaches, will be described now.

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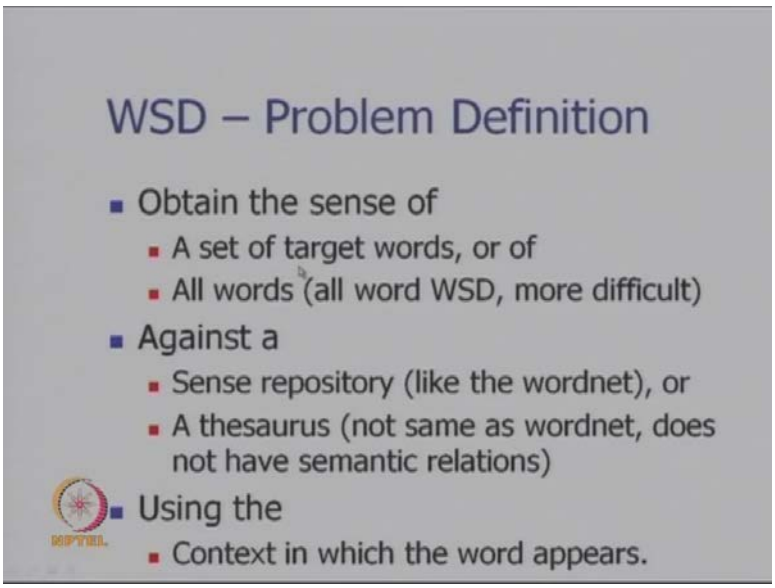

In terms of algorithms but first we have a problem definition, obtain the sense of a set of target words or of all words, which is call all word version disambiguation. This is a more difficult problem, than a set of target words that is being disambiguated, the reason is that set of target words, once it is known, that we would like to disambiguate, between these words. Then other words in the sentence looked upon the eyes clues, version

disambiguation, where as if you do not know, which words you want to disambiguate. Then all words are candidate for disambiguation, and the distinction between clue word, and the word of interest is broad.

So, all words need to be disambiguated, and in that process the algorithm, has to be more sophisticated. So, the problem definition is obtained the sense of a set of target words or of all words, against a sense repository, for example, like the wordnet or a thesaurus. Thesaurus is not same as the word net, it does not have semantic relationships, and obtain the sense of a set of target words or all words, against a sense repository, using the context, in which the word appears. This is the problem definition, we would like to understand, the concrete sense of a word as it is used in the context.

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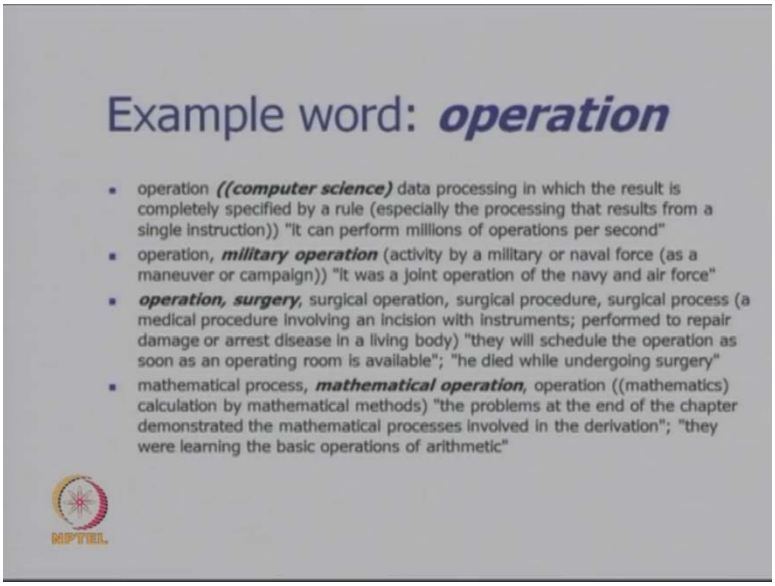

Here is an example; we take the word operation, so the word operation is very ambiguous because it can mean something in computer science. And operation in computer science, which is data processing, in which the result is completely specified by a rule, especially the processing, that results from a single instruction. It can perform millions of operations per second; so this see an example sentence, operation is used in the computer science, and sets. Operation can be, in the sense of military operation activity via military or naval force, as a maneuver or campaign it was a joint.

Operational of the navy, and air force, operation can mean a surgery, a surgical operation, a medical procedure involving an incision with instruments perform to repair

damage or arrest, disease in a living body. They will schedule the operation and as soon as the operating room is available, he died while undergoing surgery or operation, this is medical operation. And finally this operation can mean a mathematical process or a mathematical operation. So, this is calculation by mathematical methods, the problems at the end of the chapter demonstrated, the mathematical process involved in the derivation. They were learning the basic operations of arithmetic, which is mathematical operation. So, the word operation has at least these four senses, and they have to disambiguated, when they occur in a context.

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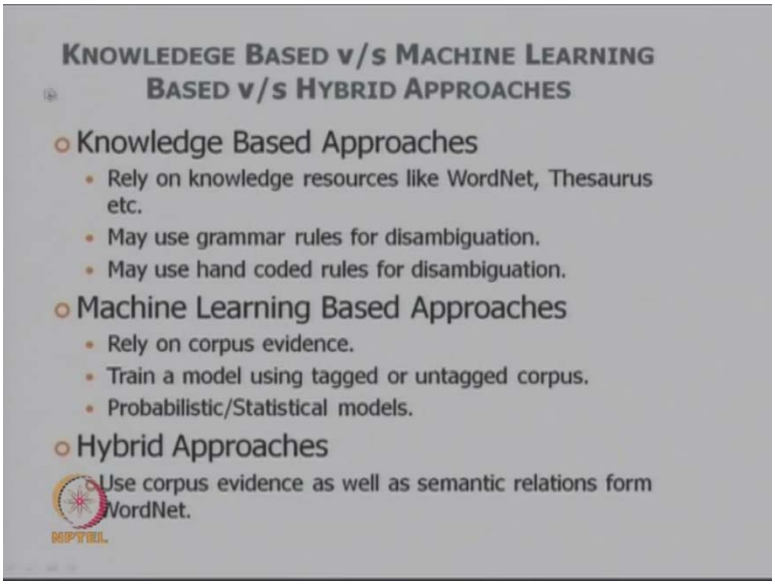

Now, version disambiguation can approaches can be divided into these few basic approaches. So, knowledge based approach, machine learning based approach, and hybrid approach. In knowledge based approach one relies on knowledge sources, like the wordnet, the thesaurus etcetera. The knowledge based approach, may used grammatical rules for disambiguation, it also may use hand coded rules, for disambiguation.

In machine learning based approach, on relies, on corpus evidence the corpus relies on corpus evidence. It is necessary to train a model using tagged or untagged corpus, and probabilistic or statistical model has built from the training corpus. In hybrid approach, one uses corpus evidence, as well as a, semantic relations from the wordnet. So, these three are the main approaches to wordnet disambiguation.

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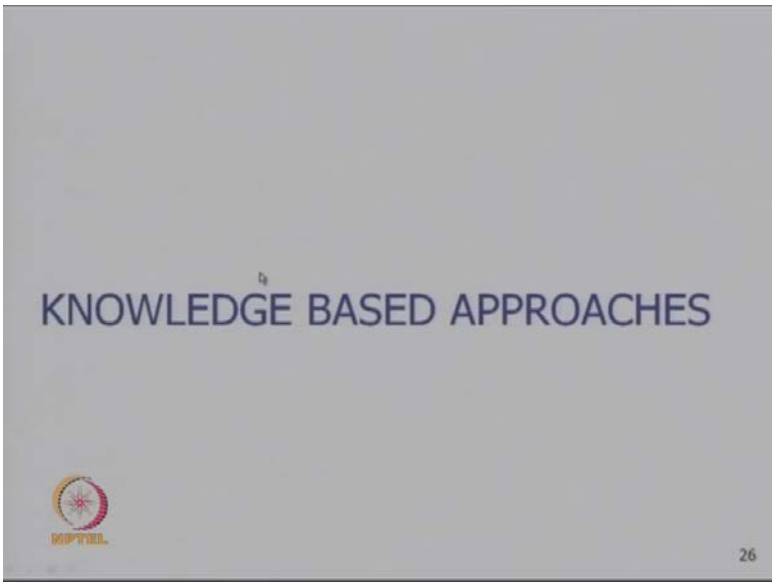

We start with knowledge based approaches.

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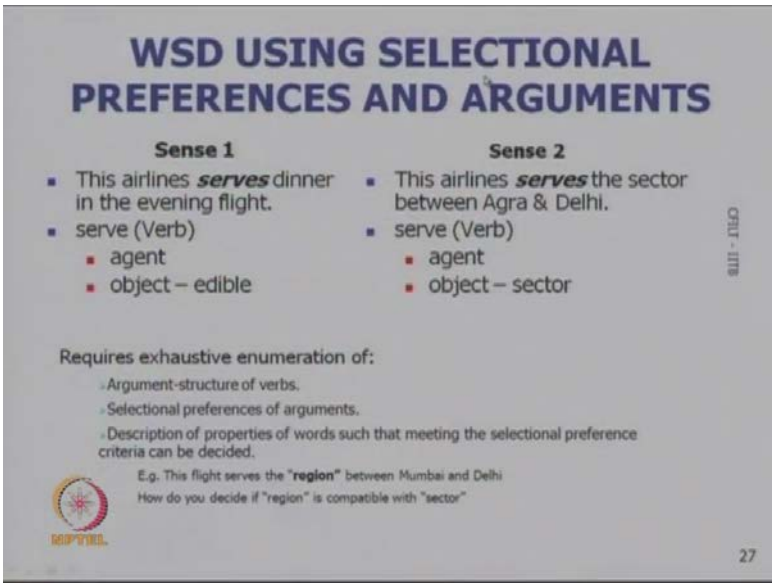

And refer to version disambiguation using selectional preferences, and argument, here is an example, the airlines serves dinner in the evening flight. This is the first sense of serve, another sense of serve is this, this airlines serves the sector between Agra and Delhi, here serving means to carry transportation, and this serving means, to offer to give. So, the airlines gives dinner in the evening flight, this airline operates carrages in the sector, between Agra and Delhi.

Here serve is a verb, serve is a verb, here also the agent of serving is required, here agent is a necessary argument, and serve also has an object, here serve has an object again but the object here is a sector, here the object is something edible. So, now, one can see, that it is possible to disambiguate, the word serve, from the property of the objective taken is not it. So, here dinner is the object, which is being used, as the argument of serving, and the property of these is edibility. So, the moment, I know the property of the object, factor the object is the edible, I know this sense of serve is used here, serve in the sense of giving, offering, where as if I know the object is of sector.

Let us say Agra, Delhi sector, then I know the sense to of service is being used, where the property of object again, is serving to disambiguate. Now, this kind of version disambiguation is very simple to understand, it is elegant, it is intuitive, however it requires an, exhaustive enumeration of argument structure of verbs, selectional preferences of arguments. Hence description of properties of words, such that meeting the selectional preference criteria, can be decided. This flight serves, the region between Mumbai and Delhi, how do you decide, if region is compatible with sector. Now region and the sector 2 different words, but both of them, mean physical space, physical distance, how does on decide that, the fact that these two have, similar property.

So, in this case this, what is happening is that, the sectional preference of the object is being used to disambiguate. But what it means, since is that one needs an exhaustible knowledge based of the properties of the form, what kind of arguments that have takes, and exhaustive enumeration of the properties, of the object, the enumeration, nouns and adjectives and so on. The arguments like agents objects have to satisfy some property. So, those properties have to be called out, from some resource, which typically is the wordnet.

Now, this is not to say, that such things have not happen, they have happen, the argument structure of verbs have been, enumerated in resources like wordnet, the pro bank, the verb portion. These are rich resources, encoding properties of words, the selectional preferences of arguments, which typically nouns, and can be obtained from the wordnet, description of properties of words, such that meeting the sectional preference criteria can be decided. This can be directly done by means of the wordnet verb resource structure and the wordnet, so this is the case.

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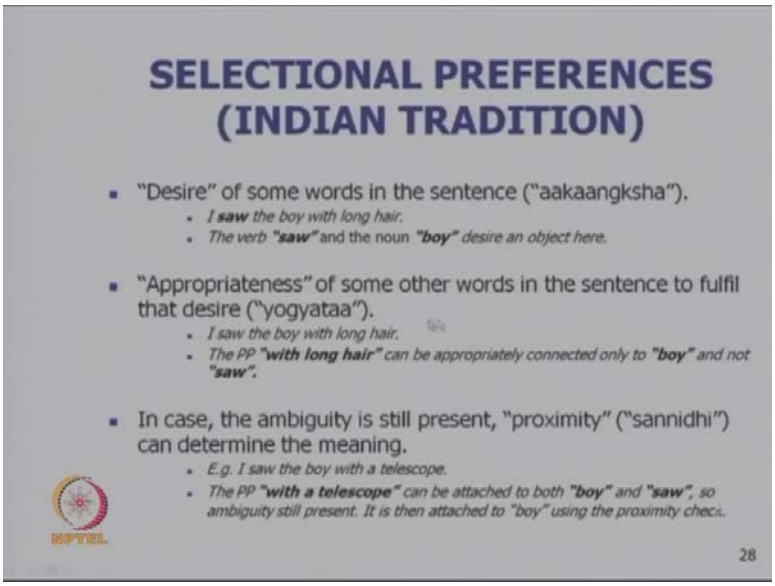

Now, in Indian tradition, the selectional preferences have been used by means of the following concepts, there is this notion of aakaangksha, which means the desire of some words, in the sentence. So, if you look at this sentence, here I saw the boy with long hair, the verb saw, and the noun boy have a semantic relationship. I saw the boy with long hair, the verb saw, and the noun boy, desire and an objective here. So, here the saw is the verb which means, desires are an object, and boy satisfies the desire, that by being the object of that activity. Now, I saw the boy with a long hair, the question is this long hair should be attached with what. So, this disambiguation is done by means of the properties of see and boy will continue with this discussion in the next lecture.