

Basic Concepts in Modal Logic
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Lecture - 22
Possible Worlds and Modal Realism

Welcome back in the last lecture we discussed semantics tableaux method with respect to some examples and we have seen that if you want to test the validity of a given formula and we need to see that we need to negate the formula and see when the branch closes. So, in the process we have been continuously using I mean how we are moving from one world to another world etcetera. So, now, one of the important concept in the modal logic and we need to understand in a better way as far as possible in a best possible manner. So, that is the concept of possible world. So, what is a possible world and are they real and if they are real then how can we defend that they are considered to be. So, concrete like ah. So, concrete like the ones which you object that you see in the world.

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Possible Worlds
Modal Realism

Possible Worlds

The model theoretic semantics of such modal sentences are given in terms of possible worlds.

Real world we do not mean the planet earth on which we live, but all those items existing in the universe, events that have occurred, and propositions and relations that characterize the items and events. An item is either a physical object such as a Pyramid, tree, Empire State building, moon, or tiger; an abstract object such as the set of prime numbers or classical logic

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So, in this this in this lecture we will be focusing our attention on what we mean by possible worlds and what philosophers has to say about the possible worlds and we will be presenting an important view which is due to David Lewis and that position is called

modal realism. So, the talks of possible worlds was already there in the works of when he talked about actual world he is of the view that this actual world is considered to be one of the best possible worlds we this lecture is all about why possible worlds and what are possible worlds and why they are considered to be important and you need to note that in the beginning of these lectures in the historical context I mention that in the classic period in particular from 1960 to 1972 there was lot of emphasis on the relational structures the underlying concept for the relation structure is nothing, but the possible world how this possible worlds are related to each other then with which you will know what kind of constrain that you are imposing on the accessibility relation accessibility relation requires the connection between the possible worlds.

So, depending upon that we are we say we said that t holds in reflex frames and d holds in serial frames and some other formulas which holds in some kind of frames. So, let us begin with what are these possible worlds. So, the modal theoretic semantics or the possible world semantics of such modal sentences are given in terms of possible worlds. So, we have said in the beginning of the course that we are doing modal logic just because we want to maintain the distinction between possibility of p necessity of p and something which is actually the case that p classical logic takes care of only what is actually p even if you talk about it is necessary that p it is understood as it is actually the case that p and possibly for example, if you say it is possible that it is raining outside it is also understood as it is actually raining out there, but we maintain this distinction that it is possible that p to it is actually the case that p because from whatever is possible it does not lead to whatever is actually the case it is possible that ghosts exists is the case, but it does not mean that actually exists. So, there is something called actual world and there is something called possible world.

So, real world we do not mean that there is a planet earth on which we live, but all those items existing in the universe or events that have occurred and propositions and relations that characterize the items and events an item is either a physical object or something like pyramid or tree or something like empire state building etcetera moon tiger etcetera or it can be even an abstract object such as set of prime numbers or something like that we you see in the classical logic.

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Possible Worlds
Modal Realism

What are possible worlds?

1. How is all this talk about possible worlds to be construed? Do possible worlds exist? Are they concrete? or imaginary, fictitious, abstract objects? If so, what is their nature?
2. Leibniz: that the world we inhabit, the actual world, is the best of all possible worlds
3. David Lewis: there are many ways things could have been besides the way they actually are. Taken at face value, this commits us to entities called, **ways things could have been**.

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So, what are these possible worlds one definition that is given in the literature is this that possible worlds are considered to be maximally consistent set of sentences that are set to be true means complete we will talk about that particular kind of definition little bit later, but let us get back to this thing that how is all this talks about possible worlds need to be construed. So, before that we will be asking that fundamental questions does this do this possible worlds really exists or it Is like a friction or something like that or are they really concrete or simply imaginary fictitious abstract kind of objects that has nothing to do with our thing if. So, if they are concrete then what is their nature? So, we fall back on Leibniz and he is of the view that the world that we inhabit that is considered to be the actual world it is considered to be the best of all possible worlds; that means, if the actual world also needs to be taken as another possible world after all we have only possible worlds, but the actual world is one such kind of possible world which is considered to be the best possible world that we are inhabiting.

So, in that context he is talking about necessity of any sentence modal sentence means for him something is necessarily true means it is true in all possible worlds including the actual possible world and something which is possible which is p means it is true in at least one possible world the same kind of idea was carried forward and then since kripke

semantics now it is we see we witness some formal, formal framework for this possible world.

Interestingly there is another influential philosopher David Lewis he worked extensively in the area of counterfactuals philosophy of language and is a pioneer in the area of logic especially he works on counterfactuals are still considered to be very popular there is an interesting book by David Lewis on counterfactuals and then there are other books written by him Pluralism on the plurality of possible worlds it is also very interesting book it led to. So, many other things, David Lewis interestingly he has come up with this view that there are many things that could have been besides the way that it is actual. So, things could have been different in different ways. So, these are all these things considered to be in possible worlds in his view there are many ways in which things could have been besides the ways that it actually the case suppose if you have taken the snapshot of this room the room that we are in then that is considered to be the actual world if you imagine that it is the actual world there are several ways this you can imagine this room could have been.

For example, if you if you remove one object from this room I mean it is still you can it is closer to the actual world or if you remove one table one chair etcetera you can still think of this particular kind of room they are also closer to this world, but you can definitely not you cannot imagine a situation in which you have removed everything clock tables chairs etcetera and then that could that is not consistent with what you think that with respect to the actual kind of world.

So, taken at face value this commits us to what is this things could have been different in different ways commits us to view commits us to entities called ways things could have been these entities can be called or named possible worlds possible worlds in simple sense different possible states of affairs or things could have been different in different ways or things might have been the same kind of object might have been different in different ways. So, all these things are considered to be possible world.

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The slide is titled "Two views of possible Worlds" and is part of a MOOC on Modal Realism from IIT Kanpur. It lists two main views: 1. Abstractionism, which views possible worlds as abstract objects like propositions or sets of numbers, and 2. Concretism, which views possible worlds as concrete spatio-temporal universes, causally and spatio-temporally disconnected from each other.

Possible Worlds
Modal Realism

Two views of possible Worlds

1. Abstractionism: View of the majority: possible worlds are some kind of **abstract objects** - such as propositions, properties, states of affairs or sets of numbers (that is, sets of sets, since numbers can be reduced to sets).
2. Concretism: Possible worlds are **concrete spatio-temporal universes**, very much like our own, **causally and spatio-temporally disconnected** from each other.

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There are two main kinds of views there may be several views, but these are the two views which are which you will find it in the literature. So, these are like this one is you treat possible worlds as abstract and other views due to David Lewis he treats possible worlds as real as our actual world which is considered to be concrete. So, abstractionism which is due to plating a and others and that is considered to be the view of majority to utter this world this possible world they think that it is a fiction that is imagination which is not considered to be real for us.

So, supposed you say that it is possible that it is real that it is raining outside it is actually the case here the view of majority of the philosophers and the possible worlds are some kinds of abstract objects such as proportions properties are states of affairs or it can be simply some sets of numbers etcetera. So, that is you know sets of sets the sim since numbers can be reduced to sets everything can be discussed in terms of language of set thing that is what is the view of abstractionism and there is another view which we are trying to see take it we are falling back on this particular kind of approach that is concretism. So, which is this is of the view that possible worlds are considered to be concrete Spatio temporal universes can view them in that way and very much like our own world and it is called casually and Spacio temporarily unfortunately they are

considered to be disconnected from each other. So, these are this can be viewed as there is another view which is called Concretism.

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The slide is titled "Why Possible Worlds" and is part of a MOOC on Modal Realism from IIT Kanpur. It discusses understanding claims about possibility and necessity, and understanding counterfactual claims.

Possible Worlds
Modal Realism

Why Possible Worlds

Understanding claims about possibility and necessity

1. it is possible that P means there is a possible world in which P is true
2. it is necessary that P means every possible world is one in which P is true.

Understanding counterfactual claims

if kangaroos had no tails, they would fall over means in the closest possible world in which kangaroos have no tails, they fall (topple over) over.

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Now, So, will just explain these two views little bit later, but we need to ask ourselves why we need to rely on this technical concept possible worlds. So, what is leading us to say that something is necessary means it is true in all possible worlds something is true in one possible world something is possibly true means it is true in only some possible worlds. So, understanding claims about possibility necessity etcetera requires we require possible worlds for example, if you say it is possible that p means that there is there exists some kind of possible world in which your p has to be true and it is necessary that p means it is true in all possible worlds.

So, if you are analyzing any modal sentences any sentences begins with necessary possibility etcetera you need to have this notion otherwise things will remain the same thing it is possible that p it is necessary that p and p all same for example, if you say two plus two is equal to four some necessary trues like two plus two is equal to four and then we need to make such kind of distinction from necessary trues to something which is possible or contingent kind of sentences like I shall be in my native place on. So, date

during the vacation that may be true or may be false also if you say something that is possible that p it is equally likely that possibility or not p is also the case.

So, if you do not have the distinction or do not have this concept there is no way in which you can figure out the distinction between possibility of p actual p and necessity of p and there are some other complex kind of sentences like this thing again these are called again this these are modal sentences and these are viewed as in a different way they are viewed as variably strict conditionals this is the name which is given by David Lewis in his book counterfactuals.

In order to understand counterfactuals are not considered to be true here of course, the antecedent of the counterfactual is always false. For example, if you take this sentence if kangaroos had no tails then they would fall over. So, this means in the closest possible world kangaroos had no tails I mean you have to imagine a world in which it really happened in that way that there are no tails then in that world the falling over will take place.

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Possible Worlds
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Possible Worlds: Uses

Understanding essential and contingent properties

1. I am essentially a person iff I am a person in every world in which I exist
2. I am contingently a philosopher iff there is a world in which I exist and am not a philosopher
3. A being has necessary existence iff it exists in every possible world

understanding the content of belief and knowledge

The total content of my beliefs is a set of possible worlds

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So, analyzing the counterfactuals conditional sentences require this technical concept that is the possible world or understanding there are some other uses the understanding

essentials and the contingent kind of properties like if you say I am essentially a person if and only if I am a person in every world in which I exists then only you will be considered a essentially a person or human being or if you say I am contingently a philosopher means if and only if there is a world in which there exists something like me and that world I am not a philosopher if I say something is contingent then it is possible that p it is not possible that not p is also the case or a being has a necessary existence if and only if it exists in every possible world. So, all these things require analysis of these sentences require to use the possible worlds. So, understanding the content of belief and knowledge logic of knowledge belief etcetera they require or interpretation of these sentences requires I mean particular semantics I will call it possible world semantics.

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Possible Worlds
Modal Realism

Possible Worlds

understanding semantic values
a proposition is a function from possible worlds to truth values an
intension is a function from possible worlds to extensions

Understanding properties
a property is a set of actual and possible individuals

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Or another thing there are several uses like this understanding semantic values like for example, the proposition is considered to be a function from possible worlds to some kind of truth values truth values are either t or f values an intension is considered to be a function from possible world to extension there is a relationship between intention and this possible worlds.

So, when we talk about propositional logic we do not take care of these particular kind of things that you know propositions are need not to be viewed as a possible world because

there is only one actual world in which we are evaluating the sentences if proposition is a sentence either true or false this is a straight forward definition that you came up with in propositional logic, but in the case of modal sentences it is not that easy those intentional logics in particular a proposition is viewed as a function from possible worlds to truth values or an intension is considered to be a function from possible worlds to extension is the one which you are trying to refer to or in other cases like understanding properties etcetera you need to invoke this possible world say property is considered to be set of actual or some kind of possible individuals.

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Possible Worlds
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Modal Realism

1. The talk of possible worlds is the literal truth. Lewis propounded a thesis of modal realism the world we inhabit the entire **cosmos** of which we are a part is but one of a vast plurality of worlds, or **cosmos**, all **causally and spatiotemporally isolated** from one another.
2. Whatever might have happened in our world does happen in one or more of these merely possible worlds: there are worlds in which donkeys talk and pigs fly, donkeys and pigs no less real or concrete than actual donkeys and pigs.

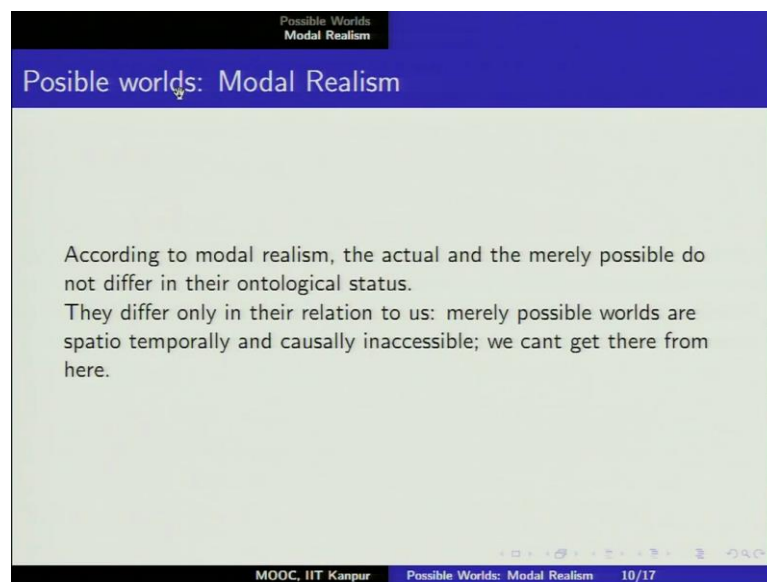
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So, these things we will require some knowledge of possible world. So, now, let us get back to the view two that is concretism, and this can be viewed as modal realism modal realism states that all our possible worlds are considered to be real and this is a view as cribbed to David Lewis . So, the talk of possible worlds is for Lewis in particular he has gone to such an extent that it is considered to be a literal truth and Lewis propounded a theory of realism where he is of the view that the world that we inhabit the entire cosmos of which we are just part of it is nothing, but one of the vast plurality of the worlds there are many worlds in that this is. So, happened this is considered to be the best possible world or cosmos and all are casually or Spatio temporarily isolated from each other.

So, we need to bring in these notions casually and Spatio temporarily etcetera. So, they are all isolated from each other they are concrete, but there is no connections between these things suppose if you say that it is possible that it is raining outside actually it is not the case that it is raining like you can still talk about that thing it is possible that someone else is considered to be the prime minister of India, but it is the casual connection is not there the Spatio temporarily it is said to be isolated that those kinds of worlds there may be several worlds you can imagine a different prime minister although we do not think about such kind of thing, but we know the facts that is why we restrict ourselves to the actual world.

But you for imagination you can think of some kind of worlds, but unfortunately they are not casually or Spatio temporarily connected to the actual world. So, whatever might have happen in our world does happen in one of the one or more of these possible worlds and these are the worlds in which you can talk about worlds like donkeys talk pigs flies donkeys and pigs no less real or concrete than the actual donkeys and pigs.

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So, according to this view modal realism the actual and the merely possible do not differ in their ontological status ontological status remains the same thing for possible worlds and the actual world. So, they differ as for as ontology is concerned it does not make any

difference. So, they differ only in their relation to us. So, merely possible worlds are Spatio temporarily and casually inaccessible mere possible worlds are like pigs flies donkeys donkey flies or pigs float on water all these things. So, we cannot get there from actual world somehow they are Spatio temporarily isolated to our actual world, but you can still imagine that thing.

So, if you take a snapshot of this room there are some worlds in which some are accessible to it they are closer to the actual world and then they are some worlds which cannot be accessible to this world you cannot think of a world in which two plus two is equal to five is true either it has to be an obstard world or you cannot imagine a world in which two plus two is equal to five is the case, but it is still considered to be a possible world, but it is the remote to us or it has to be true only in impossible kind of worlds we are not introducing this impossible worlds here.

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Possible Worlds
Modal Realism

David Lewis on Possible Worlds

I believe, and so do you, that things could have been different in countless ways. But what does this mean? Ordinary language permits the paraphrase: there are many ways things could have been besides the way they actually are. On the fact of it, this sentence is an existential quantification. It says that there exist many entities of a certain description, to wit 'ways things could have been'. [. . .] [T]aking the paraphrase a face value, I therefore believe in the existence of entities that might be called 'ways things could have been'. I prefer to call them 'possible worlds'. (p. 84)

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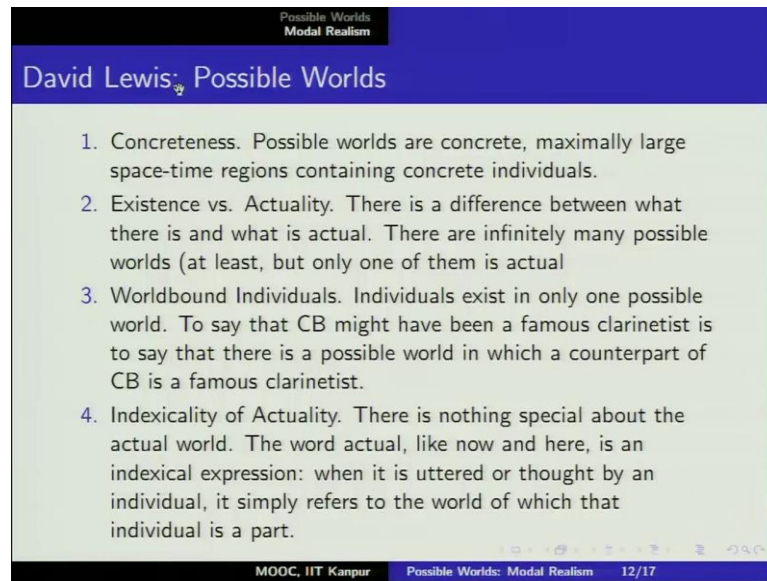
So, David Lewis on possible worlds he is of this view he is he says to quote David Lewis from the book plurality of possible worlds I think page number eighty four is of the he says this thing I believe and. So, do you that things could have been different in countless ways the same kind of object could be different in different suppose if I say it is a chalk piece it could have been different in different ways you could imagine that for example,

if you talk this chalk piece to some tribal place something like that and ask them whether what is this they might view it in a different way things could be different in different ways or you bring this chalk piece to someone who does not know anything about this chalk piece they have not seen this chalk piece at all seeing for the first time then they will view it as some kind of cylindrical object or some piece of white object or something like that they may not be viewing the object the same way we are trying to viewing it as this is a chalk piece.

So, he is of the view that things could have been different in different ways, but what does this mean in ordinary language permits the paraphrase and there are many ways things could have been besides the way that they actually are on the fact of it this sentence is an existential quantification and it says that there exists many entities of certain description to wit the ways things could have been ways things could have been he views it as possible worlds and so on so forth and it continuous since he says that talking the paraphrase a face value I means David Lewis therefore, believe in the existence of entities that might be called ways things could have been.

So, he prefers to call it with the name possible worlds there is lot of things that this passage conveys us the message that it conveys us is this that things could have been different in different ways and these are this is to be treated as the things that might have been could have been all these things they are considered to be possible worlds suppose if you consider actual world in which this is considered to be a chalk piece this chalk piece could have been different in different ways. So, same chalk piece could be a different in different ways they all are considered to be possible worlds.

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Possible Worlds
Modal Realism

David Lewis: Possible Worlds

1. Concreteness. Possible worlds are concrete, maximally large space-time regions containing concrete individuals.
2. Existence vs. Actuality. There is a difference between what there is and what is actual. There are infinitely many possible worlds (at least, but only one of them is actual)
3. Worldbound Individuals. Individuals exist in only one possible world. To say that CB might have been a famous clarinetist is to say that there is a possible world in which a counterpart of CB is a famous clarinetist.
4. Indexicality of Actuality. There is nothing special about the actual world. The word actual, like now and here, is an indexical expression: when it is uttered or thought by an individual, it simply refers to the world of which that individual is a part.

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So, these are the things which we talk about concreteness modal realism can be put into this four sentences in this way it can be summarized in this way we are not trying to cover the exhaustive analysis of David Lewis view on possible worlds, but we are highlighting on some of the important things. So, first of all it has to be concrete this is possible worlds are concrete maximally large space time regions containing concrete individuals and existence versus actuality that is there is a difference between what there is and what is actual he maintains this distinction mere existence that is actual the different is that what there is considered to be existence and what is actual is actual.

So, there are infinitely possible worlds at least, but only one of them is considered to be actual this is what he views and then world bound individuals that is this individuals exist only in one possible world. Now the thing is that whether you exist in different possible worlds or not transworld identities etcetera twin worlds suppose if there are two worlds which are like similar to each other you exist in this world and that world also Lewis does not believe that particular kind of thing individual has to exist only with respective one world you know transworld identity or twin worlds where you exist in two different worlds etcetera to say that something c b might have been a famous clarinetist or whatever it is to say that there is a possible world in which a counterpart of c b is considered to be a famous clarinetist this is what of is he believes and then the

forth view forth thing which summarizes David Lewis approach on possible worlds is that indexicality of actuality.

So, that is this there is nothing special about the actual world the word actual like now here the one which has talking etcetera is only an indexical expression indexical expression when it is indexical expression when it is uttered or thought by any individual it simply refers to the world of which that individual is already become already is a part of it. So, these are some of the views which I am not going to the details of it why I am talking about possible worlds the is that without possible worlds there is no modal logic of course, we do not have modal possible worlds semantics and without possible semantics you cannot understand many things that is why we are trying to or making an effort to understand what are these possible worlds what are the various philosophical views for the possible worlds.

And we are highlighting on only few important things there are lot of work which is going on these days in particular in continuation to either David Lewis approach or an extension of another approach which is called as abstractionism.

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Possible Worlds
Modal Realism

David Lewis argument for possible Worlds

1. P1: There are many ways the world might have been. [common sense]
2. P2: Every way the world might have been is a possible world [Definition possible world]
3. (C) Therefore, There are many possible worlds.

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David Lewis caused argument for the existence of the possible worlds is these things the term is one is this that there are many ways in which a world could have been different in different ways and that we will judge it only through the term two is this that everywhere the world might have been is considered to be a possible worlds things might have been things could have been is considered to be possible worlds therefore, there are plurality of possible worlds that is the view which he is trying to defend out of this all the plurality of the worlds he views that actual world is considered to be the best possible world is carried is Liabnez ideas are carried forward and then put it into formal framework in this way.

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The image shows a presentation slide with a dark blue header bar at the top containing the text 'Possible Worlds Modal Realism'. Below the header is a lighter blue bar with the word 'Questions' and a small icon. The main content area is light gray and contains two numbered questions:

1. How plausible is the conclusion of this argument?
2. possible worlds are ways things could be" What sort of entity are these ways?

At the bottom of the slide, there is a dark blue footer bar with the text 'MOOC, IIT Kanpur' on the left, 'Possible Worlds: Modal Realism' in the center, and '14/17' on the right.

Now, the questions that we can ask our self are these things how plausible is this conclusion of this argument conclusion are of this argument is it there are plurality of possible worlds and possible worlds are things could be or what sort of things what sort of entity are these ways etcetera ways it could have been different of course, we do not want we are not trying to answer these questions here, but you know it led to different there is another view which is called abstractionism.

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Possible Worlds
Modal Realism

Alvin Platinga

1. Worldbound Individuals. Individuals exist in only one possible world. To say that CB might have been a famous clarinetist is to say that there is a possible world in which a counterpart of CB is a famous clarinetist.
2. Indexicality of Actuality. There is nothing special about the actual world. The word actual, like now and here, is an indexical expression: when it is uttered or thought by an individual, it simply refers to the world of which that individual is a part.

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And this view is like this it is contrast to Lewis work on possible worlds and this views in this way there are something called world bound individuals; that means, individuals existing in only one possible world and to say that c b might have been a famous clarinetist or might have been a great musician he used to say that there is a possible world in which the counterpart of c b is considered to be a famous clarinetist that is clarinetist also accepts it there are some commonalities between Platinga and Lewis although they differ in viewing that one views the possible world as concrete another views possible worlds as abstracts.

And about indexicality in of actuality Platinga is of this view that there is nothing special about the actual world the world actual like now here is an indexical expression when it is uttered or thought by an individual it simply refers to the world in which the individual is considered to be a part.

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Possible Worlds
Modal Realism

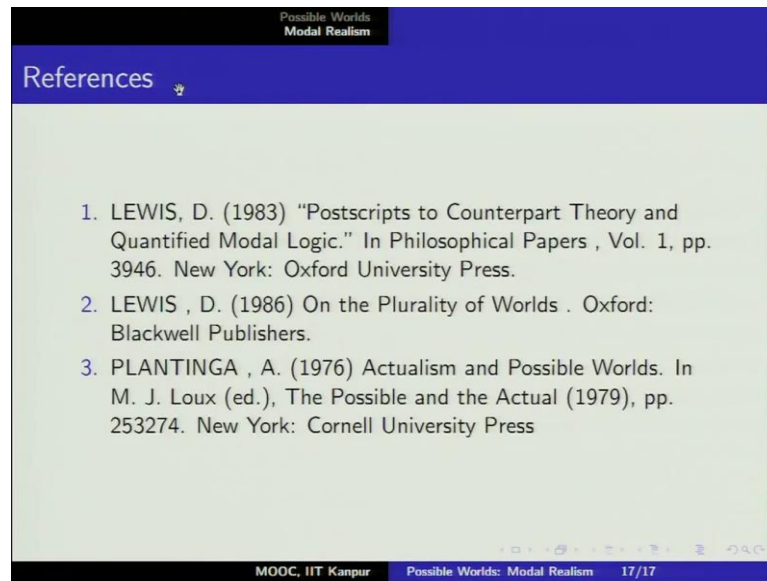
Alvin Plantinga, contd

1. Transworld Individuals. Individuals exist in many worlds, not just one. (More precisely, concrete individuals exist only in the concrete physical universe not to be confused with the abstract actual world but there are many maximal possible states of affairs in which their haecceities are exemplified.)
2. Nonindexicality of Actuality. The actual world is special: it is the only world that represents things exactly as they actually are. That is, it is the only abstract possible world that corresponds to a big concrete universe.

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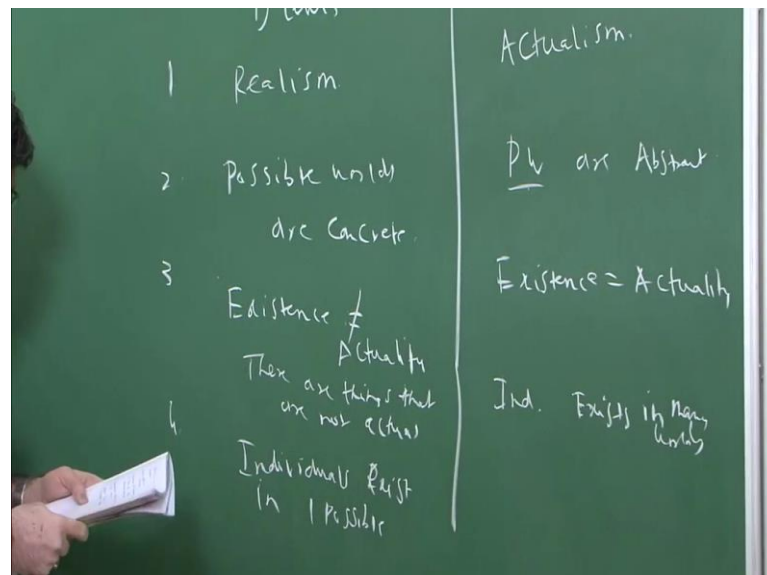
He believes in transworld individuals David Lewis does not believe in this one, but he is he believes in this one individuals exist in many possible worlds at a same time not just one more precisely concrete individuals exist in the concrete physical universe not to be confused with the abstract actual world, but there are many maximally possible states of affairs in which their Haecceities can be exemplified and two forth one is that non indexicality of actuality what does it mean the actual world is considered to be special and it is the only world that represents things exactly as they actually are that is it is the only abstract possible world that corresponds to big universe.

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So, now let us draw some kind of distinctions between Lewis and Plantinga and we will end this lecture on possible worlds in the modal realism.

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So, here is what David Lewis views and then you have views of Plantinga Alvin. Plantinga this is what is called as modal realism and this is what is called abstractionism possible

worlds are here said to be concrete here they are not real they are fictions imaginations etcetera. So, now, the differences are like this first invokes is the realism which is called as modal realism; that means, possible worlds exists in the world are considered to be real and second one is actualism then the second property is that possible worlds are concrete here possible worlds are concrete and here the possible worlds are p w stands for possible worlds are abstract fictions imaginations all other kind of things. So, David Lewis believes that existence these are the kind of summary of what we are set. So, far existence of any object or entity or anything it is not considered to be actuality existence versus actuality. So, there are things that are not actual there are things that that are not considered to be not actual that is leading us to believe that they exist, but the existence need not has to be confused with actuality.

So, here platina views that existence is actual this is means actuality. So, now, individual forth thing which distinguishes David Lewis from platina is this thing individuals exist only in one possible worlds one possible world exist in one possible world it cannot exist in two possible worlds they cannot be like transworld identity individuals exist in exist in many worlds many worlds. So, these are some of the important things and the final thing is this that actuality actually considered to be an indexical expression for Lewis and actual is not an indexical expression for platina now in this lecture to summarize we have discussed about possible worlds and we have seen that possible worlds are considered to be set of maximally consistent set of statements.

That are consider to be true although we are not giving any formal kind of definition in this lecture, but we are trying to consider we considered some of the important views of possible worlds and especially when you deal with various kinds of necessity etcetera we need to bring in the concept of possible worlds for example, if you say logical necessity it is different from something called as physical necessity.

So, there are things which are considered to be technologically possible when ever as it comes to it cannot be there are certain things which are considered to be mathematically true, but it cannot be actualized in the world technically it may not be possible those things which are considered to be technically they may be considered to be

technologically impossible in the same way when we discuss about nomic necessity etcetera we are talking about a different kind of necessity there. So, this is the talk on possible worlds main for this course we defined this view that possible worlds are as real as possible worlds are considered to be concrete and we defend the view of David Lewis. I stop here.