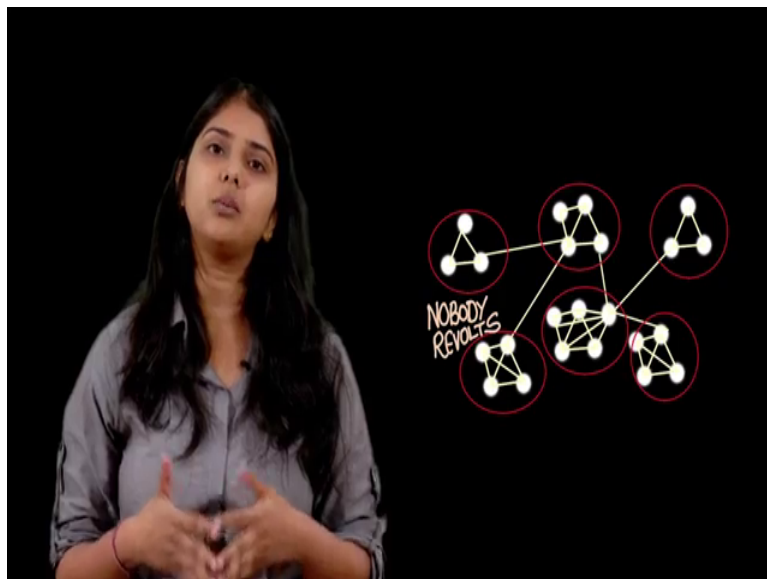


**Social Networks**  
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**Cascading Behavior in Networks**  
**Lecture – 94**  
**Knowledge, Thresholds and the Collective Action**

So, we have looked at this beautiful example till now, where there was a class and there were these 2 competing decisions, competing actions which the people in this class could have taken. So, they could have decided to go outside and enjoy or they could have decided to sit in the library and work. Now I will give you a similar, but a little bit different situation.

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So, we also looked at here the case where the people in this class they are sort of divided into small, small clusters, where the interaction between two clusters is very less. And the interaction inside a cluster is strong. So, which leads to the, this problem sometimes that one cluster does not adopt the idea which others are saying and goes by itself. And now let us take the same scenario and let us take the same bunch of people, the same clusters and put them in another scenario the scenario for company.

So, assume that there is this multinational company and then there are these people who exist in clusters. So, here are different, different clusters of people who do not communicate much with each other. Now assume that the manager of this company comes up with a stupid decision or a heavy decision which these people are not ready to take. So, every person in this company has a problem with his decision, but they are unable to revolt. Why? So, you see here that the people of this company here exist in clusters.

So, this cluster is ready to revolt. Independently this cluster is ready to revolt. Independently this another cluster is ready to revolt, third cluster ready to revolt, all clusters are ready to revolt, but these clusters are small and they are suspicious about whether the other clusters are ready to revolt or not.

So, you see what is happening here, it is the cluster is ready to revolt, but it will be a problem if this cluster alone revolts it can be very dangerous. So, this cluster all though everybody is ready to revolt, but since this particular cluster does not know that everybody else is also ready to revolt. Because, it has a less communication with the other clusters it cannot go and revolt against a manager because of this fear of getting fired.

Now, you see what is happening here. So, that is probably the reason why companies they do not allow much of the communication between different, different groups of people working there. So, it is in a sense breaking the unity, it is in a sense the divide and conquer strategy because, if you allow everybody to get united, they can take this action and revolt. But if the people live separately in different, different clusters and do not communicate much with each other it becomes difficult to revolt.

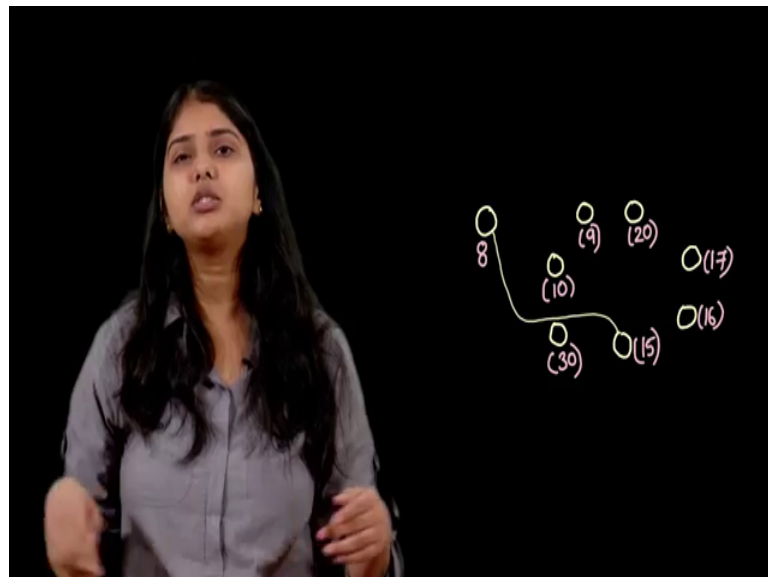
Same is the scenario as so you will see here the importance of this collective decision. What do I mean by a collective decision? So, assume that now the government has come up with a policy which I am not happy with. So, what if tomorrow morning I go on the street alone and start shouting, what will happen? Either I will be declared mad or I will be put in jail, but if with me there are these 100 people revolting then it makes some sense to revolt.

So, what I will be doing is I will be looking at these other people whether they are ready to revolt or not. And if I am suspicious that yes these people are not going to unite with

me I will also not go and revolt. Same is the situation of let us say people want to put some people want to put a coffee machine in an institute, but then there should be enough number of people who want that coffee machine only then this institute is going to fund for that machine. So, this kind of spatial scenario is known as collective action.

So, how do we model this scenario? It is a little bit different from what we have discussed previously, but modeling it as previously is also very easy. So, how do we model it? So, for modeling it, first of all we assume that every person has an intrinsic threshold.

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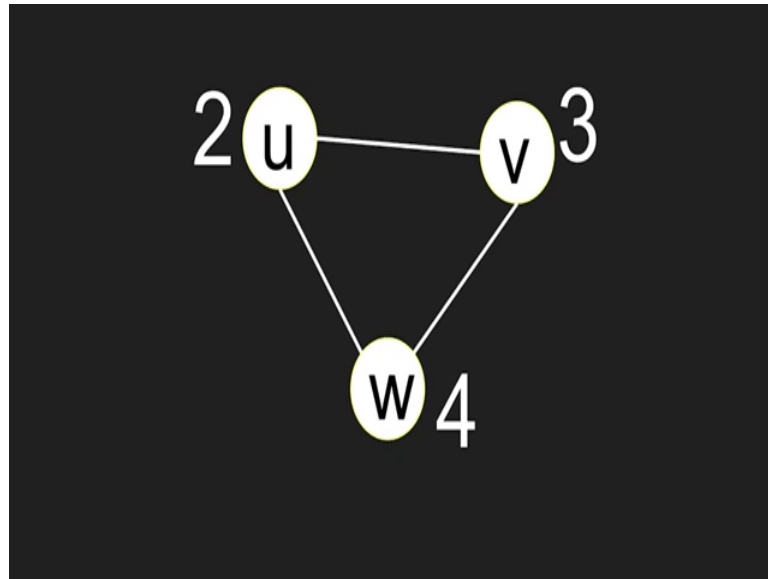


What do I mean by intrinsic threshold? So, say I have an intrinsic threshold of 8. So, it means that if including me, I say that if 8 persons are ready to revolt. So, 7 others total 8, 1 is me 7 others, so if 7 more people are ready to revolt, I will go ahead and revolt. And then there will be a threshold associated with every person.

So, each of the person will have a different, different threshold. Somebody will say I need 20 people at least to go and revolt, somebody can say that I need 40 people to go and revolt. This is the first, this is the first parameter of the model that we all have an intrinsic threshold. Now how do we decide what to do? So, to decide what to do, here we kind of know: what is the threshold of our close friends.

So, if I have a friend, let us say Mira, I will know that Mira is a kind of girl, she will require at least some 15 people to go and revolt. So, here I have an idea of my threshold, I have an idea of my friend's threshold and based on just these two ideas I have to decide whether to revolt or not. So, in the next screen cast I am going to show you 3 situations and in those 3 situations we will see whether the people they collectively revolt or not.

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So, let us look at the screen casts for the collective behavior. So, in this screen cast we will be looking at 3 cases and we will see whether the in these 3 cases there will be a protest or not. So, what was our model? According to our model every node has a threshold which is it in like the threshold for u is 2, for v is 3 and for w is 4. And what does threshold mean? Threshold mean that this node needs at least these many people to participate in the protest only then this node is going to participate in the protest. So, the node u needs 2 people to participate in the protest.

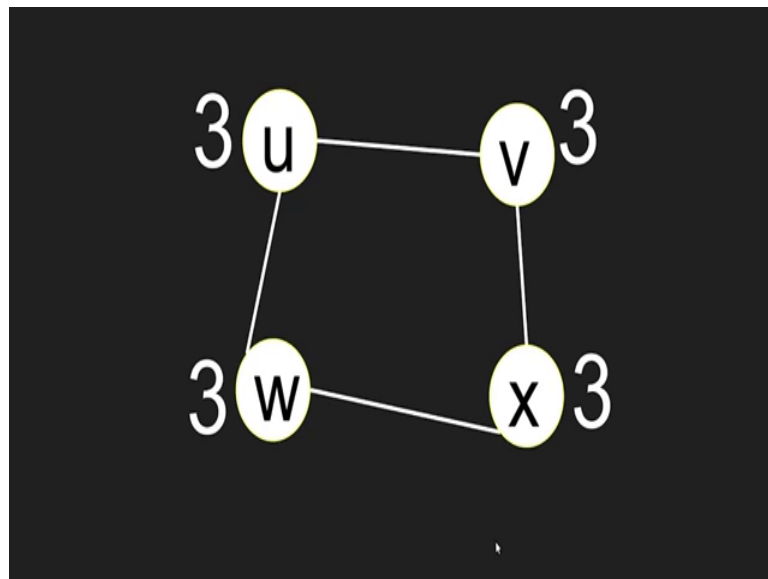
So, 1 person 2 imputing itself, so 1 obviously will be node u and then it needs 1 more person to participate in the protest for it to participate in the protest. Let us see what happens in this case. Let us look at node w here. So, the threshold for node w is 4 and w has only 2 friends right. So, even if both of these friends participate in the protest, w cannot participate because, it needs at least 4 people, so w drops the idea of participating.

Let us look at node v. It needs 3 people. So, node v looks at w and then it knows that w cannot participate in the protest because, its threshold is 4 and these many people are not

available. So, node v means node v now knows that w is not going to participate. So, again its threshold will not be reached and node v drops the idea to participate. Node u only requires 2 people, right? Only requires 2 people to participate, but then node u it know the thresholds of both of these nodes right.

And then hence it can determine that none of this people neither v nor w is going to participate. Hence node u also decides to drop the idea of protesting. Hence the protest does not happen in this case. Let us look at another example. So, if we look at this example, we can directly look at this example and we only can tell that yes node w needs 4 people which are not available and hence the protest cannot happen in this case.

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But if we look at this case, it seems quite easy for a protest to happen. So, any 3 nodes along this cycle can get together and do a protest; u, v and w if they get together they can do a protest, w, x and v can do a protest and so on right, u, v and x can do a protest.

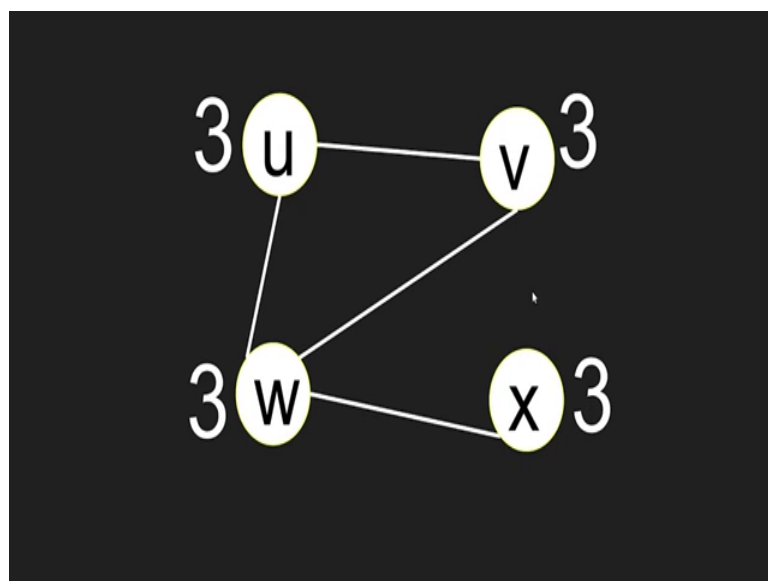
But then every node has some incomplete knowledge, they cannot see the entire network. For example, node u here have no idea about node x right. So, node u cannot see this entire network and then come out with the conclusion that yes, it can go get together with v and w and protest. So, let us see how does it happen at the level of every individual node.

So, if we look at node u. Node u knows that node v and node w they have a threshold of 3 right. And hence they can get together and do a protest, but then the problem is node u also knows that see, v and w both are the friends of node u and then node u knows that v and w are node friends. They do not know about each others thresholds. Node u knows that w has a threshold of 3 v has a threshold of 3, but then node v and w have no information about each other right.

So, we do not know what they will be doing and then node u does not have any idea about the threshold of node x. So, node u can think that may be the threshold of node x is very high let us say 5. So, if the threshold of node x is very high, here it is 5 then what will happen? v might decide node to protest because, x will not be protesting because, it has a very high threshold, then v will not be protesting and then how can you know this node u protest here right.

So, it is unsafe for you to participate in the protest and it drops its idea of participating. And the same thing happens with all of these three nodes v, x and w because, v does not know about w's threshold, x does not know about u's threshold, w does not know about v's threshold. So, even if in this case actually they can get together and do a protest, but then when these people look at the networks from their perspective they drop the idea of protesting.

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Let us now look at this case right. So, we have rewired this edge from  $v$  to  $x$  to  $v$  to  $w$  and what happens in this case. Can you guess? Yes a protest can very easily happen here. Can happen here and also these people you can see that a protest can happen here;  $u$  can look at  $v$  and  $w$  and then look at their thresholds. And then here you can be sure that yes  $v$  and  $w$  will participate because,  $v$  and  $w$  also knows about each others threshold. So, here mainly these 3 people  $u$ ,  $v$  and  $w$  can get together and go for a protest.