

**Disaster Recovery And Build Back Better**  
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**Lecture – 16**  
**Disaster Preparedness from Cognitive and Heuristic Perspectives**

Hi everyone, I am Subhajyoti Samaddar from Disaster Prevention Research Institute, Kyoto University. Welcome to disaster recovery and build back better lecture series. This lecture we will talk about disaster preparedness from cognitive and a heuristic perspective. We already had discussion on what cultural theory and social factors they play a role in disaster preparedness.

But when you are communicating people to encourage them to prepare against disaster what they are going on inside them as an individual? What kind of cognition and heuristic perspective we may look into that would be the focus of this lecture okay? So we discussed that individual does not face only disaster, but in real life we all have different kind of risk, and disaster risk or environmental risk or ecological risk is just one part of that risk.

Life is full of risk. Disaster is not an isolated one.

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Okay, we have a health risk, we have academic risk, we have job risk so which one I should prioritise, which one I should take and which one I should ignore. Because many people are

advising me to consider this risk as serious and to take preventive actions. So we already had the discussions on cultural perspective here in this lecture we will focus on heuristic or cognitive perspective okay.

So they are saying that it is okay that you are culturally biased you are culturally influenced, but in the end of the day you have to make your own decision that is you were the responsible, you would make the decision as an individual what to do and what not to do okay no other person can impose anything if you do not want they can force you they can influence you they can pressure you, but it is you who have to make the decision okay.

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So what is going on inside human brain what intellectual reasoning process they are going through is important to know when we are trying to say that okay. We want to encourage people to take preventive action against disaster. Of course culture is an important part, but apart from we, also I have a mind of individual, I am part of my neighbour, I am part of my colleague, co-workers, I am part of my friends, I am influenced by them but my actions my attitudes are my own I am also influenced by others what I do okay.

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Of course culture is an important.


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But this person is wise or poor somebody thinks he is wise somebody thinks he is poor right. So it is not only cultural differences but also individual personal differences for a role that how people think it was one object differently not only one category of culture not only one kind of social system they have, they groom people to think in particular way but also individual because of several other reasons they have their own mind.


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Then We Should Go Look For Risk Culture In  
The Man In The Mirror ...



Every individual comes to an organization with his/er own personal Perception of Risk.

Every individual comes with his/er own Inventory of Moral Values and these have a great influence over the decisions they make on day-to-day basis.



So we look into the mirror every time every day it is not that we want to know that how I am looking good. But we have another kind of mirror that we want to that what we are doing is right or wrong, socially accepted or not, individually accepted or not. So we have our own judgment about our personality okay.

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So this is fine we discussed already that people are basically culturally biased. But people have their own mind also.

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So what we do generally in order to promote disaster preparedness of risk preparedness let us say this road accident okay or something. We generally ask people have this kind of advertisement.

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Okay that you can you are travelling you were riding bike, or you were riding car you can see on roads that these posters that is alarming you that if you do rash driving this is the consequence, this is the result is waiting for you so be careful okay.

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These posters, these pictures are very common right.

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When we are, you can see that for the road safety often we want to make in order to increase your risk awareness we show this picture right. Every time you go on road you can see this one.

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It is a very nice poster 'happiness is a journey, not a destination' okay. So weekend! Safe drive, Stay alive, drive to survive. It is very kind of common poster to protect road safety same in case of disaster also.

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Also maybe we can look into health risk in order to ask people not to smoke this is a very nice picture nice poster with very precise very concise smoking causes lung cancer. So do not smoke and this picture gives thousand words to the audience that why they should not smoke.

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Also, this one is a very good example that you should not smoke if you are smoking actually not only cigarette, but you are burning yourself right so do not smoke.

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Obesity



So obesity is a very common problem in modern society, okay not only in India but in many other countries especially in US. So obesity is another kind of health risk that you do not eat junk food if you are junk get taking junk food eating junk food then this is the consequence, okay and you will get heart attack.

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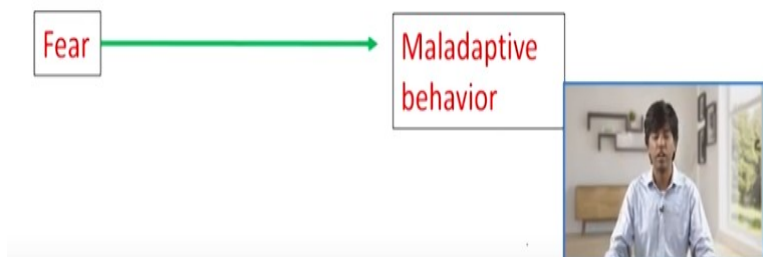




Now looking at these advertisements, these messages what is the core of that one what the core idea you can get any idea? well, look at everyone look at all these posters their focus is only one thing.

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## Adjustment / Rejection



That is they are actually want to increase your fear they want to stop your maladaptive behaviour if you do not prepare against flood then your house will be inundated. If you do not prepare built with earthquake-resistant building your building will collapse, you will die or injure.

So fear, it is the target the objective is to increase your fear if they can increase your fear that means if they can increase your risk perception, high-risk perception once you have then you should not do rash driving you should not build your house without flood protective measures. So you would not do unnecessary unwanted things that cause dangerous. So here the focus is on to increase the fear only.

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Pleasure ? Smart ? Intelligent ? Fashionable ?  
Bodily nicotine demands ?



But now the cognitive heuristic approaches they are arguing that okay why I am smoking could be different reason maybe its a kind of my pleasure, my body needs nicotine or maybe somebody told me that I look macho, handsome, smart and intelligent when I am smoking I look more fashionable when I am smoking people look at me when I smoke, or many other reasons could be there.

So why I am smoking is not that only because of one reason. So fear would not give me much reason.

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How ?



So I know I am fat, I have obesity problem, I know my house is built in a particular area that is flood-prone or I know that I did not install the rainwater harvesting tank because I have water scarcity problem, but still I did not do it. In case of obesity that I know that I am fatty, but you are not telling me you are only increasing my fear, you are only increasing my fear that if I smoke I will be at danger.

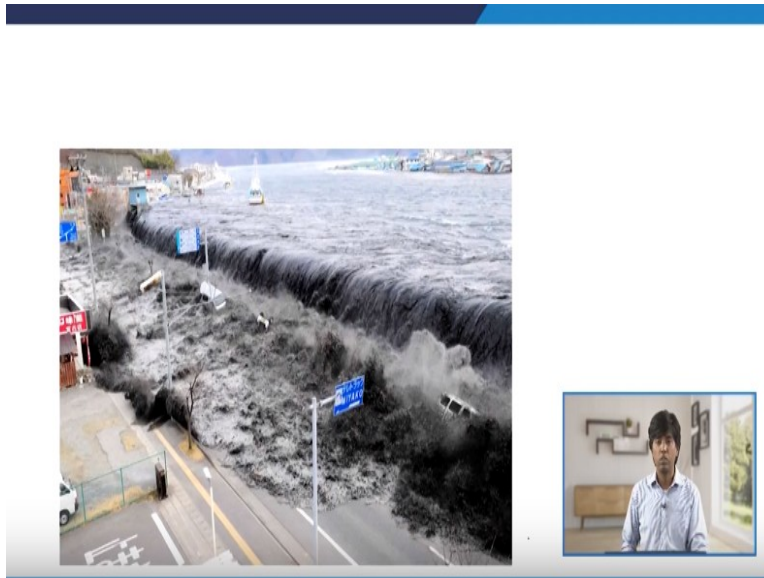
But tell me how I tried many times I did diet control it did not work. I know I am fat but how to control that one.

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If tsunami is coming and you are increasing people fear. They will think okay tsunami will come one day it is a natural act, natural phenomena we cannot protect and if it is too big and if I have lot of fear the only thing I can do is I can surrender it is like committing suicide I am a fatalist. I am not taking any action okay.

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So I have no way but to surrender this gigantic its a gods act, gigantic catastrophic disaster.  
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So fear, increasing fear would not help much to promote disaster preparedness right. If only increasing fear it means people could be become fatalist. I know there is a risk what I can do so we should tell people what they can do it is not only they are at risk but how they can reduce the risk is an important message of should be for the planners and for the practitioners and for the local governments okay.

So if we simply say like this one that try this option, a person who is having obesity issue if we simply tell them okay you can eat more fruits and vegetables and you can walk and run on the

morning and evening that would significantly help you to reduce your fat your obesity issue. He or she would be much encouraged to do it other than if we are just increasing his or her fear right.

Similarly, if there is an earthquake if we tell people that once there is an earthquake, please protect yourself by going inside the furniture table, then you can protect your head. If there is a tsunami, go immediately to the higher place in a mountainous area where tsunami waves cannot come.

So, what if I want to quit smoking and trying to quit smoking, but I felt several times, but you said okay I have one patch if you put on your arm it would help you not to have the thrust for smoking okay not the appetite for smoking so that would significantly help me to quit smoking not only my fear for something would help me but if you let me know what I can do is also important. So I am giving you options okay.

So here if I am asking someone to evacuate flood evacuations, I told that he has a lot of problems like is that difficult decisions because he does not know how risky the place is and evacuation is effective or not.

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### Arsenic Contamination

□ Nationwide, 1.2 million people already identifiable symptoms of Arsenicosis (Karim 2000).

□ 30 to 40 million people are at risk of drinking arsenic contaminated groundwater (Ahmed et al. 2006; Khan and Yang 2013).

Let us look a small example here in Bangladesh; people are battling with arsenic, arsenic contamination of groundwater. So they used to have surface water for drinking, but surface water was contaminated by pathogens waterborne disease like if you are consuming surface water you can get diarrhoea, dysentery. So in 1980s they started to install hand pumps in rural areas in Bangladesh to promote.

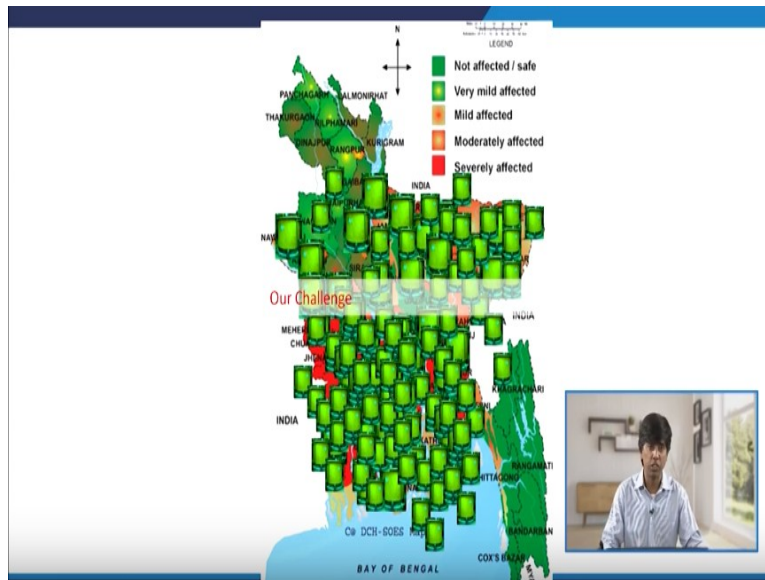
Immediately after one decade, they found these hand pumps are contaminated by arsenic and anyway so in many parts of Bangladesh are basically the coastal areas in the southern part as you can see in the map they are contaminated. Now 1.2 million people already identified symptoms of Arsenicosis okay and 30 to 40 million people are at risk in Bangladesh. So arsenic can cause cancer and many other health problems.

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Now what to do with this is the simple solution somebody is saying that rainwater harvesting is not that expensive. But you can just preserve the water from your rooftop during the rainy season, and you can preserve it for dry season, and you can use it okay. We can go for this technological matter in later on.

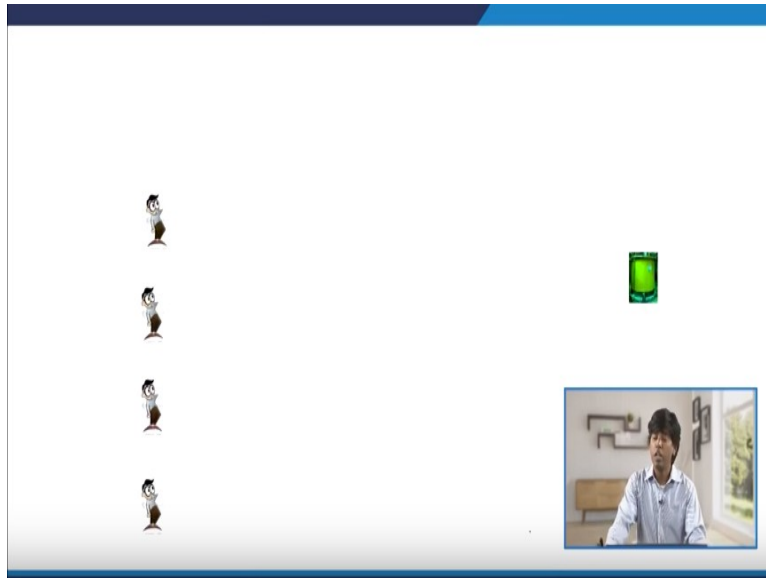
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But let us focus, consider that this is a symbolic disaster or preventive mechanism or environmental risk preventive mechanism. Now this is Bangladesh, so if only one person is doing as I am saying it would not work, what we need to do is that we need to promote this technology one after another. So more and more people should install these small tank at their own house, it is a household tank.

So everybody should every household should have this one only then we can do it right like this. So if we can able to encourage millions of people to install this rainwater harvesting tank, then it will be significantly reduce the drinking water risk in Bangladesh. So this is our challenge as a planner right.

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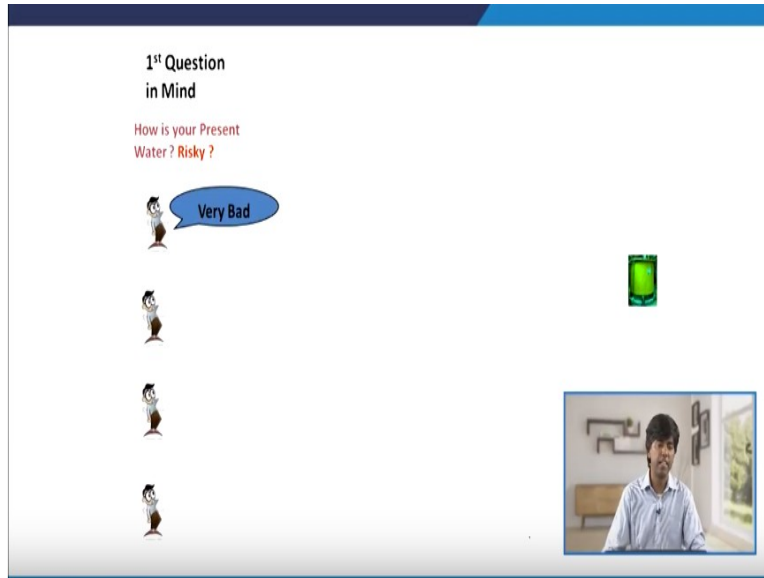
Now how they do it? Here is the thought from cognitive and heuristic perspective. Let us imagine that we have four people whom we asked to install this rainwater harvesting tank okay it is simple, four people they are the citizen of Bangladesh in coastal Bangladesh, and we want them to install this small household tank. So if you ask them what questions will come first in their mind what will they think first.

Any idea? If I ask you that please use flood protective building materials in your house or earthquake protective building materials in your house will you do it? Just think about for a seconds that will we do it or not so if we ask them to install this tank what they will think what first question will come to their mind. The first question come to their mind that how is your present water? Is it risky is the water I am drinking is it really risky?

So similarly if I am asking you to take a flood insurance or to build your house earthquake resistant, you will first think am I at a place where earthquake is happening, is it really prone to earthquake right. So the first person will think that am I at risk, is my water is quality is really good or bad.

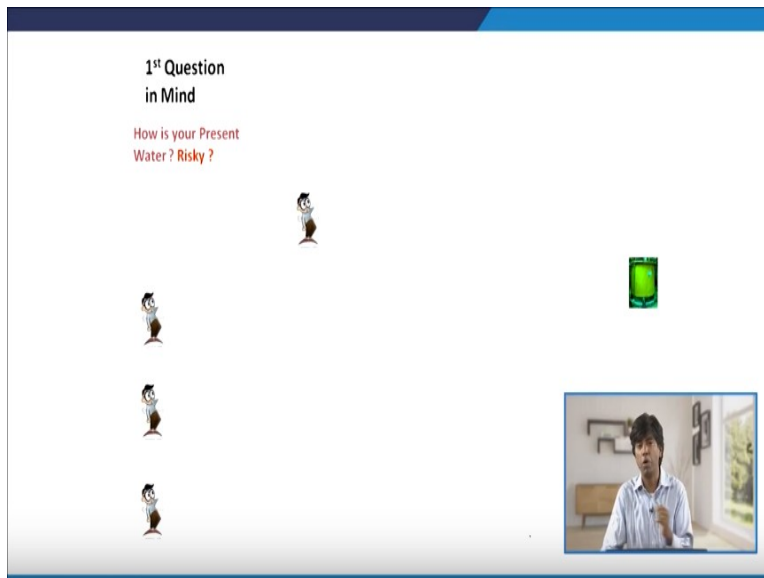
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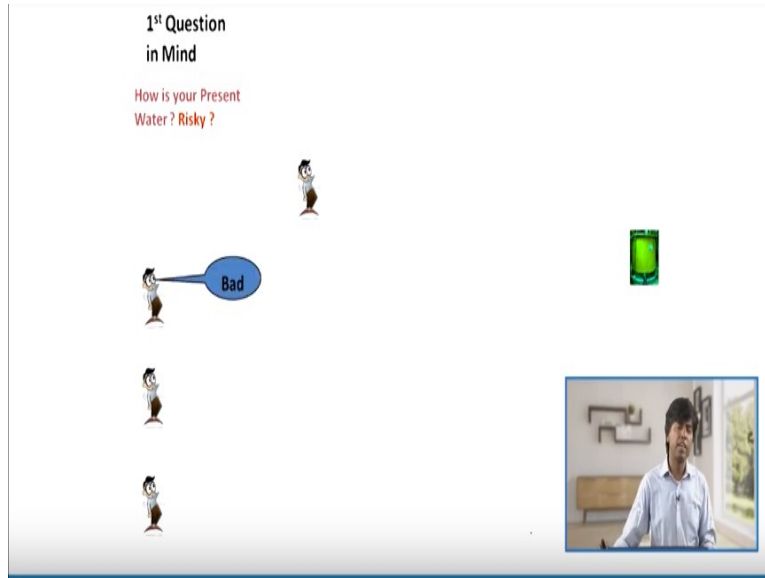
So the first person, he may consider that, my real water is really bad the present my drinking water supply is not good. So I really need this tank so he would go ahead.

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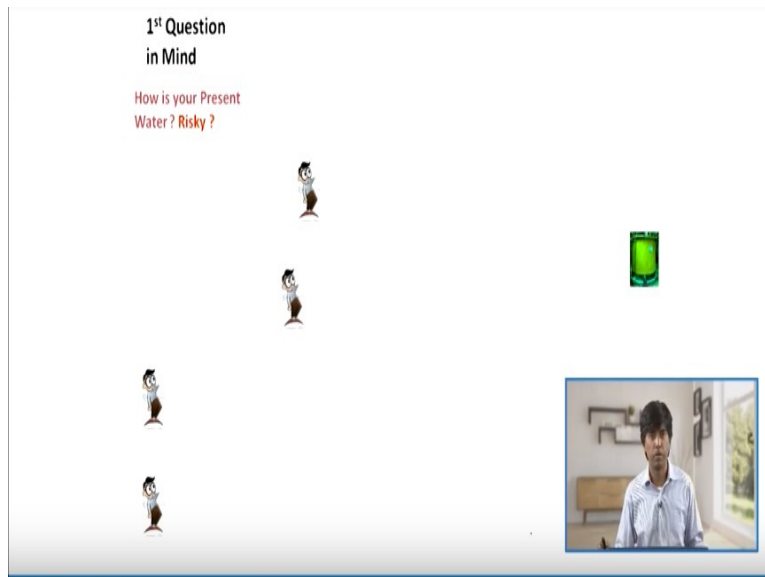


It is a long journey from starting to here there are lot of things are happening in your brain right. It is not a straight follow up you ask me to do to install the tank, and I do it. It is really a long journey, so the second person what he would think.

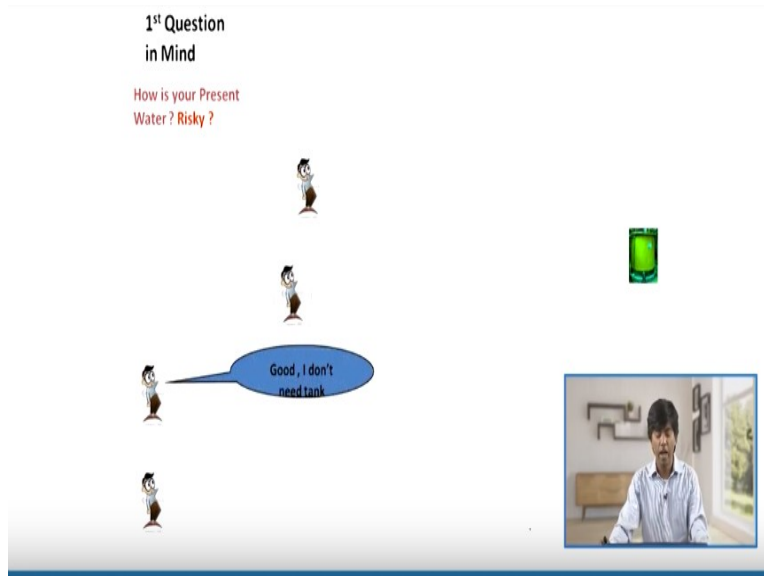
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He may think that okay, my water is bad so I should also opt for rainwater harvesting.  
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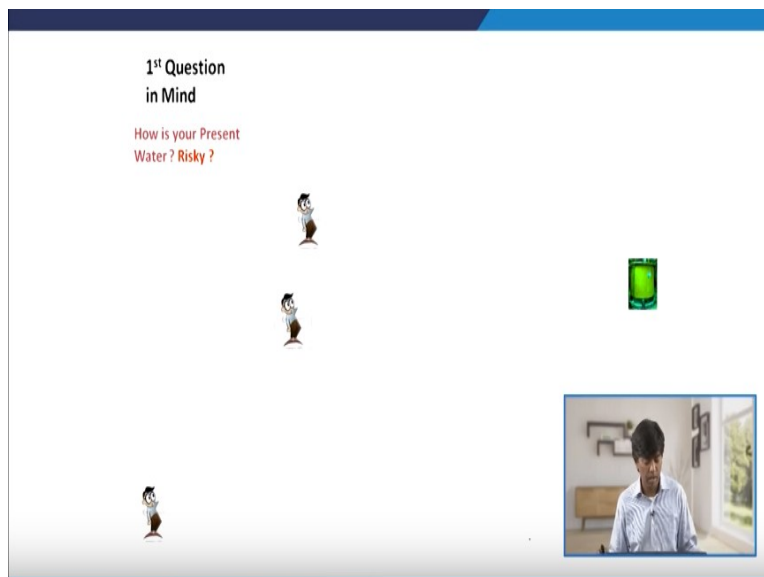


A third person, he may think.  
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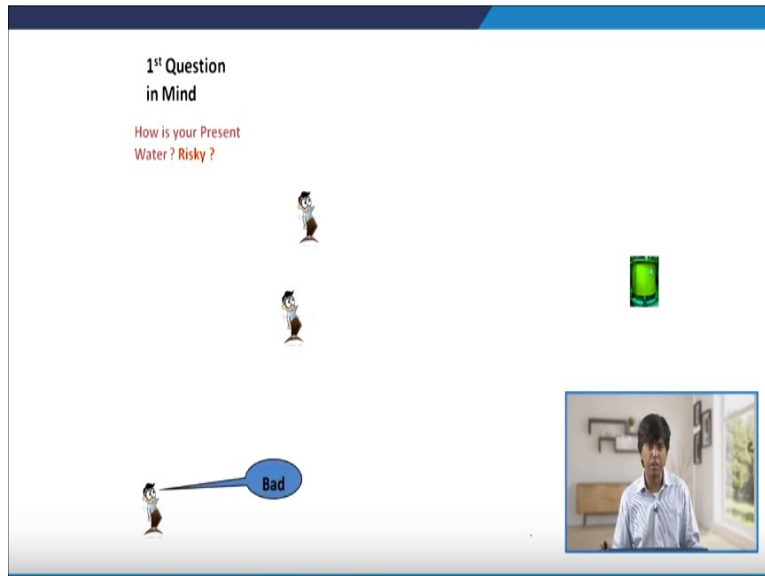
Okay, my water is good actually I do not need tank, so he left okay.

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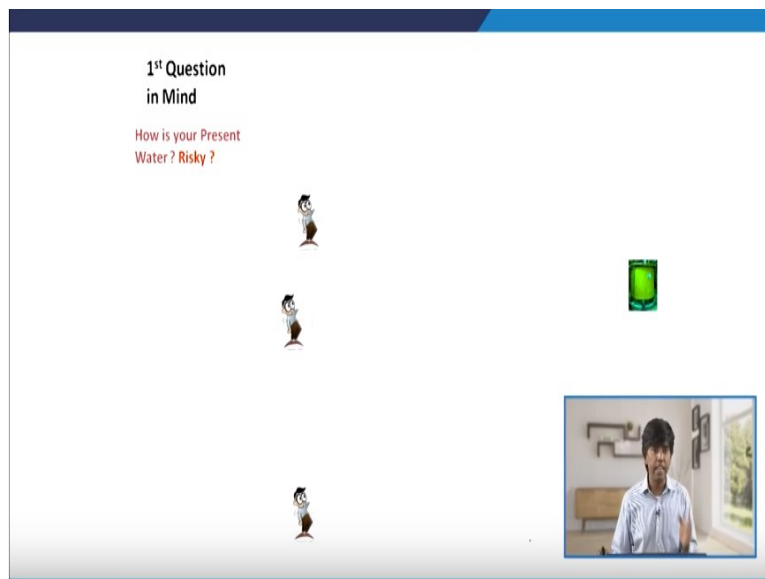
The fourth person, he may think.

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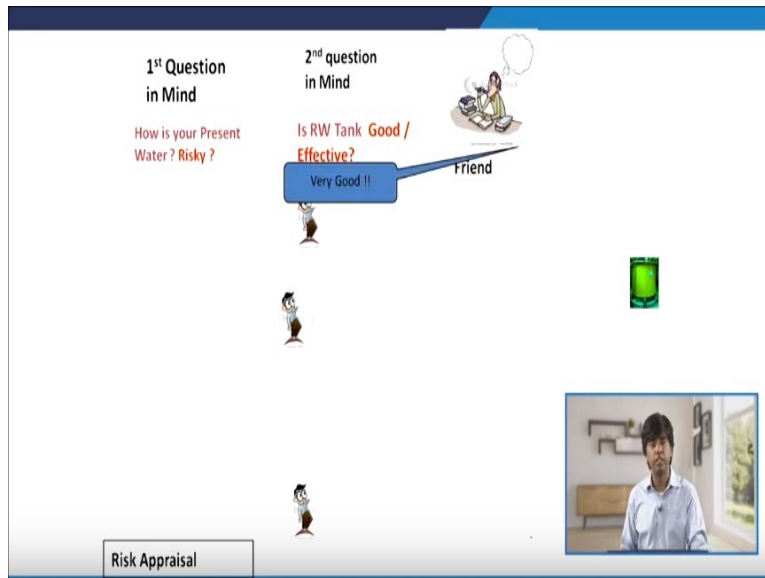
That okay, my water quality is also bad so he may come forward.

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This phase, according to that, we can call a kind of risk appraisal. What extent this risk will happen how it will happen the severity and vulnerability question okay. So I have a kind of appraisal of risk. I am evaluating my own risk. So we are talking about this one as risk appraisal the first questions came to peoples mind. Now what is the second one what the second questions come to his mind.

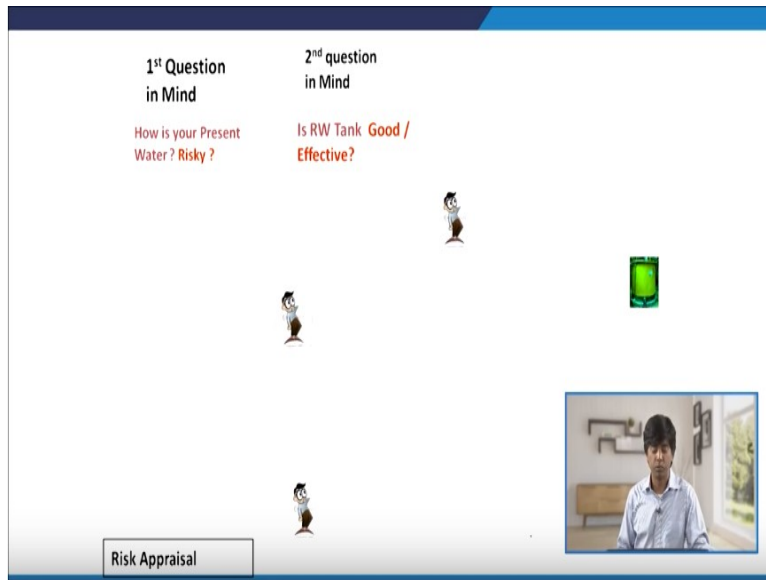
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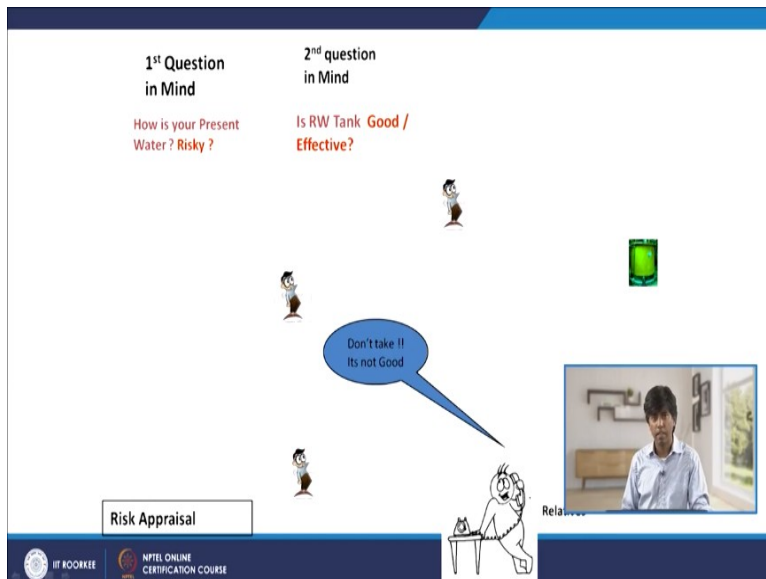
Any idea, well you can think I cannot see you right now, but you can think that you can imagine I give you some time that would help you to brainstorming, action storming okay. So the thing I will think not only cost many people think about the cost, but I will think also is it really effective?

You are talking to me that I am at risk and offering me this rainwater harvesting tank, but the first question came to me okay even if I am at risk, will this rainwater tank will help me to reduce my risk? If this mechanism is not really good what is the meaning of looking at what is the meaning of installing it right. So I really need to judge second that this is good or not. So this person may call his friend, and his friend says okay this tank is really good I installed this one okay. So he said okay very good news.

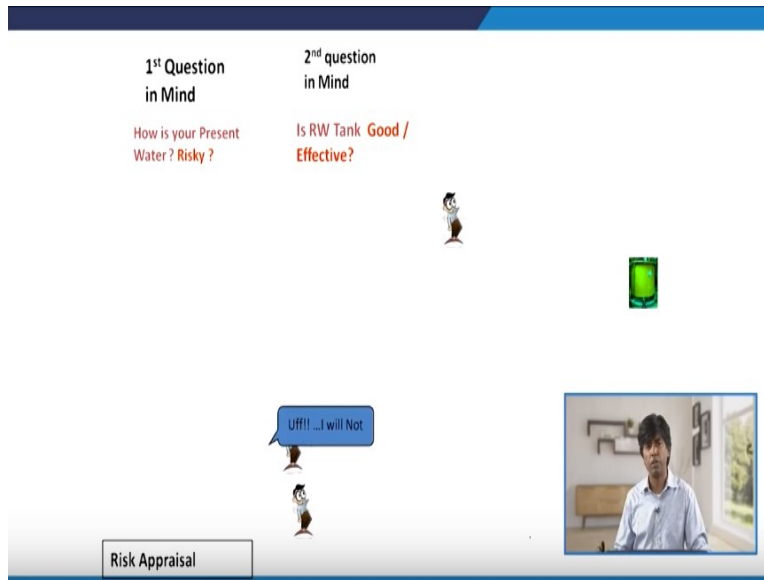
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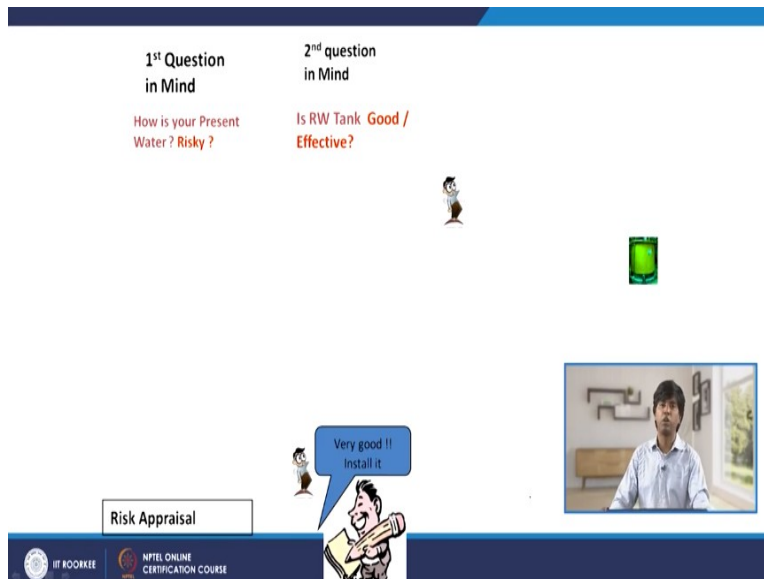
So he would proceed, go ahead with his decision then this second person he have some relatives.  
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And they gave a advice do not take is not good. So he was influenced by him, and he left.  
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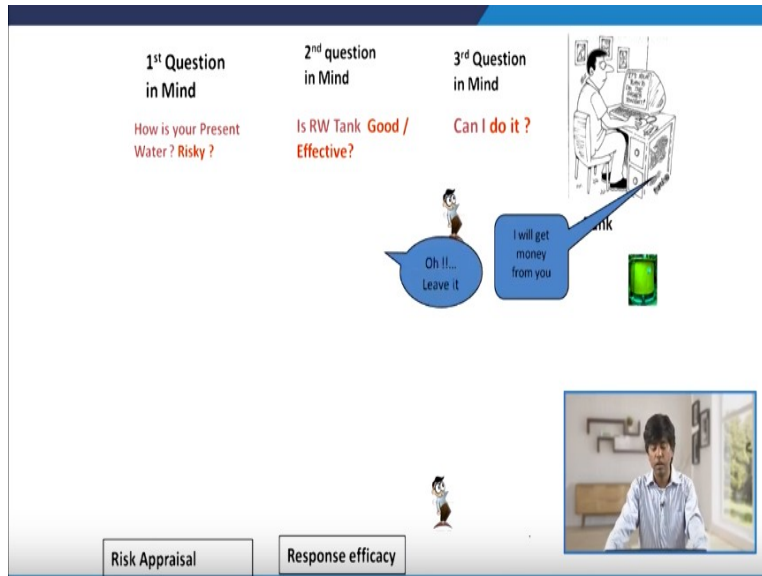


That uff I will not install this tank I do not like it. This person he may have also some friend.  
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And he called him discussed with him and they advised that okay yes this tank is really potentially good to reduce the drinking water risk at your place. So if you take this water is very good. So he was very satisfied with this review and he decided to go forward.

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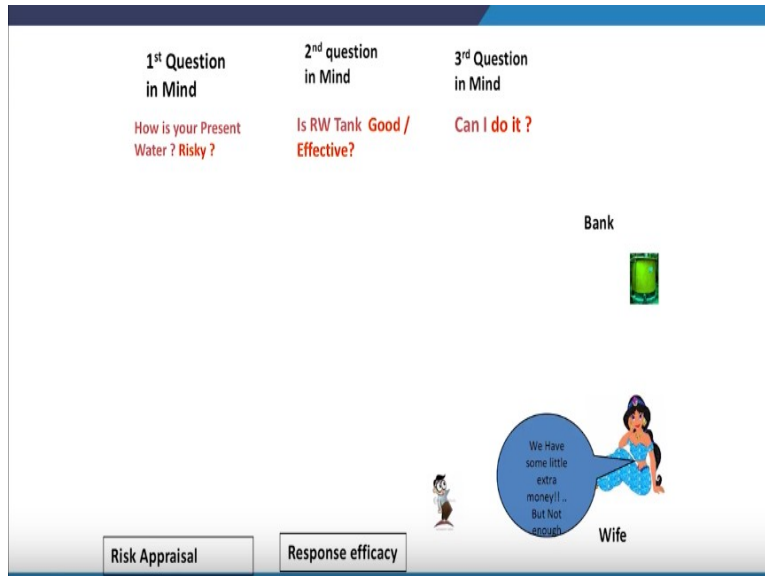
What we call this phase? First one was the risk appraisal, what is the next one? this is we called response efficacy, particularly outcome expectancy. If I am going to install someone what is the return out of it, will it work? What are the merits and demerits of it okay, will it work or not?.

Third questions in mind so you decided that okay you are at a risky place this rainwater tank is effective, but what would be the third question in mind that is very interesting is it not it so just think for a second what is the third questions possibly people think. I am at risk somebody decided and then also decided that this rainwater tank is good. Then what to think about it. Can I do it, it could be many reasons can I do it could be many reasons this could be question of cost, it could be question of that availability of the materials, it could be kind of question of like I have enough space or not right.

So this person asked the bank. He does not have enough money maybe so he asked the bank that can I get some loan. So the bank would say that you have already loan so you cannot get any extra credit now. So he left.

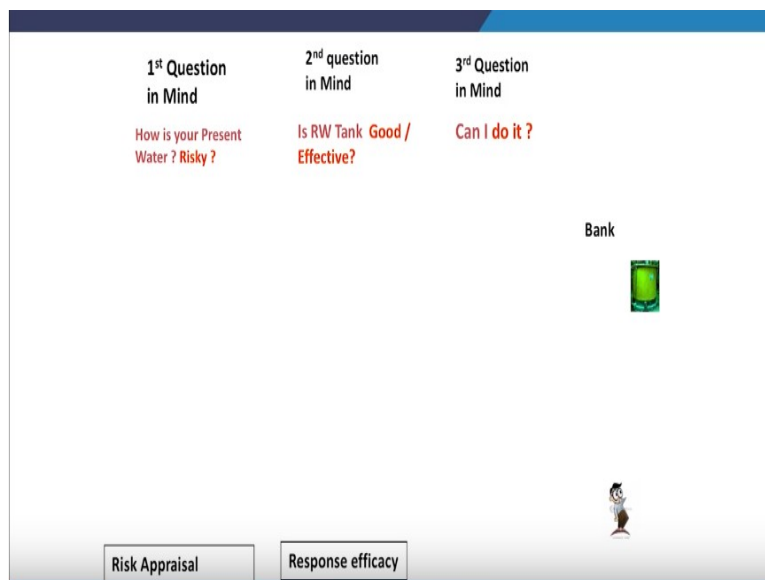
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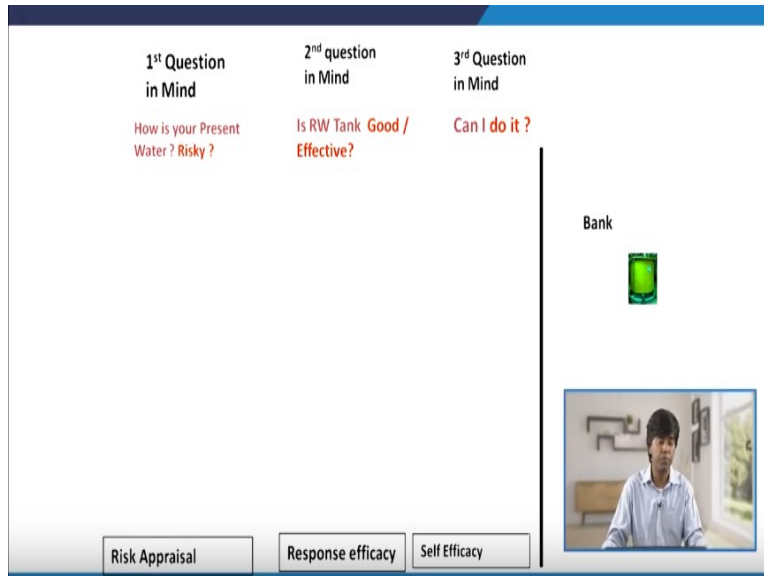
This person also have monetary problem, and he called his wife, his wife said that we have some savings extra savings so do not worry you can do it.

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So he was very happy okay, and he wanted to try this new tank to install. Now what we call this one, first is risk appraisal then is response efficacy. What we call these phase, this one we call as self-efficacy.

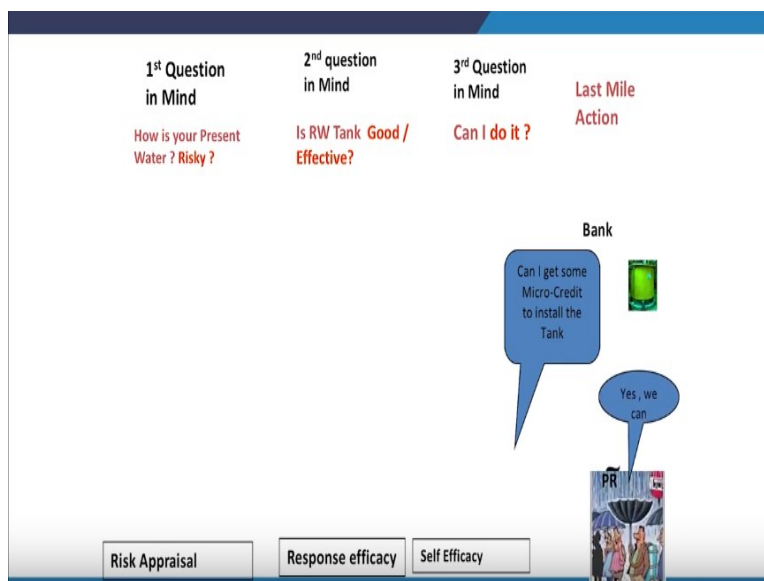
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The kind of confidence the reason could be different it could be sometimes financial reasons it could be sometimes organizational problem, physical issues like if I do not have space in my house I cannot do it. If the materials I cannot buy I cannot do it. If I do not have the technological knowledge or support then I cannot do it. So something is I am at risk something is going to work.

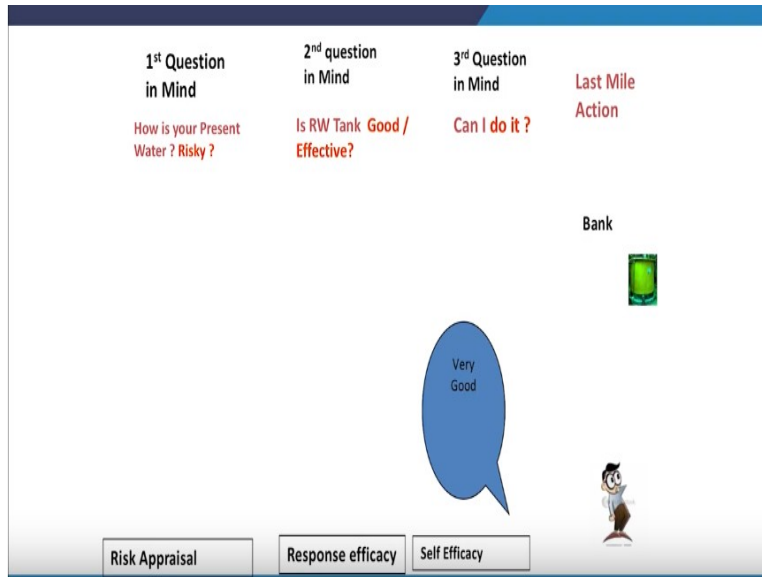
And I can do it, is very critical according to cognitive and heuristic approach but this is not the end, this is not the end yet what else, what else is very critical.

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Last-mile action maybe he has money savings, but still he needs some loan, can I get some microcredit to install the tank right. So he called some microcredit agency, and they said okay yes you can.

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And then he was very happy and decided to go for this tank.

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So finally he installed these rainwater harvesting to protect himself from drinking water disaster.

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# Protection Motivation Theory (PMT)



So these theories came from many routes, one of the prominent influential model theory is the protection motivation theory. I just simplified all of them in a concise manner so that you can get an idea how this our reasoning process in brain various disciplines, various theories and models describe. Well they vary from each other there are more variables, but that was the concise one.

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## PMT Introduction

- Communication Theory
- To better understand the specific cognitive process underlying how fear appeals motivate people to change their behavior.
- Perceived threat + Cognitive processes.
  - Analysis of rewards and costs for engaging in either a *maladaptive behavior* or *adaptive response*.
- Designing messages for health awareness campaigns that utilize fear as a motivator for positive behavior.
  - Ex: Antismoking advertisements. .



This one the PMT model, that came from the communications theory to better understand the specific cognitive process underlying how fear appeals motivate people to change their behaviour.

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## History of PMT

- Fear Prior
  - Fear was an emotional trigger for trial-and-error type responses in an attempt to escape the experience of fear.
- Dr. R. W. Rogers in 1975
  - to explain the cognitive effects of fear appeals.
- Lazarus & Leventhal
  - Fear triggers an automatic appraisal.
  - Differ in Sensitivity & Vulnerability, Interactions & Reactions.
  - Danger Control & Fear Control
    - 1<sup>st</sup> three factors of PMT: Threat Severity, Threat Vulnerability, & Response Efficacy
- PMT known as today
  - Include self efficacy and emphasize cognitive processes, which motivates either adaptive or maladaptive behavioral responses.

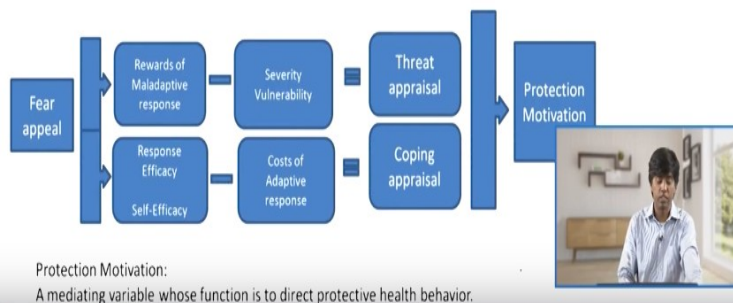


And so it was the Rogers the R.W. Rogers in 1975 started to develop this one and also then it was later on revised by other colleagues of Rogers.

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## Components of PMT

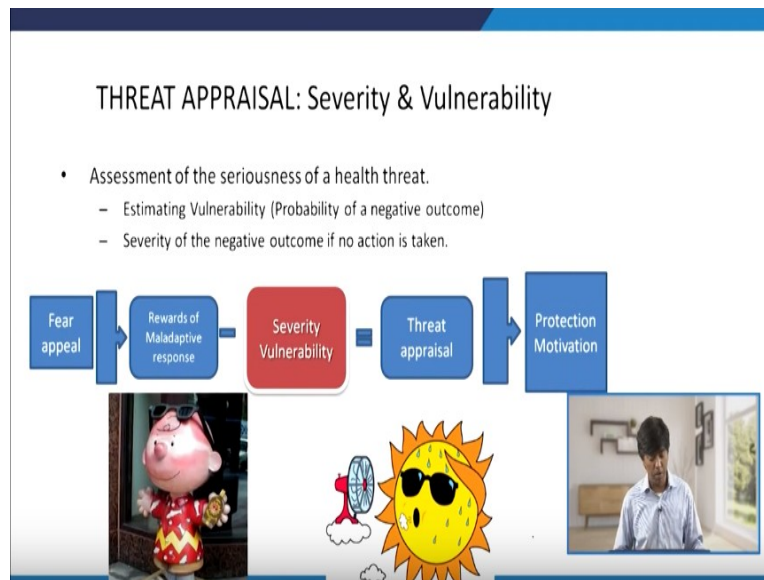
The Threat Appraisal & the Coping Appraisal are in close proximity to Protection Motivation



So here is the component of PMT of protection motivation theory. One is the fear appeal that is if you are doing some maladaptive behaviour okay like you are smoking, if you are throwing your garbage on a gutter and then what is the impact of this okay and which creates a threat appraisal and the response efficacy and self-efficacy is that if I am asking you to do something some to install to adopt some preventive measures okay.

Like if I ask you to buy a rainwater harvesting tank or buy a flood insurance what are the cost of that one and what would be the return of that one and whether you have this capacity or not financial capacity, physical capacity and minus the cost of adaptive responses okay and which is actually the coping appraisal for the protection motivation theory.

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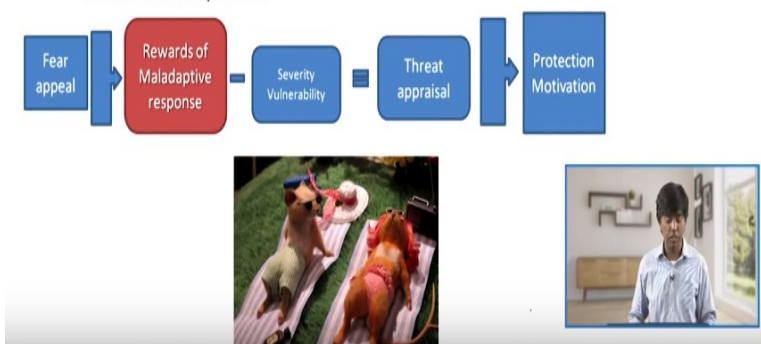
So fear appeal, the fears of maladaptive response okay like if you are smoking that may gives you some pleasure and then severity it can also have some kind of vulnerability making you more vulnerable, or maybe if you are throwing garbage, maybe you do not need to go to distance place you can just do it at your close to your house. But also it is actually choking your drain and gutter.

So this plus-minus actually coming to threat appraisal and then it is increasing your protection motivation.

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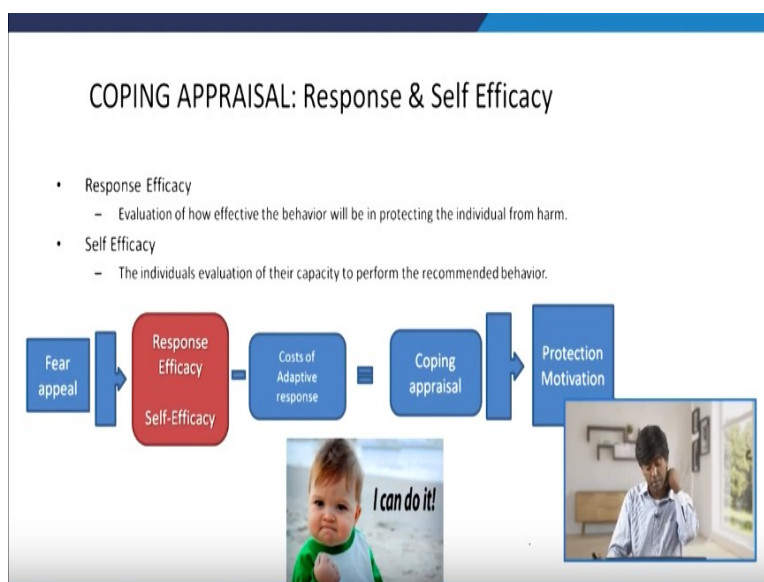
## THREAT APPRAISAL: Rewards

- Rewards are positive consequences for a maladaptive behavioral response.



But when the rewards are high for let us say for smoking or maladaptive response or throwing garbage in a drain and the consequence is lesser then you are not motivated to do it.

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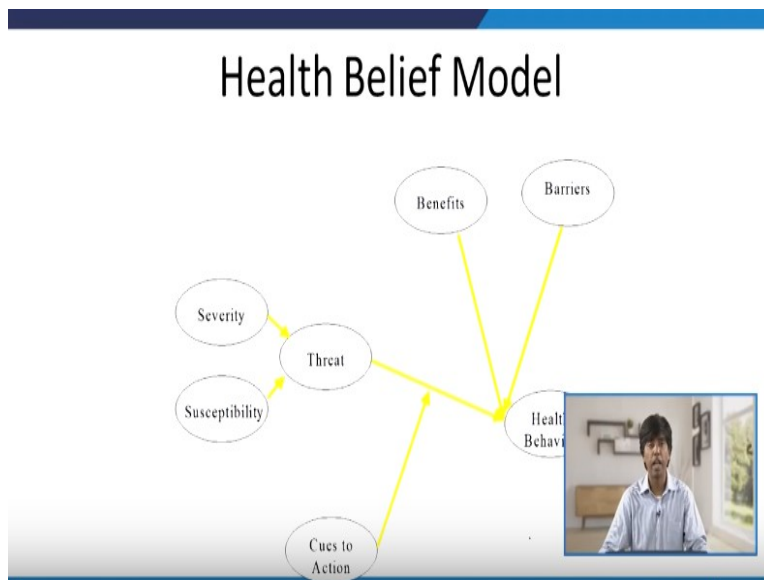


Similarly, response efficacy and self-efficacy like response is the evaluation of how effective the behaviour will be in protecting the individual from harm and the self-efficacy is the individual evaluation of their capacity to perform the recommended behaviour. So if I found that these technologies really work and I can do it is very effective. It has lot of merit, and I have this confidence.

Then I also check what are the financial costs and other costs so plus/minus would decide my coping appraisal and I go for protection motivations. So it has been applied in various health sectors and also in recently in disaster risk management. Also we have another models like health belief models, they have various kind of components like threat which has two components severity and susceptibility.

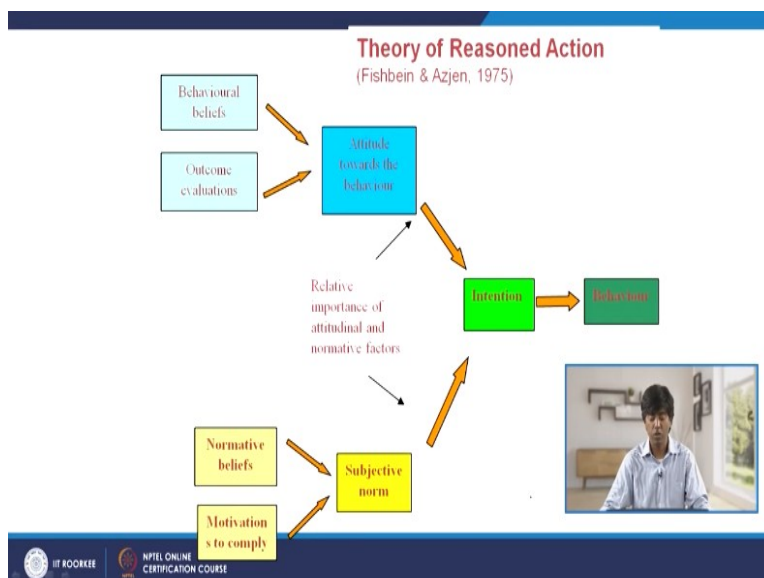
And then the benefits and barriers of adopting something which is cues of actions.

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That leads to health behaviour.

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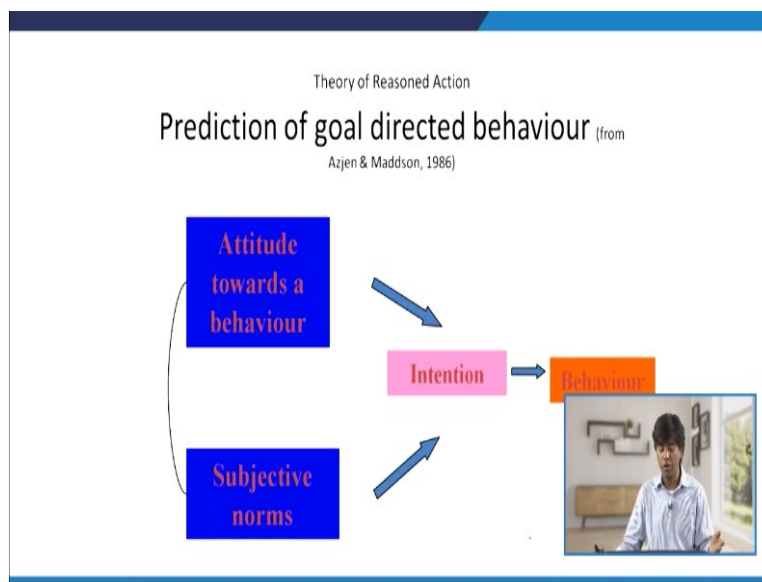




Or theory of reasoned actions developed by Fishbein and Azjen in 1975. They have also similar stories like protection motivations like what are the behavioural beliefs what I believe about and about the fear and what are the outcomes of the protection motivations that leads to kind of attitude whether I should do it or not. But this is also influenced by what other people think my society thinks, my friends thinks right.

So now normative beliefs and motivation to comply and the subjective norms okay rules and regulations that leads to intention and eventually the behaviour.

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Also we have prediction of goal directed behaviours, theory of predictions. So this is the diagram you can see and so this is just a glimpse to give you not to narrate everything. But I hope I gave a more comprehensive overview through this cartoon on installing rainwater harvesting tank and that gives you much better idea about the overall picture of cognitive perspective of disaster preparedness.

Thank you very much.