**Introduction to Cognitive Psychology**
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**Lecture – 08**
**Models of Attention**

Hello. So, we are back today with a section on attention. And to start this session, will do a quick recap of what we did in the last lecture, and from there on will continue with the today's lecture. So, in the last lecture what we focused on or what we did was we looked at what is attention, what does it really mean. And we also looked at the various factors which control attention, and the various theories of what attention.

So, quick recap onto the concepts which we discussed in the last class of attention, basically is filter it is a process or it is a mechanism of the brain which let us the brain control the kind of stimuli, which is impinging on to the brain from the sensory organs. And attention is very beneficial because attention limits the capacity of the mental resources which should be diverted to various cognitive processes which are taking place in the brain. So, basically attention is an important factor.

Now the question that we asked in the last class was whether attention can be increased or whether there is something called diverted attention. So, with practice whether we can use the attention of capacity that we have. On different tasks and as an answer to that we saw that as you practice more. And more what we get is that we can divert our attention and this is called divided attention we can use our resources mental resources on several activities.

So, basically while doing one job, we can also put our attention onto other job. And this basically when we are able to divided attention to several other jobs to a number of jobs, then some of the jobs, which are less important which are routine becomes automatic and the ones on which we are focusing attention presently is the one which is at the attentional system which is at the center of attention. Another interesting thing which we saw was that attention is basically a mechanism with fluctuates. So, attention basically keeps on fluctuating from movement to movement there is something called attention span which basically defines for how long attention would be put on to something or for how long attention is being captured.

Now in addition to that we saw something called selective attention base is basically focusing our attention on to something specific, how do we focus our attentions on 2 specific things and look into specific things. Which is basically equivalent to something called mental cons concentration? In addition to this we also looked at a couple of theories. So, brief review of the theories we looked at something called filter theory which defines, the fact that on the filter theory says that only those processes only those stimuli which on which we focus our attention to our process and other stimulus are not processed.

So, our focus of attention besides what stimuli gets processed and what stimuli does not. In addition to that it also points out that some features of the unprocessed stimuli are processed, but these are physical features and so, nothing of much value. And so, this there was an experimentation, then by cherry using something called dichotic listening task to prove how attention should be studied.

And later on, anna treisman went ahead and challenged the filter theory why because moray came up with the idea of something called cocktail what a phenomena, and he was able to show that some materials from the unintended year or from and from those processes shall not attended to could also pass for example, somebody's name. And so, anna treisman came up, and gave her gave her theory of attenuation theory which says that attention basically what attention does it does not filter out things, but it attenuates or volume downs.

The material which is attended which is unattended, which we are not putting our attention to and if needed we can actually go ahead and process that. In addition to that we also looked at something called the late selection theory, where we looked at the bottleneck which was defined by the filter theory which exists right at the beginning of an incoming message, now shapes toward the back of the message. Which basically means that most messages goes ahead and our processed for meaning for some level of meaning not all level of meaning, but 7 level of meaning and depending on the kind of processing that that you require kind of processing being happening or the kind of differentiation that you want the place at which the differentiation happens the messages are processed.

What I mean by this is that at what level 2 messages differ we will decide to what extent messages a process. So, let us continue with our discussion and focus on to our look into a new theory of attention which is called the multimodal theory of attention. So, it is a very brief theory it is a very short theory which was proposed by someone called Johnston in Heinz in 1978 and it is called the multimodal theory of attention.

And what they say is attention is actually a very flexible system, which allows for the selection of message over others. And this selection of message or this filtration of message from the incoming stimuli happens at 3 stages. So, most of the messages pass through stage 1 stage 2 stage 3 of processing if the message is filtered at stage 1, it is called early selection then a message is filtered at stage 3 it is a late selection.

Now so, how is this theory little bit different the only thing which is different in this theory is the variables which controls stage 1 or which direct stage 1 stage 2 and stage 3. Which basically describe stage 1 stage 2 and stage 3 and as you can see stage 1 is sensory representations whether sensory representation is constructed. So, if a message is processed early on it is processed at the level of the representation with the messages creating onto the neural structure.

So, if the representative itself and so, basically it will be physical properties of the message, which makes us apply that attentional filter or which directs the attentional filter for processing here. If both the messages or a number of messages are approaching us or the incoming stimuli has a number of messages different messages, which are very similar in terms of the physical property, then they can the more or less have the same kind of representations.

So, how are they processed? In this case the message are differentiated the filter is applied based on the semantic representations of the message. So, at the level of meaning, what this theory goes ahead and says is that most messages which differ. So, the first factor which is used for processing messages for separating messages by the attentional filter happens at the level of the physical stimulus or at the level of the representation itself and as you know that sensory representations are generally the composed of the physical features. These are the first features or these are the first representations, which are made onto the brain or the mind. Now in the second step if messages which are approached are of more or less same kind.

A meaning wise differentiation happens separation of messages is done in terms of what the meaning of the messages. A fact where most messages or 2 messages have the same meaning or nearly same meaning and they have the same kind of physical features, what happens then. In those cases, are deeper level analyses a deeper level of filtration a deeper level of attentional processes really work. And here the separation or the filter is dependent on both the semantic and sensory representation, into takes care of or it takes includes both the semantic representation and other senses representation.

So, if most messages are similar in terms of outwardly similar physical features and semantic semantics meaning. Then a third level of analysis where happens. It is a deeper level of analysis is a deeper level of filtration, where very, very minutely the sensory features are looked into and the semantic features are looked into. And in combination the sensory features and the semantic features are in combination with each other then become the basis or differentiation of 2 messages. So, this is what the theory is and this is a very simple theory of Heinz and Johnston.

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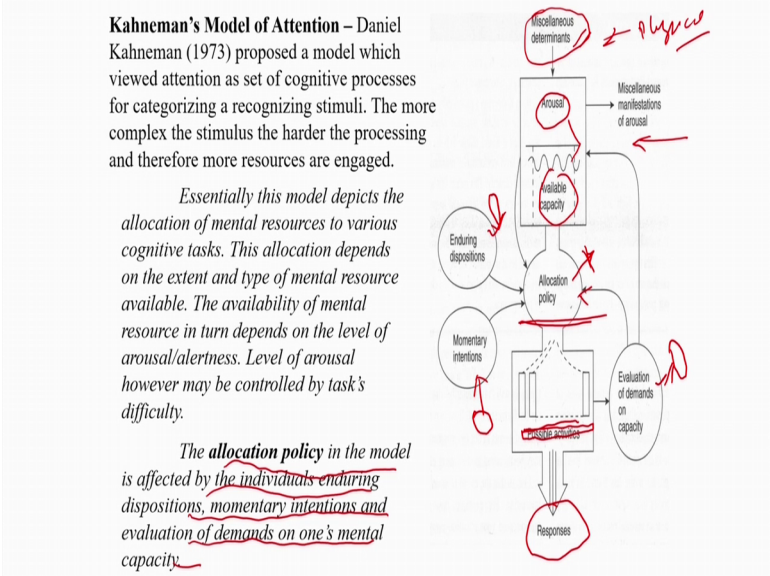


The next theory that we talked about is Daniel Kahneman's theory. Even before we go ahead and look at Daniels Kahneman's theory of how attention really works. Let us talk about attention the and the capacity of attentional systems and the mental effort which is required for moving or using attention.

So, more psychologists are actually looking at in terms of attention those messages the factors which make a message being processed or what makes what factors of a message makes something being processed and they are not looking at those factors, which are not making a mess being processed to make it more simple since in attentional in attentional theory or in terms of an attentional experiment. Most psychologists are now focusing on the fact that what makes a message being selected for processing.

So, they are not looking at those factors which make a message not get processed, but they are looking at those factors which make a message being processed. And they believe most psychologists nowadays believe that looking at those factors which basically give this idea of how something is in process, or what is the way in in which something using process that should be, and that should be, the center of attention of attentional studies our center of focus of attentional certain status.

Now one particular experiment or one particular view which defines how attentional focus or what is the capacity of attention is the viewpoint of those theories, which look as look at attention as a spotlight, a group of theorists believe that attention is like a spotlight on a stage. And so, what is this center of the stage is what focuses attention. And what they believe is that most spotlights that that is there on a stage, or any particular area the spotlights and fuzzy boundaries. It basically means that part of messages which are towards the boundary of the spotlight also gets processed.

Now Daniel Kahneman he gave a very interesting theory of attention, where he used something called things like a location policy things like user disposition things like physical states. And so, many other things or so many other factors or defining how attentional filter really works or how the process of attention really works. And so, what Daniel Kahneman says is that attention is a set of cognitive processes which is used for categorizing and recognizing stimulus.

So, Kahneman proposes a model which views attention as cognitive process which helps in making categories in making categories of the incoming stimulus or taking incoming stimulus, and assigning them into pre-recognized category. And while doing this because this helps in the recognition or in the identification of the stimuli. What he believes is the more complex stimuli. And incoming stimuli is the more mental resources is needed. The

lesser complex inter an internal stim an external stimuli is the lesser that national resources are needed.

So, essentially this model then depicts the location of mental resources to various cognitive tasks. Now if on the right-hand side, you actually see the model itself of how these Kahneman models really work. Now as if let us decipher this model, a little bit and see how this model really works. And as you see what Kahneman believes is that there are a number of mysterious determinants from in the environment which decides whether a message is processed or whether or message should be processed or not. And these miscellaneous determinants are something which is physical in nature and this comprises the physical property of any incoming messages.

But once a message enters into or impinges on our sense organs it is the level of arousal which decides whether a particular message will be will be attended to or not. So, basically the first and important factor in his theory Daniel Kahneman theory of attention is the level of arousal. And we have seen this level of arousal also in previous theories which says that level of arousal is an important factor which determines whether a message gets processed or not. And so, what Daniel Kahneman says is that with high levels of alertness high levels of arousal, a chances of processing the chances of attentional filter working is very high. Also, he says that not only the arousal levels, but also the available capacity. How much capacity of or how much mental concentration is left? That defines how the filter will work.

If a very less mental capacity is available, if most of the mental capacity is taken up, then the attentional filter will not work as required. And so, as wanted, but then if the available capacity is high and the arousal is less the filter works perfectly. Or the these are the terms on this is the filter actually works. And another factor, an interesting factor which defines the functioning of the attentional system or the attentional filter is the evaluation of demands of the capacity.

How much demand is being or made on the attentional capacity? If some other jobs or most jobs which are happening with the new incoming stimuli which needs to be filtered are automatic in nature is the is the evolve if the demand on the attentional capacity, or the attentional resource is less than an effective filter will work or the filter working will be effective. But if a second job which is given to you or the secondary job that you are

doing in addition to focusing your attention on to something new, what would really happen is that both jobs will compete with each other and lesser attention is required. And the chances are a filter will block the new message or block the important contents of the message.

Also, in addition to the arousal in the available capacity, the allocation policy is important term for Daniel Kahneman's theory. Now what is allocation policy? According to a denman Daniel Kahneman, allocation policy in the model is affected by individuals in enduring dispositions and momentary in intentions and the evaluation of demanded mental capacity. So, what he says is the way the kind of system that we use for allocating or for distributing mental concentration or mental effort on 2 different tasks depends upon 3 things.

One is the enduring disposition. It is like the interest. So, if a person is interested in something, he is bound to put much attention to that particular thing, and want to put lesser attention to other things. So, if somebody is doing something interesting, chances are that a lot of his attention policy will be allocated to that job and very less of attention is left over. But if somebody is doing a boarding job a job which is not of interest to you and which is not something which you endure it is not an enduring disposition something not of your liking, what would happen is that you would basically most of your attentional system is available resources are available. And so, what would happen is that most of the since it is available, it can be it can be made to use also of interest our momentary intentions.

Now, momentary intentions is things which happens at the moment. So, at the time of processing at the time of when attentional filter really works when something is a new stimuli comes in what happens then? So, if the task demands are something, or if at the time of processing and even to occurs which requires you to focus yourself on to something else, when to some other event or some other job or some other some other feature of a stimuli, and those reasons or those things could be also responsible for our allocation of how much allocation you can do our mental resources to a particular even incoming stimuli.

And so, this how much demand is being made how much of the processing is going on presently what are your likes and dislike, and water is a momentary intention these

factors will define how a person will define or will divide his attention. So, basically looking at it the first factor which basically decides whether attention would be paid to something or not is basically somebody's or a person's arousal level and available capacity. Well, the person is aroused enough, and whether he has huge or not if not huge, but substantial amount of available cognitive resources. If the resources are pre-using something is being used and something then the person will not attend to any new messages or will not at attentional will not come into play.

Given the fact that the enough attentional capacity is available, and enough our arousal is there, or more than maximum level of arousal at attentional capacities available even then your attention onto a particular job will depend on the allocation policy of how things are being allocated. And or how somebody wants to allocate that, or how somebody wants to put their attention onto something. And this will depend upon your likeness and liking un likeliness or some things your motivations towards a particular job or towards a particular event which is happening at the present.

Also, on what happens now so, some sudden event might occur which might take up lot of your attention. So, think of yourself self-counting notes in in a bank or people counting bank tell us counting notes, and a sudden loud bank comes in. Now when a sudden loud bank comes in or a sudden loud bank happens, the it is very difficult for the person who is doing this is job of counting the notes to focus on to it and his attention will save. So, momentary intentions are those things which happen in the moment. And so, those are those demands of those environmental demands are those movement demands which shift attention.

Other thing of interest are the evaluation of demands on the available capacity. So, how much demand is right now how much tasks are you doing in addition to the present task, which is in hand. And these will decides all possible activities that somebody can actually go ahead and do. We allocation policies will decide how much attention you will put to something and how much attention you are going to put on to something else and this finally, will decide the responses.

So, basically this theory goes ahead and says that attention depends not only on arousal and available capacity it also depends upon people's motivations liking and likings

momentary features and the current demand on a particular current demand on a on a particular system or on a particular processing which at.

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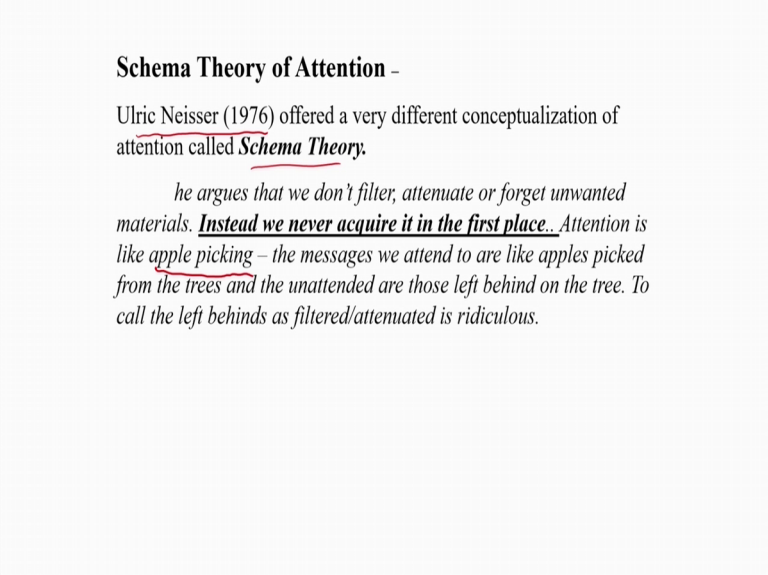


The next theory that we look into is something called the schema theory of attention. And so, this is a very interesting theory of attention, because this is our totally different view of attention. And so, what this theory actually goes I didn't says? So, this theory was first of all proposed by someone called Ulrich Neisser in the year 1976, and this is called the schema theory. So, what is the theory actually goes ahead. And says it is a very interesting theory a very interesting approach, which says that people's attention does not go ahead and filter or un filter something.

So, people's attention is not a process which actually separates things which gets filtered through it and something which does not get filtered to it. What he says is that things which are not filtered things which we would not put our attention on to we actually do not go ahead and perceive it in any way. So, basically what this theory says is that the schema theory says is that only those things which we focus our attention to perceive, but those things which we would not focus our attention to are not perceived at all. It is not taken in at all.

And so, attentional system does not work like if in in or if then kind of a system, but it works as all or none kind of a system. So, if every so, if attentional systems basically decide if everything is processing and whatever is not processed is left over and nothing

no kind of even or no kind of mental resources are allocated to it. Now what he says is that attention the process of attention is more or less like apple picking from trees. It is like picking messages from trees.

So, when he says that when we go apple picking think about we go to picking mangoes or apples from trees, the ones that we pick are the ones which are available to us and the ones that we do not see remain on the tree. And similar to that schema theory basically says, that the one message the messages that we put our attention on to are the only ones that we should be interested in, or that we care about, the ones that we do not look into, that we do not pay our attention to, that will not focus on to actually remain outside the system and there are no close or there are there is no way to basically go ahead and process them.

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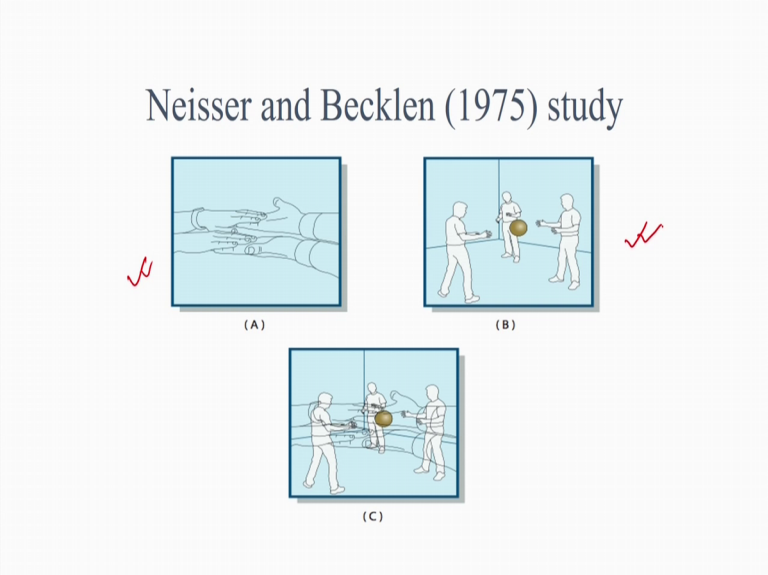


To prove that this kind of approach is true that, what we do not process or what we are not being attention to is not process at all to look at a system like this Neisser and becklen conducted and experiment in 1975 to provide evidence to this theory.

So, it is a very simple experiment which was done. Now there were 2 different videos which were shown to a group of subjects. On the first video you see people are hands slapping. So, this is the first video, in which you be the subjects in the experiment saw people hand slapping, and they had to count the number of hand slapping. So, this is an

easy job to do and people were able to count the number of hand slaps, which were being made.

On the second video people went ahead and saw the number of ball passes which were happening between people. So, there are 3 people who are playing a ball and a number of ball passes are happening. And so, the job of the subject or the person hosting taking part in the experiment is to count the number of passes which the ball is making from one person to another or the number of hand passes that is being happening. So, both easy jobs to and so, people were able to do them.

Third video was made where people were made to look into this video and the sport from what this video had is a superimposed image. So, put the videos were superimposed on to one another. And so, people were actually asked to shadow one of these videos, the video that they had to shadow was the one which is ball passing. So now, what happened is a third video is presented. So, in video one you count the number of hand passes, sorry the number of hand slapping which is there in number 2, you look at the number of ball passes. And in number 3 what you tend to do is the soup in the superimposed video, you actually have to shadow we actually have to read aloud, or tell aloud how many ball passes are there.

So, there are 2 images there are 2 superimpose videos there, on one you have the hand stepping going on, on the other you have the ball passing going on. And so, what really happens then is that people are. So, as we forgot focus to put their put their mind onto the hand passes people do not really pay attention to what is happening in the hand slapping experiment. And soon enough if you are 5 minutes into the video, the people for hand slapping actually stop doing that and starting passed, and started passing balls to each other.

But it people most people most experimenters actually 80 percent of the people who view this video, we are not able to recognize, how this or when does this switch happens. They do not realize that people who were doing this hand slapping this changed to ball throwing. This kind of thing was not noticed. And so, this is video and even when the experiment ended and a brief recap brief over view of the video was overview of what this on the video was taken 80 to 85 percent people are not able to tell whether this hand slapping video, in the hand slapping video, the change happened in terms of people

stopped hand slapping and started throwing balls. Which basically provides evidence to the fact that that attention could be a system, which is and if and all or non-kind of a system, where what you perceive is what you perceive and what you do not perceive actually does not get into the system at all.

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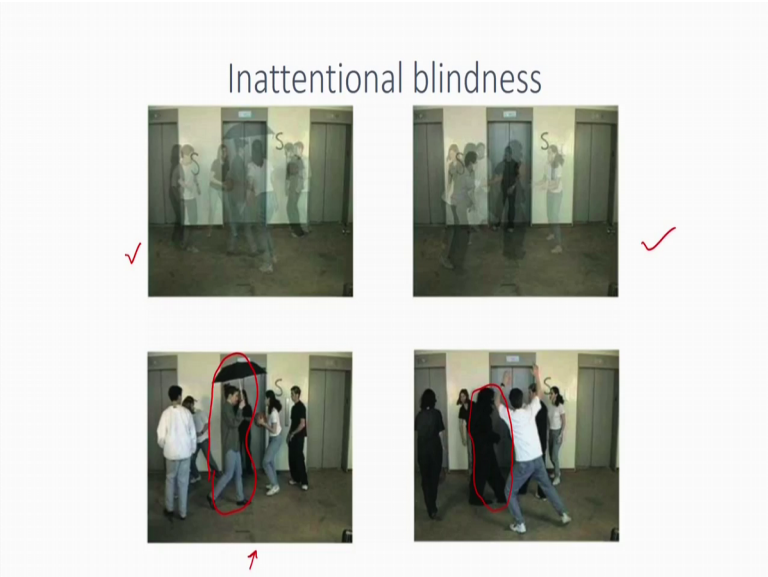


Now, similar to the study done by a Neisser and becklen an interesting fact which is obvious or which is present in our environment is something called inattentional blindness. Now inattentional blindness is basically a phenomena where things in front of us we do not see it. Now often the most of you would have had a scenario in which I think you are looking for is just in front of you and you do not it. And this particular phenomena is called inattentional blindness, and this is basically even if something is in front of you do not see it. And so, this provides inattentional blindness provides support to the schema theory.

So, to study in attentional blindness, 2 kinds of experiments were done. In one experiments people were passing ball among each other's. And so, there were 40 hand passes of ball which were there at the rate of 40 hand passes per minute. And so, most subjects, we are advice to actually go ahead and count the number of hand passes. And so, people actually engorged onto that. And so, they looked at the number of hand passes which you happening. So, look at video this and video this.

And so, in this we people look at a number of hand passes, which are actually going along. And then very equally or very nicely they are able to count the number of passes that the ball made from one object to another. Now hidden from the subject's attention where 2 events which most subjects actually didn't notice only 20 percent 25, 25 percent people actually went ahead and knew that this happened this even happened. So, within this scenario of ball passing, in one case a person carrying an umbrella came in between these ball passes or came in. So, look at this person this person I am talking to he came in between and he passed these people whose hand passing.

Similarly, in one case a woman, a short woman wearing the dress of a bear came in and passed this particular thing. So, if you if you want you can actually go ahead and see this video of inattentional blindness, it is available on YouTube, and you can see that when engorged when somebody is engorged onto a job, and when difficult job like this for example, how many hand passes are being taken placed.

Count the number of mails who are passing the ball and counting umber of females from whom the ball is passing, and if this kind of task load is put onto your attentional system is put on to your processing system, what happens is people are not able to focus on stimuli which is just in front of them, as you see that these 2 stimuli these 2 people are the bear clad lady and here the umbrella taking man passed in front of peoples eye, but they were not able to recognize this.

They were not able to see this. The reason is that as more and more load our pole is put into the attentional system you do not process things in front of you. We will basically suppose a partly a schema theory that what you process that if you do not process something it is like apple picking. So, what you do not process remains order system what you process is what remain in the system.

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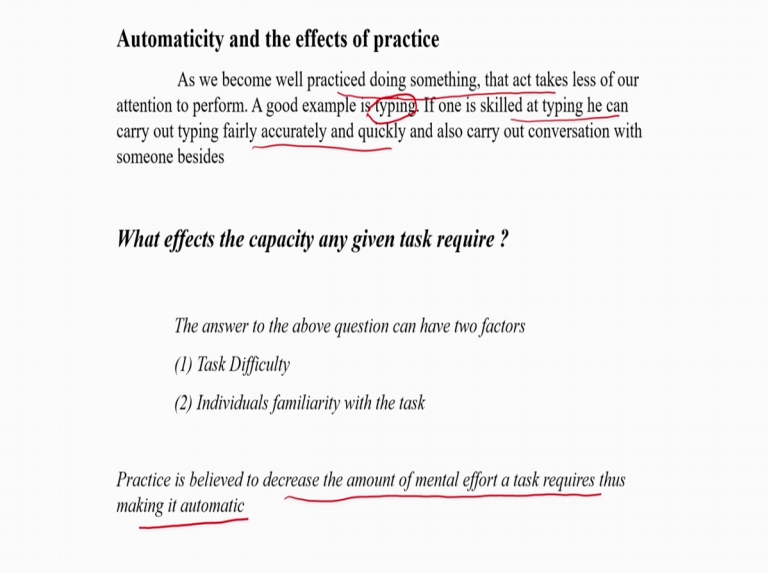


So, an interesting experiment to support schema theory now the question that we had at the beginning of this section was the safe attention is such a hard thing to look at. Whether there is something called automaticity. Whether there is something called automatic processes is there a fact that if attention can become automatic, is there a fact that can attention become automatic is and if it becomes automatic with practice can systems become automatic and pro human processing or mental processing become automatic.

So, that more attention is available for other jobs. Now we have seen that this is possible because the more learner drivers with a lot of practice can divert their attention to multiple other things for example, talking listening to music and so on and so forth. So, we look at to that feature of attention, and that feature is that with a number of practice with a lot of practice most jobs become automatic in nature. And so, attention is freedom the attentional capacity is freedom.

So, I will become well practice as we can well practice doing something that takes less upper attentional to perform a good example is typing as I said. So, you have been typing on your keyboards for a lot of time for a lot of years. And so, you realize that, as you as you practice as you learn this typing skill more and more, what really happens is that things become automatic. It becomes the processing becomes automatic. And so, while typing earlier when you when you are learning typing you have to find out where the

qwert word is where the f and d word is the switch and all those kind of things, but when as soon as you develop this habit or the your practiced more, now more attention is available now you can type talk to people rain coffee and do a lot of other jobs at hand. So, basically typing has become a lot of is a good example of how automaticity with practice attention becomes attentional spans is freed up and jobs become cognitive jobs becomes automatic in nature.

So, if one is skilled at typing he can carry out fairly accurate amount of information, and jobs quickly and carry out of a conversation as I just said. So, what affects the capacity of any task at capacity any given task require. What is the reason, or what are the factors which affect the capacity any task is going to require? The answer to the above question are 2 factors, one is task difficulty.

Now the more difficult at task is the more attentional capacity, it will require and the more time it will require for you to finish this task. So, for example, if a simple counting task is given to you a number counting task is given to you or if a simple, count counting of money is given to you it is a simple job and does not require too much attention, but if I load your memory with other demands for example, not only the fact that. So, I give you a bunch of notes to count.

Let us say all of them a 100 rupees notes. And so, you go ahead and count. And so, if the task demand is just counting the number of rupee notes it is an easy task, but then suppose I say that this job of counting the money you have to do 2 things. You have to not only it tell me how many notes are there, but also tell me which of the notes are forward facing and which of the notes are reverse facing, which means that I have notes in the bundle, which are on which are forward facing which has the front side up or the back side up.

Now, the task becomes a little bit complex and requires more of attention. And similarly, I can ask you several other load your memory or working capacity with several other facts. And so, as task capacity increases, the task difficulty increases the capacity required is more or more in demand. So, the demand of attentional capacity becomes high an individual's familiarity with the tasks. So, the second factor which decides the capacity any task is going to require is the individual similarity with the task. Now

individuals who are very familiar with a particular task who know what a task looks like, or what is the requirement of a task they are able to do a task.

Very nicely and very easily in comparison to those individuals who do not know a task. For example, look at bank tellers. Now bank tellers are very familiar with this counting task they know how to count and they know a lot of other things about the counting, how the note looks like what is the crispness of the note the motor memory; which means the hand memory of counting is better. And so, they can do this job easily, but if you take these people the same people and into some other job. It is very difficult to them to pay attention. Look at coders. People like in our institute people students who do coding.

Now, when they are doing coding they are very familiar with the coding job and it is in a particular language. Let us say, somebody is learning c is very familiar with that encoding is easy for him, but he moves from one language to the other language, or tries to do something else in terms of data mining or something else. In those cases, in a in an unfamiliar territory it becomes really difficult. So, individual similarity how much familiar you are with a particular task decides how much ah effort or how much capacity of attention you will require and so, 2 important factors that I discussed now a star's difficulty and the individual's familiarity with the task.

So, practice generally is believed to decrease the amount of mental effort or task requires, and makes this automatic. So, as I discussed briefly with you that the more number of practices that you do the more familiar we get with a particular task, the more easy it becomes for you to do the task and the more automatic it becomes. The more automatic task becomes the more automatic many tasks become the more easier your life is.

Think of your daily routine now if your daily routine if you look into it from getting up in the morning to come into the to the mess for having food coming to the place of study which is the lecture theory it has in our institute. And similarly, and riding a bicycle or based processes which are there all of these are automatic, right. You do not have to put too much mental concentration into it. You do not have to each day think about how to ride a bicycle or what should I do in riding a bicycle, or how do I eat my food you know even a people who walk here do not even have to think how and why my foot is pushing the how do I walk about pushing the earth down and that makes me walking.

They also do not have to think about simple task of going or brushing or this kind of job these are fairly automatic. And if you ask these people these students or what happened today what kind of food you have most people do not even realize what kind of food you have it is an automatic process. Yes, but then there is with practice now why has this become automatic is that they do this routinely they do these tasks routinely over and over again 365 days or year. And so, it becomes more and more automatic.

Automaticity actually states it is it goes ahead and saves your mental concentration. So, you can put this concentration. So, that you can put this attention to other jobs which is of interest and so, you can or other jobs which is more demanding and you can put your attention. So, if students are get engrossed into basic things like what food they eat or how the cycle bicycling works or how do they brush and those of daily activities, they will not be left with mental consideration to read to understand lectures to understand what is happening here. And so, this practice making automation is an important fact. Remember, that as we practice more and more of your attentional system becomes free and becomes available to put into tasks which require.

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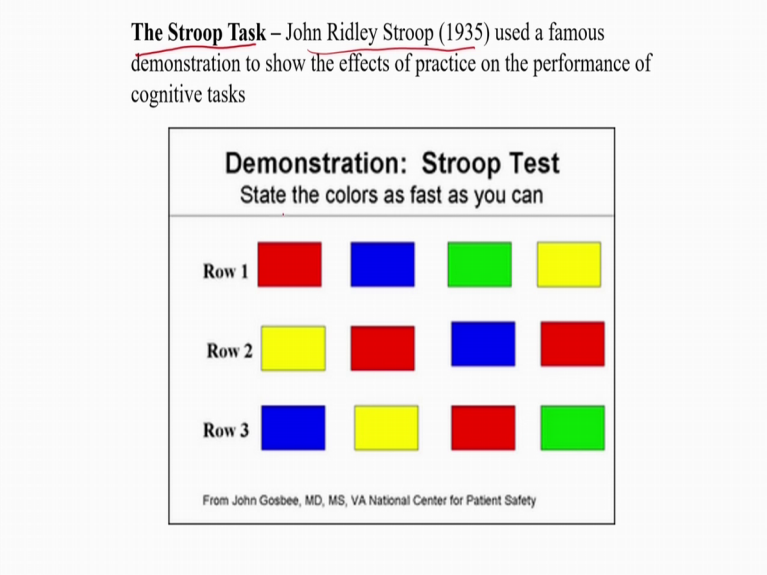


So, very interesting task, or a very interesting experiment which goes ahead and proves that automaticity or being automatic and doing things are with practice jobs become automatic, or where as you practice more and more a task more and more attentional

system or more attentional resources are available. And this availability of more resources makes you focus on to other jobs.

So, which basically means that now more practice you do the more automaticity becomes and more attentional resources are available. And so, a task which was defined which is called the stroop task now it is the very, very interesting tasks. So, let us do this task and see how does it really work and in the later half and the end of this task, I will also go ahead and show you the meaning of how this tasks really works.

So, johns ridley stroop in 1935 made a famous demonstration to prove that automaticity is basically the reason or of or it is it is a byproduct of practice, and automaticity frees up a lot of attention. So, let us do the task I will give you some couple of minutes to go ahead and do the task. So, basically focus on to your screen and start doing what I am asking you to do. So, this is a demonstration of other stroop task.

So, look at this demonstration. What you have to do is state the color as fast as possible. So, I will give you 1 minute to basically do this task self-task of this and look at this 3 rows and quickly name this color or quickly go ahead, and name this color and write it if possible somewhere. So, look at this demonstration and name the color. Now I am pretty sure most of you would have accurately named the color bars which are presented here. And so, we move to the next part of this demonstration, but I will give you around about 30 seconds to 45 seconds to finish this task.

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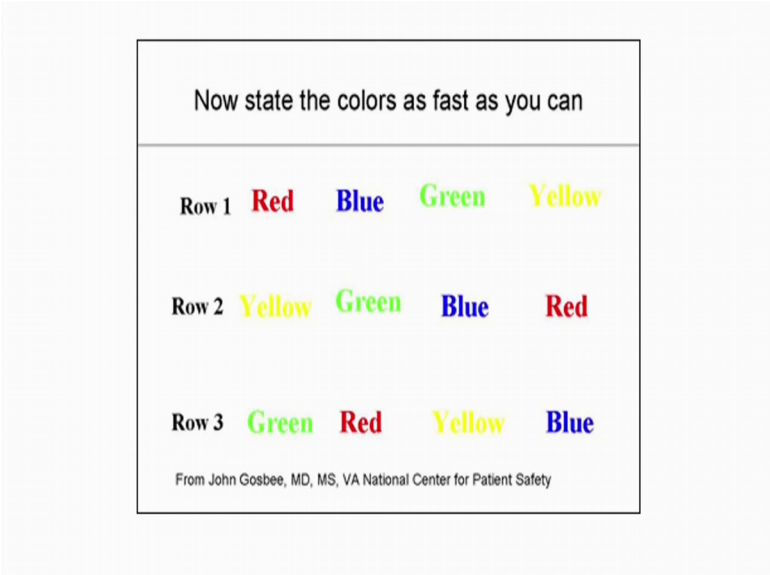

So, in the demonstration to what you really have to do is state the colors as fast as you can. Just read what is the colors which is we reading written on this demonstration just go ahead and read the colors. So, do that and I will give you 30 seconds for doing it. So, I given enough time to read the colors. And now we will shift to third demonstration, but over the advice. In the third demonstration, you have to do the thing that I am asking you to do as fast as possible.

So, do not cheat basically what you need to do is to take enough as fast as possible the job which is being given to you. And so, what you have to do in the third demonstration is to name listen very carefully to name the color of the ink, color of the ink in which the particular word is written. So, all you have to do is to go ahead and name the color of the ink they linked the color of the ink in which it is written. So, I will present to you and I will give you 30 second period to do as this job.

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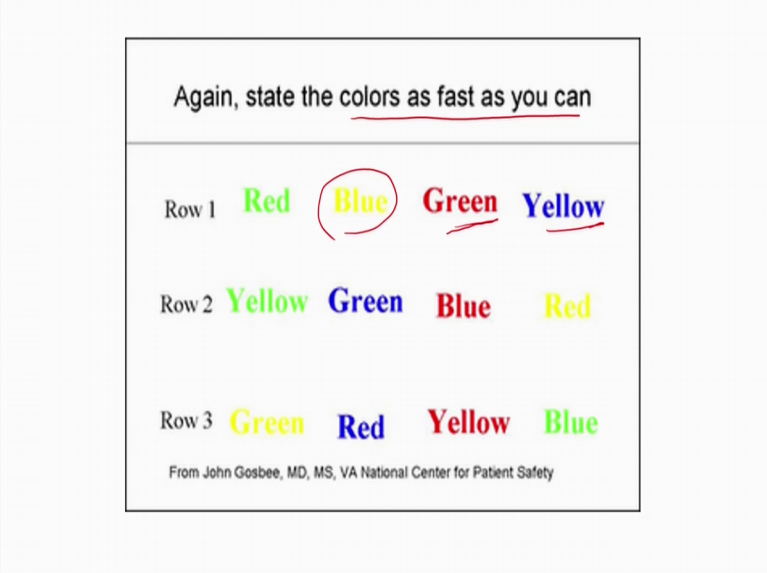


So, let us turn do it what you have to do is to name the color of the ink in which state the colors of the ink in which this was a pigment. So, let us start. So, most of you would have completed and did you see what happened. What really happened is that most people actually are not able to correctly identify the color of the ink in which this particular word is written.

The reason is that red is written in green as the most people tend to read red instead of green which is what the correct answer was, or for example, here you see that blue is

written in yellow. So, when given a task of reading as fast as possible what you see you will read blue here, but not the question was the thing that I asked you to do was to name the color of the ink. So, your response here should have been yellow. And similarly, here the response should have been red not green and in this case the response should be blue not yellow.

Now, why does this happen? Why is it difficult for you to name the color of the ink and instead of which you can very fast tell me what the what the display what are the things are written or the what are the words written in the display. What do you think happened? What is the reason why this happened? And another question is given enough practice can people lower the time of response here. So, if enough time is given can people do this task fast. So, let us find the answer.

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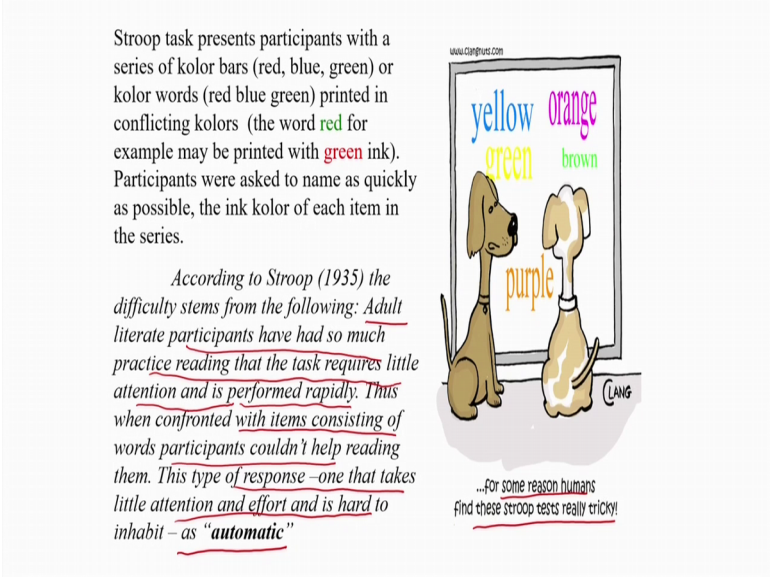


Now, stroop tasks presents with a series of color bar as I said red blue green or color word printed in conflicting colors and people have to name the color of the ink. But then as I said most people are not able to perform the stroop task. According to stroop why this happened is that adults are literate participants has so much practice reading the task requires the attend that the task requires little attention is performed rapidly. Now since as illiterates we are so familiar with reading we have so much practice with reading; that it is difficult not to read.

And so, when the question asks is to read to basically name the color of the ink, it becomes a difficult job. Why does it become a difficult job? It becomes a difficult job, because reading is natural to us. It is something which we know and so, the first response our system. So, we have so much practice with it when the first response our cognitive system does is read the letters. And that is why you cannot name the color of the ink. But then what really happens is that with practice this could be reduced.

So, if I give this task to you let us say for 5 days and if you practice 20 times on 5 days amount of time it takes for you to read the color of the ink. They comes easy. And so, thus this become this conference with the item consisting of word pairs. And now this type of response when they take little attention and effort is called automatic. And so, on a funny cartoon on the right-hand side you can see that; obviously, dogs do not see it, but then this puppy is saying to the other puppy let us see for some reasons human find this stroop tasks really tricky.

They do not believe their eyes they do not believe that humans are so stupid because you know dogs cannot talk. And so, when dogs cannot talk it is very easy for them also people who are not literate. People who have very literacy or less literacy are not familiar with the learning paradigm. It is very easy for them to do this job. Only for people who are literate people who have enough literacy or people who have enough practice with reading it becomes difficult for them. Now an interesting thing that I want to bring in here is whether the neural structure responds to attention.

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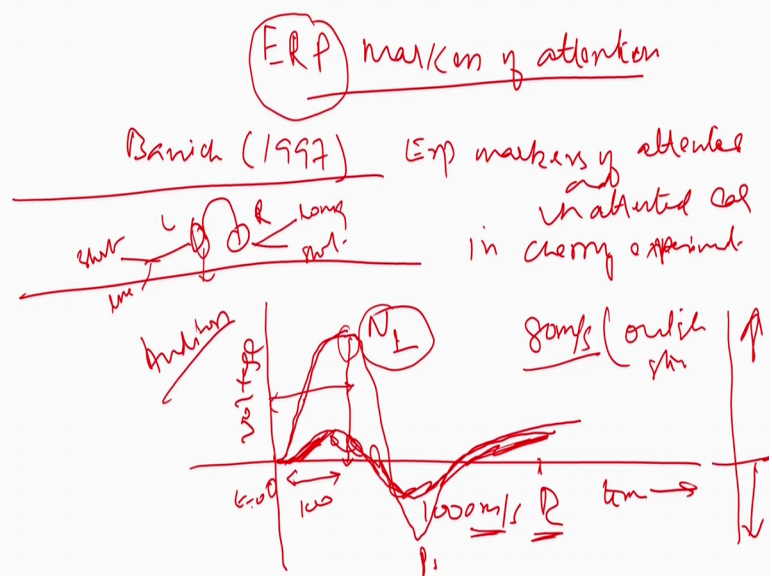


So, whether there are something called neuro physiological evidences of attention. So, basically what I mean here is that in the beginning of this lecture, I told you I said to you that we were looking at not only how the cognitive processes work, or what is the reason of how the mind works, we will also look at something called the brain responses to it.

So, in the earlier experiments, in the earlier part of this chapter, we have looked at that attended years produce things from attended years are processed more than from the unattended year. So, unattended materials or stimuli from the unattended here is either tuned down or not processed at all or not picked up at all, and the several theories which go ahead and say that attended years differ from an idea in terms of how much is process.

So, what we want to see is whether there is an ERP marker; where there is a brain response to this whether this is true at the level of the brain. And so, someone call banish banich, I am sorry in 1997, he studied or he designed an experiment to study how does the ERP markers of the attended and unattended years in cherries experiment. I would say modified cherries experiment really evolved.

So, his task was like this, there is this 2-year headphone that we talk about. And so, both the headphones actually go ahead the right the left headphone and the right headphone they hear soft and heart tones short and long tones long and short tones on both the years.

So, I have long tones and short tones which shall be presented in both the year. And what people have to do is to shadow one of the year in this case the left here, and to tell me aloud how many short tones or long tones was be was be presented and the design of the year. Experiment generally most designs of year if experiment in the works in this way. So, basically this is the time axis, and this is the voltage axis the current axis of how much potential is generated what is the amplitude of the ERP ways, or what is the amplitude of the event related potential wave.

So, basically, we discussed in the first section the trp is a method of doing cognitive psychology. And ERP measures through sensors on the on the surface of the head what kind of electric potential is generated. And so, after stimulus presentation so, let us say that this is t equals to 0, where the stimulus is presented from here on, 1000 millisecond event or 1000 milliseconds section was cut.

So, eggs where recorded from different regions of the brain this egg that I am talking about is from the auditory cortex since it is the auditory job. And so, this our number of trials. So, ERP is what you have to do is you have to take a large number of trials, and basically go ahead and calculate something called the mean of all these trials. So, a large number of a trials are taken, and I mixed together, because human beings respond in different way there is a baseline there is there is a baseline waveform which is there. And so, these baseline may differ.

So, to find out that unique signature, that we are looking for in ERP we have to take a number of trials. So, number of trials we taken, and from these number of trials ERP was cut from the moment the stimulus was initiated to 100 to a thousand millisecond or a response. So, thousands a millisecond was the response time which was given.

So, within, thousand millisecond you have to go ahead and response whether it was a short tone and long tone and what really happened. So, when it was done it was found that an ERP like this was generated. Now this ERP here is something called the N 1 and this ERP here is something called the P 1 now what is the N 1 and P 1 N 1 is 100 millisecond.

So, the you see that the potential this is the voltage axis, and this is the time axis. So, what really happens is that you see a peak a peak in voltage on the negative side, amazingly most ERP is that are in this way. So, the upside is generally negative and the

bottom side is not generally positive of my graph. And so, what happens here is that attended years. So, this is the ERP affair attended year this is the ERP of it unattended year. So, the one which is thick is the ERP of an unattended year. And so, what is found is that in the attended year 80 milliseconds. So, this is basically 100 millisecond but 80 milliseconds following the onset of the stimulus I see a peak and this peak is called the N 1 peak.

This happens this N 1 peak is basically peak which shows novelty. It is basically a peak which shows new things into the stimulus or it is it is basically our attentional peak most books we will talk about this that attentional peak something which captures the attention something which is not present in in the system. So, basically this 80 millisecond is a time, which is required for a stimulus to basically come in and imprint on your or a sense organ.

So, when you are attended year is waiting or when they attended here is actually preparing itself within the first 80 millisecond of peak will register peak will be registered, and this peak will demonstrate that it is attended the attended year the year which is being attended to shows brain response or shows the brain dynamics, and this says that it is attended whereas, on the unintended year you do not see this peak. Similarly, you will find b 1 p 3 peak and so on and so forth, but we will discuss those peaks somewhere else at some other point of time when we were looking at what are ERPs and our ERP is done.

So, in the next coming lecture upcoming lecture we will continue with the automaticity the concept of automaticity of how automaticity really works what are the factors which makes attentional systems available and job automatic and how is attentional capacity allocated at different resources. And we will also talk about something called the psychological refractory period it is a very interesting thing to look at.

Thank you.