

Social Behavior and the Brain: An Introduction to Social Neuroscience

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Week – 06

Lecture – 26

Hello and welcome to the course Social Behaviour in the Brain – An Introduction to Social Neuroscience. I am Dr. Ark Verma, an associate professor in the Department of Cognitive Science at IIT Kanpur. This is week 6. We will continue talking a bit about regulating social behavior. We have talked about the fact that prejudice is something that automatically comes into play when we are navigating through or you know trying to understand and recognize social stimuli.

One of the very important aspects of prejudice is this capacity for evaluation which we were talking about in the last lecture. Let us continue that discussion. So, in the previous lecture we started discussing about the regulation of attitudes and evaluative processes. We looked at the iterative processing model.

Basically provided by Cunningham and Zelazo, where we basically said that you know attitudes and evaluations are actually arrived at a combination of both automatic and deliberative processes. And it is an iteration, it is basically you know repetition of that cycle of taking some components of automatic evaluation, when there is time we sort of give it a thought we deliberate upon this and eventually we combine the outputs of both of these processes in order to make sense of the social stimuli. And a bunch of experiments were discussed if you remember in the last week in the last lecture itself, where we were talking about how do these processes combine together to predict and to understand our reaction towards objects of prejudice. For example, white Americans reacting to black faces, black Americans reacting to white Americans faces and so on. Interestingly, we also you know qualified the distinction between the terms attitude and evaluation, where we said that attitude would refer to all the pre-existing valence information and the current state of evaluative system.

So, we basically talked about the fact that attitude is something about an object that you hold previously, it is something that you have held a priory. It is probably based on maybe some of your past experiences, maybe what you have learned through the society, maybe things that are there even before you have actually interacted at any length with the stimulus. on the other hand just sort of going back on the other hand we talked about the fact that evaluation is the current state of the evaluative system starting from the first interaction starting from how much you know information you are gaining with time about the attitudinal object. For example, you may be biased against prejudice towards a

particular class of social individuals, a particular class of groups and then eventually once you start interacting with them, once you make friends with some of them, once you start understanding their cultures, practices and this and that, the evaluation sort of moderates the any prior held prejudice. So, it in that sense makes it a more balanced outcome, it makes it a more balanced and realistic evaluation without any prior held belief.

Typically, however, the iterative reprocessing model basically says that this will be a iterative process this is something that will keep on you know keep going on one after the other one cycle and the other cycle and the other cycle and eventually with time that is how our attitudes and evaluations change about these you know attitudinal objects basically that you can say how we mature and how we take in new information as it unfolds. So, we will continue this discussion in this lecture as well. Now, in order to determine see this is basically we are talking about social neuroscience. So, while we are talking about some of these theoretical concepts, we have to also talk about how does the brain you know come into the picture, where do these concepts manifest themselves in the brain. So, in that regard if you want to determine the neural structures underpinning the relatively automatic versus relatively reflective you know deliberative processing, we would actually need to compare brain activity between tasks in which people attend or you know wherein those the people do not attend to their evaluations.

When you are attending to your initial evaluation of the stimuli, you are basically paying it some conscious attention, you are basically reflecting upon it and deliberating upon it. Now, there have been multiple kinds of experimental tasks. Some tasks require individuals to reflect upon these things, some tasks do not require individuals to reflect upon their initial evaluation and basically ask them to just go ahead with responding according to those evaluations. So, to just elaborate again in a bit more detail, in the attended condition reflected tasks, participants are typically asked to think about and report their evaluations. So, where you where you are attending, you basically have been asked to say what do you think about this attitude object? Maybe you know it is a person of different race or color or religion or maybe it is just Typical object, there is this shirt, what do you think about this shirt? There is this particular social custom or phenomena, what do you think about it? So, for example, the valence of faces, names, concepts as I just said, may be about capital punishment, may be about reservations may be any anything like that.

On the contrary in the unattended non reflective task participants may be asked to report on a non evaluative aspect of the same stimuli. So, here evaluation is actually or the task performance is orthogonal to the evaluation it is not directly linked. You may be having some evaluation you may be having some those initial impressions, but the task does not ask you to express it. The task actually asks you to express about something else for example, the gender of the faces or maybe the color of the face appearances any of those kind of things. And in these tasks or you know sometimes what may happen is that the

stimuli may be presented so rapidly as to prevent actually a conscious detection, so that you cannot have a conscious or awareness of your attitude towards the stimuli.

Now, since these tasks the latter that I am talking about are non reflective task they reduce or eliminate any conscious evaluative processing. The patterns of neural activations basically that differ depending upon the evaluative properties of the stimuli can be assumed to manifest the automatic processes. So, in deliberative tasks where you are actually supposed to attend to your evaluation versus these non-deliberative, non-reflective tasks where you do not have to attend consciously to these things, then these tasks are probably the tasks where your automatic evaluations are manifesting themselves. Now, also automatic evaluative and emotional processing for example, particularly of negativity has actually been linked to the activity in amygdala. Remember we have talked since beginning when we were talking about faces and so on that when people have a negative evaluation of a particular stimuli say for example, judgment of danger, judgment of vigilance then amygdala is what sort of becomes activated and amygdala activity gets moderated by the degree of threat or danger that the person perceives.

So, this is this almond shaped structure, this is buried in you know medial temporal lobe, it supports fear conditioning and it also supports understands or manifests in the perception of fear in others. How are you you know how afraid are you feeling of somebody else and you know in that sense. Now, across modalities, auditory or otherwise, the amygdala generally responds to, you know, more strongly to negative than positive stimuli and it also happens when the stimuli are presented even subliminally. So, even if you are sort of presenting, you know, a stimulus below the threshold of conscious perception, amygdala sort of is able to detect it and it is able to signal threat or danger about whatever attitude object you are presenting, face, name, any other concept, event and so on. Now, more recent research actually suggests that the amygdala may be responsive to the intensity or the arousal value of stimuli rather than just their valence.

Now, remember when we are talking about you know emotional information in stimulus. There are multiple aspects one of the aspects is obviously valence. So, the degree of positivity versus negativity, but also a very important aspect and you will see this in you know with words or with pictures and so on. Typically they are rated on two more things for example, one is arousal what is the degree of arousal that particular picture or face or word is causing. For example, it could be a positive pleasant picture, but a very mild picture it does not really move you that much.

It could be a negative picture you know may be something sad, may be something gruesome, cruel or so on, but the degree of cruelty will also manifest in terms of how aroused you will be when you are looking at that, how moved, how perturbed you will be when you are looking at those pictures. So, that is arousal. The third thing is dominance,

what is the dominant emotion, what is the dominant you know trait of that picture. So, again this is something of the you know of that you should remember when you are talking about emotional stimuli, but here the you know the proposal is that the amygdala may not only be responsive to valence, but actually it may be responding to the arousal that these stimuli are causing and that is something very very important. So, how do we check it? So, Cunningham and colleagues in an fMRI study asked participants to rate concept words such as murder, happiness in either an evaluative sense.

So, are these good words or bad words or a non-evaluative sense are these concrete nouns or abstract nouns. Both conditions controlling for stimulus valence, they found an activity in the amygdala was actually predicted by the participants ratings of stimulus intensity. For example, anger can have several things. So, you can be angry, you can be disappointed, you can be annoyed. one kind one way or you can be furious or enraged and so on.

So, the intensity of the same concept can be different you know when differently expressed. So, what these people found what Cunningham and colleagues actually found that amygdala activity is corresponding to the intensity that the participants are perceiving in any of these words. Also valence was found to be associated with activity in the right in the anterior insula not amygdala, but the right anterior insula which actually responded more strongly to negative than positive stimuli. So, we are slightly presenting a bit of a different account here. So, far we have been talking about that oh amygdala responds to negative emotions, fear and so on, but here we are sort of getting a more nuanced information that the amygdala might be responding to intensity of negativity or positivity.

On the other hand, the right anterior insular is what is responding to how negative versus how positive the particular concept is. Now, there is also something very interesting in terms of how these you know particular organs are connected to the other organs in the brain. For example, there are large scale projections from the insular to the hypothalamus and the role that both of these structures together play in the modulation of the sympathetic and parasympathetic nervous system activity, they basically suggest or implies that valence may be represented in the brain as a physiological orientation towards a stimulus you know how I mean in terms in some terms how oriented you are towards that particular stimulus means also how ready to act you are when you come across that kind of stimulus to approach it or to avoid it. Now, so this is more in terms of how people are automatically deliberating on these things. Let us look at more conscious expression of evaluation and how people elaborate upon these things.

Now, it has been suggested that the prefrontal cortex is involved in the conscious expression of evaluations as well as their elaboration. More specifically, elaborative processing in the prefrontal cortex has been proposed to change the nature of evaluation

So, the more the prefrontal cortex is able to analyze on a given attitude object, to add more information about it to basically threadbare, understand the causality, understand why people behave in a particular manner. May be you are initially very angry on somebody, but then when you sit down the prefrontal cortex which is your thinking and deciding center in some sense very loosely put, analyzes more information, puts context together, adds two and two and you know gets all that degree of analysis. Then what happens is it allows to change the nature of the initial evaluation that you were holding.

Therefore, the prefrontal cortex may leave the value of the evaluation relatively unchanged, but rather just embed it in a slightly more complex cognitive structure. You may still not like let us say the decision somebody else has made, but your understanding is more nuance you understand the context of the decision or broadly in your knowledge structure for example, you employ a particular stereotype to justify a prejudice. I do not like people of this religion or this color or this caste because traditionally we do not like them. There is common knowledge people say you know it is been there for several years and several centuries that people know this as a fact about people of that caste or religion or color or whatever. Now, on other times the prefrontal cortex may be actively able to modulate evaluative processing either by suppressing or by enhancing the automatic processes from subcortical regions in further iterations of the evaluative cycle.

Remember the iterative reprocessing model it says there are many iterations there are several cycles of evaluations that are going on. So, what the prefrontal cortex might be doing is it is working with the automatic evaluations that are coming in and it is elaborating upon them it is adding more and more information and every cycle it is adding some more information. It is basically providing more elaborated nuanced slightly more complicated information. So, that your initial impressions may be tempered a little bit they may be tempered down little bit or you know appropriately stated in some sense. So, in line with this prediction that the prefrontal regions are involved in conscious consideration and expression of evaluations, comparison of evaluative and non-evaluative conditions in the concept board study that we just saw revealed heightened activation in the prefrontal regions when the participants were making explicit evaluative judgments.

So, whenever explicit evaluative judgments are you know in play you can expect that the prefrontal cortex may be playing a very important role in this case. More specifically, if you talk about where in the prefrontal cortex, the evaluative task recruited or showed greater activity in the anterior cingulate cortex, the right anterior prefrontal cortex and the bilateral regions of the orbital frontal cortex. So, these might be the regions that are involving in this explicit evaluation, this nuanced discussion about these you know impressions. So this is one study, in another study what they found was participants were asked to rate the names of famous people for example, Adolf Hitler, Bill Cosby, may be Mahindra Singh Dhoni, Virat Kohli anything in for our context either in terms of their valence good people bad people or their historical status you know are they past you

know are they people very important in the past or are they still relevant today those kind of things. and this activity or this kind of task found greater activity in the medial and the ventrolateral prefrontal cortex for both evaluative and non evaluative judgment.

The screenshot shows a video player interface for a lecture titled "Lecture 26" on Chitralekha. The interface includes a video player with a transcript overlay. The transcript contains text about brain activity in the medial and ventrolateral prefrontal cortex. The video player has a progress bar at the bottom and a control bar with various icons. The transcript is divided into segments with timestamps and a "Bookmark Segments" button is visible.

Chitralekha
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Organizations Tasks

Lecture 26

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So, here you can see that based on what is the kind of task and this is a basic principle in neuroscience that the brain response to stimuli based on not broadly just the stimulus, but what you have to do with the stimulus, what is the task that you have been asked to perform with respect to the stimulus. So, likewise it has been suggested that the prefrontal regions are likely to be particularly important for the construction of complex evaluations and that the prefrontal cortex supports the integration of initial evaluations with additional attitudinal as well as contextual information about a given stimulus. So, I hope it makes you know very good sense so far that there is obviously an a priori automatic sort of evaluation which is your attitude, but as soon as you start interacting with the stimulus you start getting more information about the stimulus you will engage into more elaborated evaluation more conscious deliberative elaborated evaluation and basically the prefrontal cortex is the region that is allowing you to do that. So, in line with this contention just taking this forward Cunningham and colleagues observed a greater activity in the ventrolateral PFC when participants evaluated famous people towards whom they were ambivalent. So, you see with famous people it is very interesting sometimes we like them sometimes we hate them, but there are most people who you know the largest categories of people who we are just sort of ambivalent about you know you may have the best most famous cricketer you may have a most hated cricketer for whatever reasons, but you may have a lot of other people who you do not really have a

lot to say about you say yes I know he is a famous person I am not either positively or negatively inclined toward this person.

So, we are ambivalent in that scenario. Also, in Cunningham and colleagues 2004 study participants ratings of how much typically they try to control their initial reaction to concepts correlated strongly with you know ambivalence and it predicted prefrontal activity in response to those concepts. Now, remember we are talking about regulation where does regulation mainly take place it takes place in the prefrontal cortex. So, the more you are trying to regulate say for example, initially you had a very negative feeling, but you do not want to say this in front of the experimenter. So, where is it that you are trying to regulate that when you are trying to regulate your internal feelings the prefrontal cortex automatically is supposed to be working on that ok.

So, in both of these studies the correlations between stimulus ambivalence or control and prefrontal activity were found to be greater in the evaluative rather than the non evaluative condition. See non evaluative condition things are happening almost automatically out of your conscious awareness they are happening on the basis of the automatic processes. Evaluative condition yes the prefrontal cortex is engaged and it is the one that is mainly calling the shots. Now, what does this tell us? It indicates that conscious and reflective processing may be required for the representation and possibly the resolution of all kinds of complex evaluations. So, final evaluation of something that you have is basically governed by the prefrontal cortex and it basically requires conscious and reflective processing rather than automatic first impression processing.

Now, both of these are also seen as interactive processes. So, we cannot or we should not be seeing automatic and non-automatic and deliberative processes are different. We should not be seeing evaluative and non-evaluative task as being completely different. That is obviously, at all times an interaction between the two. So, that is basically also brings us to this point that it must be noted that there is this activity in the amygdala and the insula which was evident in both the non-evaluative and evaluative tasks.

In these studies we were talking about Cunningham's 2003 and 2004 studies. These regions were engaged when participants made non evaluative ratings suggest that they were involved in relatively automatic processing and at the detection of stimulus values and intensity does not require conscious attention. So, just in the previous slides we were talking about the fact that when you do conscious and reflective processing the PFC is activated, but also in the same studies they found activity in the insula and the amygdala, but in the non evaluative conditions. So, if it is happening in the non evaluative condition, it means that the activity in these regions is being moderated even if you are not directly attending, if you are not directly sort of processing the evaluation. So, it is probably happening in a very automatic phase and it does not really require conscious attention or awareness to play a part.

Still, these regions were also found to be very active when participants made evaluative ratings. It also suggests that they were not supplanted or replaced by more reflective process. So, reflective processes are there they operate, but they do not replace the automatic process. It does not happen that only reflective processing will happening will happen. Automatic processing will anyways happen that is the default.

Reflective processing probably will happen mainly on top of whatever automatic processing has happened. So, the amygdala shows greater activation in the evaluative than the non-evaluate task implying that amygdala activity reflects initially reflects both initial associatively driven automatic evaluations as well as subsequent reflective evaluative processing. So, amygdala seems to be involved in both of these cases. if you look at these findings they suggest that there exists therefore, a hierarchical evaluative system higher order processes come online information is continuously fed back through the lower order processes to generate updated evaluations. So, again as I said first evaluations probably are automatic, but then more and more information is engaged and basically the reflective and deliberative processing happens by the mediation of the prefrontal cortex.

Also even as conscious deliberation starts to exert an influence on evaluative processing, evaluative states themselves are likely to go on being represented in sub cortical brain structure. So, evaluative processes also are you know they are they are not mainly only in the prefrontal areas, but also they get represented in some form or the other in the sub cortical structures of the brain the hypothalamus and the limbic system circuit. So, in these studies participants were directly people wanted to investigate this as well. So, participants were directly asked to reflect on and report their evaluations. So, what do you think about something and although explicitly evaluated situations are typically very common in everyday life.

For example, choosing what to eat in a restaurant, selecting a job candidate etcetera. The issue of what really triggers a shift from relatively reflective processing in the absence of an explicit evaluative goal has something is something that people have really pondered about. Another very interesting question in the same vein is that what besides instructions to deliberately evaluate a stimulus causes a continued iterations of this evaluative processing. Remember the model said we keep on doing this again and again. Why are we doing this again and again basically? What is it that is triggering this iterative evaluative process? If you have a basic idea, if you have a basic automatic impression, why should we do that? So, these questions are there.

What makes us do that again and again? One of the triggers that have been proposed is stimulus ambivalence. If you do not feel very strongly about something, then you want to probe it more, you want to understand about it more. So, when automatic associative processes do not really give rise to a simple binary like it is very good or it is very bad or

I like it or I do not like it in that that kind of evaluation an individual therefore, may engage in further reflective processing to resolve the inconsistency. See typically we want to see the world in black and white typically we want to know whether we like something or we do not like something whether we love something or we hate something. If that initially automatic evaluation has not given us that then obviously, the individual may be triggered to get more information in the hope that once you have more information you will be able to decide whether you like something or you do not like something. So, more reflective processing will be triggered and it is triggered by these incongruities between the current evaluation of the stimulus and the feedback that the environment is giving.

Suppose initially you do not like something, but everybody else is saying oh it is very good and the person is very nice and this and that. So, you will yourself then try and collect more information engage in a more deliberative reflective analytic sort of processing. For instance, the need for further deliberation may be signaled if approaching a positively evaluated stimulus does not yield the rewards expected to accompany it or even worse if it sort of comes out to be on the contrary it is a positive stimulus, but the thing is some kind of punishment happens. Now, research basically suggest that in these cases the orbitofrontal cortex is that is the one that is involved and it is basically it is the region that is involved in the comparison of what you know you initially expected on what you are getting out of the evaluation. The detection of a disparity between expectations and outcomes therefore, or the presence of an uncertainty like ambivalence triggers activity in the anterior cingulate cortex region that is associated with conflict monitoring.

Remember all of these regions in the prefrontal cortex perform several functions. they are performed in elaboration, they are performed in detection of conflict, they are also performed in they are also involved in resolution of conflicts and so on. So, the ACC signals the organisms current evaluative state that you know it requires some adjustment, it triggers the prefrontal regions to engage in more evaluative processing to resolve this incongruity. Now, continued evaluative processing therefore, which ensues later updates the current evaluation with the additional information that is recruited from pre-stored attitudes as well as the environment to achieve a better match to the reality or to sort of land in a more valid evaluation. See, what does the system consider valid? If you are sure about the fact that you like something or you do not like something.

As long as you do not have that decision made more and more reflective processing will be engaged probably mediated by the anterior cingulate cortex and that will go on it will keep on iterating unless you have a final answer oh I like something on the basis of whatever information I have gathered or whatever analysis I have you know performed so far. Also, in addition to this elaboration and evaluating the updations, updating the evaluations with more information, the prefrontal activity also serves to embed the

evaluations within more complex cognitive structures and schema. Say for example, a more nuanced understanding, see when we are younger. we have a very binary understanding of the world, something is black, something is white, it is good or it is bad. As soon as you grow, as you grow older, as you get more experience of life, as you get more nuanced understanding of how the world works, there are typically more grays than either black or white all right.

So, basically the structure of the world, the description of the world, the description of how the world functions is actually more great is it is a much more complicated cognitive phenomena, it is a much more complicated schema and that it seems is you know the job of the prefrontal cortex to create for create you know something like that for us. An individual's personally an individual's evaluation cycle of a single stimulus is often subsumed within a larger system or ideology. See for example, you may I do not know whether I should take these examples, but you may like reservation or you may not like reservation, you may like capital punishment. or you may not like capital punishment, but the fact that you like capital punishment or you not like capital punishment or you do not like sorry capital punishment is actually part of a larger ideology. You may have some you know notions about the fundamental rights of individuals, you may have some notions about morality, you may have some notions about what the state can do, must do or should do.

Or should not do for that matter. And in that sense gradually these you know deliberate evaluations they become part of these larger complex structures. And sometimes what will start happening is these complex structures once they are established enough they become sources of stereotypes and nuances. So, because I think that people should be behaving in this particular manner I think that capital punishment is right all right. So, again this is a iterative to and fro kind of a process. So, what happens is when you are actually deliberating a lot reflective processing may alter a current evaluation to make it consistent with a set of personal or societal values.

The screenshot shows the Chitralekha video annotation interface. The video player on the left displays a speaker in a blue shirt. The right side of the interface shows a list of video segments with their start and end times and a transcript. The segments are numbered 36, 7, 18, 22, and 21. The transcript text is visible for each segment. The interface also includes a top navigation bar with 'Organizations' and 'Tasks' tabs, and a user profile for 'Irfan Ahma'.

On other occasions a current evaluation may remain unchanged, but reflective processing may be employed to justify an account for it. For example, the case of capital punishment for you know for perpetrators of heinous crimes like rape and you know double murders and this and that. Now, the thing is you will see very interestingly a lot of times in the society that people in principle may not agree with capital punishment, but they make an exception and say oh if somebody is involved in a heinous rape or you know murdering of a minor, then certainly they should be awarded with capital punishment. So, what you are doing is a you have this broad idea, a broad ideology that in principle I do not like the idea of capital punishment, but I have this particular logic that a heinous crime has been committed against a minor and therefore, I am making an exception and I am saying that no people who are involved in these crimes should be awarded with capital punishment or terrorism or any of these things for that matter. So, the literature on intergroup relations suggests that stereotypes about social groups are also often used as justifications for possessing negative attitudes.

I was saying this moments ago isn't it that sometimes these ideological you know substructures or broad structures become sources of stereotypes you know there is a societally held attitude that people from this religion or this caste or this race are not good. You know in 1930s and 40s in Germany that is probably what manifested that people probably had a degree of ill feeling or a degree of you know held beliefs that Jews are the source of all their problems and then that they allowed it to manifest in you know in the way the Jews were treated during the course of that entire second world war. So, while individually people might not be agreeing with it. So, not everybody wants to you

know punish or harm somebody, but people sort of you know the German sort of justified it to themselves that you know broadly we know that these people are you know sources of all the problems that Germany is facing. Therefore, it they are you know Hitler or the Nazis are justified in perpetrating all kinds of violence that they are perpetrating against the Jews.

So, this is in that sense very interesting and this whole discussion on evaluation and attitudes and how things are you know how deliberative iterative process are happening versus how automatic evaluations are coming you should see all of this in light of these kind of processes. Stereotypes therefore, again just sort of moving further are deemed as causal schemas that attribute certain outcomes for example, low societal status to the dispositional characteristics of the group. Now, this is also very interesting you should suffer because they you know deserve it because of their nature of being money minded, being stingy, being uncharitable this and that you can have any kind of thing you know anything like that. You can say people of a certain class should suffer because they are you know less literate, they are less educated, they are typically involved in menial jobs this and that and so on. And so, it is their qualities that make them deserving of the suffering that we are giving them.

Or that is it is their qualities that makes them deserving of the hate and the prejudice that we have towards them and this is very very interesting this is something that you should be thinking about a lot. Perceivers typically will evaluate a number of a single member of a stigmatized group negatively if they believe that causally justifying that stereotype you know they they justify that and they apply it to that person now you are meeting with a particular person of a hated group. Now, your interaction was perfectly fine, but the thing is what people typically do is that they are not evaluating this person on just the persons specific personal characteristics, but also they are judging or treating the person on the basis of how they want to treat that overall group or how the stereotype detects that that entire group be treated. So, it has therefore, been proposed that the prefrontal regions of the brain are also involved in this type of elaborative processing wherein evaluations are integrated with pre-existing cognitive structures. You know stereotypes and schemas are all pre-existing cognitive structures and a particular evaluation with this particular member is also happening.

So, there is therefore, however, you know so this is something that people have said might be happening here. Although there is little direct evidence in the evaluative domain that this contention is consistent you know yeah by a recent study by Satpute and colleagues which examine the neural correlates of causal reasoning. So, in some sense there is you know proof about this available in one of these studies. Let us look at that study. So, in this study by Satpute and colleagues in 2003 in one conditions participants were asked to rate whether two concepts were semantically associated ring or emerald.

For example, they are semantically associated emerald is a precious stone that is typically worn in a ring. In another condition they rated whether the two concepts were causally related for example, when in case of when one causes the other. So, the presence of the moon causes the high tides and the low tides in the sea. Now, determining the causal relationship between concepts was found to be associated with heightened activity in the dorsal lateral PFC as well as the precuneus. Now, to the extent that stereotypes and other cognitive schemas serve to justify evaluations by embedding them within a causal structure I hate this person because of this this this within a causal structure one should actually expect that you know similar pattern of activations should be observed when an individuals are when an individual is elaborating their evaluations in this particular way.

Now, as per the current model the iterative reprocessing model reflective processes are thought to drive and direct automatic evaluative processes. That is it is not that the reflective processes necessarily generate a distinct evaluative state themselves, but rather they foreground or background information. Say for example, what they do is if your initial see you have a previously held stereotype you have a schema about the causal structure of why members of this group should be hated and be you know treated badly, but you are having this specific interaction with an individual. So, what happens is based on this particular interaction, the cognitive structure is either foregrounding all the bads that you remember.

Say for example, your initial interaction is also going bad. You know that a person is behaving in a particular wrong way. I do not want to take a specific example, but what

will happen is if the initial interaction the automatic thing is also going bad. So, it will foreground all the stereotypes and sigma that you have. if it is going good it will try and background all of that all right. So, and then may be go on to the additional iteration let me collect more information.

Now, with reflective processing evaluations can be shared by current motivations and goals also and they can be modulated by reflective thought. For example, it will happen a lot of times that you really hate a person, you really hate that entire community, but Now, you have come to an office and there is a member of this community who is responsible for your particular favor that you want who is responsible for something something you have to take a favor from them. So, what happens is depending upon your motivations and goals you will tell yourself oh no I have to really talk nicely to this person get the job done and may be later you know keep harboring my stereotypes. this is also very interesting idea which you should think and you know think about analyze. This idea actually gets support from studies of emotional regulation that demonstrate a common set of prefrontal activations accompanying both deliberative down regulation and up regulation of amygdala activation.

So, there will be a lot of times you will be required to do these down regulations. I am feeling very strongly against this particular individual, but he is in a position of power and I have to get something from him. So, I will obviously down regulate my ill feelings and I will try and be very kind and polite to the person. So, that the person actually does me the favor that I request of him. Now a mechanism by which this reflection can really you know change or alter automatic processing is by directing attention to motivationally salient aspects of stimuli.

What is most relevant in terms of what you need in this particular moment? This system can potentially detect relevant features and redirect attention such that the significant stimuli receive enhanced processing. For example, you do not like a member of this community, but you are there you are interacting with them you really motivationally need you know to behave positively. So, the system will drive your attention to all the positive things to things that are relevant to things that are needed. In line with this recent evidence actually suggest that chronic differences in orientation towards valence information as well as situational variables actually may also direct attention and thereby influence the perception of emotional intensity. So, how badly you are feeling towards somebody or how good you are feeling towards somebody may also be moderated by this kind of process.

People wanted to see this investigate this in more detail. So, Cunningham and colleagues did this study in 2005, where they presented the participants with positively and negatively valiant stimuli during fMRI scanning. After scanning had happened participants completed an individual differences measure of their prevention and

promotion focus orientation. So, whether you want you know your biases to be highlighted or downgraded they did this study. Individuals what did they found? Individuals scoring high on promotion focus tended to be attentive to and motivated by the achievement of gains, because you want to promote you have something to gain. So, their attention was basically focused on achievement of gains, whereas individuals who are scoring high on prevention focus tended to be oriented towards avoidance of losses.

So, you do not want to incur any losses in your interaction. So, together these results indicate that more promotion focus participants had greater activation in the amygdala, anterior cingulate cortex and extracellular cortex for positive stimuli. Conversely more preventive prevention focus participants had greater activation in the same regions for the negative stimuli. So, depending upon what are you looking for, what is the basic motivation for an interaction that will decide what things you will attend to, how will you up regulate or down regulate your initial evaluations. Now, amygdala in the attentional brain regions were not really universally tuned towards a particular valence, but they were found to be tuned towards stimuli that were relevant, motivationally important for the individual.

There are also other studies. So, for example, more direct evidence for the motivated direction of automatic processing by reflective processes from the work of Cunningham and colleagues 2008, where they did another study participants were presented with famous names and they were asked to focus on either the positive or the negative aspects of the person. ignoring how anything is bad just focus on the positive thing or ignoring how anything is good just focus on the negative thing of negative aspect of these individuals. Remember with famous people there are always all kinds of stories there are positive stories going around there are negative stories going around. Now, when the participants were doing this task, activity in the bilateral amygdala and insula was found to vary as a function of the evaluative fit. So, if your initial evaluation was positive and you are asked to look at positive aspects, then the activity will be different.

If your initial evaluation was positive and you are asked to focus on negative things, the fit is you know there is this incongruency. and this incongruency will moderate the activity of the amygdala and the insula. On the other hand, an opposite pattern was found for positive focus condition yeah. So, this is something I have already said. Together these studies suggest that the reflective thought engaged by task demands and motivational concerns can actually direct and modulate the processing of village information to generate situationally appropriate responses.

So, the task said or even if you do not like this person please focus on some positive ideas, some positive things that this person may have. So, obviously, you will moderate, you will change, you will modify your initial evaluations. Now, similar effects have also been found in the studies of prejudice where for example, participants are typically

motivated to control or to inhibit evaluations you know they may initially be holding towards these different social groups. Specifically greater amygdala activation to black rather than white faces was found when participants used social categories to make evaluative judgments about them, but greater activation to white rather than black faces were found when people tried to treat the faces as just individuals ok.

So, this is also a very interesting nuance part that is there. The motivation to individuate modulated the automatic evaluative signal. Remember this is also something that we were talking about. The prejudiced groups, the groups that we are prejudiced against typically are just all compiled together. If you are a member of let us say the Jew community, all Jews are bad. However, if you are member of a you know favored community let us say whites or other you know groups, then all groups each individual has its own unique positive quality that adds to the overall thing.

So, but you know you will individuate and evaluate the individuals properties there. Another study actually looked very directly in this case. So, what they did was they presented faces subliminally 12 of 13 white participants showed greater amygdalic activation to black faces because they were treating all as together. However, in a different condition when stimuli were presented supraliminally and participants had the opportunity to regulate initial interactions there was equal amygdalic response to black and white faces again initial evaluations versus regulated evaluations. consistent with the modulation of evaluative processing by prefrontal regions. This was this decreased activation in the amygdala to black faces related to white faces was accompanied by an increased activation in the areas of the anterior cingulate cortex and lateral prefrontal cortex.

Now, like the findings have been for race greater activity in amygdala and insula have been found for images of members of other stigmatized groups. So, both of these things are both of these areas are active there. However, unlike in studies that involve racial stimuli in which personal goals and social norms may encourage participants to inhibit negative responses because the norm is to not be racial just understand that. Negative responses for these sorts of stigmatized others may be considered normatively acceptable.

So, again depends on what the society is thinking at that point in time. And also perhaps for this reason in this study heightened activity in amygdala and insula were accompanied by greater activity in the ACC and the lateral PFC in response to the stigmatized images. So, overall just summing this up consistent with the idea that individuals foreground automatically activated negative information when it is congruent with motivational concerns. So, if you are out to you know speak ill about members of a particular community Jews you know blacks and so on, you will foreground all the negative stereotypical information. And in this case the literal PFC mediated foregrounding may actually lead to the amplification of negative emotional evaluations. So, remember

automatic evaluation, deliberative evaluation, motivational concern, causal structures also for example, you know whether there is a incongruity or congruity between initial and actual interactions.

So, all of these play a very very important role as to how the individuals interact and how they let their you know biases manifest in this condition. Thank you. I will meet you in the next lecture where we will continue this discussion a little bit more.