Social Behavior and the Brain: An Introduction to Social Neuroscience

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Week - 02
Lecture - 06

Hello and welcome to the course social behavior and the brain and introduction to social neuroscience i am doctor ark varma an associate professor at the department of cognitive science iit kanpur . This is the second week of the course and we are still continuing to understand the ideas about understanding and representing of self and others in the brain. This lecture will continue from last lecture number 5 where we were talking about direct processing of self and other and we were discussing a bunch of neuroimaging studies which had been synthesized into a meta-analysis by Zaki and Oshner. Now in this part of this lecture we are going to talk about the analysis of reflective processing of the self and the other. Now we were able to so far review the patterns of processing of the self and other when the participants of this experiment had engaged in the direct mode of processing. Now, the dissociations that were observed thereby could possibly be attributed to the differential recruitment of the systems important for processing the sensory and sensory information available for direct personal experience as compared to the indirect observations of others.

Now, remember we had contrasted direct processing and reflective processing earlier in the previous week as well in lectures 4 and 5 if I remember correctly. Now, just before we sort of go into this, you should remember when we are talking about direct processing, we are talking about processing which is more autonomic and it is quick and it is basically more physiologically driven. And when we are talking about reflective processing, we are talking more in terms of deliberative processing of the stimuli which also allows us to basically consider the outcome of these autonomic systems and sort of moderate them or regulate them as per the need be. Now let us move on to examine the reflective processing for self and other.

As regards emotion, now the authors of this meta analysis plotted the activation peaks from the studies on reflective processing and they constrained their plots to display the results of the main contrast requiring explicit judgment of effective states. So you can see if you remember the quadrant that we had drawn. There are two factors direct processing and reflective processing and then there are the other two factors targets cell processing and other processing and there are a bunch of these you know decisions that these participants have to make. In this set of analysis what we are going to look at is direct processing of effective states where people have been required to explicitly judge the

effective states of the targets. Now this category that we call reflective self included any contrast in which the participants were asked to either rate their own experiences while viewing emotional stimuli and the reflective other category included contrast wherein the participants were asked to rate the emotional state of someone else in a picture, a vignette or a cartoon.

Now why is this you know reflective self including the areas where the participants are asked to rate their experiences rather than just observing you know the first emotional response that the brain is showing in response to the stimuli. Remember we are talking about reflective processing and what do we do in reflective processing we are basically giving the individual time to deliberate upon you know whatever experiences he or she is having. And, also when you allow them to rate their own experiences you are giving them time to sort of understand and experience these emotions in a little bit more detail and also while or just before giving the rating response they would probably be a degree of moderation when the participants are consciously considering the degree of emotion they are you know feeling in response to these stimulations. So, reflective self therefore, will include all of those studies which had asked participants to view emotional pictures and then reflect upon what they are feeling when they are watching these pictures. Remember, this takes away the direct processing component and allows us to examine activity which is happening in a more deliberative sense, in a more conscious aware sense and it is not autonomic or physiological to that degree.

Remember, ah direct processing and reflective processing have a contrast. Direct processing happens autonomically whereas reflective processing sort of evaluates the autonomic response to these visual stimuli, ok. So, also the authors included both contrast comparing the judgment to no judgment and contrast comparing affective judgments to judgments about the external stimulus which were not affective. What are affective judgments? When you are asking the participant to explicitly rate or evaluate the emotion that they are observing in you know a set of stimuli. Let us say pictures or let us say faces oh this face you are seeing is it a happy face, is it a sad face, is it a disgusted face or for example you might be aware of the IAPS database where there are effective pictures also rated for valence and arousal.

So, what you are asking is we are asking the participants to go through these pictures and basically rate their arousal or their you know the the valence of emotion that they are feeling. So, there are two kinds of judgment that they have included. First is when they are actually explicitly asked to judge or rate versus when they are not asked to judge. So, these are the two contrast and the other two contrast is effective judgment versus non-effective judgment. So, for example, what is the emotional state that you are feeling at any point in time or just you know decision about you know tell the gender of the you know face that we are showing you.

So, this way what we will get is we will get a very good contrast about how does reflective processing of emotions occur in these variety of circumstances that the authors have tried to capture here. Also, moving forward the authors were interested in investigating the interaction between qualitatively different types of reflections about others. For example, when they plotted the reflective other studies wherein participants made non-emotional mental state judgments about others in Vignette's pictures and cartoons separately from where participants made judgments about their enduring personality traits of their targets. So, remember a bunch of these studies actually use phase stimuli and when you are you know looking at phase stimuli there is a bunch of computations possible, there is a bunch of evaluations that are possible that you can do at your own end. So, for this next set of analysis when the participants were asked to make judgments Sometimes also the non-emotional mental states about the other individuals.

So, you are basically asking let us say you know the gender question or you are asking say for example whether this is a good person or a bad person those kind of things. So, these are non-emotional judgments. So, you are not judging or estimating their emotional states in others, but you are basically asking them about other characteristics which are not in this effective you know zone. Also, sometimes participants were asked to make personality trait judgments about these targets say for example, is this guy going to be a punctual guy, is it you know a conscientious guy and things like that. So, at this point if you see here not only the emotional state is being evaluated, but these tasks seem to have a component of the theory of mind task.

Remember theory of mind task involve judgment of others mental states and computation that go along with them so these are some of the analysis that these authors sort of wanted to do now let's look at the results more closely. Reflective emotional processing showed several regions of overlap for both self targets and the other targets. What are these regions where we found this overlap? We found the overlap in the areas in the precuneus and the posterior cingulate cortex, the medial prefrontal cortex, the bilateral temporal poles and the medial orbitofrontal cortex. So, these are the regions which showed overlap for both self targets and other targets when the participants were reflectively processing emotional state. So, when they were given time to rate the emotional states of others or when they were given time to reflect on the emotional states or rate the emotional states of themselves.

All right and this is interesting because as I was just saying these regions have also been thought to be responsible for the mental state attribution in general. Remember the last point that I was mentioning sometimes these participants were making non-emotional judgments as well. Sometimes they were basically trying to you know estimate the personality traits of these individuals as well and therefore activation in these areas should not be very surprising for us, but let us go ahead and see. So, it seems that these regions that are involved in mental state or attribution are also coinvolved in emotion

comprehension as well. So, technically what we are seeing is given the type of contrast that the authors have studied, you are basically seeing two kinds of regions you know showing activations here and also regions that are involved in theory of mind tasks or mental state attribution task as well as emotion comprehension tasks.

Now also activity in the numerous sub regions of the medial prefrontal cortex including anterior and ventral portions also follows that this medial prefrontal cortex is a central region to both kinds of inferences inferences about mental states and also inferences about emotional experiences. So, the medial prefrontal cortex seems to be a very critical area which is actually involved also in the theory of mind task, but also in the you know comprehension of the emotional state task. Now, moving on the participants also observed activity in two additional overlap regions the precuneus and the PCC ok. So, let us look in more detail. So, it must be noted that this activity in the precuneus is also been often related to both visuospatial imagery and self focused attention and also visual perspective taking in a first person or a third person point of view.

Now, remember what we are doing here is we are basically saying ok when we put these kinds of contrasts together when we are you know evaluating participants neural activity given that you know continued on the type of judgments that we are asking them to do these different regions are lighting up which are these regions. the precuneus and the posterior cingulate cortex, the medial prefrontal cortex, the bilateral temporal poles and the medial OFC. Now, the next thing that we are doing is we are trying to see or trying to reason why each of these regions or to what extent each of these regions must be involved in this judgment of emotional states of others or let us say the other kind of judgments that we are evaluating here. So, the precuneus seems to be a linked to visuospatial imagery as well and self focused attention and also interestingly it is found to be implicated where a perspective taking is observed both in the first person say for example, how do I see you know let us say the person in front of me what they are feeling how do I rate that or how do I sort of as a third person observe my own you know affective state. So, as third person perspective and first person perspective in both these cases the precuneus is supposed to be activated.

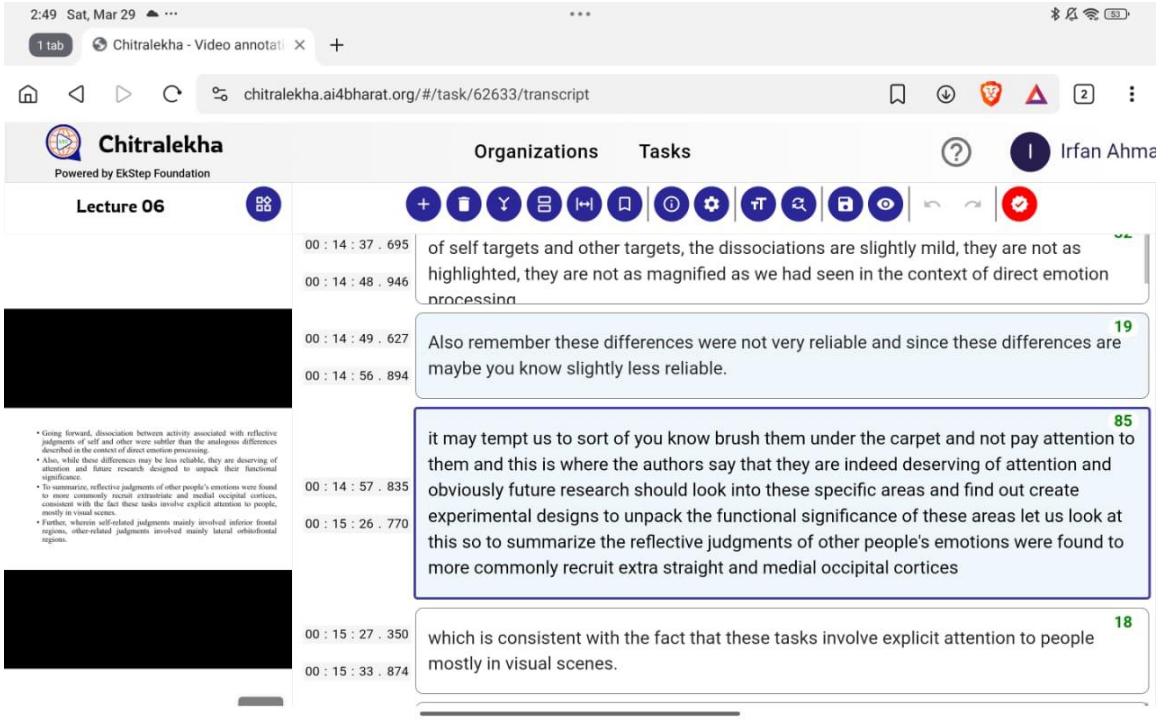
Now, while the precuneus does not seem to have any connections with any other sensory cortices, it is connected with the superior temporal sulcus and the anterior cingulate cortex. And therefore, it seems that the precuneus may be involved in directing attentional resources to salient social or emotional stimuli that would allow the individual basically making decisions about you know the first person or third person perspective, self-focused attention and visuospatial imagery. Now in the same way the precuneus or the posterior cingulate cortex is often involved in self-referential mental and emotional tasks. While it has been suggested that the PCC may play a part in the ventral emotional stream sending information about potentially salient stimuli to the ventral anterior cingulate cortex through direct reciprocal connections. So, you can see here something

that sort of comes out very interestingly here is the activity that is observed in different areas of the brain is very contingent to the type of task that you are asking the brain to do.

It is very sensitive to the task demands. So, and also the activity is not exclusively localized or exclusively tied to a specific type of task. Now, this is something very interesting and this is something very important. for all students of neuroscience to remember that when we find activations in specific brain areas to be involved when the participant is involved in a particular kind of task it does not mean that that region let's say region A linked to activity X it does not mean that that region A is exclusively tied to activity X it may mean on the you know on the other hand that region A obviously mediates task activity X, but it must be mediating other kinds of activities say for example, activities Y, Z, A, B, C, N also. So, this is again something that we have to keep in mind when we are interpreting the results of this meta analysis.

Now put together common activation in these regions suggest that perceivers use similar mechanisms for self-perception and other perception to direct attentional resources to emotional cues. Again just keeping it together there is obviously a certain degree of overlap the areas that we mentioned moments ago. So, for both self perception and other perception wherein the individual is required or individual needs to direct their attentional resources to emotional cues and gather more and more information from there. And this happens in both cases, it happens when you are looking at self related targets also happens when you are looking at other related targets. going forward this there was also a degree of dissociation observed.

So, let us look at where dissociation between activity associated with the reflective judgments of self and other was relatively subtler than the analogous differences described in the context of direct emotion processing. So, remember in direct emotion processing we found certain degree of overlap, but we also found you know relatively large degree of dissociations as well, but here when you are looking at reflective processing. of self targets and other targets, the dissociations are slightly mild, they are not as highlighted, they are not as magnified as we had seen in the context of direct emotion processing. Also remember these differences were not very reliable and since these differences are maybe you know slightly less reliable. it may tempt us to sort of you know brush them under the carpet and not pay attention to them and this is where the authors say that they are indeed deserving of attention and obviously future research should look into these specific areas and find out create experimental designs to unpack the functional significance of these areas let us look at this.



So to summarize the reflective judgments of other people's emotions were found to more commonly recruit extra straight and medial occipital cortices which is consistent with the fact that these tasks involve explicit attention to people mostly in visual scenes. So, again depending on the kind of stimuli the participants were seeing in the studies that are aggregated over here, broadly it can be said or summarily it can be said that when participants were engaged in reflective judgments of other people's emotions, the areas more commonly recruited or involved in these decisions were the extra straight and the medial occipital cortices which is probably because that these areas are also involved in paying explicit attention to people and stimuli. Also where self related judgments mainly involved inferior frontal regions, other related judgments involved mainly lateral orbital frontal regions. So, here is the subtle dissociation that we see in you know participants viewing the self target or the other target in the reflective mode of processing that we are observing at this point. Now, these two regions that I mentioned as these regions are associated with response selection and inhibition it is there that their response that they may be playing precise computational roles and it sort of seems to be a very interesting topic of debate ok.

So, the most interesting features of these plots. is the commonality of activity regardless of the target of perception in contrast to the pattern observed for the direct mode of processing. So, in the direct mode of processing we actually looked at overlapping areas in the dissociated areas you know together and we saw that there was a degree of significance to both, but here it seems given the you know the dissociations are relatively subtle. It seems most interesting to look at the common activity or the overlapping

activity. in regions of the brain when the participants are observing either the self or the other as targets.

So, we can conclude from the same that when the self or someone else is viewed as an object of reflection, a network of region comes into play that is involved in directing attention, interpreting social cues and inferring internal states. Just pay attention to this. What are we saying? When the self or even somebody else the target is other is viewed as an object of reflection. What do I mean by object of reflection? You are basically saying that you are observing, you are evaluating, you are considering either your own mental state basically you know measuring it against the contextual appropriateness, the situation that you are in, the kind of people that are surrounding you and so on. and ah it basically is a multilayered multifaceted task.

So, it basically ah network of region ah would network of regions would come into play that is involved in a directing attention because you can ah you know ah gather cues from the environment interpreting social cues is very important. So, for example, you know who are the people that you are surrounded with, what is the situation, what is the time, you know is it appropriate time to let us say you know blurt out your anger or shower your emotions or you would sort of want to you know exercise some restraint and basically restrain yourself for later time. So, directing attention, gathering social cues, interpreting social cues and also inferring the internal states of the agents. Remember in the previous lecture we were talking about emotional regulation and we said that a very important function or a very important aspect of comprehending emotions is also linked to inferring the internal states of others basically if you know The example that I gave in the previous class, if you are hit by somebody just by walking or you bang into somebody else, obviously the first response will be of disappointment and anger, but suppose you can you know immediately gather that this was by mistake and neither the party were at fault, then you have to sort of you know moderate your response with that knowledge. on the other hand here in the absence of reflective processing the direct in the bottom of perception of emotion from low level cues recruits slightly different systems depending upon the type of perceptual input associated with each target so something that I was just saying In reflective processing slightly different network of regions is getting activated and in direct processing we see that a different set of regions are getting activated, regions which have more to do with the lower level cues, regions which have more to do with the you know visceral activation or visceral feeling for self and slightly visual cue base for others.

So, so far what we have seen is an interesting contrast that depending upon the mode of processing that the participants are asked to engage in, depending upon the target, depending upon the nature of the stimulus, depending upon the exact task that the people are asked to do, the areas of the brain that will get involved will vary subtly. It does not

mean that say for example, the medial prefrontal cortex is found to be involved in several of these task in different you know variations. So, it does not mean that the core areas will become different, but the degree to which the network of the brain regions gets recruited and gets moderated will obviously vary depending upon the exact kinds of task, the exact demands of the task that are placed on the individuals. Moving on the reflective mode of processing allows us to attend to and elaborate upon our judgments about ourselves and about other people ok. So, the same could be done either by thinking about how someone else is feeling as compared to what they are thinking about and such differences in focus might involve different underlying neural circuitry.

Now, what does this point mean? This basically means that if you sort of you know considering about somebody else if you are trying to make sense of let us say you know while you wake up in the morning rushing towards school you bang into somebody they get hurt and you sort of are you know yourself in summary and you get out of there. Now, if you at a later point in time take some time out to think about that individual you can do it by two ways you can either think of you know you can either go through the empathy route trying to understand what this other person might be feeling because of this misapp maybe other person got hurt maybe they broke something things like that or what basically you can say oh what this person might be thinking about me or what is this person thinking what are his mental states what are his intentions and so on. So, two things one is the you know evaluation of their affective state and the other is the evaluation of their intentions and thought processes and based on what you exactly want to focus upon the neural circuitry that will be employed by your brain will be actually different. So, it again remember what we are doing is what we are studying is social cognitive neuroscience and remember in the first lecture of this or first or second lecture we discuss in detail that social cognitive neuroscience ah is empowered by something called the power of situation. It is empowered by this principle of observing the context in great detail of observing the players in great detail.

Observing the situations in great detail because the results ah are actually interpreted ah against the background of these things the results are not interpreted in isolation you show a stimulus and you know region of the brain lights up the results are not straight forwardly interpreted the results will be interpreted in the light of what is it that you have been asked to do about the stimulus what is the situation what mode of processing does this particular task engage and that is what we are seeing here. So, to tease apart the different neural mechanisms that are involved in the different ways of thinking about the others remember either you are examining their effective state or you are trying to examine their mental states and intentions and so on. These authors they you know examine the activations related to emotional and non-emotional mental state judgments about others. So, remember there are these you know task in model cognition they are used false belief task where say for example, there are two players one of them has to

judge you know has is sort of made to believe something else about the other one and you know they basically then have to estimate what this other person is thinking. So, two kinds of judgments are contrasted, first is emotional mental state judgment and the other is non-emotional mental state judgment.

When they did this, this analysis demonstrated dissociation in the brain regions recruited by cognitive as opposed to effective inferences about other people. Cognitive inferences are mental state inferences, intentional inferences, attributions of this kind. Effective inferences are how simply how what these people might be feeling, are they feeling happy, are they feeling sad, are they feeling you know annoyed, what is it that they are feeling at that point in time. So, this you can liken a bit more to empathy whereas this other kind of task you can liken more to the theory of mind kind of task that are there. Now, when the participants are asked to in you know get involved in cognitive judgments.

So, the cognitive judgments more commonly are found to recruit the bilateral temporal parietal junction and frontal eye fields whereas, when they are asked to engage in affective judgments about others, the affective judgments more commonly recruited the orbital frontal cortices and the anterior and ventromedial prefrontal cortex regions. So, you can see here is a very nice dissociation based upon what is it that you are trying to infer about this other target person. Maybe you are watching a scene, maybe you are watching a cartoon, maybe you are watching a face, but it depends on the kind of decision that you want to take about them. If you want to make a cognitive judgment, then a slightly different region is getting activated. If you are making an affective judgment, then again a slightly different region is getting activated or recruited by the brain, ok.

In more detail, the temporoparietal junction is associated with mental state judgments and shifting attention towards behaviorally relevant stimuli in external cueing task. So, this is again something else that the temporoparietal junction does sorry. The frontal eye fields is found to be engaged during tasks that require increased attention and working memory for visuospatial stimuli including when one is attempting to inhibit reflexive tendencies to shift one's eyes towards a visual stimulus. So, this frontal eye fields area is basically involved in working memory and executive function task. You know when you are trying to inhibit something, select a particular response, manage a particular you know natural response tendency and so on, whereas the temporal parietal junction is very interestingly implicated in mental state judgments and also orienting or shifting of attention.

When you put together when you sort of observe the kind of activations we are seeing in these regions and when you are using that to draw inferences about cognitive, but not affective states this could suggest us that the cognitive inferences depend to a greater extent on the mental manipulation of the information about stimuli in the external world.

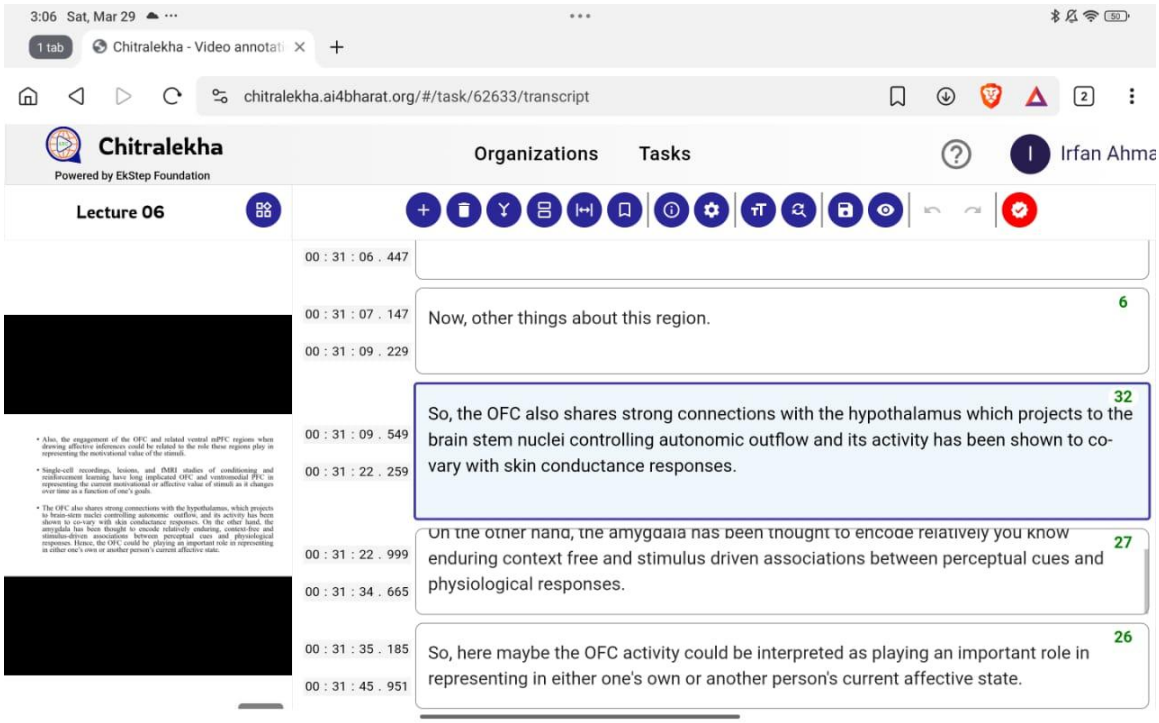
So, it basically tells us that working memory and other executive functions, other executive capabilities come into play when you are trying to make cognitive judgments about the other. Remember, a lot of us play or probably play cards or a lot of us engage in some kinds of gamble. Even say for example when you are watching a quiz show and the host sort of you know is playing with you, the host maybe knows the answer, you are asked to choose an answer and you are sort of thinking oh this is correct, this is correct and a lot of times you are trying to pick up the answer from observing the you know the host or the you know game masters, facial expression, body language and so on. So, when you are making cognitive judgments then it seems that a degree of working memory and executive functional resources which is also sort of supported by the activation of the temporal parietal junction and the frontal eye fields seems to be involved in this you know activity.

And, this is again what naturally brings us to these theory of mind tasks and remember theory of mind tasks or theory of mind as a mental function heavily relies on executive functional capabilities and especially on inhibitory control and the two executive function abilities and the inhibitory control abilities actually are supposed to develop in parallel. When our own perspectives and someone else's perspective differ making accurate judgments about their mental states requires us to adjust from our own state and this process is attentionally demanding. So, you have to make some adjustments, you have to make some compromises and it basically is a very attentionally demanding task. It is a task that requires you to sort of you know sometimes inhibit your natural response take into account that oh this person is my teammate, he is trying to take this decision, I am sure that decision is in the interest of let us say the group or the both of us. So, you are going through these you know relatively complicated calculations and that is why So, the abilities that are together known as executive function abilities or the you know the working memory which is used for manipulation of information in a real time scale both sort of get involved and both get included in these kind of judgments.

And this is where the activations of the frontal eye fields and the temporoparietal junction during mental state inference may reflect the unique attentional demands of keeping multiple mental states in the mind simultaneously. So, what we are saying is or what the authors are saying is that these regions are probably activated because they are involved in these computations, they are involved in the if-but sort of scenario, they are involved with in counterfactuals and making all of these judgments together. Also ah the interesting engagement of the orbitofrontal cortex and the related ventral medial prefrontal cortex regions when ah people are drawing effective inferences could be related to the role these regions play in representing the motivational value of the stimuli. How badly you want them! , is it a you know it is it an approach stimulus or is it an avoidance stimulus, is the picture in questions a stimuli in question is inviting, it is ah leaded with the positive valence or lead in with negative valence all of these kind of

judgments. seem to involve the orbitofrontal cortex and the ventral medial prefrontal cortex because these regions are good and these regions have been prior you know indicated to be involved in the evaluation of the motivational value of stimuli.

And there are different kinds of tasks which sort of give us this information. So, single cell recordings, lesion studies, fMRI studies of conditioning and reinforcement learning have already told us that this orbitofrontal cortex and the ventral you know ventromedial prefrontal cortex is basically involved is supposed to be useful in representing the current motivational or effective value of stimuli as it changes over time as a function of one's goal. At a point in time when you are just on a vacation and you sort of want to let your hair down and enjoy, then a bowl or a mug or a tub of ice cream seems very inviting. It seems very, very in sync with your goals because you are out there, you are going to have a vacation. But on the other hand, let us say if you are on some kind of a diet, if you want to sort of restrain, then obviously if pictures of great food, pictures of ice creams for that matter will not seem very appealing, will not seem very inviting to you, rather if you sort of you know controlled yourself to a certain degree, they may seem repelling as well at you know certain points in time.



This is where the OFC and the VMPFC is seem to be involved. Now, other things about this region. So, the OFC also shares strong connections with the hypothalamus which projects to the brain stem nuclei controlling autonomic outflow and its activity has been shown to co-vary with skin conductance responses. On the other hand, the amygdala has been thought to encode relatively you know enduring context free and stimulus driven

associations between perceptual cues and physiological responses. So, here maybe the OFC activity could be interpreted as playing an important role in representing in either one's own or another person's current affective state.

So, these motivational values when you are sort of making these effective judgments about stimuli, this is where the OFC this is seems to be coming into play. Now, this hypothesis could you know explain the role of the OFC in the perception of emotion in self and another. So, this is something that the authors have proposed and let us try and understand it in more detail. Now, results of a recent study wherein participants were asked to see emotional or neutral pictures and then rate their effect. for the subsequent 20 seconds after the pictures disappeared.

So, you are being shown pictures and once the pictures are gone there is a 20 seconds response time window where you are basically asked to you know rate either how you are feeling or how somebody else is feeling after the pictures have gone. Now interestingly after viewing negative pictures subjects commonly reported feeling sustained emotion even after the picture was gone. So, negative stimuli or negative pictures seem to have that kind of lasting effect where people are you know observing or people are feeling this sustained emotion for a slightly longer time even after the pictures have disappeared. The involved regions for this kind of task were the amygdala and the lateral orbitofrontal cortex. Why the amygdala? Amygdala seem to be activated along with the presence of negative affective pictures, negative emotional pictures.

So, it sort of lights up when you are evaluating a negative stimulus. But the lateral orbit of frontal cortex seem to be engaged, seem to be involved contingent to the participants sustained self reported emotion where they are probably deliberating or reflecting on what they have just seen. Sometimes these negative pictures if you look at the IAPS database you can just you know go on the internet and you will find a bunch of those pictures. Sometimes you are obviously you know caught lingering or caught sort of you know evaluating those pictures. after they have left and they seem to be you know at the back of your head which might be the reason for the sustained emotion experience that these participants are reporting.

Also the orbitofrontal cortex seem to reflect the personal experience and generation of an emotional response to a particular stimulus. And indeed in the same way in this you know similarly antisocial and psychopathic patients as well as those who show you know lesions to the orbitofrontal cortex and the ventromedial prefrontal cortex show attenuated autonomic reactions to expected stressors as well as in you know anticipation of unpredictable stressors suggesting an inability to generate context appropriate effective responses. So, you can see here through this example that the OFC seems to be involved. when you are you know reflecting upon the personal experience and then the generation of an emotional response to particular stimuli. And in individuals where the orbitofrontal

cortex is damaged those individuals seem to be unable to actually show these autonomic reactions.

The reactions are either delayed out of context or you know extremely attenuated, extremely ah weakened response they show to these kind of emotional stimuli. Also in other kinds of studies it has been shown or it has been suggested that the effective representations in the orbitofrontal cortex may help individuals understand the emotions generated in other people as well. So, not only the ah you know the generation of an emotional response in ourselves, the orbitofrontal cortex has also been implicated in you know generating the affective representations you know that are being generated in other individuals. So, patients who have the wave free damage can sometimes do not understand the social faux pas kind of situations. Say for example, you are happy about somebody winning a particular prize, but when you go you say something else which is completely counterintuitive.

So, for example, let us you are going to congratulate somebody they have won a big prize and you suddenly say oh many many condolences to yourself. So, while you were actually intending to say congratulations you by mistake said condolences and this seems to be a social mistake because others will try and see how this you know how this kind of a mistake has happened. Others people others with normally function OFC will immediately be conscious of that and they will try to make amends. Patients who have a damaged orbitofrontal cortex are unable to see these things. They seem to be insensitive to a certain degree to what the other people might be feeling.

Say for example these people. unknowingly might be bragging too much about their own success, putting people down at their failures and in that sense create a very socially awkward situation. Obviously they are not you know the inhibition is does not seem to be operating nicely, but more importantly they are not able to feel, they are not able to experience or estimate what is going on in these other people's minds, in their other people's you know emotional states. So, as I said their social interactions could engender either pride or embarrassment in healthy individuals. So, for example, if a healthy individual gets into this kind of mistake in situation they would either feel embarrassment or you know pride if something goes correct. And, self-conscious emotions like these are important in you know social interactions because they inform us about how our own behavior has had an intended or unintended consequence for others.

So, if you say correctly congratulations you know I am very happy with your success it creates the intended effect. On the other hand, if you are saying you know in a party and somebody is celebrating their success and you say oh many condolences for your loss and something like that and then it sort of creates a very awkward situation. So, these self-conscious emotions that are being generated by the OFC seem to be extremely important in not only you know experiencing correctly the context appropriate emotions, but also

estimating correctly the context appropriate emotional response given ah the other individuals involved in this interaction so to the extent that damage to the OFC renders us unable to experience these emotions normally we may become inappropriately boastful or forward or rude you know sometimes people make social advances you know you are in a party you are talking to somebody you like them you try to ah you know become friends with them but you also have to be at that same point be very careful and mindful of whether the person ah is you know enjoying your company not enjoying your company encouraging your advances not encouraging your advances so people with ofc damage ah do not have these skills they they seem to miss these skills and therefore a lot of times will be found to be engaged in contextually inappropriate responses be it either too much pride, too much boastfulness or even being insensitive towards what others are feeling. All in all if you try and just you know wrap this up comparisons of the patterns of neural activity associated with the reflective mode of processing for self and the other showed much more overlap and fewer differences than did the same comparison for the direct mode of processing. Also, this suggests that when individuals indulge in making explicit judgments about people, perceivers actually tap into a common sense of cognitive and affective process regardless of whether they are reflecting about themselves or others.

Remember, we talked about shared representations, we talked about empathy, we talked about feeling the same that the other person is feeling. And, here if you remember again which things that I mentioned in the beginning of this lecture that regions that are involved in the theory of mind sort of mental function are heavily involved. So, it basically tells us that people tap into this you know people do to a certain extent use their own mental states as a template to infer other people's emotions. So, this is something that we have to you know keep in mind. now perceivers usually direct their attention to salient cues they infer internal states and also create autonomic and emotional states in themselves when they are trying to infer emotions in others and when inferring false beliefs may use inhibitory control to separate their own point of view from the target.

So, something that I was just saying it seems that judgment of emotions seems to involve or tap into this common network of shared representations wherein then it becomes on the latter side becomes very you know important for us to know this is our perspective and this the other person's perspective. Remember in the previous lecture we were talking about when people are involved in a fight or in a competitive battle even though they can feel that same empathy they need to sort of moderate their empathy until the fight is over and the you know battle is won. So, this is basically something that comes out from this set of studies as well and from the observation of reflective mode of processing for self and the other as well. Thank you, I will see you in the next talk.