

Social Behavior and the Brain: An Introduction to Social Neuroscience

Dr Ark Verma

Department of Cognitive Sciences

Indian Institute of Technology Kanpur

Week - 06

Lecture – 29

Hello and welcome to the course Social Behaviour and the Brain, an Introduction to Social Neuroscience. I am Dr. Ark Verma, an Associate Professor in the Department of Cognitive Science, IIT Kanpur. This is week 6 where we are talking about different aspects of regulating social behaviour, but in this lecture we are going to continue talking about emotional decision making continuing from the previous lecture. Now, neuroscientific research on emotional decision making suggests a number of possible ways that the orbitofrontal cortex may be supporting effective decision making complemented by emotional processes, alright. So, we talked about various possible ways in which the orbitofrontal cortex might be moderating you know emotional decision making, we talked about the somatic market theory, we talked about you know this other theory that I do not remember the name at the moment.

The screenshot shows a web browser window with the Chitrallekha video annotation interface. The browser address bar shows the URL: chitrallekha.ai4bharat.org/#/task/65819/transcript. The interface includes a header with the Chitrallekha logo, a 'Translate page?' button, and a user profile for 'Irfan Ahma'. Below the header is a toolbar with various icons for navigation and editing. The main content area displays a transcript of a lecture, organized into a grid of boxes. Each box contains a line number (e.g., 16, 17, 34, 31, 28, 25), a timestamp, and a snippet of text from the video. The text in the boxes is:
Line 16: Hello and welcome to the course Social Behaviour and the Brain, an Introduction to Social Neuroscience.
Line 17: I am Dr. Arik Verma, an Associate Professor in the Department of Cognitive Science, IIT Kanpur.
Line 34: This is week 6 where we are talking about different aspects of regulating social behaviour, but in this lecture we are going to continue talking about emotional decision making continuing from the previous lecture.
Line 31: This is week 6, where we are talking about different aspects of regulating social behavior, but in this lecture, we are going to continue discussing emotional decision-making from the previous lecture.
Line 28: Now, neuroscientific research on emotional decision making suggests a
Line 25: Now, neuroscientific research on emotional decision-making suggests a

But the idea is that there is different kinds of ways in which the neuro in which the orbitofrontal cortex may has been established to moderate emotional decision making.

For example, the social psychological perspective presents the questions about the claim that the orbitofrontal cortex mediates emotional influences on cognition through the interpretation of physiological arousal, alright. So, the social psychological perspective basically raises question about the fact that how does the orbitofrontal cortex mediate the emotional influences on cognition through the interpretation of physiological arousal. Remember the somatic market theory was saying that it is the somatic states that accompany decisions.

It is basically something that is ah you know factored in by the orbit of frontal cortex. How happy you feel or how sad you feel on making or before making certain decisions and that gets factored in that moderates our decisions to a certain extent. Now, research has shown that although physiological arousal may be you know involved. it is too slow to exclusively account for the emotional priming influences on cognition. So, yes physiological arousal may be involved it may be a factor in emotional decision making, but physiological arousal happens at a much slower time scale.

Emotional decision making the way we calculate impressions and the way we act on them happens much more rapidly. So, the idea is that while it may be involved yes. it seems to be too slow maybe we have to look at other ways or other candidates that are performing here. So, studies have shown that patients who have spinal cord injuries and they are bereft of physiological feedback they also report subjective experiences of emotion like those of healthy control participants. if it is just the physiological arousal that is you know controlling emotional feeling of emotions and consequently role of emotions and decision making then these people who have spinal cord injuries should not feel that should not experience subjectively you know should not have this subjective experience of emotions but they do so it seems that while physiological arousal in a normal working state is important, but it is not the only or the not the entirety of how emotions interact with our decision making.

So, these people spinal cord injury people they also do not show impaired performance on gambling task. Remember we were talking about the Iowa gambling task where we said if the person can feel happiness on gains or loss or sadness on losses, they will not be able to you know Only then they will be able to moderate and win those tasks. If they are not feeling either of those then they are not going to be able to change their strategies and perform well. Research has also shown that individuals sometimes they tend to misattribute the source of their physiological arousal. You might be feeling excited, happy, sad, low, different things physiologically you know sometimes people say oh I am feeling too low.

People do not understand a lot of times where is this arousal state coming from this low or this arousal where is this really coming from. And therefore, the consequent decisions can actually be guided by those misattributions or you can say these consequent

emotional decisions can actually be misguided because you have misattributed the source of this arousal ok. There is a set of behavioral findings that suggest that it is unlikely that patterns of arousal are fundamental you know for ensuring non-biased decisions. So, it while arousal is still may be an important player, but it cannot be fundamental to how these decisions are being made. Another thing a comparison of the neuroscience research and behavioral research also it reveals that it is difficult to integrate the two lines of research one that said you know physiological arousal is extremely necessary and other that says it may be not that much important.

So, you cannot really combine both of these lines of finding. So, we have to adopt a different approach at looking at them. Also one of the problems is that people find out is that that there is this difference of emotion measurement that is seen across a wide range of studies. So, there are a lot of these studies who talk about emotional processing, there are lot of these studies who talk about the role of orbitofrontal cortex, but there are discrepancies in the methodologies that are adopted by these studies. The way they have defined their conceptual variables and the way they have defined their operational variables.

For example, in this orbitofrontal studies alone emotion is sometimes operationalized as somatic markers. on gains or losses in financial decision making tasks or positive or negative appraisals or sometimes just as physical pain. Now, if you just look at these things somatic markers how are you feeling, gain is happening, loss is happening that is away from the you know abstraction that we call emotion, positive appraisal, negative appraisal or even physical pain because these are so disparate different concepts, it seems that there is no uniform understanding of what is really emotional, what is the real consequence of physiological arousal here. And therefore, the disparity in some of these studies findings can be understood using the disparity in the methods that they are using. Therefore, something that is very interesting very important is the standardization of measurement of emotions.

So, standardization of emotion measurement if it is done it will allow for better synthesis of findings across these studies and across neural and behavioral levels of analysis. Standardization of emotion measurement. will also be able to pinpoint the specific role of the orbitofrontal cortex in emotion decision making and the different theories that they have arise in they probably have arise in because some studies actually involve emotions whereas some plainly do not, they have misdefined their conceptual and operational variables. People have also raised questions about the validity. For example, they have questioned whether tasks like the go no go task actually elicit any emotion or not or it is just a you know rational decision that people are taking basically aiming to maximize their gains and minimize their losses.

For more specifically for example, in this paradigm participants are given points to reinforce their behavior as they learn when to produce a response and when to withhold a response. It is just probably they are you know performing a different task than what the experimenters are expecting them to. From this standpoint learning that behavior is good can be considered to be an emotional process. It is a good outcome once you make sense of that it is an emotional process. However, on the other hand social psychologist might argue that developing valence associations for behaviors is better described as attitude or preference formation rather than an emotional response or for example, that reward and punishment shape motivation to approach or avoid objects.

So, people are saying also that you know the go no go task, the IO gambling task you know and there are some of these tasks that have been used in these studies. Typically, people are not really convinced that these are actually tasks that elicit or involve emotion and hence they cannot tell us very clearly about what is it that the orbitofrontal cortex is doing. A standard operationalization therefore, of emotion has to be developed through empirical investigations by social psychologists, where you are not bringing the brain in, you are basically looking at how do you define emotion first, how do you agree on, how does everybody agree on a particular definition and then look at neural activity corresponding to that definition. So, an attempt is that emotion can be defined as a short lived psychophysiological phenomena that coordinates the modes of adaptation to changing environmental demands. This is a very basic operational definition of emotion.

Empirical studies actually suggest that changes at three levels of measurement convergently should be used to understand emotion. For example, self-report, physiological assessment and coding of facial expressions. All three these things convergently should tell us about whether emotions were invoked as expected or not. Let us look at this one competing hypothesis to the dynamic filtering theory and the somatic marker hypothesis that we studied in the previous lecture is a monitoring hypothesis.

What is this monitoring hypothesis about? The blended approach from social psychological conceptualization and the measurement of emotion and decision making with neuroscience methodology basically characterizes an important research enterprise with regards to orbitofrontal function. What is it? These studies suggest that orbitofrontal damage actually does not impair the ability to generate emotional responses as are being assessed by the physiological, facial emotional movement and self-report measures. So, actually damage to the orbitofrontal cortex may impair the ability to monitor the contextual relevance of one's behavior whether your behaviors fits this particular context or not and will lead to specific outcomes or not. and therefore, it may preclude the generation of emotion that is useful for subsequent decision making. So, it is happening a bit earlier than the emotions are generated, it seems that it is basically monitoring whether this behavior makes sense within this context or not.

10:19 Sun, May 18

Chitralkha - Video annotati

chitralkha.ai4bharat.org/#/task/65819/transcript

Chitralkha
Powered by EkStep Foundation

Organizations Tasks

Lecture 29

00 : 10 : 32 : 728 They are saying or this particular approach is saying or the monitoring hypothesis is saying that this is probably the main function of the orbitofrontal cortex. 26

00 : 10 : 41 : 133

00 : 10 : 41 : 988 Also, the monitoring function of the orbital frontal cortex has been proposed to extend to evaluating when emotional information to evaluating when emotional information should be incorporated into decision making and when emotional influences should be 37

00 : 10 : 58 : 863

00 : 10 : 59 : 184 So, in which scenario the somatic states have to play a part in decision making and in which scenarios they have to be kept out of this game. 28

00 : 11 : 07 : 771

00 : 11 : 08 : 432 So, this is a relatively fresh perspective on orbitofrontal function and it actually does not disprove of the adaptive emotional influence on decision making that we have been talking you know from the previous lecture rather it actually highlights the need for more 51

00 : 11 : 27 : 843

00 : 11 : 29 : 337 So, let us let us look at this in some more detail. 12

00 : 11 : 29 : 337

This fresh perspective on orbitofrontal function does not disprove an adaptive emotional influence on decision making; rather it highlights the need for future research on this question.

Orbitofrontal Cortex & Experimentally Induced Emotionality

Now, to address the disparity between emotion measurement in neural studies and behavioral studies, the authors first examined whether patients with orbitofrontal damage could experience emotion (Beur, 2007).

They examined the possibility that orbitofrontal damage might be associated with diminished emotion, as suggested by the somatic marker hypothesis, or particularly intense emotion, as suggested by Dynamic Filtering Theory.

They are saying or this particular approach is saying or the monitoring hypothesis is saying that this is probably the main function of the orbitofrontal cortex. Also, the monitoring function of the orbital frontal cortex has been proposed to extend to evaluating when emotional information to evaluating when emotional information should be incorporated into decision making and when emotional influences should be inhibited. So, in which scenario the somatic states have to play a part in decision making and in which scenarios they have to be kept out of this game. So, this is a relatively fresh perspective on orbitofrontal function and it actually does not disprove of the adaptive emotional influence on decision making that we have been talking you know from the previous lecture rather it actually highlights the need for more nuanced you know future research in this question. So, let us let us look at this in some more detail.

To address this disparity between emotion measurement in neural studies and behavioral studies, the authors basically tried to examine whether patients with orbitofrontal damage could actually experience any emotion at all. So, what they did? They examined the possibility that orbitofrontal damage might be associated with diminished emotion as suggested by the somatic Margar hypothesis or particularly intense emotion as was suggested by the dynamic filtering theory. What did the authors do? They compared the performance of patients with orbitofrontal cortex damage to the performance of age matched controls in a series of emotion eliciting tasks. So, they perform these bunch of emotion eliciting tasks and they compared the performance of orbitofrontal cortex damage patients and age match healthy controls on these tasks and they basically wanted to see how much emotion do the two groups you know really experience. So, in one study

participants were made to watch a series of standardized film clips that have been shown to elicit discrete emotional state, one film each for amusement, disgust, anger, sadness or contentment.

So, each of these film clips were mapped with a certain emotion and if you are watching that clip you are expected to be experiencing that emotion. Also they examined a different emotion as well slightly more complicated which is embarrassment. So, embarrassment was examined by asking participants to pose a silly face and hold it while viewing themselves on a monitor. So, as soon as you see yourself on the monitor you have to make a silly face and show oh I am very shy, I am very embarrassed that my face is appearing on the monitor. They use three measures as you are just talking to assess emotion.

Autonomic nervous system physiology, basically physiological responses, physiological arousal, they use questionnaires and they use the facial muscle movement activity. You know the FACTS protocol as was defined by Ekman and Friesen in 1978. Interestingly, the authors did not find any significant differences across the groups with one exception, ok. Broadly both groups performed in a very similar manner. But the orbitofrontal damage was associated with increased self reports and facial expressions of embarrassment.

So, people are becoming in some sense you know they are more conscious of themselves, they are more conscious of how they should feel in scenarios. Let us qualify this going further. So, in an additional series of tasks just to add on these studies the authors examined whether participants could suppress their facial expressions emotional facial expressions in response to a disgusting film you know the film that is supposed to elicit disgust. Again, no significant differences in the ability to suppress facial expressions of disgust was found between the two groups. So, both of them were able to actually suppress very well.

The other measures the self-report and the autonomic physiological measures also did not differ between the two groups. Again remember all of these things they basically tell us that the orbitofrontal cortex patients and the healthy controls are performing in very similar manner across these tasks. Evidence of suppression in both groups was reflected in the facial twitching typically associated with efforts to suppress facial expression. So, how are they interpreting you know the success of suppression is this facial twitching. When you are feeling something and you are trying to hide it there is twitching of the facial muscles that is what they are using to interpret this.

Now, if you put all of these findings together what happens is that they suggest that orbitofrontal cortex actually does damage to orbitofrontal cortex does not impair the ability to experience or suppress emotions ok. So, it seems that it is not or the area might

not be involved in that. Now, this is so far we are talking about. you know experienced emotionality let us talk about spontaneous emotionality also. Now even though the previous study demonstrated that patients with orbitofrontal damage were able to generate and suppress emotions it did not examine the effect of orbitofrontal damage on emotion generation in day to day life you know generic task everyday outcomes.

So, in a different study the authors would examine the emotions of participants while they engaged in two social interaction tasks. First is a teasing task where people are teasing them or an over praise task when they are over praising them and when the you know when people over praise you typically you tend to become shy or conscious and so on is not it. Let us look at these tasks. In the teasing task, the participants had to make up nicknames for two participants that they did not know very well from before, whereas in the over praise task participants were required to generate a creative title for a paragraph that was read aloud to them.

There is a bit more about this task. The paragraph that they had to create a title for initially had intentionally it had no content whatsoever making it really difficult to generate a title that would be considered creative ok. It was not a situation that you could write a poem on or give a you know nice niche word to it. But, after the participants had made up the title the experimenters really praised them for 2 minutes they just kept on praising them and when individuals and you know and understand this when individuals are sincerely praised they tend to become slightly embarrassed because it violates the you know the prevalent social norms that you know why should you pat on your own back and so on. So, this particular task actually creates a situation in which the participants you know in which the praise is clearly not deserved because a paragraph did not have anything so that you can generate a creative title. So, whatever title you has come up you have come up with it does not deserve this kind of praise, but the the experimenter is praising going on praising for 2 minutes.

The screenshot shows the Chitralekha video annotation interface. The video player displays a transcript with the following segments:

Segment ID	Text	Start Time	End Time
8	There is a bit more ab	00 : 16 : 21 . 039	00 : 16 : 22 . 360
32	The paragraph that they had to create a title for initially had intentionally it had no content whatsoever making it really	00 : 16 : 22 . 980	00 : 16 : 33 . 850
22	It was not a situation that you could write a poem on or give a you know nice niche word to it	00 : 16 : 33 . 890	00 : 16 : 38 . 854
67	But, after the participants had made up the title the experimenters really praised them for 2 minutes they just kept on praising them and when individuals and you know and understand this when individuals are sincerely praised they tend	00 : 16 : 39 . 134	00 : 17 : 00 . 425

So, it is totally undeserved praise and if somebody who is you know a healthy control will quickly detect that this is undeserved place and they will give a corresponding reaction to that, alright. Either be amused or surprised and they will see the irony in that situation, you know the humor in that situation. The study showed that the orbitofrontal damage patients actually act inappropriately and their emotions are unexpected given their inappropriate behavior. Let us look at in this in more detail. So, what is happening in the teasing task, orbitofrontal patients exhibited teasing behavior that was objectively much more inappropriate than that of control participants.

So, you know so they just let themselves go a little bit rather than being embarrassed by the inappropriateness of their teasing the orbitofrontal you know patients were actually proud of how they were teasing these other individuals that were supposed to be you know teased. On the other hand in the over praise task the orbitofrontal patients actually exhibited you know embarrassment such that this praise is deserved. If the praise is deserved you will feel embarrassed, if the praise is undeserved you will actually laugh and see the humor there, but these people were behaving such as oh it is well deserved praise and they were showing that they are embarrassed. So, it seems that they are not able to detect the irony in that situation. In other words patients with orbitofrontal damage exhibit the kind of emotion that would be expected for individuals who had not acted in an offensive manner and had genuinely excelled at this task see.

So, what is happening is these people are not able to contextually they are not able to identify what kind of behavior is contextually appropriate in a given setting. rather they

are not able to match their behavior to contextual relevance that is basically what is happening. So, these studies suggest that orbitofrontal damage seems to be associated with a discrepancy between emotion and behavior and the fit of context between them all right. So, I will stop here I will go on to talk about the same thing just continue this discussion in the next lecture. Thank you.