Social Behavior and the Brain: An Introduction to Social Neuroscience

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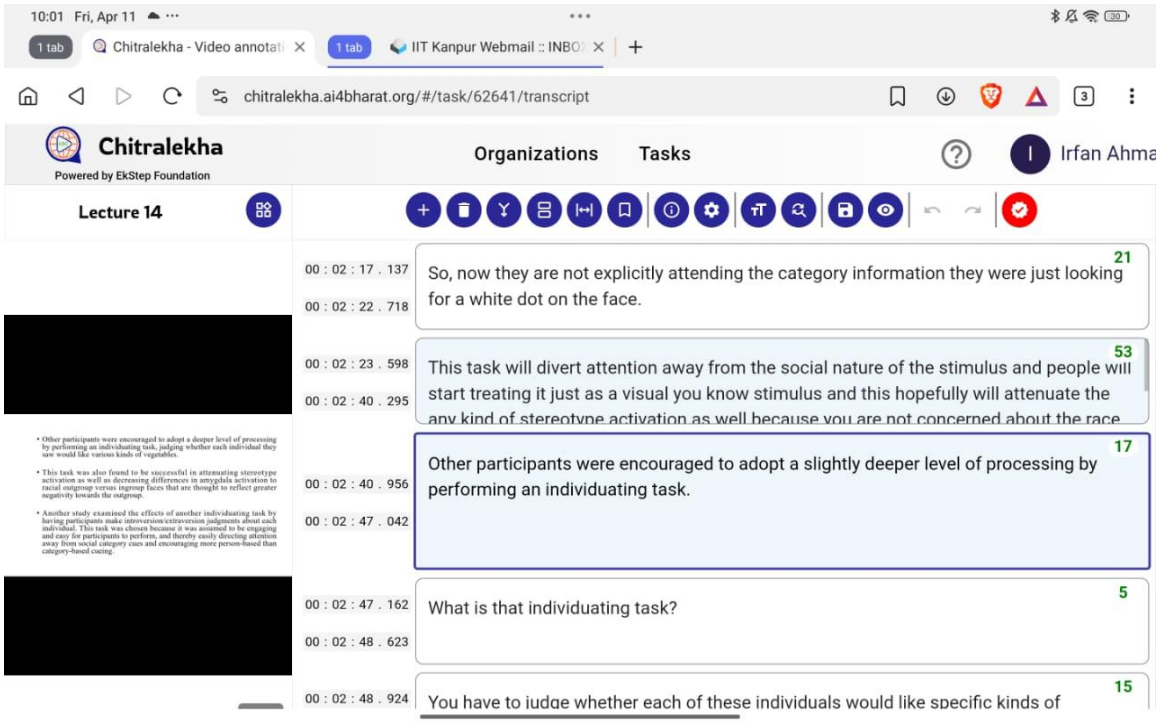
Week - 03
Lecture – 14

Hello and welcome to the course social behavior in the brain and introduction to social neuroscience i am doctor Ark Varma and associate professor at the department of cognitive science iit kanpur this is the third week of the course where we are trying to understand and represent social groups and in this lecture i am going to talk about activating social category information from faces Now, as we were seeing in the last lecture that from faces itself social category information like race, gender and age is automatically and rapidly activated. Now, we have also noticed that ERP components that are sensitive to these can also be moderated by task relevant and task irrelevant factors. Now, how does this really happen, how does this interaction really take place let us look at in more detail in this lecture. Now, the effects of social category are encoded automatically in obligatory even if the participants were found to be not attending to the category information explicitly. However, the authors sought to examine this particular phenomena in a bit more detail. in subsequent studies by examining attention to race and gender under task instructions that were designed to you know direct explicit attention away from these dimensions.

So, for example, in the previous task if you remember Ito and Erlin study they had explicitly asked participants to categorize stimuli on the basis of black or white, male or female. So, they were explicitly paying attention to these dimensions. What will happen if in a new task we are asking participants to not attend to these things, but to something entirely different? Will these social category specific ERP components be evident again or will they not play a part? Let us look at this. So, in one of these studies effect of focusing attention at a level either more shallow or more deep than social category was examined this is Ito and Erlen 2005.

A shallow level of processing was encouraged by having some participants perform a visual feature detection task where they were asked to monitor the stimulus for the presence or absence of a white dot on each face. So, now they are not explicitly attending the category information they were just looking for a white dot on the face. This task will divert attention away from the social nature of the stimulus and people will start treating it just as a visual you know stimulus and this hopefully will attenuate the any kind of stereotype activation as well because you are not concerned about the race or the gender of these faces. Other participants were encouraged to adopt a slightly deeper level of

processing by performing an individuating task. What is that individuating task? You have to judge whether each of these individuals would like specific kinds of vegetables.



You can ask like oh whether this person is a vegetarian or vegan or not or let us say more specifically ask oh does this person like potatoes or carrots or broccoli or cauliflower and so on. So, here you are evaluating the individual choice of the person again just by looking at the face. So, in this deeper level of processing you are trying to evaluate the individual choices of the person and in the previous task where they are encouraging to a process at a shallower level you are just looking at the face as a stimulus and searching for a white dot on the face. Now, this task was also found to be successful in attenuating stereotype activation as well as decreasing differences in amygdala activation to racial outgroups versus in-group faces that are thought to reflect greater negativity towards the outgroup remember we were seeing amygdala activation vigilant response from the amygdala coming across in response to out group faces than in group faces. Now, if you are doing this kind of task when you are individuating when you are considering the individual choices of the person then also both the serotype activation is reduced and also the amygdala response as a vigilant response is also diminished.

In another study they examine the effects of another individuating task by having participant judgments about introversion or extroversion about each individual. So, in this case you are not asking whether this person likes broccoli or cauliflower, you are basically asking whether this is a picture of a introverted individual or an extroverted individual. This task was chosen because it was assumed to be engaging and easy and

easy for participants to perform and thereby easily directing attention away from the social category information and encouraging more person based than category based queuing. How does this fair? With these very different processing goals that you see the vegetable task, the introversion, extroversion task or the dot task, results actually indicated that race and gender information was still encoded very early in processing. For example, the ERP effects that these tasks elicited were very similar to those obtained by the previous studies that were done by Ito and Erland, remember the 2003 study that were discussing in the previous lecture.

Wherein participants when they were explicitly attending to race and gender. Interestingly P200s were found to be larger to blacks and males, N200s were found larger to whites and females as in the previous task. And P300 was found to be sensitive to match between your targets race and gender with the preceding faces. So, on the whole you are getting exactly the same kind of effects even when the task is asking you to pay attention to exactly different things as opposed to you know explicit gender information or category information. However, there was one meaningful difference that is observed which is wherein the N100 race differences that were obtained during explicit processing those were slightly in attenuated.

So, the initial evaluation probably seems to be moderated more specifically just to do this in a bit more detail whereas, N100s were larger to blacks when participants explicitly specifically attended to race or gender, race did not affect the N100 when participants were attending to dots or performing the you know individuated task like vegetable preference or introversion extroversion. Also the stimulus presentation you can see was slightly more complicated in the previous version studies than these latter one. So, that may also have you know may have moderated how the people are performing, if you just pay attention to this the dot task required placing dots on some of the faces and the vegetable task required presenting the name of the vegetable about which the preference judgment was to be made and therefore, it complicates things and it makes it difficult to determine whether the N 100 results that we are seeing now. is basically because of more processing that is recruited or just differences in the stimuli. Also note that stimulus presentation for participants performing the introversion-extroversion task was identical to prior studies and in this study the N-100 rates in this study were larger to black than to white.

So, in these three tasks you can see based on these task conditions a slight attenuation of the N100 is seen. What does this tell us? This suggests that increased visual complexity more so than the level of processing may have been responsible for this difference in the N100 that has been observed. Now, again if you look at the world it is you know a fastly dynamically changing global world and it is very common to find racially mixed people, people that will have both if I may say. So, let us say a black and a white and an Asian and a white, Southeast Asian and a white you have all of these combination of you know

individuals with these multi-ethnic, multi-racial backgrounds that are there. So, the authors were interested that if there are specific kinds of responses from whites to whites, from whites to blacks or from blacks to whites and from blacks to blacks, then what will happen if we present these individuals with racially mixed background picture.

So, it is an interesting question because it will basically may or may not bring together the stereotypes or the prejudice that may be activating when we saw these you know the vigilance responses that we saw in the previous lecture. So, to understand race perception in this context and while also gaining a little bit more information about how perception of race operates, the authors conducted a series of studies recording ERPs as white participants viewed digitally morphed photos of Asians and white males and black and white males. so just a bit of digital morphing here this process of digital morphing produce very realistic photos of faces possessing features which are shared with both the whites and the blacks the males and the females actually this is no gender manipulation was not done it is Asian and white males and black and white males so this is all males Now to the examine the responses to faces that were maximally racially ambiguous most were a 50-50 blend of an Asian and a white face or a 50-50 blend of a black and a white face. Pilot testing determined that the faces were subjectively perceived as falling between the two racial extremes used to create them and they were not simply perceived as member of one or the other racial group. Now ERPs were then recorded as white participants viewed these racially ambiguous Asian white morphs as well as the you know unambiguously Asian and unambiguously white faces and also the same kind of comparison racially ambiguous black white morphs and black faces and white faces.

Now, participants were asked to perform an explicit race categorization task, choosing between Asian and white in the first study, black and white in the second study. So, this is the setup. Now, focusing first on the responses to the unambiguous faces, P200s were larger to Asians and blacks than to whites, and N200s were larger to white than Asians and blacks. So, we get typically the same performance that we find in the Ito and Erlen 2003 study. These findings as I said are identical to the findings that we previously saw.

Now, across multiple studies in target racial groups, the authors find that mostly white participants showed larger P200s to racial out group members, but larger N200s to racial in group members. the same effect was also seen for this current study in which black white and black white faces were presented to these participants if you look at this more closely an interesting pattern is observed there in the p two hundred and the n two hundred responses were indistinguishable from responses to whites in both studies So, here you can see some kind of a categorization to one group may be people are being perceived to be similar those groups is happening. At the same time responses to racially ambiguous and white you know faces differed from responses to Asians and blacks. So, this initial there is a bit of a confusion that is erupting because of the racial admixture of

these faces. However, it is not until the P300 which peaks around 500 milliseconds that responses to whites racially ambiguous faces actually diverges.

This was revealed by showing the participants a majority of white faces in one block. and then a majority of Asian or black faces in another block depending upon the goal of the study. Also note because we are talking about the P 300 component, it is a component that is sensitive to incongruities along salient dimensions. So, it is basically a mismatch detection kind of component. So, if you present white, white, white and then racially admixed face or white, white, white then a black face then this component seems to turn up.

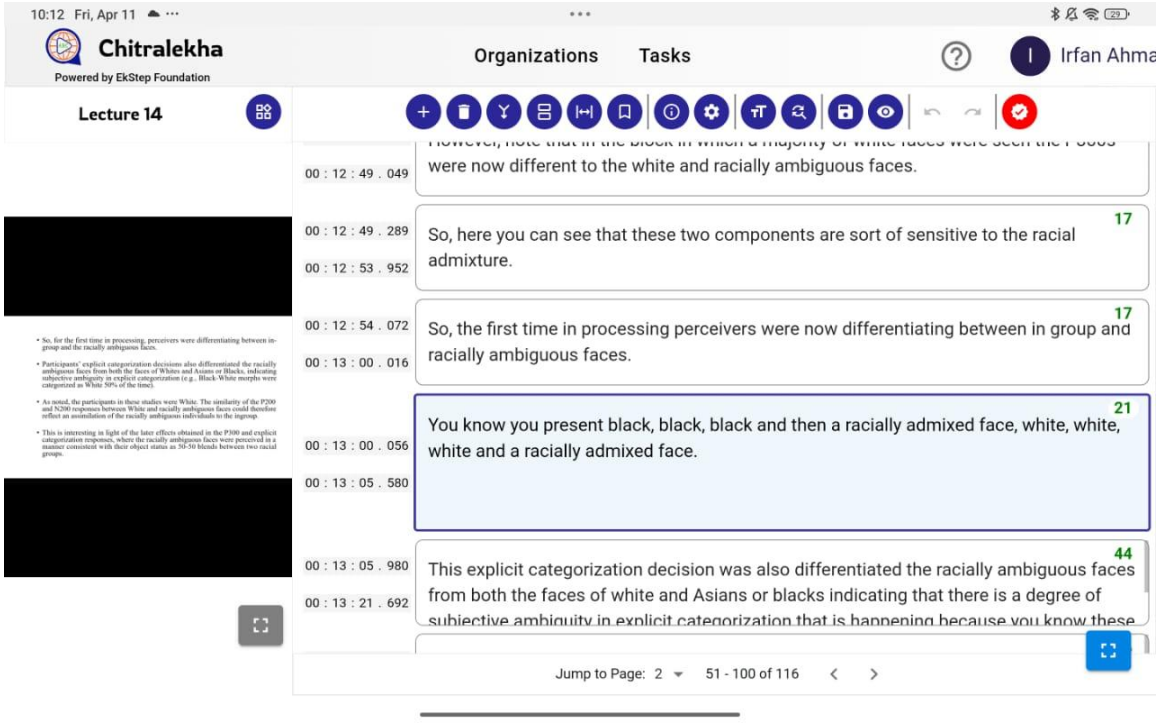
So, as per the expectations yes the authors replicated the racial incongruity effects for the unambiguous white, black and Asian faces. So, whenever there is a category jump the P300 amplitude sort of was increased. This is what you can see here. So, you can see that typically the responses are very similar, but it changes at around you know this level at around P300 the changes are very easily observed whereas here they are very similar to each other. and you can see the same happening here as well.

Now using the study in which black white and black white faces were shown as an example, this manifested as increased P300s to incongruent black faces when they were seen in the block in which primarily white faces were shown. So, if you are showing white, white, white and then suddenly a black face erupts obviously a category judgment will come up and you see the heightened P300s. Also P300s were increased to incongruent white faces when they were seen in a block in which primarily black faces were shown. So, black, black, black and suddenly white then also the P300 sort of is coming up. So, the authors however were actually more interested in the responses to these racially mixed faces.

So, what did they do? They in a block in which a majority of black faces were seen P300s were also found to be increased to racially ambiguous faces. This is in line with the pattern seen in the P200 and the N200 of different responses to the black and racially ambiguous faces. Now, you can see these components are able to distinguish between perfectly black, perfectly white and racially admixed faces. However, note that in the block in which a majority of white faces were seen the P300s were now different to the white and racially ambiguous faces. So, here you can see that these two components are sort of sensitive to the racial admixture.

So, the first time in processing perceivers were now differentiating between in group and racially ambiguous faces. You know you present black, black, black and then a racially admixed face, white, white, white and a racially admixed face. This explicit categorization decision was also differentiated the racially ambiguous faces from both the faces of white and Asians or blacks indicating that there is a degree of subjective

ambiguity in explicit categorization that is happening because you know these faces are 50-50 mixtures. As noted participants in these studies were white the similarity of the P200 and the N200 between white and racially ambiguous faces could therefore hint an assimilation of the racially ambiguous face into their ingrow ok. and this is very interesting because in the light of the later effects that we have seen the p three hundred and explicit categorization responses where the racially unambiguous faces were perceived in a manner consistent with their object status as a fifty fifty blends between two racial groups.



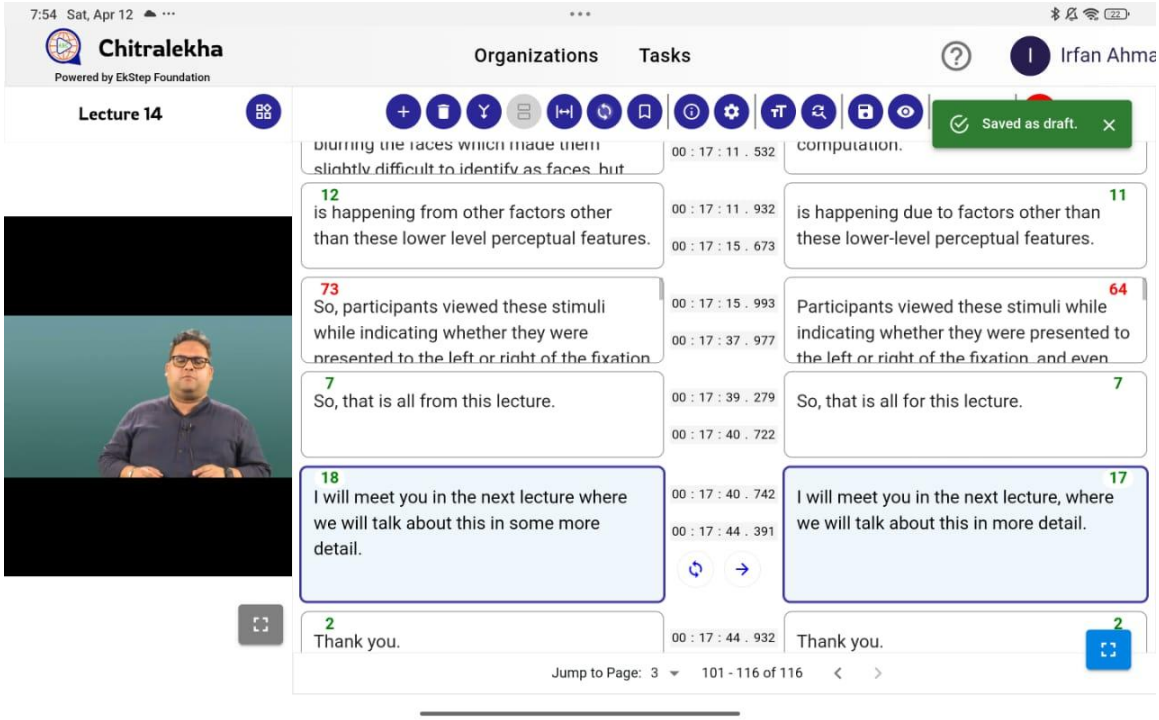
So, what is happening is a kind of an assimilation is emerging where if you are seeing white, white, white faces and then you are seeing initially you know a mixed face and if the participant is also white they are putting all of them in the same category they are giving responses similar to the responses that they were giving to white faces. Now, how do the authors interpret it? According to the authors this pattern of result demonstrates that the processing of social category information is initially slightly operates at a more gross scale then and eventually gets to a more fine grained scale where they can start seeing the minute differences between these faces. Although the participants in these studies eventually explicitly perceived the faces as belonging to neither the in-group or out-group because now they have started appreciating the minor differences, the overlap in the physical features between the in-group and these ambiguous faces may initially have led to the racial ambiguous faces being categorized as close to the in-group. Now, this interval where the racially ambiguous phase switches from being processed similarly to in group members to being differentiated from both the white and black groups may

which is happening around the P300 component may signal the point at which more fine tuned processing starts happening. So, see other than these categorization it is these experiments are also telling us at what point a more fine grained tuning is happening, a more fine grained analysis of the stimulus is taking place.

Researchers have also asked whether the effects that have been reported so far was specific to only faces and to social category cues per say or whether they may result from just perceptual differences. See the overall luminance, the overall color tone of a white face and a black face will be actually different. So, are these differences coming from these low level perceptual features or they are actually factoring in the actual race information that is you know being manipulated in this. For example, most of the studies have used color stimuli and may cause the faces across race categories to be perceived as different because of these low level differences in luminance and other perceptual features. So, this is obviously a genuine question that will come up, but there are several findings that argue against this interpretation.

For example, differences were observed not only between black and white faces, but also between males and females where the perceptual differences were much minimal, ok. So, it is not that the perceptual differences are driving these components. Also, race effects were also observed and they were the same when the authors used color images as opposed to when they were using gray scale images. So, it seems that even if you put gray scale images, take away the color information, the computation of social category based on facial features is still happening. It has more to do with this category information than to do with these you know lower level perceptual differences.

As the studies with the racially ambiguous faces indicate similar effects were obtained for racial outgroups other than blacks for whom the perceptual contrast to ingroup white faces was relatively smaller. Finally Kubota and Ito demonstrated that race effects were absent when the face nature of the stimuli was obscured. all other physical differences were maintained. So, again even if you morph the stimuli even if you take away the facial nature then these you know race effects were sort of absent all right. So, this was achieved by inverting and blurring the faces which made them slightly difficult to identify as faces, but retain some of the overall physical features such as color and luminance, but these color and luminance together were not able to activate the category information basically tells us that the category information computation is happening from other factors other than these lower level perceptual features.



So, participants viewed these stimuli while indicating whether they were presented to the left or right of the fixation and even that when they were doing that there were no significant race effects observed within these stimuli together that the support the idea that the effects obtained in response to differences were actually in response to differences in race and gender and not the you know other perceptual effects that are being seen. So, that is all from this lecture. I will meet you in the next lecture where we will talk about this in some more detail. Thank you.