Social Behavior and the Brain: An Introduction to Social Neuroscience

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Week - 03
Lecture – 15

Hello and welcome to the course social behavior in the brain an introduction to social neuroscience I am Dr Ark Verma an associate professor at the department of cognitive science IIT kanpur this is the final lecture of week three where we are trying to understand and represent social groups and in this lecture I am going to talk to you about consequences of social category information activation because we studied in the last two lectures that faces are also a window for activating social category information such as race gender age and these activations are rather automatic they happen involuntarily and very rapidly, but what happens along with this cognition of the social categories. Once you start understanding that the person whose face you are seeing belongs to another race or another gender or you know is much younger or much older to you, does it also modulate our responses to them, does it sort of determine our social behavior. I bet it does because it leads to sometimes the activation of stereotypes associated with these kinds of differences. For example, differences or racial stereotypes that exist between the whites and the blacks, the age related stereotypes for example you know the younger ones are always less mature and the older ones are always very preachy about us or for example gender stereotypes like you know females are poor drivers, males are misogynistic and so many of these other things. So, why does this happen and how does this happen let us try and go and study this. So, as I was mentioning we studied a social category information is activated rapidly and effortlessly, but it also leads to the activation of stereotypes and prejudice views that accompany the social categorization.

Studies have demonstrated implicit stereotyping and prejudice across a range of context and range of tasks. However these effects are also known to vary as a functional of individual factors such as the need for self enhancement or motivations to control prejudice. Now this is an interesting thing because as I am saying understanding or cognition of these you know racial differences or say for example the social categorization it must happen naturally it is a very important function in the overall scheme to understand and you know organize our social world. But even if for example due to cultural baggage due to individual experiences one may have unpleasant experiences one may have stereotypical you know understanding of the other in the social group it is not always the best thing.

And know modern history has taught us that stereotypes and prejudice actually breed discrimination which is not good for you know a society that aims to live peacefully and in cooperation and it is not seen today at least today as a mark of a good individual. So, thereby even if these you know categorization information are being activated rapidly even if the implicit stereotypes are coming to the fore while you are seeing let us say picture of a person from a different race or a different gender or a different age people always want to control these things keep them in rain or at least not express them in public. So, that they do not malign their own image as being somebody whose racial somebody whose you know prejudice against others. So, a lot of this also interacts with this motivation of presenting yourself as good people or even for example personally enhancing our own image in our own eyes trying to aspire to move away from these culturally baggage stereotypes that exists. So, given the attentional differences to social groups that we saw in the previous two lectures, the authors wondered whether these individual differences in the lower level more perceptual processes would also moderate the extent implicit biases that come with social categorization.

So, they started with this investigation of stereotype activation trying to assess whether the degree to which the perceivers differentiated black faces from white faces relatively early in perception also affected the degree to which these stereotypes are getting activated. Participants were asked to complete a sequential priming task wherein they made decisions about target objects that were primed by either faces of black males or white males ok. So, these could be everyday objects, it could be objects like a gun or a flower or you know a pen and these daily use objects, but these objects will be primed by either black faces or white faces. Now, remember I hope you understand how the priming paradigm works. The primes sort of make it easier or more difficult to react to the targets.

If the prime and the target are related in a particular sense, the primes may you know hasten the recognition of these target objects or sometimes slower down the recognition of these target objects. What is playing out here? For example, if I am showing a black face and if I am showing an object that is in some sense related to the black face, then maybe the recognition of this object will become faster. Similarly, if I am showing a white face and I am showing something that may be culturally linked to the white faces, maybe the recognition of this particular object will become faster. So, let us see what happened. So, these participants saw two different blocks of trials that were designed to examine implicit negative associations with blacks in slightly different ways.

Let us look at how they did this. in one block of trials they classified the pictures of guns and in another block of guns and insects and because there is and as I was saying you know there is at least in the United States a stronger association between blacks and concepts related to threat and danger and which has been demonstrated in a range of context blacks are probably associated more to gun violence and that is why if you are you know responding to categorizing gun between let's say handguns and machine guns

and so on. I am not really aware of the exact you know type of guns they used as stimuli, but if suppose they are differentiating between guns and these are being primed by black faces the assumption was the a priori hypothesis could have been that people will respond faster to guns because they were primed by black faces because these black faces will activate the semantic network which sort of links guns to the black faces in whichever way. now this block therefore compared responses to a class of objects associated with the negative cultural stereotype of blacks which is guns and with the category that is also negative ah in valence but is not racially stereotypical for example insects is also for example probably associated with ah you know the black community because sometimes the places they inhabit may not be as hygienic and may be swarming with insects but again it is not stereotypically racial in the sense that you know insects can be found where other relatively poorer people are living as well irrespective of their race. So, in another block of trials, so this was guns and insects, there was another block of trials where participants were asked to classify the pictures of guns and images associated with sports that are considered relatively stereotypical of blacks.

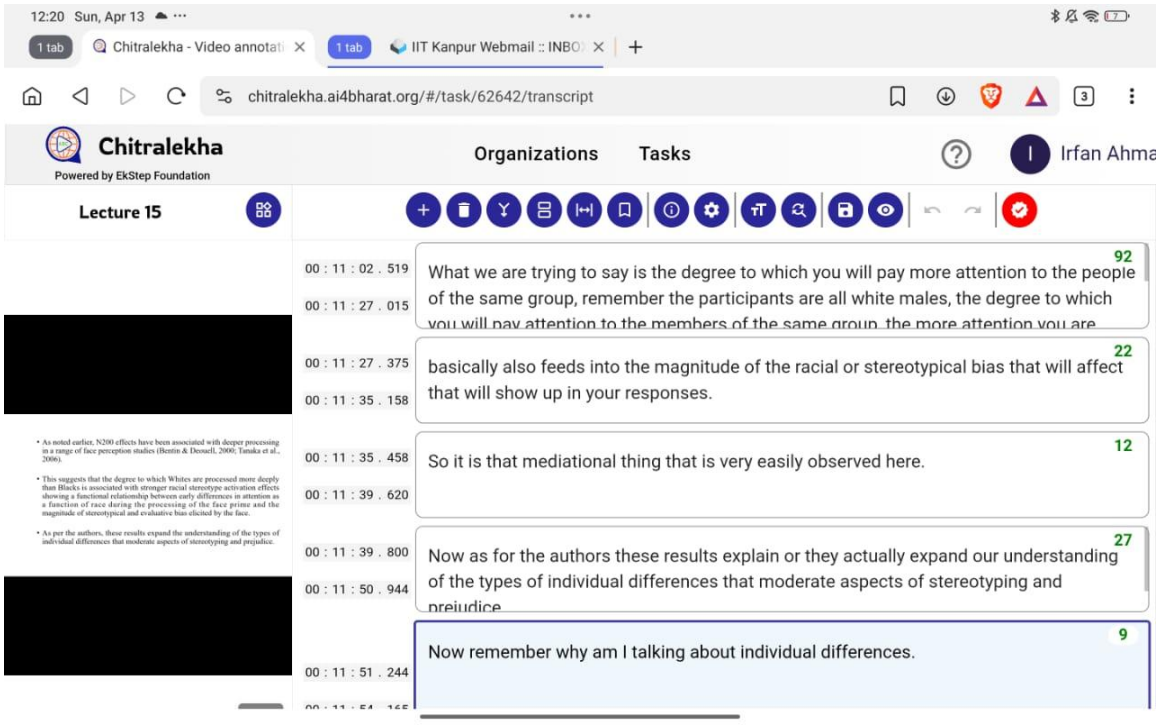
For example, basketball you know basketball is something that a lot of black you know people black Americans you know colored Americans are supposed to be playing, they are typically tall, they are athletic and therefore, they excel in basketball. Now, this association is ratio is probably racially stereotypical, but in a more positive way than guns. So, this block allowed a comparison between some negative aspect of the stereotype and a category that is also ah racially stereotypical, but in a more positive light. Let us see how people fair. So, they recorded the ERPs to these phase frames and the ERPs actually replicated the results obtained in the previous studies remember Ito and Erlen 2003, Ito and Erlen 2005 and so on.

So what did they find? They found that the P200s were larger to blacks than and N200s were larger to whites. You know the discriminative response and the assimilative response. The authors also obtained the expected priming effects that they were looking for. For instance when the target was a gun participants were faster to classify it if it was preceded by black face prime as opposed to if it were preceded by a white face prime. of greater interest however was whether the magnitude of these serotyping effects could be predicted by the magnitude of the ERP that we are observing.

So, in both these blocks the degree to which the two N 200s were greater for whites than blacks predicted actually a greater bias in response latency. So, here we can see that there is a connection in the magnitude to which these serotypes are getting activated and the way the people are responding to these black and white faces. In other words, as the degree to which the individual showed attentional differences in N200 favoring whites over blacks, the degree to which the blacks were associated with threat and danger as compared to the non-stereotypical negative stimuli actually or stereotypical positive stimuli actually increased. So, if they were you know in a sense paying more attention to

the white faces any there was more you know same group response it actually predicted the degree of discriminatory or prejudice response these individuals were giving to the black faces or stereotypically you know negative stimuli. Now this is not surprising because probably a bunch of these things that we learn over time are you know they get embedded in our psyche they get embedded in our response making mechanisms in our response choosing mechanisms.

So, you know again I will say that these effects are very I mean the these studies that we are presenting here are very culturally sort of sensitive in the sense that we do not know whether these kind of racial effects will operate in the Indian you know subcontinent also. But, again because these have been carried out in the United States of America, there are those racial stereotypes that exist and the authors of these studies have tried to cash in or try to study those racial stereotypes using these particular ways that we are seeing. Now, as noted earlier the N 200 effect that we have seen has already been associated with deeper processing in the range of phase perception studies. Remember deeper processing for the same group people as well as shallower processing to the other group people. This such as that the degree to which the whites are processed more deeply than blacks is associated with the stronger racial stereotype activation effects and it shows a bit of a functional relationship between the early differences in attention as a function of race during the process of these phase priming and it in a sense is related to the magnitude of stereotypical and evaluative bias that is elicited by the face.



Just let me break this down for you. What we are trying to say is the degree to which you will pay more attention to the people of the same group, remember the participants are all white males, the degree to which you will pay attention to the members of the same group, the more attention you are giving to the members of the same group is able to predict how discriminatory the P200s or your responses will be towards members of the other group and how discriminatory you are going to be towards the people of this other group basically also feeds into the magnitude of the racial or stereotypical bias that will affect that will show up in your responses. So it is that mediational thing that is very easily observed here. Now as for the authors these results explain or they actually expand our understanding of the types of individual differences that moderate aspects of stereotyping and prejudice. Now remember why am I talking about individual differences.

Not everybody will have those biases embedded in their psyche as deeply as everybody else. Some people may be less affected by these serotypes, some people will show relatively lesser affinity towards the same group and you know conversely relatively smaller discriminatory attitudes towards the other group. So, it basically also have to do with the individuals you know personal makeup their personal experiences the kind of information they have been exposed to over time, but to the extent that they are more positively attached to their own group sometimes predicts how strongly or weakly they are prejudiced or racially stereotypical towards the members of the other group. Now this is again these bunch of studies just a couple of studies actually shows that stereotyping and prejudice comes hand in hand with the activation of social category information and while this is you know seems like a fundamental property of cognition it makes difficult living in a society where nowadays you know it is a global society people are living in mixed backgrounds and obviously being considered racist is actually a negative attribute rather than being a you know a positive or a or a meaningful attribute you know like it was back in the 1700s in the 1800s. So, what comes with it or what comes with the natural activation of these stereotypes is the tendency to want to suppress these stereotypes is the tendency to want to regulate our behavior to a certain extent so that we do not come out as racist in front of others.

So, behavioral regulation also sort of seems to be engaged here let us study how. So, so far the authors have examined the perceptual processes associated with perceiving the members of different social groups and these processes were indeed interesting by themselves, but also because they determine the you know nature of our social behavior. For instance, previously examined studies have shown that there is a relationship between the differences in attention to members of different racial groups and the beliefs they activate suggest a way in these perceptual differences could relate to behavior. So, again as I was saying the more attention you are paying to your own group you are probably

discriminating with the other group and that is feeding in your behavior. So, it is a sort of a linked sort of a structure.

Now, bigger differences in attention as a function of phrase could also be associated with bigger differences in the semantic and evaluative associations that are activated by group exemplars which in turn could influence how the perceiver behave towards a group member. Now, remember why is this attention being modulated by this black face? Why is this attention being modulated? towards a gun linked to this black face. Because there is a degree of semantic knowledge, there is a degree of evaluative association that is linked with these faces. For example, if your semantic network treats or you know is linked with black faces linked with you know violence and guns and drugs and so many other things and you can take any other group for example you can take females attached to their serotypes you can take you know cast memberships attached to different serotypes religion memberships attached to different serotypes you can think of any of these as examples therefore this particular context if the black faces are linked to these you know stereotypical arrangements these stereotypical semantic evaluations then So, you know this will bring or this will be able to predict ok why am I paying more attention to these faces because in my semantic network they actually you know raise a cause for alarm and you know vigilant response from the amygdala and similarly my evaluative association the way I will evaluate a particular member of that group will have that baggage with me. For example, if I have a racial stereotype towards the black and I am meeting a black person I am looking at the face of a black person.

Then the amount of baggage that I have with respect to this racial group will in some sense manifest in how I evaluate this single exemplar of that group. And this is a very interesting way it is a heuristical way it is a short cut in which probably the you know the brain or the mind organizes and tries to understand the social world, but again this is something interesting because it will bias our social behavior in our everyday lives as well. So, in the studies that we have reviewed so far, the authors were not able to directly examine the behavioral outcomes for the activation of category information and consequent stereotypical and prejudiced behaviors. So, to investigate that the authors employed paradigm that was developed by Correll and colleagues in 2002, where participants were made to see a variable number of background scenes for short, but variable durations of on each trial. at some point let's just describe the background at some point a person appears holding either a handgun or a similarly sized objects such as a wallet or a cell phone maybe a hammer and here the participants were asked either to shoot anyone who is holding a gun and to press another button to not shoot anyone who is unarmed.

You might remember the go no go kind of studies that are there if you see a particular stimulus press a key to go if you see a particular kind of stimulus don't press a key or let's say you know and don't give a response this one is slightly different because here either

you are pressing a button to shoot or you are pressing another button to not shoot. Now Coraline colleagues found that the targets race actually modulated the responses in this task. Participants were found to be faster and more accurate to make shoot responses to armed black than white targets. Why is this happening? Because the armed black individual is consistent with the racial stereotype that exists of black people being associated with gun violence. Interestingly, the participants were also found to be faster and more accurate to make non-shoot responses to unarmed white rather than unarmed black targets.

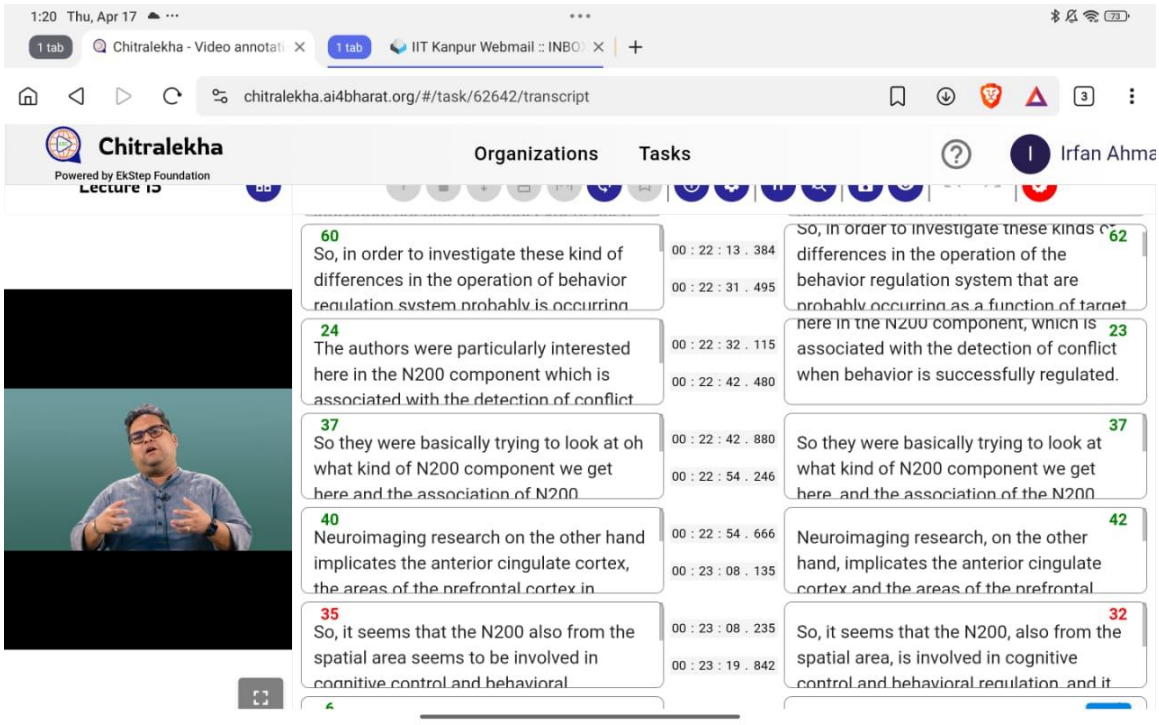
So, you can see here that these racial stereotypes are manifesting in our behavior on sort of an unrelated task, again remember that these tasks are just mimics or simulation of real environment, but here you can see that these stereotypes actually have ah the potential to moderate our behavior in you know in the real settings. Next the authors were interested in using these ERP responses you know considering the behavior in this task from the perspective of behavior regulation. Now if this happens if there is this you know tendency to activate these racial stereotypes to go for shoot responses and so on. How does it you know how do people regulate their behavior because we are not going around expressing our racial stereotypes in public we try and hide them we try and regulate them in the interest of peaceful and cooperative coexistence. So, to study this behavior regulation the participants employed a slightly general model of behavior regulation that specifies a two part behavior control system.

What are these parts one component is implied in continuous and pre-conscious monitoring for conflict in activated representations during ongoing information processing say suppose you are seeing a black face all the negative stereotypes are coming up so one component is constantly monitoring all of these points of conflict that may be arising the outcome of this whether conflict is happening or not. So, the outcome of this particular component is used by the second component which acts as the regulatory part of the system and it responds to detected conflict with the implementation of higher order cognitive control. Remember we have talked about this probably in a different course. that the DLPFC, the ACC and you know some of these regions are involved in you know cognitive control they are involved in suppressing unwarranted responses and activating the correct response in a given scenario. So, this two part behavior regulation system also has these two aspects one is detecting conflict the other is trying to suppress conflict or trying to get context appropriate response for that conflict.

Now, just look at the task. So, making the decisions required by the shooting task is likely to activate multiple representations, multiple kinds of informations are being activated. In addition to the information explicitly relevant to determining whether someone is holding a weapon or not, the speed and the ease with which each race is encoded also suggest that the race categorization is also happening at the same time and in turn contributing to activating the beliefs and concepts associated with each of these

racial groups. So, remember we started with faces as activating racial information as activating prejudice. So, all of this is happening at the same time and in real time it is modulating it is moderating our behavior. Now, because of these cultural stereotypes you know which exist that more strongly associate blacks than whites with concept relating to violence and threat perceiving a black individual may be more strongly activating beliefs that facilitate making a shoot response.

You know that is basically the just the mechanics of this task as soon as you see a black face the racial stereotypes get activated and because the racial stereotypes suggest that oh black people are associated with violence and danger and warning it seems just right you know in some sense it seems just right that you go ahead with the shooting response and it is interesting as well as alarming you know if you look at it from a distance. So, putting these two features together suggest that conflict monitoring should detect less conflict between considering a shooting response and perceiving a black target as compared to a white target. So, when you seeing a black target and you have a shooting response, then the regulatory system probably is detecting less conflict. It is not suppressing this choice of behavior whereas if you are seeing an unarmed white individual and then you are going to give the shooting response then a certain conflict is detected and basically that particular response is suppressed. Isn't it interesting that even the regulatory system is allowing us to go ahead with the racially stereotypical or with the response that is consistent with the racial stereotypes that we have learned over time.



Through narratives through information's through maybe in part by individual specific personal experiences. So, in order to investigate these kind of differences in the operation of behavior regulation system probably is occurring as a function of target race and whether these kind of differences are related to task performance the authors took this a little bit further they utilize the ERPs when the participants were performing this shooting task what did they find. The authors were particularly interested here in the N200 component which is associated with the detection of conflict when behavior is successfully regulated ok. So they were basically trying to look at oh what kind of N200 component we get here and the association of N200 component is interesting also because it is associated with conflict detection in some previous research. Neuroimaging research on the other hand implicates the anterior cingulate cortex, the areas of the prefrontal cortex in conflict monitoring and cognitive control respectively and source modeling of the N200 also implicates the ACC and these other areas of PFC.

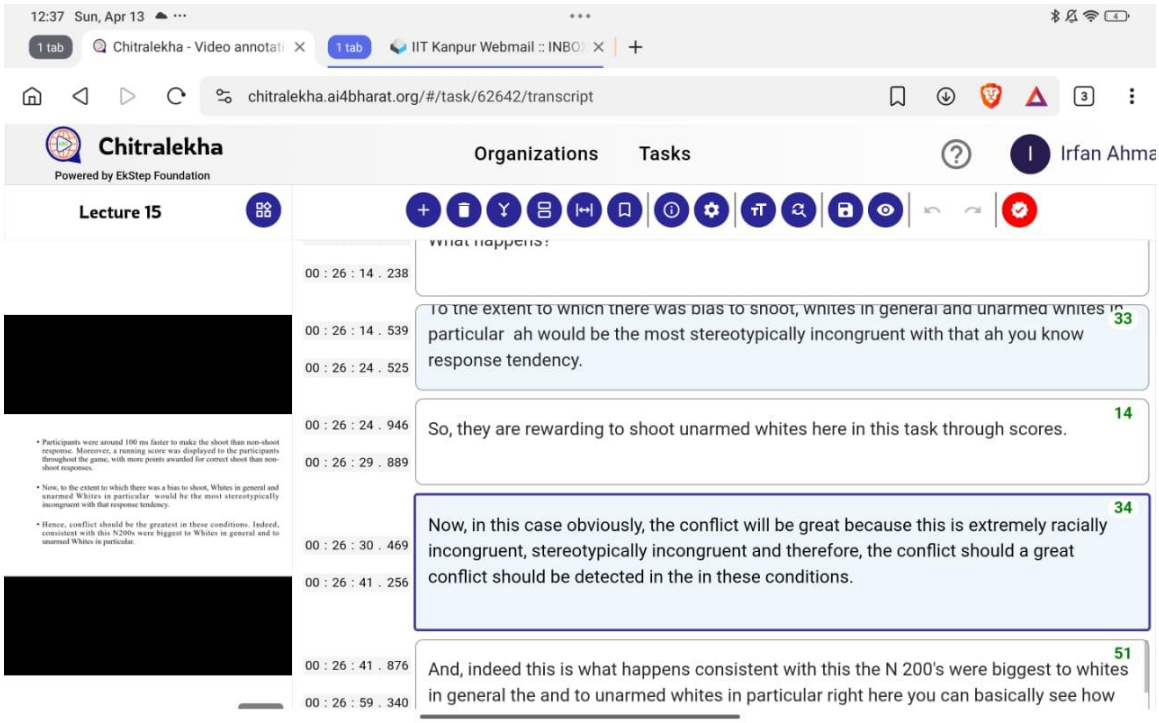
So, it seems that the N200 also from the spatial area seems to be involved in cognitive control and behavioral regulation and it seems likely that we should expect that this thing will get activated. What did the results tell us? The behavior results replicated the findings from previous studies using this task. What did they find? Participants were actually faster to shoot armed blacks than whites, but faster to not shoot unarmed whites than blacks, so racially consistent behavior. However, for the N 200s the responses were indeed larger to whites than to blacks moreover this race effect was moderated ah by the object being held with the largest N 200s happening for unarmed whites. So, you can see the brain also is in some sense tuned to responding in racially stereotypical ways it is tuned to accepting a particular kind of behavior which is consistent with our racial stereotypes.

Ok. In contrast interestingly the N 200 amplitude did not differ from the black targets as a function of the object held. So, if there are black targets irrespective of whether they are armed or unarmed the shoot response seems to be the more automatic and the more prepotent response whereas, if it is whites then the not shoot response seems to be more prepotent seems to be something that the people are more prepared to do. Again remember all of this is happening outside the purview of conscious strategizing and awareness all right. These are stereotypes that are being manifested in behavior in a in an almost automatic rapid manner and again look at the timeline this is happening at around 200 milliseconds. So, this pattern that is here by observed suggest more sensitivity to conflict representations when viewing whites than when viewing blacks in this task and sensitivity to the presence of or absence of weapons only for whites.

Interesting you might have seen and I probably should not be saying this, but you might have seen that there are so many of these images of you know racially negatively narrated groups becoming victims of these kind of stereotypes. So, here irrespective of whether the white person is you is holding an arm or not, the first tendency is to not harm them

because they are members of the same group. Remember the participants here are white participants. However, irrespective of the fact whether the black person is you is holding a gun or not, the first tendency is to shoot and because they are members of the other group, alright. So, this basically is a very interesting manifestation or demonstration of how deeply the racially held stereotypes may moderate our social behavior.

Now the authors attribute these results to bias towards making the shoot responses in this task and we have sort of seen now why these biases are emerging. Going forward ah if you look at the data more closely participants were around 100 milliseconds faster to make shoot than non-shoot responses. Moreover, when a running score was displayed to the participant throughout the game with more points awarded for correct shoot than not shoot responses, just to sort of understand or give them a bit of a feedback about this. What happens? To the extent to which there was bias to shoot, whites in general and unarmed whites in particular would be the most stereotypically incongruent with that ah you know response tendency. So, they are rewarding to shoot unarmed whites here in this task through scores.



Now, in this case obviously, the conflict will be great because this is extremely racially incongruent, stereotypically incongruent and therefore, the conflict should a great conflict should be detected in the in these conditions. And, indeed this is what happens consistent with this the N 200's were biggest to whites in general the and to unarmed whites in particular right here you can basically see how the responses are different from white unarmed white armed ah black unarmed and black armed individuals in this task. Also

something that is interesting ah in this task is that the N 200 ah differences were found to be correlated with actual behavior. More specifically, the degree to which the N 200s to whites exceeded those to blacks predicted the degree of racial bias in these response latencies. In other words, the neural responses indicative of a bigger race difference in conflict detection were associated with more racially biased behavior.

So, you can see again something that I have been repeating the overall tendency of the brain to respond to racial information basically also modulates its tendency to engage in racially biased behavior or not.okay Also, interestingly the individual differences in racial in activating racial stereotypes was found to be predicting behavior and it was found to be more strongly associating blacks than whites with violence and danger and this particular association was also fueling the greater bias in actual behavior of shooting or non shooting responses. Interestingly, the authors also discovered that the racial differences in conflict monitoring mediated the relation between racial stereotypes and behavior. So, participants who most strongly associated the blacks than whites with violence were more biased in their behavior and this was accounted for by the stronger neural signals associated with conflict monitoring to whites than blacks. So, if you have a certain kind of belief system, if you have inherited certain kind of ah stereotypical racially ah you know charged belief system, it sort of modulates your behavior in very ah measurable ways and we will see the mediation model in the just the next slide.

So, if you put all of these results together, you see that these results support the application of behavioral regulation models in understanding how stereotypes of and prejudice affect behavior. They also suggest that perceptions of congruency between activated behavioral tendencies and beliefs differ as a function of target race and that these differences actually predict our behavior. So, you look at this thing here, it seems that you know the shooter bias is basically being fed in by the cultural stereotype and which is also feeding the N 200 response and the N 200 response which is the pre potent you know response of the brain is also fueling the shooter bias. So this mediation of the relation is very interesting basically it is an you know demonstration of the fact that how cultural stereotypes actually may directly moderate our behavior. So that is all from this lecture and this week I will see you next week with the next class. Thank you.