Selected Topics in Psychology
Neuropsychology
Prof. Rakesh K Gupta
Department of Humanities and Social Sciences
Indian Institute of Technology, Kanpur

Lecture - 24
Side Bias in Human Behaviour

I will talk about one peculiarity of human behavior, which I refer to as side bias. There are efforts and attempts made to understand human behavior made through several sub system. One subsystem refer to understanding human behavior through cognitive functioning, one subsystem is in the affective to mean, we try to understand temperamental personality note and affective other emotional domains. Very little effort has been made to understand human motor action and the psyche behind it.

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My attempt here in this talk would be to understand a unique feature of human behavior which is often noticed, but largely ignored. I will talk about that, but before I talk about it, I would like to refer that like human body everything in this world is somewhat symmetrically organized, even the human body is also symmetrically organized except for some visceral organs from sephelo cordal directions. If you see a human body you will find that you have got two legs, two eyes, two ears, two hands and morphological symmetry across the vertical line is almost perfected. Though there are attempts to study

the structural differences between the two sides of the brains, the two hands the length and width all these things have been done, but it has been found that there are negligible differences between in the structural issues in the two sides of the body.

The question comes that whether the two sides of the body if they are structurally so symmetrical or they symmetrical functionally as well. I will refer about this question, and I will talk about a topic which is termed by me as side bias and side bias in human behavior.

As I said like human behavior the entire world all constituents of the nature have got some symmetry. A birds fly with two wings as a symmetry; the aero plane in the sky that we see also have got a perfected symmetry. The rivers, the trees, the birds, the animals anything that we see has got a symmetry in morphology. My question is addressed here on human body that we have a perfect symmetry, but we have differential functions of those symmetrical within those symmetrical structures, which are asymmetrical in nature.

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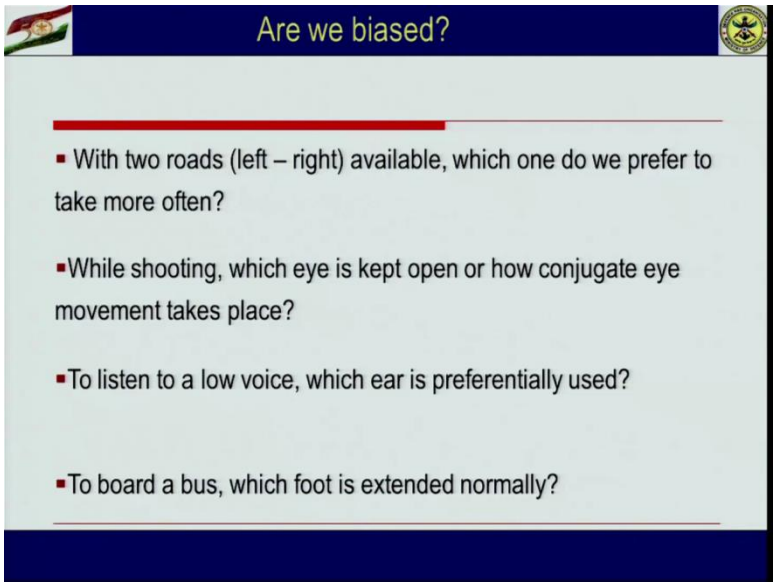

So, I would like to talk to you about these asymmetries in our human function which is largely ignored, but very often noticed. Now, before I actually go into the subject matter as it has still not got in a high level of scientific validity, though it is clearly evident. We would first like to examine whether our behaviors are biased or not. Let us for example, try to understand, with two roads available before us which one do you prefer to take

more often. If I have got two roads front of me one going towards the left side, other going towards the right side, but both reaching at the same point, at the same time if you take either of these roads, you would prefer to go by which road? Are you interested or you are more biased towards the left side of the road or are you more biased towards the right side of the road? We do not have a clear answer for this.

Likewise if I try to shoot with a gun, which eyes kept open and how conjugate eye moment takes place. Do we open both the eyes in shooting no, it is not possible we have to close one eye. So, which eye we would prefer to close and which eye we would prefer to open we would find that there is often a bias, we use one eye more often as open and one eye more often as closed.

If we have to listen a low voice - a radio or a ticking of a watch do you use both ears randomly, both ears randomly, no. We use one ear, but we know that preferentially one ear is more often used as compared to the other. So, we find often there is a bias. If I have to board a bus, I will definitely not use both the leg I will use one foot more often to board a bus as compared to the other. If we notice to ourselves, we will find that there is a clear bias within ourselves as well.

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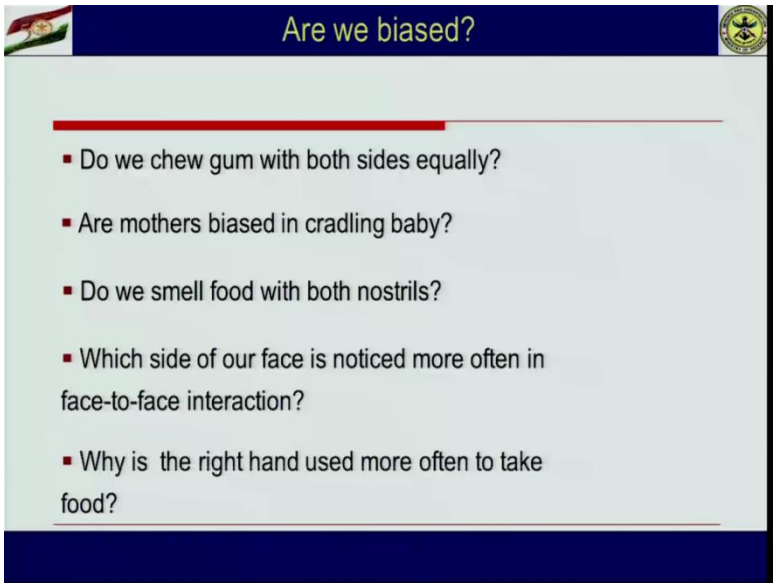

Likewise, when we take food or chew a gum, do we use both sides equally, when we do the mastication? We do not do that we use one side more often as compared to other, do you notice which side we use more often. So, the question comes whether mothers are

biased in cradling baby or not, we have often noticed that mothers cradle the baby in the left side, the left hand. And do I rarely see that mother cradle the baby in the right side what could be the reason behind it, is it so the mothers are biased? I am raising this questions to generate more answers through researchers, the primary idea behind raising this question is to understand why our behaviors get biased under certain conditions. Likewise do we smell food with both nostrils equally, no we do it with bias at one side of the nostrils. Therefore we need to know why do we do this.

Likewise which side of our face is noticed more often in a face-to-face interaction. Do we see the whole face at a time, whenever we interact with somebody or we see one side of the face more often as compared to the other side. At a later point of time, I will give you evidence telling why one side of the face is more noticed as compared to the other. Why the right hand is used more often to take food, we are often taking food with the right hand, do we take food with the left hand also with equal frequency, no. Most of the people take food with the right hand of course, there are people some people who also take it with the left hand, but the percentage may be five percent or less than that.

With all these questions, what I tried to raise is that we have certain peculiarity which we term in form of human behavior bias, but why do we do that for such kind of action is something that we need to ask. And when we ask this questions, we would like to find question from evolutionary sciences, from biological sciences, from engineering sciences, from behavioral sciences. So, the idea behind this topic is to raise questions rather than giving answers; and by raising questions we will be able to get the route of human behavior through evolutionary sciences I will raise more questions for that.

More such questions for biological sciences, why they are biologically more tenable what kind of resource allocation I they do through being a biased activity pattern, what kind of engineering sciences questions that we answer, and what kind of behavioral sciences questions that we answer by studying side bias as a phenomenon.

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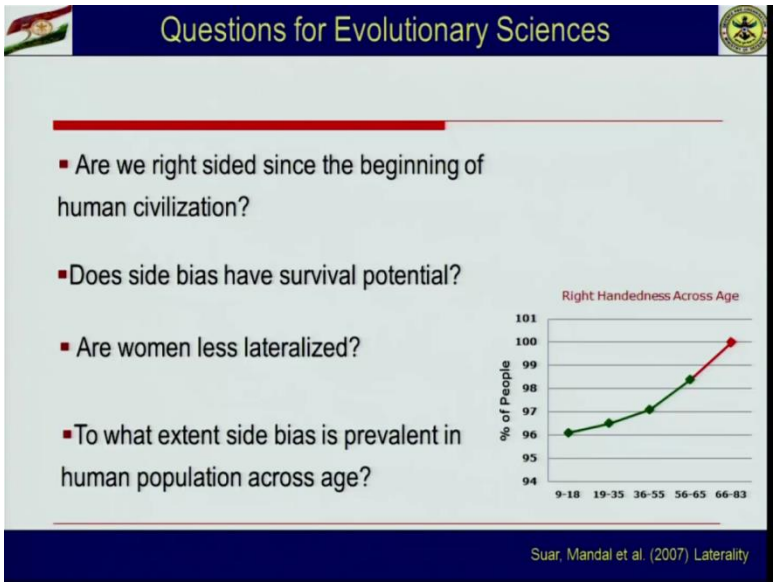

First will take up questions for evolutionary sciences. The first and foremost thing comes to our mind that are we right sided since the beginning of the human civilization? We know more often we use the right hand, more often we use the right foot, but the question comes are we right sided ever since the human civilization has begun, or we became right sided at a much later point of time? This question needs to be answered. Likewise does side bias have a survival potential by being right sided, do we increase the chance of survival or is it so by not having bias we will reduce our survival potential that is another question, which evolutionary scientist can answer.

Are women less lateralized than men is another question? We have men and women in this world with equal proportions, but is it so that men are more lateralized and women are less lateralized or the reverse is true? We do not have a clear answer we find that for various functions the laterality pattern differs between men and women, but does this functional biases have got certain survival potential or certain implications for revolutionary sciences. Likewise to what extent side bias is prevalent human population across age. We have done a very recent study in which we have found that appeared in a channel called laterality, we have found that after a particular age that is sixty five plus, the left hander's are really nonexistent. I will raise this issue when I will be discussing hand bias as one of the issues that we have studied under a department of science and technology programme, but this question is being raised in order to tell that more we

grow less, there are left sided bias people when the human population is studied across the age.

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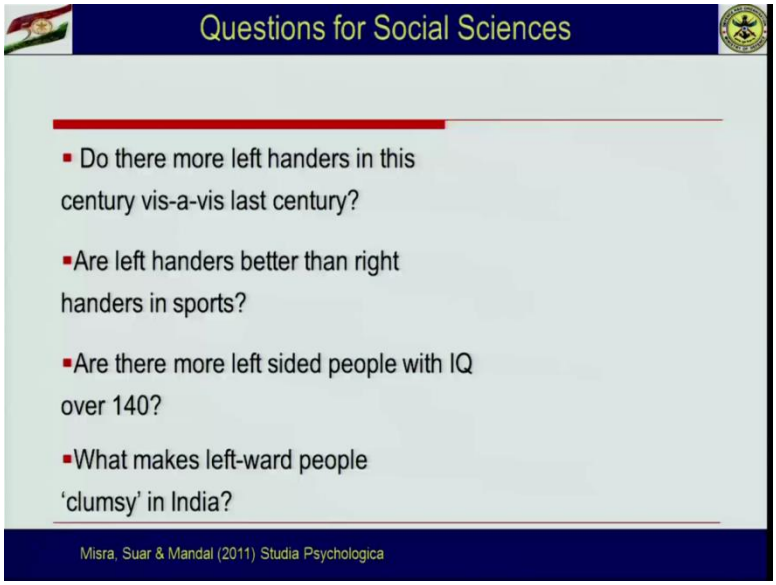

There are certain questions for social sciences like evolutionary sciences, we have certain questions for social sciences. In this entire talk, I will be raising only questions to find out answers because the answers are not very apparent or prevalent. So, the questions for social sciences do there more left handers seen this century vis-à-vis last century. The latest study suggests that there has been an increase in the left sided people in comparison to the last century, in this particular century. There has been such such evidence, but so such systematic answer has been found, whether we have got more left handers in this century as compared to the last century. It has I have said in last century we have found that there are less left handers and the number of people who are left handers in this century have been found to have increased.

Likewise are left handers better than right handers in sports, we find that left handers are there in sports and right handers as well, but is it so that left handers shoot better or left handers has got a better performance as compared to the right handers. All left handers right handers use more often the left handers in order to exploit the vulnerabilities of the right handers for left handers that is another question which we for which we do not have answer found. A clear left hander in cricket a clear right hander in cricket in the game of cricket use the left hand in order to bowl a right handed or a left-handed batsmen. Why

do they do so, is it so that the left hand is used to exploit the weaknesses of the right hander or is it so that the left hander play better sports in all forms of or all walks of sports that people are playing.

Likewise are they are more left sided people with IQ over 140. It has been found that the the percentage of people with left hand have got higher IQ over 140 which is considered to be extremely gifted number of cases hundred one forty is the best or the highest that we can measure with the existing tools. There have been studies which which are found that people with over 140 IQ have got more left handedness as a tendency as compared to the right hand, but we do not have a clear answer, this thing has to be studied these are good questions for social sciences.

What makes leftward people clumsy in India? For example, if a person is clearly left handed, but since the social desirability is always for the right side, do they become clumsy over a period of time and do they commit more accident as a result of which. So, what makes leftward people clumsy in India, because of social desirability or not having the left fit world around them for use of implements and other kinds of activities. So, these are the questions we have found for the social scientist. So, like evolutionary scientists, we have some questions regarding side bias in social sciences.

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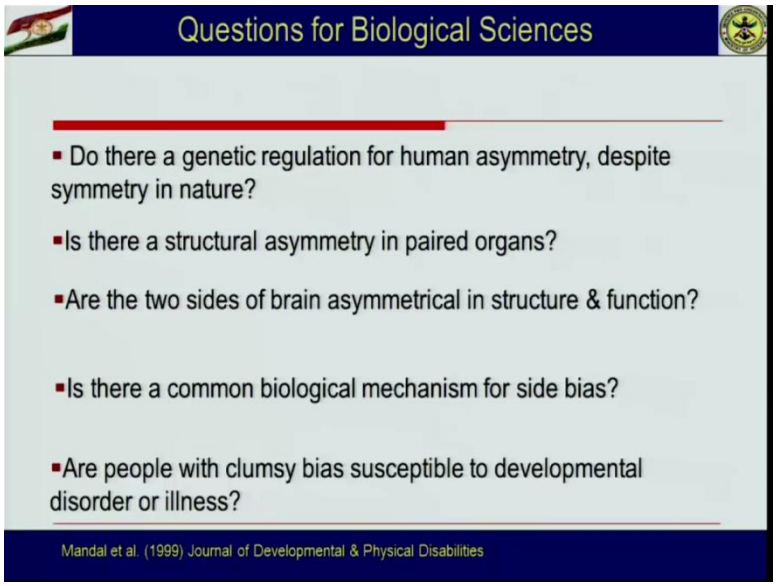

Likewise, we have questions for biological sciences using side biases. Do there a genetic regulation for human asymmetry despite symmetry in nature? Everything in the nature is

symmetrical, but do there a genetic human asymmetry that needs to be studied. Likewise, is there a structural asymmetry in paired organ as well, like we have got two legs, we have got two feet we have got two ears, we have got two sides of the brain, is there a structural asymmetry in the paired organ. There are asymmetries existing, but as of now we know that they are very very non-significant; yet it is important to study to what extent the two sides of the brain, and the two sides of the body are different in terms of structural asymmetry.

Are the two sides of brain are asymmetrical in structure and function as well? No functionally we know that the two sides of the brain are very asymmetrical. But structurally we know the right side of the brain is slightly bigger than the left side of the brain as well as left side has got more favour as compared to the right side of the brain there are minor variations in the two sides of the brain. But there are major variations in the functions of the two sides that needs to be studied in biological sciences, which of course, we have studied in great number and depth in the studies related to hemispheric lateralization or cerebral hemisphericity.

Is there a common biological mechanism for all forms of side bias, this is also not very clearly known. For example, we know that the two sides of the brain are different for two different kinds of entities, but the two legs, the two hands, the two ears, the two eyes that is we have got sense organ asymmetries, we have got paired asymmetries for leg and foot long limbs. Question comes whether there is one biological switch board for all kinds of asymmetry or they are peripherally learned, separately learned through cultural processes in executing some kind of asymmetry. This is a question not yet answer done we answer for tomorrow.

Are people with clumsy bias susceptible to developmental disorder or illness, that is also not clearly known. With Guesswin Gelavuda and Dehan study we know that there are some kind of actipicality or clumsiness in mental disorders like pscysophinia, some of the developmental disorders like esleksia, mental retardation. All these studies are available today, but the linkage between this clumsy bias or actipical side bias and developmental disorder is also not very clearly known. So, what question comes that with all these raising issues the biological sciences can approach side bias as a topic to answer several such questions.

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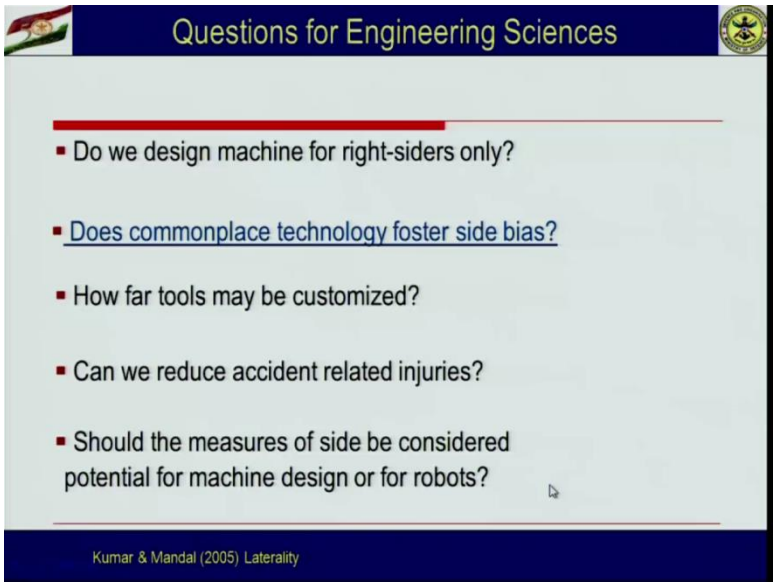

We have some questions for engineering sciences as well. For example, do we design machine for right-siders only? We know that ten percent of the people in this world are left sided, left handed, but all machines are generally created for right handed. For example, the mouse of a computer is meant for a right sider. The scissor is created or manufactured only for the right-hander a left hander will never find it very easy to use a mouse or a scissor. So, the question comes for engineering sciences, do we design machine only for right sided people?

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Does common place technology foster side bias for example, if I show you some of the pictures you will find that a chair with right arm meant for writing, there is a space meant only for the right sided people or the right handed person. If the person is left hander will not be able to use the chair. A scissor for surgical purposes cannot be utilized by a left sided surgeon. A mouse is meant for the right handed people, it cannot be utilized by the left handed people. The door of a refrigerator is always opened for the benefit of the right handed people. A thread of a screw is meant for only right sided people to push forward, it cannot be pushed forward with a driver by a left sided people. The camera the snapper is always the switch is always at the right hand is never at the left sided. So, the left handed people can never make use of it.

So, the question come with all these gadgets available in the world meant only for right fit people, what is the engineering challenges that we have for those tools which should be meant for both sided people or at least create some such machines which are condusive to the requirement of the left handed people. How far these tools may be customized that is also a very important issues. Like in a aeroplane, if we have a left handed pilot to what extent we can design a cock pit for the benefit of the left handed pilot. How can you reduce the accident related injuries for people who are otherwise left sided, but been forced to become right sided to accommodate the right fit world, that is a big question for all of us. And we all know by developing actipicality by developing clumsiness, we actually enhance the chance of accident.

Likewise should the measures of side bias be considered as potential for design of machine or even for robots. Robots are being created keeping human as symmetry or human functional side bias into consideration, no. Or should we design the machine keeping the the human side bias inherent as an inherent potential into this system. So, all these questions that I have raised for engineering sciences, a mechanical challenge a challenge for deferent devices which will be using on a regular day today basis. So, we have questions for evolutionary sciences, we have questions for social sciences, we have questions for biological sciences, we have questions for engineering sciences.

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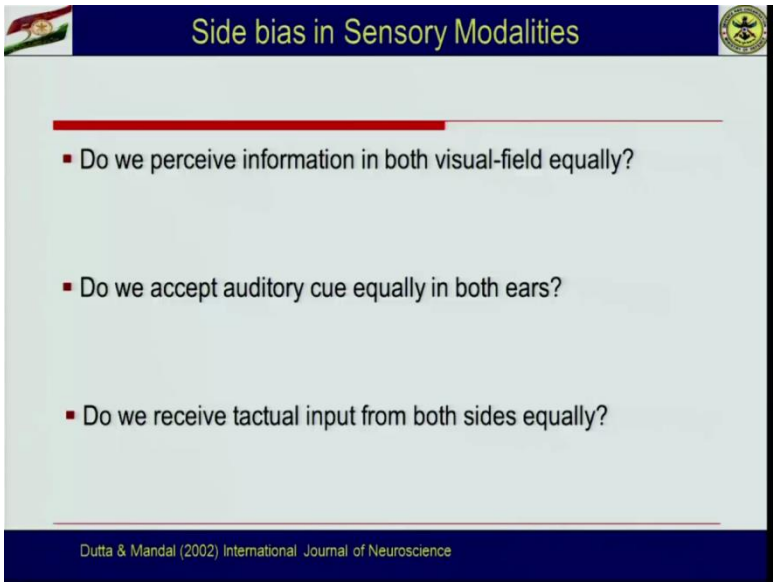

Using this same concept of human side bias how can we explain them we find that there are side bias in sensory modalities. We know that we do not perceive information from both visual fielding equally the we have a tendency to look towards the left side more often as compare to the right side because the left side terminates is found more for processing an image. But the right side is terminant for processing any lexical stimulus these gets confused with the idea when we have got a scanning bias of reading things from left to right likewise do accept auditory cue equally by both ears. No, probably the hemispheric cerebral hemispheric functional asymmetry also come into picture when we get the auditory queue like a visual queue also. Do we receive tactual input from both sides equally the two sides of the tactually get input, but do interpret them equally, no there is always a difference.

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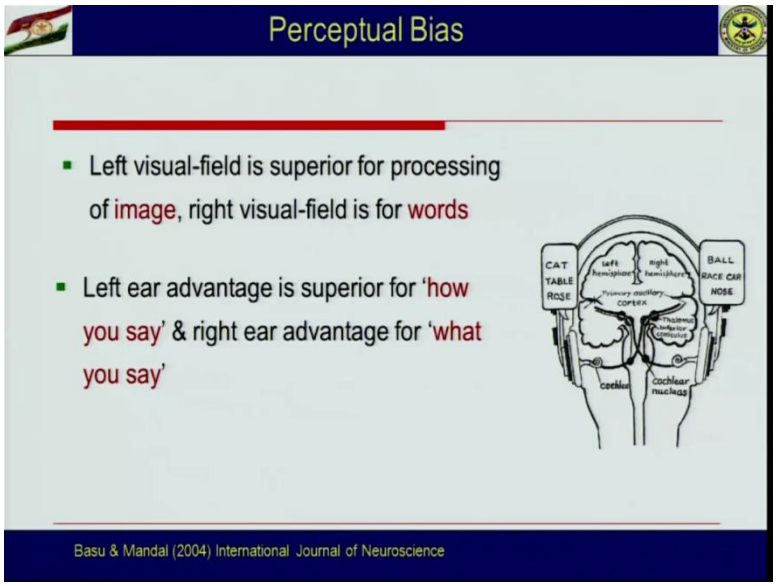

So, there is the perceptual bias. Let me explain how this perceptual bias is same. We found that left visual field is superior processing image, where the right visual field is superior for processing words. We know that what processing is better done by the left side of the brain and the right side of the brain is better for processing image. So, when we refer about left visual field, it is actually dominated by the right side of the brain. And when we refer about lexical processing or words, we know that the other side of the left side of the brain gets dominant, and the right visual field which is a contra lateral connectivity towards the percept gets effected dominance. So, perceptual bias is inherently within our system in the visual field itself.

Likewise, we have a dominant ear bias artery bias also within the system. The left ear advantage is always superior for understanding how you say, whereas the right ear advantage is always found what you say. So, the content is better understood through the right ear and the context is better understood through the left ear. And left ear has a connectivity contra lateral you at the right side of the brain which gives a better visuospacial information and a contextual information. Whereas the right ear advantage is far more in the understanding of the content which is the lexical processing and better done by the left side of the brain which is contra laterally connected with the right ear.

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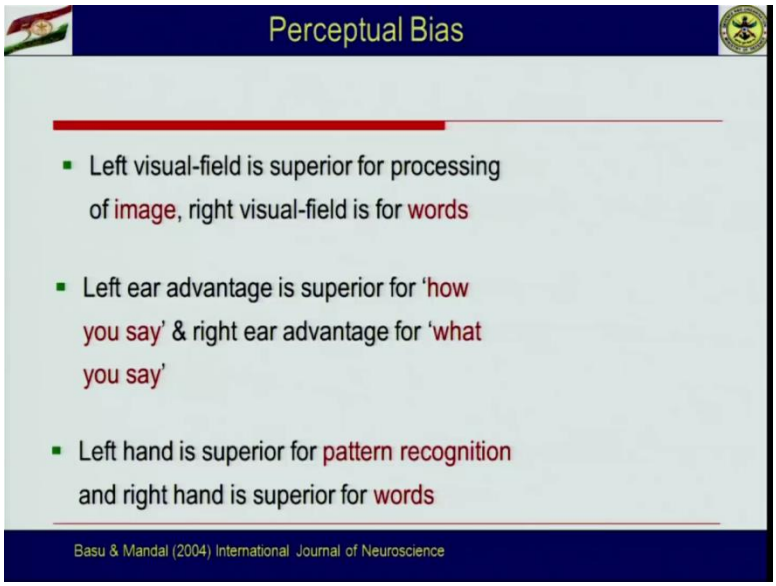

Likewise, left hand is found to be superior with the pattern reorganization which is contra latterly connected with the right side of the brain, and the right hand is found to be superior for the processing of the words which is contra laterally connected with the left side of the brain. So, if we understand their perceptual bias, we will find that the visual processing, the auditory processing, and the tactual processing are somewhat organized contra laterally with the two sides of the brain.

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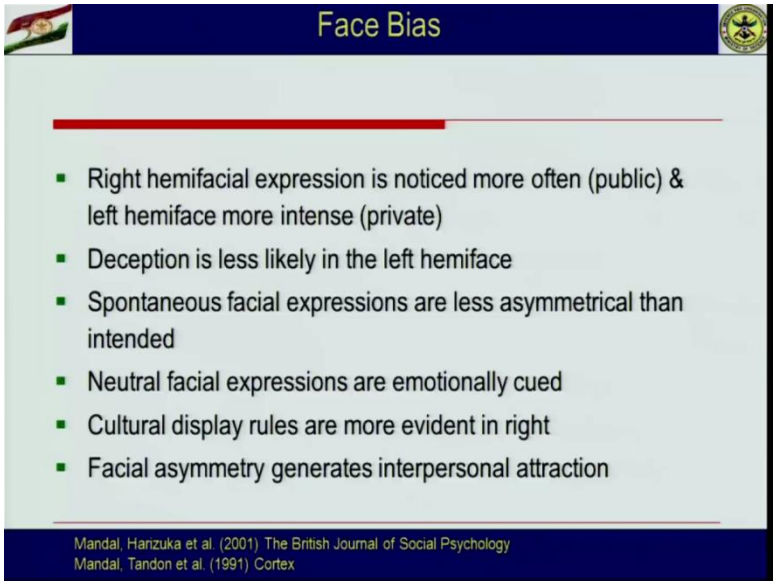

Likewise, we have got a bias in the face, and face expression also. We have found that the right side of the face is more public as compare to the left side which is more intense or private. That is when we express a face and if we vertically organize or try to dissect a facial expression, we will find that the right side can be controlled more often by the left side of the brain motorically, and which is ah more often seen in any public viewing as compare to the left hemi face which is more private and not more often noticed by any one local. So, we term them as more private as compare to more public. So, there is a clear difference in the expression between the two sides of the face the right side of the face and the left side of the face, there is a clear bias.

Likewise we have found that deception in facial expression is less slightly in the left hemiface that is the control in your left semiface is much less as your control on the right semiface. Therefore people fail to make any kind of deception in the left hemiface as compared to the right hemiface. So, deception detection vary easily if we can create a composite of left left hemi face.

We have also seen that this spontaneous expressions are less asymmetrical as in comparison to those as intended therefore, whenever there is a deception there is a difference between of the two sides of the face. But if the expression is too spontaneous, it is generally found to be less asymmetrical that is more symmetrical as compare to the one which is gama flaced or displayed according to certain rule, it may be intensified, it may be de intensified, it may be neutralized, it may be masked under all such conditions of display root, it has been found that the lactum is placed is less lateralized. I mean likely to be controlled as compared to the right side of the face

We have also found that even the neutral facial expressions are emotionally cued, because we often with our embedded experiences of emotion in face the musculature get a permanent marking in the face. And we have found that even with the neutral faces, if we create a heavy face composite with the left left composite, and the right right composite using the same facial expression of neutral or resting state. The left semi hemiface is found to be more emotionally conclude as compare to the right one, because there is always some kind of permanent marking flows and squints found available in consonance with the personality pattern of the person. So, in one of the studies, we have found that if we create a facial composite with neutral faces and then create a left left

composite and a right right composite, the left left composite is found to be more congruent with the personality predisposition of the person.

The cultural display roles are also found to be more evident in the right side of the face, because we can control the right side of the face more often motorically by having a voluntary control with the left side of the brain. That is what we have mentioned that the right side of the face which is controlled by the left side of the brain display better culturally sensitive practices as compare to the left side of the face, which is controlled by the right side of the brain. And also we have found that by having facial asymmetry we generate great interpersonal attractions. So, most of the attraction studies have found where there is a greater degree of morphological facial asymmetry which create some kind of interpersonal interaction.

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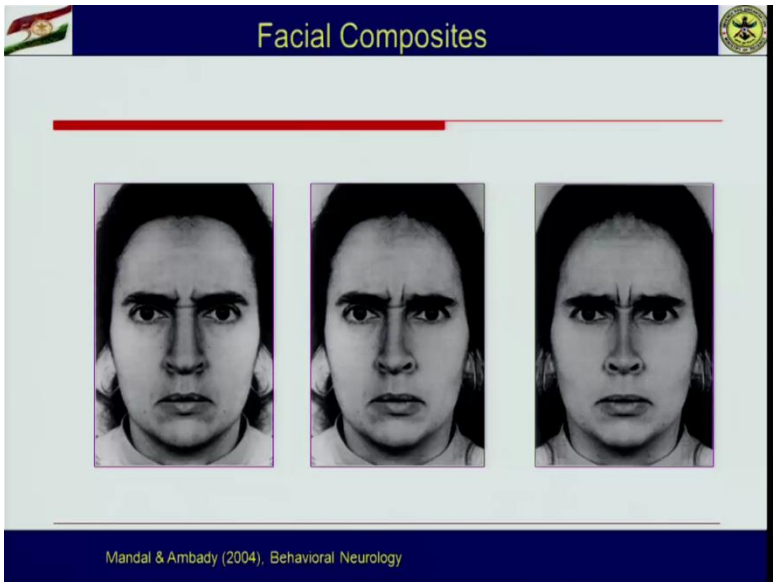

So, we have photographs drawn from various sources in particular these studies done with the photograph developed by (( )) and he is associates. We have found that by developing composites of the same facial expression there are differences in the expression. In fact, the middle photograph out of the three are the original expression, and then we have created left left composite and right right composite. The left left composite is on the extreme right side, and the right right composites on the extreme left side. And you will find that there is a clear difference between the left left composite and the right right composite of the facial expression.

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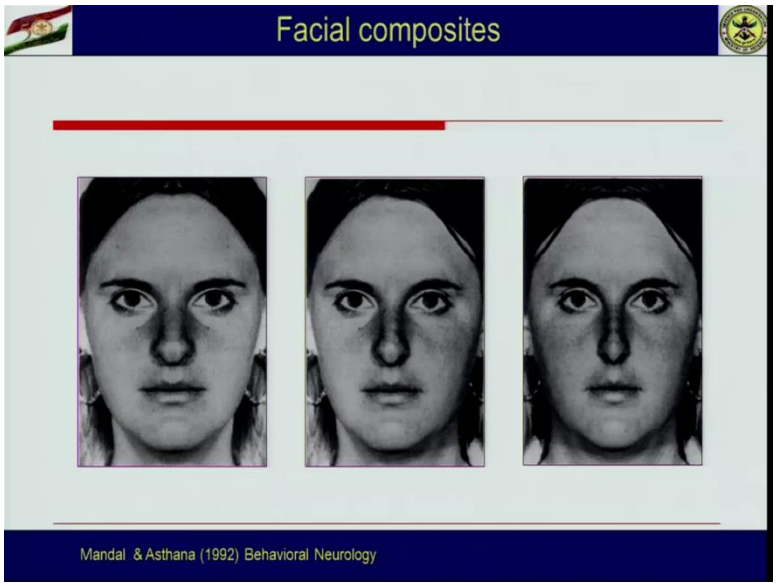

Even in neutral expressions, as I have said that they are often cued. We have found that the middle photograph, which is the original photograph by having a left left composite and a right right composite, there are differences in the expression. And the expression themselves with facial furrows and squins and other musculated changes, it is evident that the left left face becomes more interpersonally cued as compare to the right right faces.

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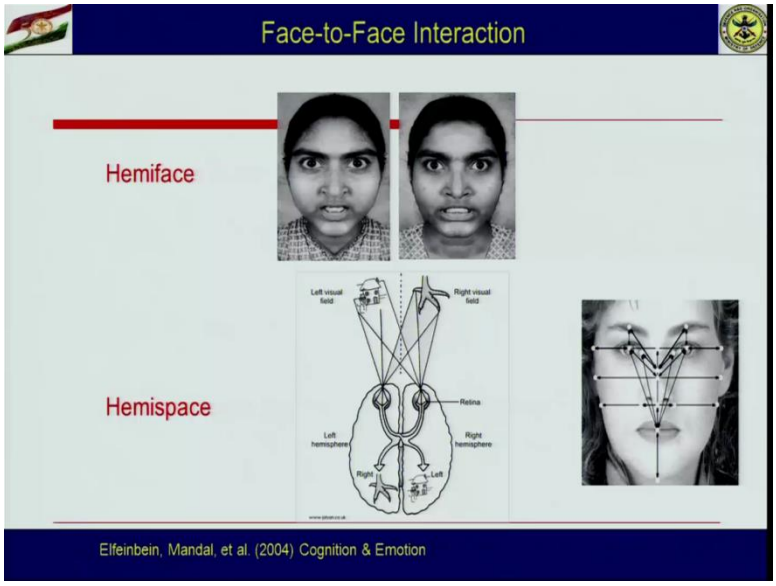

We have also found that when we interact in a face to face condition, the biases in the hemiface and the biases in the hemispace also creates a very good interaction. As I said that the right side of the face is a more public face as dictated by Wolf in nineteen forties has gain lot of support from later experimental studies. Wolf suggest that the right side of the face is more public and the left side of the face is more private why is it so, because our left visual field is dominant always for any kind of image processing in including face. So, whenever we look at a face, we look at the right side of the face of the person whom we are looking which is better controlled by the person through the manipulation of the left hemisphere motoric control.

Therefore all forms of social display rules come in the right side of the face, and we also have a tendency to look at the right side of the face as our left visual field is dominant. By doing that we developed civilization process, we intend to filter those information with the person is interested in displaying rather than what expression the person thus have in its private life, which is dominant which is expressed better in the left left side of the face. So, left left side is governed more by the right side of the brain which is more emotional brain. So, in our face to face interaction that is the interaction of hemi space and hemi face, we have found that we have a tendency to look at with a bias at the left side of the visual field which falls the on lookers right side of the face. The interaction of hemiface and hemispace tells better that how this civilization starts with the understanding and filtering of the emotional cues that a person is displays and the person understanding through perceptual biases.

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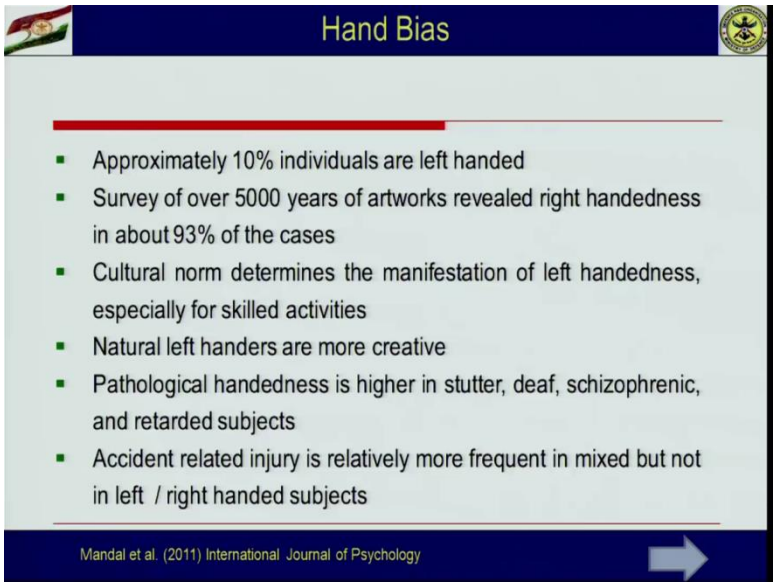

Likewise, we have got hand biases as well. We have found that approximately ten percent of the individuals are left handed. When a survey was done and study was reported in science over 5000 periods of artworks revealed that a right handedness is about ninety three percent of all the cases in last 5000 years. This study was published in one of the articles published in science, and it has been found that in almost every nut artworks that was through artifacts, rallies and other kind of materials in the last five thousand years the population which were found to be right handed are closed to ninety three percent. Even today we have got closed to seven to ten percent of the left handers in this population. So, hand bias is evident ever since this civilization don of the civilization.

We have also found that the cultural norm determines the manifestation of the left handedness especially for skilled activities. Some of these skilled activities are having cultural practices have got cultural norms. So, we continue to do it with right handedness and the manifestation of left handed always have got some kind of function social functions particularly in cultures in the eastern part of the world. We have also found that natural left handlers are more creative, we have also found that pathological handedness is higher in stutter, deaf, schizophrenic, and retarded disorders, but these practices these evidences are contradictory in one sense that in some literature it has been found that left handed are more creative. They are found to be more expressive, but at the same time

left handedness has been found to linked with some pathologies involving developmental disorders, schizophrenia and other kind diseases.

We have also found that accidental injuries relatively more frequent in makes, but not in left handed right handed subjects. Revealing or indicating that if a person is either left or right handed the accident frequency does not increase, but if the hand dominance is changes forcefully in the course of development then there is a chance that the people become mixed or close or clumsy. As a result of which there is a higher incident of accident under such conditions.

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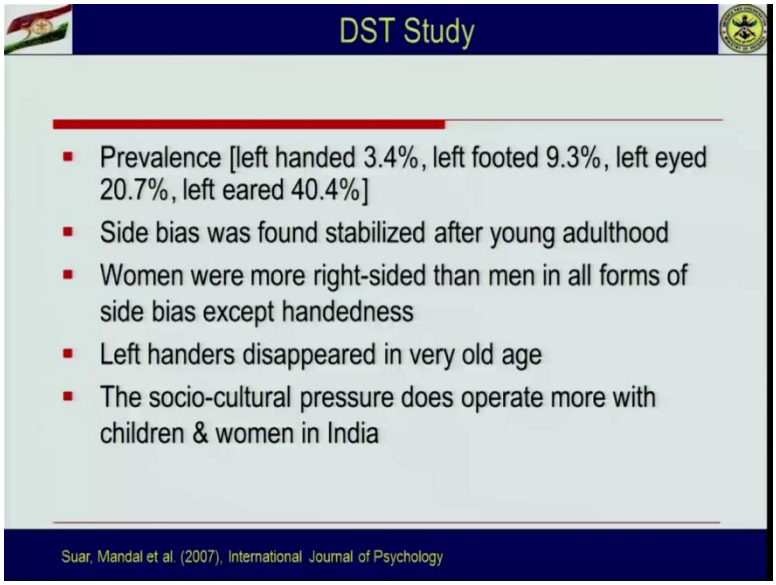

In one of our studies sponsored by department of science and technology, we have found that in India, we have left handed about three point four percent, while world statistics suggest that it is close to nine to ten percent. This is primarily because there are social functions against left hand use mostly we in India take food with right hand, do not use fork or spoons. Therefore, and left hand is always considered to be dirty in many ritual activities, we have been using right hand only. Therefore, cultural non-sense substance are more prevalent with the use of left hand, and it has been found that in women it is less as compare to man within average of three point four percent.

Left footed people are found to be hard work nine point three percent because there is no such social function it has to it. Left eyed people have to found close to twenty percent twenty one percent, and left eared people are found to be close to forty percent. So, the

prevalence suggest that where there is less of function there are more possibilities of having left sided bias as compared to the right sided bias. We have also found that side bias is sterilized of two young adulthood, after seventeen to eighteen years it is stabilized and it does not change. Women are more right sided than men in all forms up sided except handedness.

Left handers have been found to have disappeared in very old age, there are two hypothesis which are available in the literature. And these literature, these studies are conducted in Canada and US. There are two hypothesis has been proposed for this one is a elimination hypothesis and other is a modification hypothesis. The modification hypothesis suggest that since it is a right fit world, the left hand if forced to convert or modified their behavior to the suit the requirement of the right fit world. And the elimination hypothesis suggest that since the left hand respond is very difficult to survive in the right world, they are eliminating following some kind of accidents or some kind of disease or injuries. So, either by a elimination hypothesis or by modification hypothesis, we find that there are very left handed in the very old age, they are either modified or eliminated that is a hypothesis proposed, but this needs to be tested further because there is no strong evidence behind it.

Though in India, we also have found there are very few left hander after sixty five years of age. The socio cultural pressure also does operate more with the children and women in India less with men. In men, it has been found that though they are close to four percent of the left handers, when they go to western countries the percentage increases radically and it is close to ten percent. So, India studying in India or Indians staying in India are about four percent left handers, but Indian staying in America or other western countries the percentage is nearly doubled that is nonsense are far less. And in India also the children and women are more subjected to such social pressure, therefore the percentage is are much lower for the left handers in these countries.

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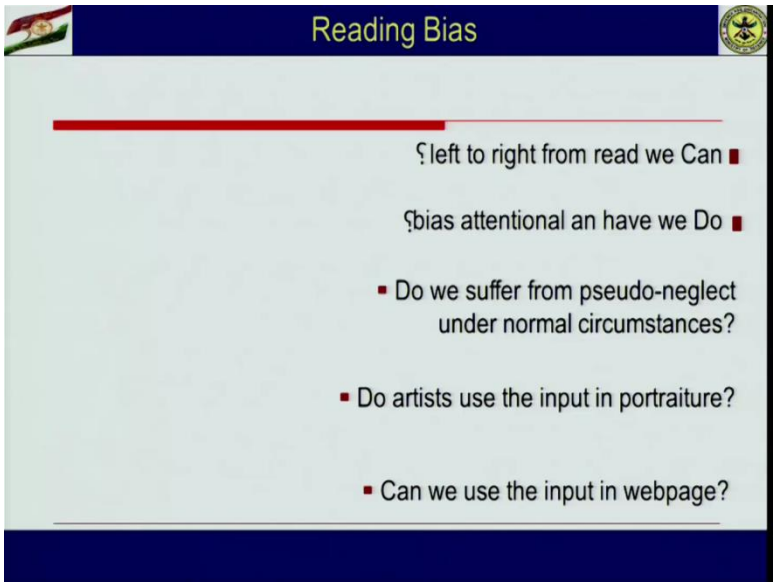

We also have got reading bias likewise, we have got hand bias, we have got face bias, we have got reading bias also we have a tendency to read everything from left to right because, we have a reading bias as well, but can we read things from right to left as well adduced would to speakers. Do we have a attentional bias also as a result of reading bias that is we read everything from left to right simply because of our reading bias. These are subject of studies. Do we suffer from pseudo neglect under normal circumstances that is if we are to read something from right to left do we suffer from some kind of pseudo neglect, there is also an area of study. Do artist used the input in portraiture that we have found. Artist often use in this study in the great pictures and Monalisa we have found artist often use this asymmetry in their portraiture also, but what does it imply needs to be studied further. Can we use the input in the webpage making as well. Say and question of in computer science as well that do use such kind of input when we frame or design architecture. We try to make it more understandable that can be able to understanding up human being.

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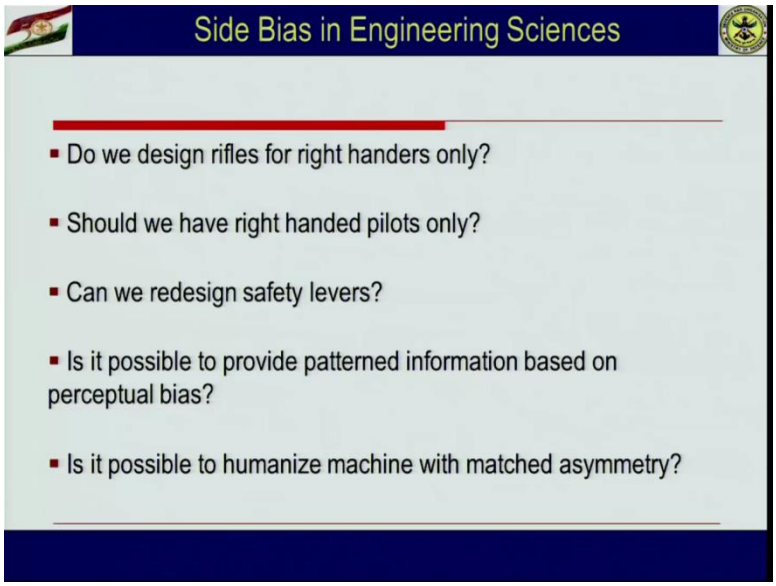

So, the question comes therefore, side bias in engineering sciences is a very important issues. For example, can we design rifles for right handers only, or we designing rifles for right handers only, can we do it for left handers as well? Because all rifles that we use if we use it I meant for right-hander, but if we use it with the left hand the front cartridge will come on the face of the person who is shooting. So, it requires altogether a different manufacturing design for making it useful for left hander, can we do that. Likewise should we have right handed pilots only, because if the cockpit design is meant for only right-handed pilots. What will happened to the left-handed pilots, and as we have already noticed that the left handed pilots are if not better than right handed are equally potential as compared to the right handed pilots, but are they in the natural disadvantage.

Likewise can we redesign the safety levers all safety levers in all for example, locomotive levers locomotive engines are at the right side. But if we have a driver locomotive with a left hander he would never be able reach that can we redesign it based on the requirements of the human capabilities. Is it possible to provide patterned information based on perceptual bias? As we know we read most of the things from left to right here is the standing bias of image processing from left side to right side, can we take this input in order to design our safety practices in the road? Likewise it is possible to humanize mission with the matched asymmetry. We know that side bias is part of our system is part of our functional system therefore, is it possible to humanize a robot or a machine with the concept of the side bias? This is the question for engineering sciences.

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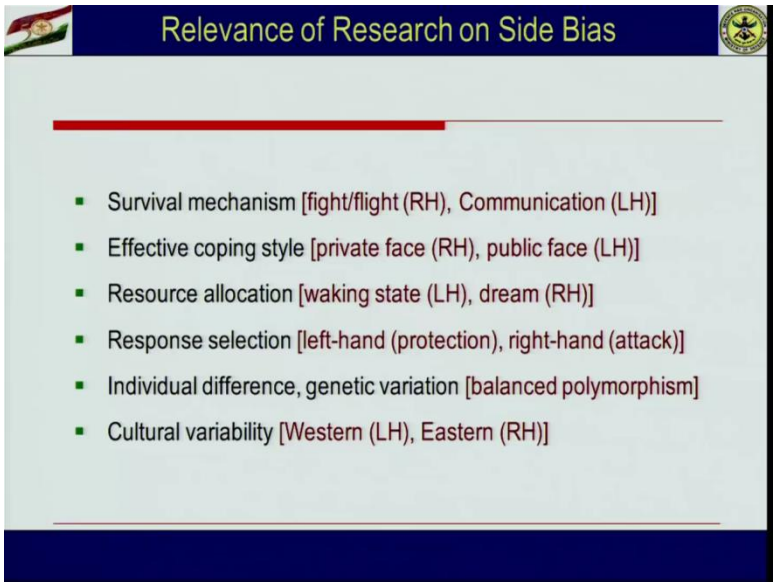

Finally, such kind of research has got great relevance on all kinds of sciences as I had mentioned. Survival mechanism for example, we have found that fight and flight as well as communication pattern is based on the side bias practices that is the right hemisphere is used most for fight and flight the communication is done more by the left hemisphere. So, survival mechanism is based on some kind of hemispheric differences or some from upside bias. Likewise, effective coping style as I said private faces more dominated in the right hemisphere, which is portrayed through the left face. Likewise public face is more in the left hemisphere, which is expressed through the right side of the face, effective coping style also depends on some form upside bias.

Resource allocation is also dominated by some kind of outside bias in the waking state left hemisphere is more dominant. In the dream state, right hemisphere becomes more dominant. So, not only in the waking and dream state all forms of resource allocation in the body are also done by some form of side bias. Response selection is also very important. The left hand is always used for protection. Is it possible to understand why we we fight with the right hand and protect with everything with left hand. So, protection and attack mechanism, the response selection is very clear defined in our coping style. So, that is also part of one of the very interesting evolutionary answer questions for the answers why we are so?

Individual difference in genetic variations are also an area of the study with side bias that we need to study and finally, the cultural variability the the left hemisphere is more dominant found to be in western population. Whereas as compared to the western population somewhat higher level of right dominance is found in eastern population some such studies have been published. So, the culture variability is also evident in the side bias. Put together the relevance of research in side biasing all forms of like in all forms behavior can be studied using social sciences paradigms, using biological sciences paradigms, using evolutionary sciences paradigms and using engineering sciences paradigms. This gives a new set of question for which we have got answers to bring.

Thank you so much.