**Selected Topics in Psychology**
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**Lecture – 23**
**Functional MRI in Psychology**

Person 1: Sir, when it comes to do you ((Refer Time: 00:19)) what are the difficulty when it come to devoted variables that you take into account.

Professor: So, I did not mention something here, I was discussing with that permission about using the resting state of MRI. They did not touch actually here. Now this question became relevant because you need to surprise the girl who discovered resting state was an Indian, Bharath Deshwan and that was been a topic. And in just will do the paradigm, without doing any paradigm just do take on, on-off, on-off like that any those primary design because children difficult to train them, to especially doing difficult paradigms. ((Refer Time: 01:10)) they may do, they may still do, but getting the memory and getting into emotion getting into all the paradigm, they know, they do not cooperate with you.

When it comes to smaller children like children who needs a decision to make the machine how do you do this. So, that is where the new methodology what is called the functional connectivity MRI or resting state of MRI became available about seven-eight years back. We have a large data available with that is VGI, I think you do not have test it, because we are busy so many things which we are having you know beside our clinical responsibilities. But this is one area which can really take care of your needs you do not to design paradigms actually you can look at a domain what you are expecting and you can do a connectivity base for domains surface connectivity functional connectivity and connecting the detail (( )) that have become the.

The new thing last we have number of peoples come connecting the d t I with the network connectivity. So, that is what I become very very important today and I think we need to work on a data, so go back to I think next month whatever I start working on the data. So, we huge data line with us, because every patient was going to the machine where doing the resting state of (( )) and it is some subjects. We have a huge data of the some policy detail especially your data is available of them and we had a lot of work on this and we have looked into this. So, children in the difficult proposition to work with,

they have to understand what we are doing and the best we do is do a resting state with them and that is the only we need to do that the reason is I always believe that your all trading them anything and you are getting a domains to all the connectivity which is a natural connectivity of the brain.

Even in like, there are example people in like deep coma. In a deep coma, if you look at the argued data from the brain dead machine actually, I will get look at data is I have three patient who are brain dead, only a brain dead where are go to the functional convenient I know. The all connectivity just note down or just that spheres that is the proof actually we do not have permission actually you do not have look at the data.

Person 2: If it is a fantastic data that you have.

Professor: I would that is I am saying we have the huge boss that lot of in term much time and he was busy, we are busy to that is things, but we have look at the data actually. In the next, if you are interested, I can give the data you look at this with that actually and there is a huge strength we have with us that the that big data you know. We have the conformation that is by a low flow in the brain and there are ways to conform that and the where will done actually. So, you can actually see how the comatose patient, we go to comatose of patient data also grade three, grade two, grade one, grade four. So, you can see how the arousal and brains arousal that is important for the connectivity.

So, I am sure, if you are interested we can giving the data to look at and let that lot of spend some time is it and may for few things status over the thing which we have done and then you can move from there. So, unfortunately my data which we have already I have look at the all the data of course, a critical responsibility are so many you know the most of the time we are working with the patient and whatever time we get we look at the science that is we have.

Person 3: Sir I have a question regarding this there was be out of high (( ))) is called no so saying that using FMRI we can actually detect whether a person is lying or not (( )).

Professor: See I always believe that you cannot force a brain think what do you want to think right. What are paradigm we generate, and paradigm you are training the guy you know to to think those thing to do those things that is why the resting state became the reality. You are not training for anything, you are not doing anything, you are looking at

the domains and checking all the domain. So, I am not sure it to really true whatever you may still told to do x paradigms where you think y paradigm in the machine, I am control of that. And even when you are lying quit restriction paradigm, see if the another interesting I will tell you about the FMRI is then whenever doing the resting state or otherwise like the motor function and all.

In lot of activity coming in the brain, because eyes you are seeing through the eyes you see lot of activities in the (( ))). Even in the resting state, if you close the eyes and open the eyes there is the difference in the connectivity. So, whether you like it or not, you see things yourself, you do it what you are doing and that really you reflected in the brain and bride a functioning right what are you doing. So, I am not sure what are the population is all truth you know and you have to take in (( )).

Person 3: (( )) how can we use FMRI for natural restrict models, for example people actually have to be expose to rare situations for example, say driving, piloting the aircrafts and so on. If you do own to understand in (( ))…

Professor: Yeah that is a good question, because I happen to know somebody who are working on you know how to find out somebody is external pro node you know it in contest we (( )). A lot of patient function they have nerve dysfunctions in the brain condition, because and the biggest problem with them is how do assure they are save drivers or not. So, designed a paradigm in which the guy actually sees on the you know apparent on the make believe or virtual, you know car, I will start driving the car. So, you can create a virtual situations you know like a pilot driving aircraft or suddenly some dark comes you know like you must be saying if you go to like this is a rasanjale srinivasa studio and you look at the 3 D seen, you actually feel your you are going hit somebody you know I was scared actually. So, you can create some simulators by which you can actually create situations on the console and that is possible within the machine.

Otherwise machine cannot go in this guy to do the something you know. So, that is way to create a paradigm and that I learn from that guy who where is either in my clinic who develop methodology to find out that how you can be extent problem and why not. I just simulations where virtual methods of doing things only.

Person 3: Sir is there any technique available we leave out FMRI, where we do not have to use these original systems and the person is actually looking to the real situations, (( )).

Professor: See I told you in the beginning there are three methods one is the emerging method eco dynamic method. Second one is the nervasation method. You can do a electric photography EG, you can take a small m e g's and check that that is the only way you can look at the function to brain is outside, otherwise you need a magnate you need the whole side of things to see the hemodynamic change. It does not have a resolution, a special resolution; it has a very excellent observation. So, and there was a way people have done that actually, you know something new people are done all kind of situations where they can put a electrodes, and check for the you know brain activity during the like you know lowing that lie dictator announcing with the use.

So, their use all these l e g real kind of halt rate the set of physiology are using to reject those things that you can do any where for their you do not you the very high the infrastructure, but for this kind of methodology you need a hardware which cannot go to the real situations.

Person 3: You do not explain actual under line structures.

Professor: No that is that is I am saying. So, this is like making believe and that is real believing it. I always believe, there once you train a guy that is why I say see well you well you do imaging the brain I see the actual brain. Whether you training a lot the brain is rate right, they receive the structure that tracks of the brain I can see the tracks of the brain myself you do not change the title brain what are you. The same way when the guy is lying quietly inside the machine whatever seeing if you do not want to seeing that gets reflected into the network. So, that is why I call it this is the objectives as well to the brain, this is the subjective assessment of brain.

I got and whatever you see if even talked you, you may not listen to me, you may somewhere else. So, everybody have the attention as pile right, it varies some x to y timing, but it is something which is not really you know constant. So many times, when I am talking somebody, something my brain brain goes somewhere easing some to listing to him and I am somewhere else. So, this thing have all the time is all of us. So, to say that you are attended what I am saying how I connecting the what I am say into do your

doing that think of a women, think of a kid, think of a something God, think of a devil. So, it depends what you say you know, but actual thinking I do not want to the actual thing yes, so that is the biggest issue with the with the FRMI.

The real application paradigms and then I told you about that getting use to paradigm. The paradigm you know that because an another issue that is why in a very big way the rest instate if becoming a very very popular method today. I think the last five years, we read the paper rest in state FRMI, where a huge number of because it is no objectivity, no subjectivity all objectivity. How you analyze the data that become now the analytical tool become like person author will give somebody as will be that will becomes most important part, there is subjectivity. So, that is a way one has to move in the functional MRI, improvement resolution and improvement non a connectivity.

In fact, there is a big run which is being run in US in a lot of money even pumped in by Obama is the collect term project. And the connect term project is nothing but connecting the function and wires in the way, functional structural connectivity. This is all this if this resting state and this (( )) or DSI, there over it is getting and the FC. Note the bold of MRI, FCMEI, that become an important. We saw what four years back when FCMI, but we do not publishing anything, we know didn't anything very exciting area you know, though involved observation. Like you do in which they seem which is the same way, you see the function and and see how the connected the wires like a fibers why would the fibers. And with the DSI, you will go into the sub quardical fibres. The relation is so high, if a spectrum emerging DSI.

Person 3: I wanted to ask you something. Are you made the statement that when you take a subject and putting into a simulator, basically there is a great degree of a (( )) effect, something that usually in be (( )) studies one would like to get rid of. Say colleges to would like to have unconditioned, and a virtuated type of a response, considering that find it is a true response, but in a real medical practice, you would have a patients who you cannot ask to know undergo situation in phenomena in simulator. So, can one construe it that if you have certain type of psychological functions, cognitive functions which are derived out of patient population research that would be much more know objective compared to where you have the normal participants who are send to simulators and then introduced to MRI.

Professor: No, I totally agree with you on this, because I give an example. If I perform the same test as a volunteer two time or three times, I know what I am doing. It is a teaching a psychology and you know what about the that I know about that that never perform the same test again for a week at least let them forget what where the did you know like a just suppose for a small children. Children they are very smart, they quickly pickup, once you pickup then they can tell you without you telling the many thing. So, that is a big big problem with all of us you know when we see that I am you know and try to get different kind of process to was a same paradigm. So, that they do not have the reputation of things you know there are other method using the number connection test or the figure connection test.

So, once somebody know want to chief all the play, they just it was a that quickly in finishing connect the whole thing. For first time on what it does especially disease is a real life situation, I will do it every day, we do you like a lot. But once you will give one person three times, the same person with diseased, you will do better next time I am telling you. You all do that and most you understand you also know way how to come to the room first I will take five minutes second on three two minutes and next on together with the is what you called habituation fact, learning fact or whatever you know is a that is there.

So, same thing happens in that is why I stress on this a resting state, and look at they have look at their own domains, since what it is resting state. Then a more meaning from then actually doing the true bold a meaning that is old now only is we will looking the differencing on because the no limitations you know, into no a limitation about a technique is more important than knowing the usefulness, so that we know technique. That is makes a more allow to about what is already keep writing the crap the same crap again again with have good for the science.

Person 3: Also in terms of say with respect to pain sensitivity, the physiologically direct pain verses by motional a perusal of the pain. There are now in all religious practices you have certain type of believe based practice, which forces you to inflect pain on yourself. Say one religious community,

Professor: Moharam

Person 3: Moharam example

Professor: In the walking in fire, walking in fire what even fire when I see because every day you know the TV is something is coming.

Person : I was looking at one television episode where I note a person had multiple cuts, it was knife cut throughout is body, it was bleeding, I am, but then may because somebody it had convinced him that this is what I know this is every cut your since are also been they remove out. So, with multiple cuts the man is still was no without severe pain.

Professor: So, I give you simple example a guy who comes to the village he those to pain, because he is use to some pain. And the secondary he is told in the brain like if the same person then you more also look fire for religious purpose. And he rouse in a love must is it that the difference, because he is conditioned the brain is conditioned that this is important for you, this is good for you, I must do it, I must do it and the same when you would not do it. So, the brain conditioning has a lot of effect on the first standard is the brain also. So, that is why always try to see a un condition brain note condition the brain that is why you look at.

Person 3: And there is also an interesting the whole set of neuropsychological test batteries, there happens to be a fantastic test in terms of capturing the overall cognitive state of individual, in terms of how x type of a cognitive function is being performed. I was once just going through the details of how this test actually got about and the best part of it was that there were a set of know items usually the way psychological tests are design, but then for all of them MRI was done. Usually the standard way the way psychologies would use it that you have a set of performs activities and then you run factor analysis, and then on the based on the hygiene value and the factor low cross low you drop the items. This is the standard way that is surviving all that was the fantastic way where it was not basically the statistical properties, but it was rather the magnetic resonance and many many items got deleted. Many things have to be evolve and he red in the historical incidents know, how it finally, the final version came forward with multiple revisions that it was primarily outcome of that MRI, which decided a whether a particular item should be retain in the test or not.

Professor: The more objective.

Person 3: More objective and that is the reason why in still in many clinics where they have psychologist in the neurosurgery.

Professor: Yeah yeah sure.

Person 3: Departments there know the use this very test, because the now let find this is a well validated test. So, there no need for m r i's right now to be performed you just have a few selective test with outcome and you know that find this is how the thing is working before surgery of course, you will have this.

So, good thing happen to psychology use that MRI objective wise whole thing with that I will say with all the limitations them I have talked about I am not trying to criticize too much of technology also, but technology still evolving one has to evolve a technology you cannot be at the same, but you still know you have to move forward that what we are getting there is what we have to do actually I cannot still do about when I would resting state the correct term is a correcting function and structure wiring color functions you know you have the function in brain, but they would not block you know the function right the guy find what is they find some ordinary roots of coming you know you call it as accessory area secondary area on the brain or territory area on the brain function something like that it calls you know.

It all come because of this thing only and I think this is going to be the future of collective is going to be future for understanding made for a in fact, I am planning to ride a grant, where I will low or note to work also if you can put the grant specially mutual contact which I will talk to tomorrow you know which is addressing where it is and then we can connect the real you know structure in function to understand why it is happening.

Sir, I have a question when you talking about clinic population, it is we have at least who have simply intellectual disciplinity you see mental with the retardation or any suppose you know you interested in particular para dynamically para dimensist to see how they match. So, match in task right sir is it a good idea to take in the visuals to who can a good cannot match and too have the same disability disability to compare with in the…

Oh, you show here.

Or take one look that has the disability in compare to the normal normals, of course the individual autism; obviously, they brain is compromising for any other right and within that you have five function no function one this is able to perform the other group is not able to perform. So, when you are try to compare is to be the idea to compare between the disability group or take a children who have this mentally retardation autism and see how they perform in relation to children who normal. So, which in better paradise see it is a question of what kind of population you are you are handling if you are power analysis conceive you have the numbers in each group there is subgroup you will see that is important I will shown you example tomorrow where I am take a children several policy with low I q with normal I q and compare the aggression with the detail how the figure different like you know how you know how I q effects the technography and the functionality. So, it is always good to have sub groups if possible the numbers along to take do not take numbers.

It is a giving a false impression they should be statistically a viable you know. in terms of power analysis in terms of justification numbers you taken there should it one out with that gives you better understanding of the whole analysis, if you know sub grouping is always good otherwise you have the numbers.

My can be the suggestion any you can having project in which our just be work with those implies to take a individuals data and put it on the, but then into the template with the other things. So, like how these are connectivity's. So, coming we make it a little functional brain let us say. So, so we have the associated the images which we make the, because only volume and then we have the tracks we have the areas we known little bit of out their functionalities. So, whatever the reason we code all that and then make it a kinds of functional software and then what you will be expect in psychology. So, this area will be activated why it will be activated what you will you are doing what is the purple that how does it interact with the psychological recur.

Some all this things or put as associated properties and what is known. So, those things are known. So, then I know that if I activate to here then it has a relation with these things. So, much is normal and then is there a you would have some air normal reaction or there is something extra and that what is normal how much should be a normal correlation etcetera. So, all this could be adopted by making a model and then I may just like you are having simulators. So, here then for emotions you know what are the kind of

actions which will take place is it not? We can we can code those and then along. So, no this becomes our setup instead of just reattempt here.

No, I agree c two begin with your start some here, but you can create a number one like I given example, but I is basically if you are larger now first of all what is normal there question is always now after giving the last couple of year saying that I am not sure, we are all normal's we are abnormal is somewhere or the other to define normality if it is within the like sixty six percent or like or like thirty three percent I do not know how to and which were which respect we are six sixty percent which we are 33 percent we do not know. So, there is only issue which are always debate in memory in that why are you why I am normal and where this guy in the not normal you know that is a question if you the same to individual sink, and you can question yourself you know and you goes the seeing that you need discussion when you have had a discussion your friend or your colleague though this guy is not normally is normal. So, to define normality is a big issue by itself you know. So, I do not understand you know how to define the normality is a bio chemical non validity you are function normality of logical normality.

So, I need to once and say discussion it is a it is a big question can be divided at any length of the problem, but what you have suggestion it is a good suggestion, but it needs lot of effort and dedicated groups work on this and definite compound with the I always believing the we publish people under note is part of the people where we shown that the indian brain development generally the brain development in the in the in the child in you tube it follow different pattern then what American satisfiability we publish that we stole the astrology and d t r and when I showed that to the devidty they were amazed this one nobody done this. So, we do not know we always compare with the western world our gold standard the west no toss I think you and machello discuss number of times regarding you know the same paradigm or psychological collide paradigm used in eastern u p the same paradigm used in Orissa.

The same as you remain and you can you cannot generalized the paradigm used in x part of the country even in the country in the y part of the country, because their local dialects the way they perceive thinks the different in Delhi to different in gurgon it is different as we have seen now and in the UP Lucknow, it is different in Guwahati it was different. So, one has to create or the view had discussed at length a number of times how do create our own paradigms based on the local language the local understanding the local

dialects what is common to a people to a person in this part of the world may be the bird is the sparrow for this some of the bird is a parrot for some the bird is something else or you know what I mean. So, this is important. So, you have to generate your paradigm.

The local dialect the locally local understanding of the subject. So, I am continue always I have never seen the guy who is talking about Indian paradigm or the paradigm in our context paradigm relation to the x community or the y community, because even the community ways is different if it is same local dialect the factors was the mostly the practice from the christian the process seek the different they perceive different is same thing you know. So, we have never designed the ethnic difference of the you know in the perception was same thing and we tried put in anything in one way or the other you know there is not big issue with I think with needs to be addressed and it is not a it is not a simple issue in this lot of effort and all I think we and not discussed number of times this issue and we said of that is what somebody and.

Then somebody tell it that is all they never beyond when beyond that I think. So, it is a good thing to understand, but it is not easy to do it actually it gets a related to the ferro ground of an operator and a machine the same machine can be used differently by two operators and the two operators behave differently if the machine is different our psychology changes will be switch over from say tablet to desktop and if I use a tablet and a kid uses tablet the use is different. So, here when the brain the structure is similar what differences are made by you know how a person uses how how do I use my brain. So, then what are the effects of the say there is a patient or there is a person you are engaging it the psychology of the person.

I mean the earlier psychology how does that react with the current things whatever you are trying to know . So, this also comes into question. In fact, I can see your duty in what you are saying say like most of the construct in psychology in terms of quantification move majority of them are always not the concerned psychology who try to put it on a scheme. So, you have a variable degree now if I look at MRI data I find that say area x of the brain is right now litten, therefore, I can see that that this is area responsible for this task now we knew a variable in intensity is it that the same area is involved or is it that some corresponding area also gets involved. So, and most of our psychological processors cannot be completely compartmentally.

You know removed from associated functions like say if I am experiencing an emotion and if you are say looking at the intensity of my emotion by an emotion by default will have some commenting operational of the experience the feedback that I get from I am happy I express my happiness and if my surrounding is not appreciating my reflection of happiness I will I will calm done. So, there would be no emotion itself for example, even though I am mapping the intensity will be associated with several other functions. So, if I now put it into the model rate yourself seriously you know then perhaps some great things might come out that said which MRI research as of now showed at this area. So, there you find it now it is not only this, but other associated functions or variable intensity and more than the area it was usually at dissipated yes.

The one function relates to. So, many areas of brain I will show you tomorrow like you have not seen that baswathi has done the f s l analysis when we have tried to see which areas of the brain are showing a relation correlation with some other correlate correlative functions and all and you can see that actually you can actually see this is a structures you that is automatic that is a correlative and then you do an allow analysis you find it is correlation for same region. So, that we will that I think. So, you are one of the by the way there are. So, many the abstract to the all sign and we did not tell you that we do not know all these.

So, here that is one question what about s MRI with humans and s MRI with anyone.

So, there are plenty peoples are there…

So, because their psychology hopefully is not that complimented you know.

No people are do like this all this various models of the animal where they do different kind of correlation.

Test you know and they do it on MRI the number of peoples available.

So, does it…

Awake a asleep and all kind of things they do and all kind of things and ah.

See I think certain things say for example, motor activity for example.

Motor no issue.

Or say sleep eating behavior.

Yeah.

Sex behavior many behaviors you know which are common ah.

Repetitiveness.

Repetitiveness. So, many behavior this behavior you can still may comparison, but had cognitic functions.

To higher effect of the

Sir I need. So, have a ability question I try to put it as just as possible my question is about dynamic systems for example, the usual paradigm that we develop for measuring say memory if we are measuring some point of the memory for example, we are asking the person to recall about and when we recalls the word may be you can measure their entire process, but what about the entire dynamics from the time that is asked to recall it till the time that he actually recalls it not actually when we are entered dynamics system. So, that you cannot assess this paradigm because you do not have temporality we do look at the temporality we are looking at few seconds does not a few seconds saying what you have what you just now told me does not if few seconds I think see that is something which the resolution and.

The temporality both are lacking I mean this is just a very crude to begin as we say that then you feel something if you that be something is happening what is the real truths will know may be in the next avatar or something you know and it is my hit then that will utter you too at the other end of the stories we make Rajini get into that incredible, but certainly what you said is absolutely correct I mean I am with you on this what we are saying is not a real truth was something is being sad something is being done. And if you liably want what is you can understand today, and tomorrow same thing becomes you know like you know something which should go further that is how people make interest do new things develop new things and all.