

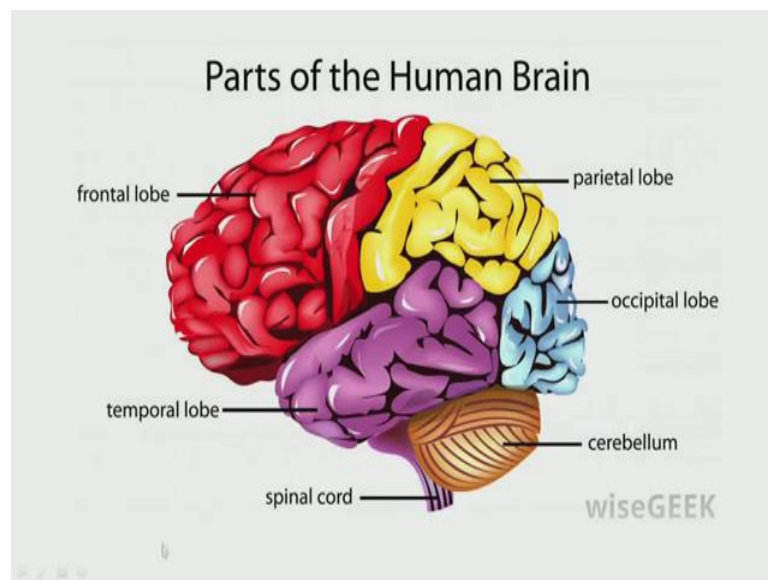
Language and Mind
Prof. Rajesh Kumar
Department of Humanities and Social Sciences
Indian Institute of Technology, Madras

Module – 02
Lecture - 09
Language in Mind

Today, we will look at Human Mind. We will try to understand, why is it that we put so much of emphasis on language and its relationship with human mind. This started long back; the relationship between these two basically is substantiated with certain areas in human mind as well. And somehow some people have claimed that certain area in human mind is designated to language.

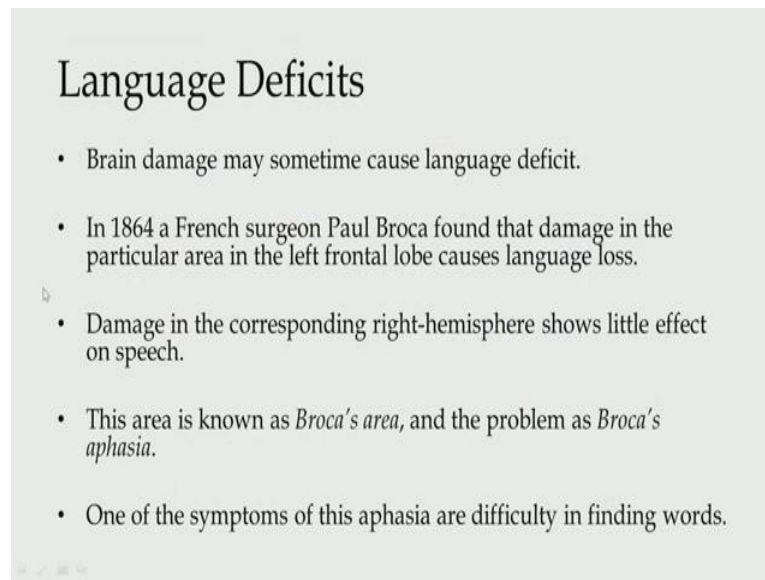
It was rather unfortunate such a discussion started with language impairment, with diagnosis of language impairment. And we will try to look at some examples of those things and will relate those examples with the role of human mind and which will lead us to understand human cognition as well.

(Refer Slide Time: 01:32)



So, what happened? Let us look at how human mind looks like. This is the picture of human mind. It indicates some of the parts of human brain and in this one in particular, I would like you to look at the frontal lobe, which is going to be discussed further. This frontal lobe is marked with red in this picture.

(Refer Slide Time: 02:09)



Language Deficits

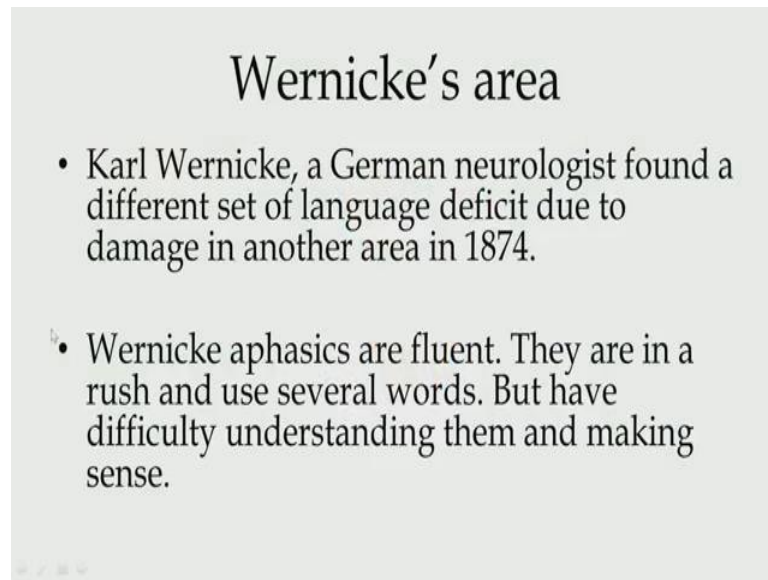
- Brain damage may sometime cause language deficit.
- In 1864 a French surgeon Paul Broca found that damage in the particular area in the left frontal lobe causes language loss.
- Damage in the corresponding right-hemisphere shows little effect on speech.
- This area is known as *Broca's area*, and the problem as *Broca's aphasia*.
- One of the symptoms of this aphasia are difficulty in finding words.

So, see, what has happened, so what happens in this. A discussion on this started with cases of brain damage; and when some cases lead to language deficit, it attracted attention of a French surgeon, Paul Broca in 1864. When he was looking at cases of brain damage and what he summarized and what he found that injury in a particular area in the left frontal lobe of brain causes language loss and some kind of disorder in language. This was very revolutionary and this is the beginning point. This is one of the points where people have started talking about a particular area of human mind, human brain designated to language. This damage was important, was also significant for people to look at. And particularly, why it attracted attention was because damage in the corresponding right hemisphere, shows almost no or very little effect on speech, which substantiated further that probably left frontal lobe is the area, which appears to be designated to language.

And we know this now as Broca's area, because Paul Broca looked at it for the first time, it is known as Broca's areas; and the disorder that Broca noticed is known as Broca's Aphasia. The term aphasia in common understanding, common terms, means language loss, language disorder. So, this problem is now known as Broca's Aphasia. One of the symptoms of Broca's Aphasics is the difficulty in understanding, difficulty in finding words.

They will be struggling with finding words they want to speak. There are lots of work done in this kind of disorder. I do not have any example ready here, but please pay attention to difficulty in finding words denotes Broca's Aphasia.

(Refer Slide Time: 05:11)



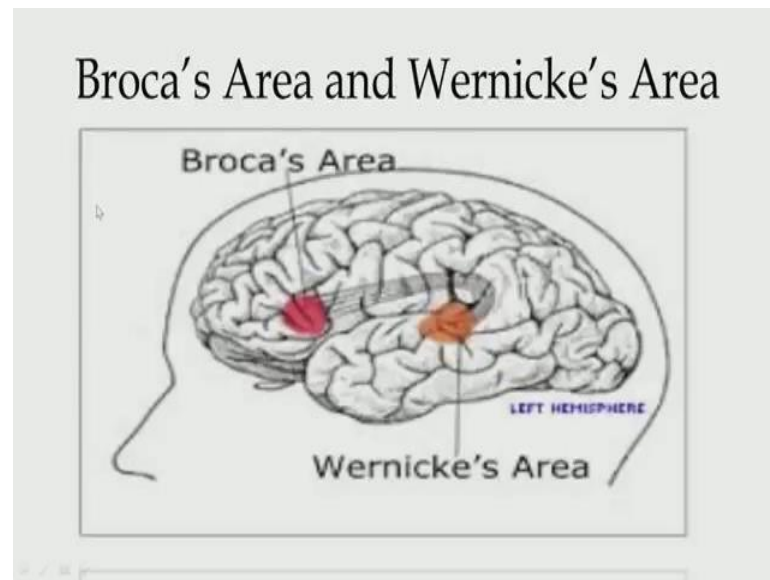
Wernicke's area

- Karl Wernicke, a German neurologist found a different set of language deficit due to damage in another area in 1874.
- Wernicke aphasics are fluent. They are in a rush and use several words. But have difficulty understanding them and making sense.

Little later, we see another development, a German neurologist, Karl Wernicke in 1874, finds something more related to this disorder, related to language disorder. And he found some more development and he talked about one more area. As a matter of coincidence, that area is also located in left frontal lobe and that area now is known as Wernicke's area.

The difference is Wernicke Aphasics are fluent; Wernicke Aphasics do not struggle for finding words. If at all anything, they are rather in a rush; they end up saying several words, but they have difficulty understanding those words and making sense of those words. So, the difficulty in making sense and difficulty in understanding is known as Wernicke's Aphasia; that is the difference between the two, Wernicke's Aphasia and Broca's Aphasia.

(Refer Slide Time: 06:30)



This is the picture, which indicates both areas in the frontal, left frontal lobe of human brain. They are marked Broca's areas is marked in red and Wernicke's area is marked in yellow. You can look at this area, look at these two areas to understand, why this left frontal lobe was designated as the area related to language. We would like to compare these two things, these two disorders; these two types of Aphasia little bit more in order to understand the difficulties with them, and finally see why these types of disorder are important for us to understand the role of human mind and understanding this area.

(Refer Slide Time: 07:46)

Broca's Area and Wernicke's Area

- Broca's area is adjacent to the area that controls motor movements of the vocal tract.
- Wernicke's area is near the area of brain involved in hearing.
- Wernicke's area stores auditory memories of words and Broca's area stores memories for how to pronounce them.
- Wernicke's aphasics can articulate but cannot understand whereas Broca's aphasics can understand but have difficulties articulating words.
- In 1970 it was found that Broca's aphasics have difficulty understanding too.

See, the idea is and this was suggested by Wernicke, that Broca's area is, it is adjacent to the area that controls motor movements of the vocal tract. However, Wernicke's area is near the area of brain involved in hearing. These things have lot more implications than we needed this time. But, we want you to understand the two areas and what is the difference between the two. These two areas, even after identifying area that is designated to language, we are talking about two of them; an internal division of these areas; one which is located near the parts that controls motor movements of vocal tract and the other that is responsible for, that is involved in hearing. So, naturally, so Wernicke's area stores auditory memories of words and Broca's areas stores memories for how to pronounce them. Wernicke's area is responsible for auditory control and Broca's areas for articulatory control.

Wernicke's Aphasics can articulate, but cannot understand, have difficulty in understanding. Wernicke's aphasics have absolutely no difficulty articulating. However, Broca's Aphasics can understand things, they have no difficulty in understanding. Well, at one point it was claimed that they did not have difficulty understanding; however, they had difficulty articulating words. Well, the difficulty in articulating words continues to be identified as Broca's Aphasia.

However, lot later in 1970, it was found that Broca's Aphasics have difficulty understanding too. So, these are the developments in the study of language disorder, Aphasia in the wider domain of psycholinguistics and neurolinguistics. We will restrict our discussion of these things in order to understand relationship between language and human mind.

So, the point is, we now know, while trying to understand language disorders, we now know, there is a particular area in human brain in the left frontal lobe, which are responsible for language. Among the two, one, Broca's areas probably and particularly, controls articulatory stuff and Wernicke's area is dedicated for auditory controls.

(Refer Slide Time: 11:07)

Types of Aphasia

- Anomic Aphasia
 - Not being able to think of a word
- Conduction Aphasia
 - Relatively meaningful and fluent speech but full of errors of pronunciation. They repeat sentence and words told to them.

There are other types of disorders as well, when it comes to language disorder and since we are talking about at least two, Broca's Aphasics and Wernicke's Aphasics, Broca's areas and Wernicke's areas, it is important for us to at least go through two more.

There is one which is called Anomic Aphasia and the difficulty in this is, it is related to thinking. Anomic Aphasics have difficulty, finding difficulty thinking of a word; it takes long time for them to come up with the word. Well, as you can see, this is close to Broca's Aphasics, but there is a distinction between the two; and again, I restrict the discussion here. The other one is Conduction Aphasia and this is relatively meaning; the Conduction Aphasics have relatively meaningful and fluent speech. But, such speech is full of errors of pronunciations and Conduction Aphasics repeat sentences or words that are told to them.

So, what we see with these four Broca's Aphasics, Wernicke's, Anomic Aphasics and Conduction Aphasics, that their language disorder has been studied a lot, language disorder has been studied in great deal. Now, this disorder and the study of this disorder is important. What does this tell us? People came up with these things with the study of brain impairment.

(Refer Slide Time: 13:28)

What does brain impairment tell us?

- In general aphasia is viewed as a disorder of general conceptual thinking.
- A serious look at aphasia tells us:
 - Certain types of brain damage leave non-linguistic abilities intact and only damage linguistic abilities.
 - In yet another type of brain damage the ability to produce grammatical sentence is often spared while causing substantial cognitive loss.
- Language ability is quite distinct from general purpose cognitive functioning.

But, what does this tell us, why is this study significant and in what way this tells us about relationship between language and human mind. Well, we know, one of the claims is pretty obvious that with such a study, we know that human brain has an area, which is responsible for language. What we have seen, what we have discussed while learning about language learning, about language acquisition, things like language acquisition device and universal grammar in particular, those are hypothetical ideas.

Now, discussion on Broca's area and Wernicke's area and the left frontal lobe, these are the physical areas of human brain. So, a relationship between the two, whether a relationship exists between hypothetical, hypothetical idea of language acquisition device and the language area identified in left frontal lobe or not is a matter of further investigation, lot of work is underway in these areas.

However, what is pretty clear here is Aphasia in general is viewed as a disorder of general conceptual thinking. But, if we look at it in a more careful way, what we find is, it indicates about certain types of brain damages and what we see that certain types of brain damages leave non linguistic abilities intact and only damage linguistic abilities. Now, this is an important finding; however there are yet other types of brain damages, where the ability to produce grammatical sentences is often spared.

That is with some other types of brain damages, people can speak, people can create, people can come up with perfectly acceptable and grammatical sentences. Therefore, we

say, in some types of in certain types of brain damages, the ability to produce a grammatical sentence is often spared. However, damage, it causes substantial damage, it causes substantial cognitive loss; that is, the damage which spares grammatical ability, which spares speaking ability, affects other kind of cognitive abilities.

Now, this is important that we have, if we categorize different types of damages, some damages hampers linguistic abilities, some damages do not hamper linguistic ability, rather they hamper certain other cognitive abilities. On the basis of this, we can say that language ability is quite distinct from other general purpose cognitive function of human brain.

This will be one of the evidence to suggest many, including Ray Jackendoff, this discussion comes from Ray Jackendoff, that the language ability is specific purpose cognition. The study of brain damage tells us at least two things distinctly; one helps us identify physical area in human brain dedicated to language; second, language, brain impairments, brain damages, the study of brain damage indicates that certain types of damage may cause only linguistic ability. Whereas, certain types of damages, certain types of brain damages, may not cause linguistics ability, may not hamper, may not distort linguistic ability. However, they are going to affect other kinds of cognitive loss in a substantial way.

Thank you.