
Q. Robert suffered a stroke at the age of 55. After the stroke he was paralysed down his right side, though he could move his left arm and leg easily. Robert could clearly understand what was said to him, but was unable to produce any speech.

Discuss how knowledge of hemispheric lateralisation and language centres in the brain has helped our understanding of cases such as Robert's. Refer to Robert's case in your answer. [16]

Ans.

Hemispheric lateralisation is the idea that each hemisphere of the brain viz. the left and right hemispheres are specialised for different functions. For some specific functions like vision, hearing and movement, these hemispheres are found to follow the contralateral principle, meaning that the left hemisphere regulates these functions for the right side of the body and the right hemisphere regulates these functions for the left side of the body. The left hemisphere is found to specialise in language, which is evidenced by the presence of major language centers in it. One such center is Wernicke's area. This area is in the left temporal lobe, in the posterior part of the superior temporal gyrus. Wernicke's area is found to regulate language comprehension and damage to it results in the condition of Wernicke's aphasia which causes impairment in understanding language though speech remains fluent even if nonsensical. Another such center is Broca's area. It is found in the left frontal lobe, in the posterior part of the inferior frontal gyrus. Broca's area regulates speech production such that damage to it causes problems in producing speech while understanding remains intact.

Robert's symptoms demonstrate contralaterality. His right side of the body is damaged indicating that it is the left hemisphere which is impaired while the right hemisphere remains intact, evidenced by his being able to move his left arm and left leg easily. Damage to Robert's left hemisphere is further evidenced by his language-related problems. While his Wernicke's area remains intact, given that he can clearly understand what is said to him; he seems to be suffering from Broca's aphasia, given that he is unable to produce any speech.

A strength of the ideas of lateralisation and language centers is that they are supported by research from their onset. The pioneering research for language centers was done by Broca who demonstrated in his case study of 'Tan' (case study of Leborgne) that it is indeed Broca's area which is damaged in the case of impaired speech production. Using post-mortem methodology, upon the death of 'Tan,' he showed lesions in the Broca's area as evidence for that being the reason for Tan's ability to be able to articulate on one syllable - 'tan.' Following case studies by Broca himself and other researchers went on to support the idea repeatedly that in patients of Broca's aphasia, it is that particular area which is damaged. Dronkers et al. (2007) showed in their case studies that damage to Broca's areas results in difficulty forming sentences, halting speech and impaired syntax even though understanding of speech remains intact. In fact, even technological research done after Broca's case study supports the case study evidence. For example, an advanced using rTMS technology by Pascual-Leone et al. (1991) showed that temporary disruption to Broca's area in healthy individuals results in speech production difficulties. Such experimental evidence adds validity to Broca's evidence coming from individual case studies.

However, a weakness of these ideas is that they are not always supported by research. Some recent studies using advanced technology that can map out the brain more extensively have demonstrated that it is in fact, the collective functioning of several brain areas that contributes to particular functions and localisation might be a very reductionist idea. For example Dick and Tremblay (2016) showed that only 2% of modern researchers think that language is completely controlled by Broca's and Wernicke's area. Technology such as fMRI has been used to generate high resolution images of several brain regions as participants perform language-related tasks. It is repeatedly found that alongside Broca's and Wernicke's area, there are centers in the right hemisphere that contribute to understanding and production of speech. Also that subcortical areas such as the thalamus contribute to these functions. Hence, the idea that language centers in the brain completely control language abilities in a person may be invalid.

Whatsapp : +919892507784 for psychology classes

E-mail : [jyotika@excellingpsychology.com](mailto: jyotika@excellingpsychology.com) for other queries

Lesson prepared by:

Jyotika Varmani

CIE A Levels Psychology School Teacher, Modern College, Mauritius

CIE A Levels Psychology Subject Expert, Podar International, Mumbai

AQA A Levels Psychology Tutor, Higher OTS Academy, UAE

AQA A Levels Psychology Tutor, Gritty Tech, India

AQA A Levels Psychology Tutor, Aurora ELearning, UAE

Edexcel Psychology Tutor, ETutor Home, India

Youtuber with 4k+ Global Psychology Student and Teacher Subscribers

Psychology Website Author with 10M+ Global Views

9+ Years Experience in International GCSE and A-Levels Psychology Tutoring for CIE, AQA, Edexcel and IBDP

M.A. (Psychology Honours), UGC-SET and NET (first attempt, first ranker),

PGDHE (Post-Graduate Diploma in Higher Education)

Visit Jyotika Varmani's complete profile at -

<https://www.teacheron.com/tutor-profile/1KH>