Module 1:Human Nervous System

Lecture 8:Hemispheric dominance

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Hemispheric dominance

The two hemispheres of our brain differ in terms of activity level of the cortical areas involved in various types of tasks. The hemisphere with the greater contribution for a specific task is said to be dominant for that very task. This is also referred to as lateralization or hemispheric asymmetry. You may also find the term ‘behavioural asymmetry' being used. Psychologists are more interested studying hemispheric asymmetry because it helps you understand the difference in information processing and behavioural manifestations and its relation with the side and site of the cortex.

Examination of hemispheric asymmetry in the patients with brain injury is the oldest strategy used to study hemisphere dominance. The knowledge of side and site of damage and assessment of behavioural outcomes can help infer functional significance of the given area of the brain. Study of the patients undergoing surgical disconnection of the two hemispheres for the treatment of severe epilepsy (commonly referred as split-brain patients) was more influential as it allowed observation of function of each hemisphere in isolation. Later, techniques such as hemispheric stimulation, dichotic presentation, split-filed presentation, etc. were also used to understand the hemispheric control of various types of functions. The outcomes of such studies were vital for understanding the biological bases of human behaviour. For instance, there is left hemisphere dominance for language and motor skills whereas right hemisphere dominance is seen for spatial processing. Superior temporal gyrus is activated during speech processing which is followed by left hemisphere perisylvian cortical activation. Left hemisphere superiority has been reported for categorizing stimuli, considered responses, and inhibition of immediate responses whereas right hemisphere dominates for topographical information, emotional responses, and immediate responses without processing. Right hemisphere superiority has also been found for colour discrimination when it is difficult to name or describe them. However, the two hemispheres are equal when colours can be easily named. Right hemisphere also dominates for shape discrimination and memory for shapes that do not have verbal labels.

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Laterality research also explains cerebral dominance that gets reflected through peripheral measures such as preference for usage of hand, foot, eye, ear, and face. For example, the prevalence of left-handedness in India is reportedly as low as 3.2% (recent findings have reported 6.78% left-handers in the population). As far as foot preference is concerned, majority of the humans use the right foot for mobilization and the left foot for postural stability. Researchers have even reported difference in the preferential usage of these peripheral indices between normal and clinical population. For instance, the right hemisphere dominance in the autistic individuals gets reflected in their superiority at spatial tasks and face recognition. Healthy children show left ear preference for music and right ear preference for verbal stimuli whereas autistic children show left ear preference for both the types of stimuli.

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