BCI ASSIGNMENT-2

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Sensorimotor Rhythm (SMR)

Sensorimotor rhythm (SMR) is an EEG paradigm that assesses activity in the brain's sensorimotor cortex. SMR activity occurs at a frequency of 12-15 Hz and is connected with movement planning and execution.

One of the most common applications of the SMR paradigm is in neurofeedback training. Neurofeedback is a sort of biofeedback that teaches people how to manage their brain activity in order to improve their cognitive or behavioral performance. Individuals are trained in SMR neurofeedback training to boost their SMR activity in order to improve motor abilities or minimize symptoms of diseases such as ADHD or epilepsy.

The individual wears an EEG cap that monitors their brain activity throughout an SMR neurofeedback session. The EEG data are subsequently analyzed and real-time input is provided to the individual via visual or audio feedback. For example, the person could be watching a computer screen that displays a game or other visual display that responds to changes in their SMR activity. They may see the gaming character moving faster or more smoothly if they raise their SMR activity. Individuals who learn to control their SMR activity can improve their motor skills or minimize symptoms of their disease.

The SMR paradigm is used in BCIs. BCIs are systems that allow people to use their brain activity to control external objects such as prosthetic limbs or computers. The individual learns to adjust their SMR activity to control the external device in an SMR-based BCI. They might learn, for example, to raise their SMR activity to move a robotic arm or reduce their SMR activity to halt the arm.

SMR has the advantage of being a naturally occurring brain rhythm that does not necessitate intrusive procedures such as implanting electrodes directly into the brain. Because SMR can be measured non-invasively using scalp EEG, it is a safe and feasible option for use in BCIs.

The SMR paradigm may potentially have uses in the field of rehabilitation. Individuals who have had a stroke or another neurological injury, for example, may struggle with movement or motor planning. SMR neurofeedback training or BCI-based rehabilitation may be able to assist these people restore some motor function by training their brains to control their motions better.

Several studies have demonstrated the usefulness of the SMR paradigm in a variety of applications. SMR neurofeedback training, for example, has been shown to improve motor skills in both healthy people and those with neurological diseases such as ADHD, epilepsy, and cerebral palsy. It's also been found to boost cognitive processes including attention and working memory.

The SMR paradigm can also be used to investigate the brain mechanisms governing motor planning and execution. SMR signals can be used by researchers to study how the brain coordinates movements and how this coordination changes with different motor activities and situations.

Overall, the SMR paradigm is a valuable tool for examining and regulating sensorimotor cortical brain activity. Its potential applications in neurofeedback training, BCIs, and rehabilitation make it a viable future research and development path.