

45. Lilly, John C. 1956. "Distribution of 'Motor' Functions in the Cerebral Cortex in the Conscious, Intact Monkey." *Science*. 124 :937

45

DISTRIBUTION OF "MOTOR" FUNCTIONS IN THE CEREBRAL CORTEX  
IN THE CONSCIOUS INTACT MONKEY

John C. Lilly, M.D.

National Institute of Mental Health, National Institutes of  
Health, U. S. Public Health Service, Department of Health,  
Education, and Welfare, Bethesda, Maryland

(Abstract of talk presented at the National Academy of  
Sciences Autumn Meeting, November 8, 1956, Washington, D.C.)  
Science, 124, No. 3228:937, 1956

Classically the 'motor' functions of the cerebral cortex are placed in and restricted to the 'precentral motor cortex', anterior to the central sulcus. This view has persisted despite some evidence in the literature that 'motor' functions are more widely distributed in the cortex (Schäfer, Walker and Weaver, and von Bechterev). By means of stimulations of unanesthetized monkeys' cortices through implanted electrodes, it can be shown that most (if not all) of the cerebral cortex can produce motor effects at approximately the same threshold value of stimulating electric current. By means of arrays of electrodes packed at intervals from one to two millimeters apart and in total numbers from 25 to 610 in a given animal, it is shown that there are no 'silent' areas in the cortex; every area produces a movement. In any classical 'sensory' region, the elicited movements are such as to direct the sense organ for that region in a specific direction, i.e. in the acoustic area detailed ear movements are evoked; in the visual areas, conjugate eyes and head movements; in the tactile regions, somatic movements. In all areas but two the activity elicited was restricted to contralateral movements; in the face and the spinal column areas, bilateral asymmetrical movements are elicited; the latter region is the only

cortical one from which general excitement of the whole animal can be evoked. It is suggested that the cerebral cortex in each and every small area is 'sensorimotor' rather than either 'sensory' alone or 'motor' alone; the precentral region up to the frontal pole is a predominantly efferent system whereas the postcentral regions belong to a predominantly afferent system.