THE COGNITIVE MOTOR SYSTEM

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The traditional view on the cortical motor system of the brain is that it exists to translate thought, sensation and emotion into movement. According to this view, the motor system has an exclusively “productive” function and is not involved in cognition.

 In my conversation I will show that this view is wrong. First, modern physiological and brain imaging data, confirmed the seminal findings of V. Mountcastle and J. Hyvarinen that posterior parietal cortex is involved in motor organization, and, most importantly, demonstrated that the motor activity represents the scaffold on the top of which sensory information is coded. Second, connectivity data traced a series of parietal-frontal circuits, each mediating specific cognitive functions.

 In my talk I will present, at outset, a modern subdivision of parietal and premotor areas and will describe their connections. Subsequently, I will discuss the functional properties of three of these parieto-frontal networks: a) the network that transforms the object affordances, as defined by J.J. Gibson, into appropriate motor acts; b) the circuit involving in the construction of the peripersonal space, and its role in reaching and defensive actions; c) the networks responsible for understanding and imitating actions of others. I will finish by discussing the ethological importance of these last circuits - mirror circuits.

 