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Sommario/riassunto — In the study of sensorimotor systems, an important research goal has been to understand the way neural networks in the spinal cord and brain interact to control voluntary movement. Computational modeling has provided insight into the interaction between centrally generated commands, proprioceptive feedback signals and the biomechanical responses of the moving body. Research in this field is also driven by the need to improve and optimize rehabilitation after nervous system injury and to devise biomimetic methods of control in robotic devices. This research topic is focused on efforts dedicated to identify and model the neuromechanical control of movement. Neural networks in the brain and spinal cord are known to generate patterned activity that mediates coordinated activation of multiple muscles in both rhythmic and discrete movements, e.g. locomotion and reaching. Commands descending from the higher centres in the CNS modulate the activity of spinal networks, which control movement on the basis of sensory feedback of various types, including that from proprioceptive afferents. The computational models will continue to shed light on the central strategies and mechanisms of sensorimotor control and learning. This research topic demonstrated that computational modeling is playing a more and more prominent role in the studies of postural and movement control. With increasing ability to gather data from all levels of the neuromechanical sensorimotor systems, there is a compelling need for novel, creative modeling of new and existing data sets,

because the more systematic means to extract knowledge and insights about neural computations of sensorimotor systems from these data is through computational modeling. While models should be based on experimental data and validated with experimental evidence, they should also be flexible to provide a conceptual framework for unifying diverse data sets, to generate new insights of neural mechanisms, to integrate new data sets into the general framework, to validate or refute hypotheses and to suggest new testable hypotheses for future experimental investigation. It is thus expected that neural and computational modeling of the sensorimotor system should create new opportunities for experimentalists and modelers to collaborate in a joint endeavor to advance our understanding of the neural mechanisms for postural and movement control.

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