

From Brains to behavior: principles of motion generation and perception.

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Abstract

Motor neuroscience centers on characterizing human movement, and the way it is represented and generated by the brain. A key concept in this field is that despite the rich repertoire of human movements and their variability across individuals, both the behavioral and neuronal aspects of movement are highly invariant, and can be understood in terms of basic principles or low dimensional systems. Highlighting this concept, in my presentation I will discuss three core topics in this research field: (1) Trajectory planning, where prominent theories based on optimal control and geometric invariance, aim at describing movement kinematics and timing using basic unifying principles. (2) Compositionality, and specifically the ideas of motor primitives and muscle synergies that account for inter-segmental coordination and muscle activations, using hierarchical low-dimensional structures; and (3) Neural control models, which regard the neural encoding and organization giving rise to the emerging characteristics of movement generation and perception.