Learning and Remapping in the Sensory Motor System

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Abstract: Studies of adaptation to patterns of deterministic forces have revealed the ability of the motor control system to form and use predictive representations of the environment. These studies have also pointed out that adaptation to novel dynamics is aimed at preserving the trajectories of a controlled endpoint, either the hand of a subject or a transported object. I will review some of these experiments and other studies aimed at understanding how the motor system forms representation of space. An extensive line of investigations in visual information processing has dealt with the issue of how the Euclidean properties of space are recovered from visual signals that do not appear to possess these properties. The same question is addressed here in the context of motor behavior and motor learning. I will discuss some theoretical considerations and experimental evidence about the ability of the nervous system to create novel patterns of coordination that are consistent with the representation of extrapersonal space. I will also discuss the relevance of this to rehabilitation and brain-machine interfaces.