THE EVOLUTION OF VERSATILE BUT EFFECTOR SPECIFIC NOVEL MOTOR TRAJECTORIES IN ADULTS

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Motor control can be viewed as the planning of sequences (combinations) of basic movement components for effective performance on a given task. We have recently reported that prolonged training can result in novel prototypical movement trajectories (Hauptmann et al. 2000). To study the modification through practice of motor representation, subjects (Ss) underwent training (3-4 weeks) on sequences of handwriting like trajectories connecting 4 target points (4 segments) on a digitizing tablet ("as fast and accurately as possible"). Here we report the results of kinematic analyses in 9 Ss showing large practice related performance gains. Initially, the task was accomplished using straight trajectories, each with a bell shaped velocity profile. However, prolonged training resulted in trajectories that were shown to be maximally smooth for pairs of target-connecting trajectories (co-articulation). This "global planning" mode was characterized by the emergence of a single curved path (replacing a pair of straight trajectories) and a robust decrease in the error between the predicted optimally smooth movement and actual performance. The switch to "global planning" was relatively abrupt for the first pair of segments and more gradual for the second pair. In transfer experiments, the new curved trajectories were not sensitive to size scaling, start or end points or to changing movement direction, but were **effector** and task **context** specific. Our results support the notion that motor planning can be modulated to a large degree by experience and suggest that new effector and context specific "movement primitives" can evolve as a function of long-term practice on a sequence of movements in adults.

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