

Motor adaptation

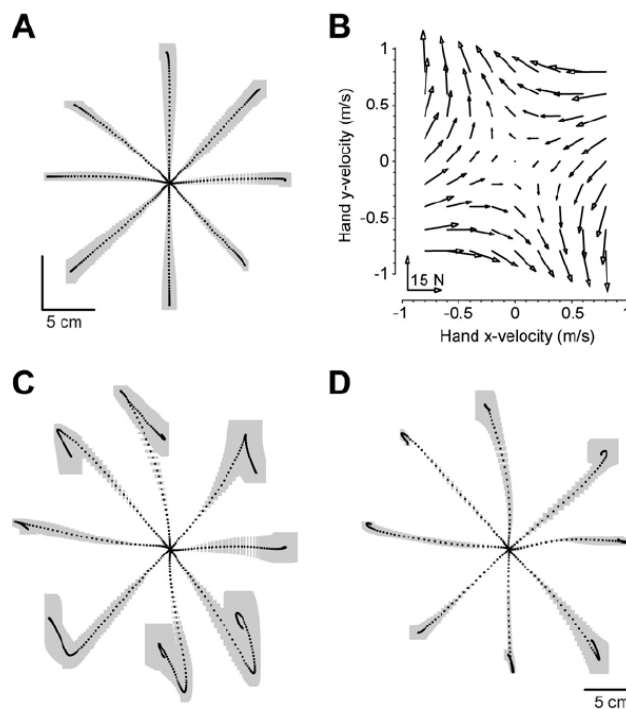
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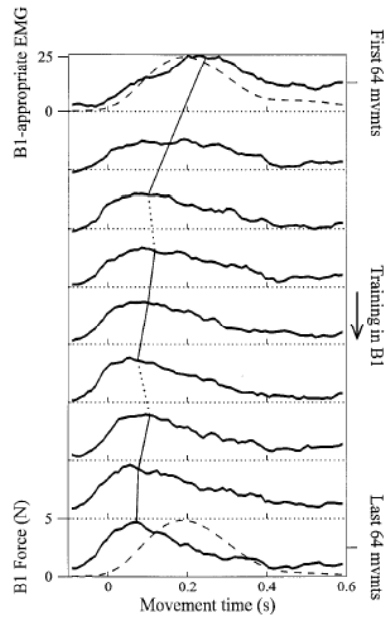
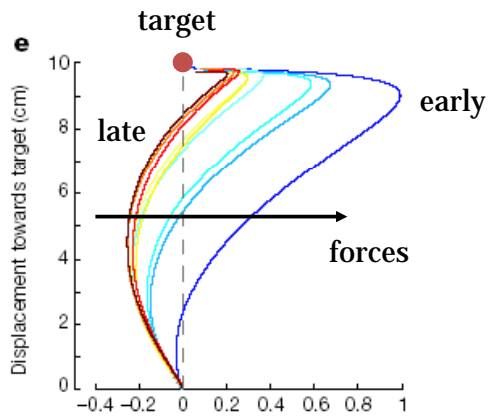
Force-field adaptation

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Baseline trajectory is roughly recovered

Muscle activation becomes predictive



Task-specific adaptation

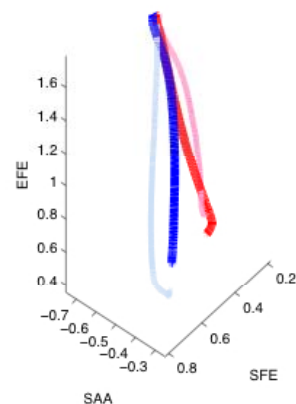
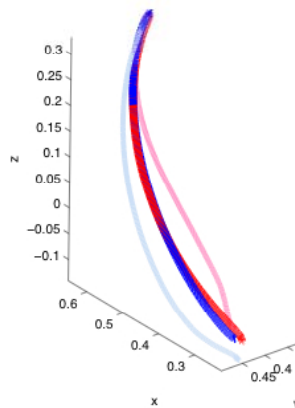


reaching to 3D targets

robot creates torque-field in joint space

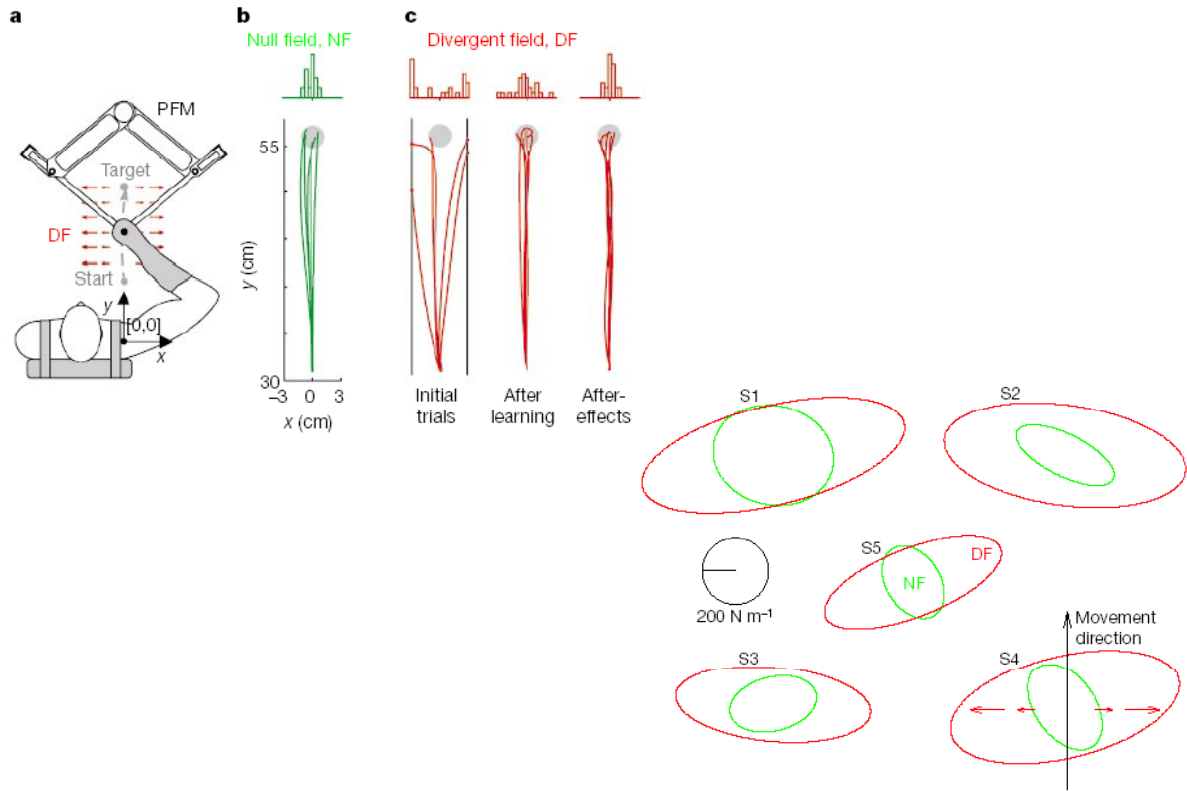
hand trajectories

joint trajectories



Stiffness adaptation

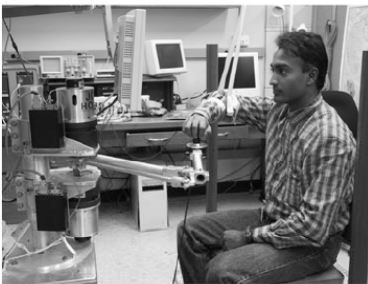
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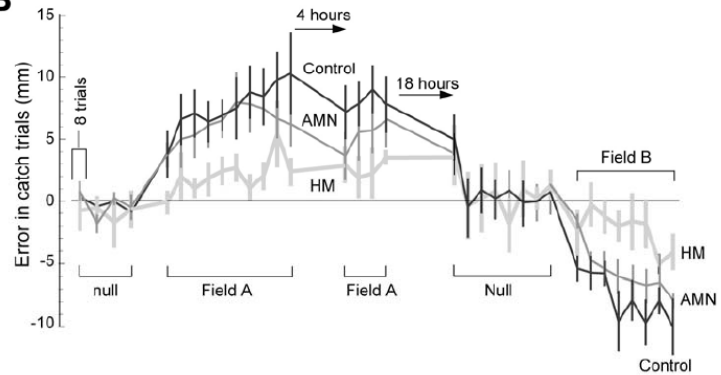
Adaptation with brain damage

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A

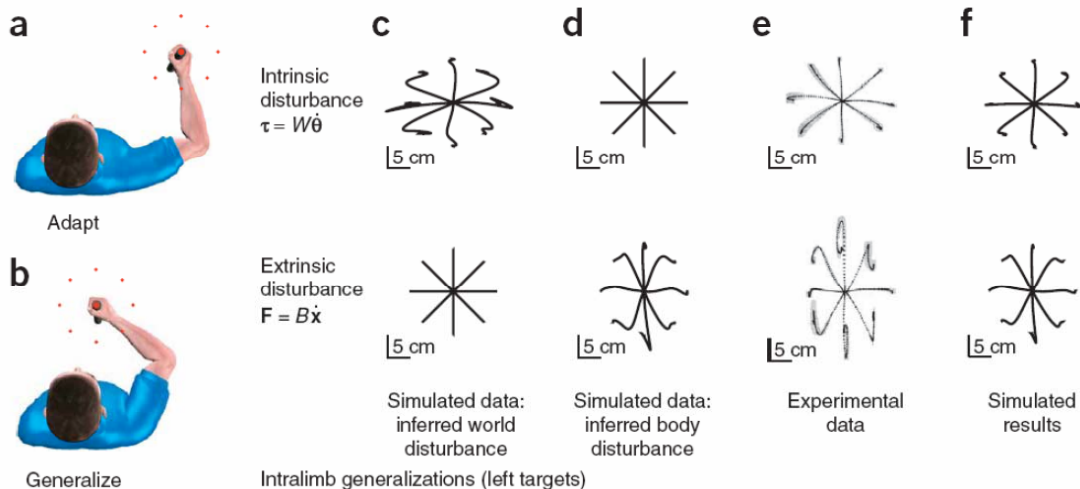
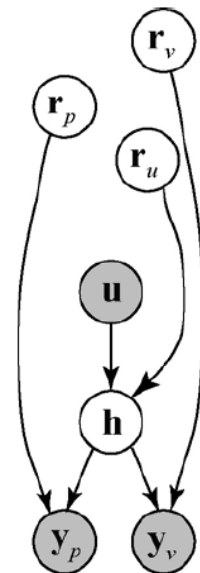


B



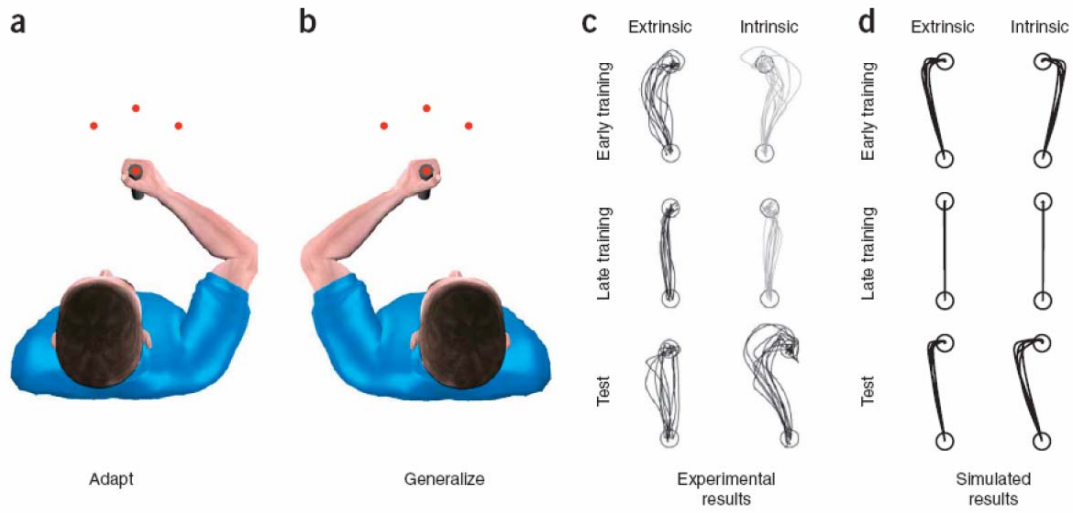
Sensory-motor errors can be explained in many ways, and the brain has to decide which explanation is correct:

- sensed hand displacements could be real, or due to biases in vision and proprioception
- real displacements could be due to external forces, or to changes in the body dynamics (fatigue, growth, etc.)
- external forces can be constant in world coordinates, or in joint coordinates (leading to different generalization)
- external forces can be present in all movements, or only in movements similar to the current movement
- the causes of error may decay quickly, or decay gradually over time
- external forces can arise from a single source that varies over time, or from multiple sources that switch over time



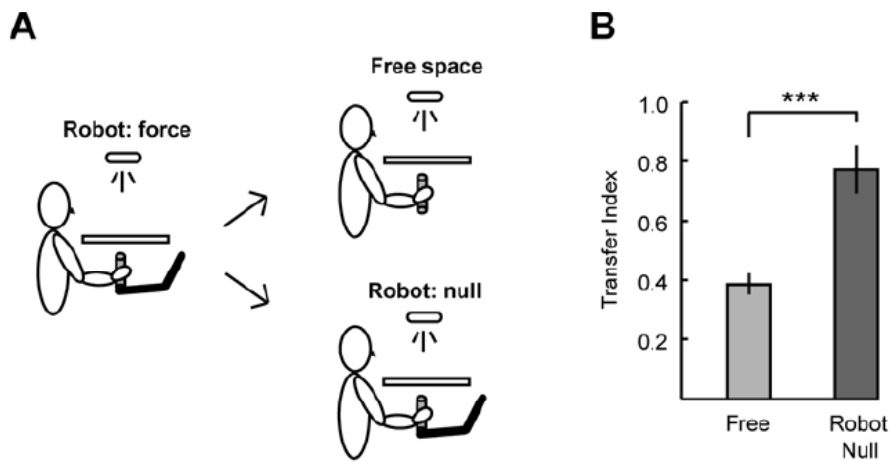
Transfer to another limb

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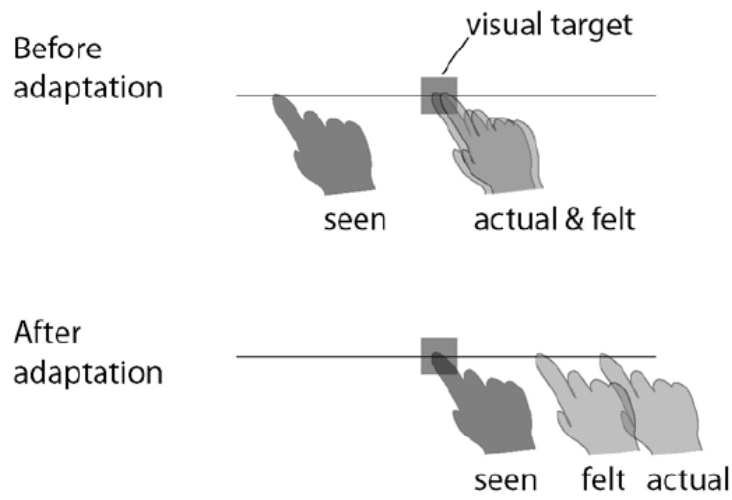
Context-specific adaptation

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Adaptation causes perceptual illusions

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Timescales of adaptation

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