

Fine Motor Control in Altered Gravity Conditions

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Skilled object manipulation is an essential motor activity of daily living. When we grasp and lift an object, we adjust our grip forces precisely to the weight of the object and other movement dependent loads. Altered gravity conditions cause changes of the object's weight. During the first experience of such a weight change, the grip force increases irrespectively of the direction of the change. During lower-than-normal gravity this paradox grip force increase is compensated and reversed within few seconds indicating a strategic response. When we move the object, movement dependent loads persist while the weight changes. Despite this massive perturbation of familiar environmental conditions, grip force control adapts to the novel load conditions surprisingly fast suggesting that static and dynamic components of the load can be dissociated. Further measurements should disentangle the strategic components of grip force adaptation and the ability to determine loads from physical principles in changed gravity.