#40: Optimal Control of Unimanual and Bimanual Actions: An Inverse Optimization Approach

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Mathematically studying human motor control like all other complex systems deals with redundancy of possible outputs. And the way our central nervous system chooses the most appropriate set of system variables involving in a task, among other infinite possible options, has remained an open question. To address this problem mathematically, using forward optimization techniques has become a popular approach. However, although this mathematical solution alleviated the burden of studying motor control, the basis on which its objective criteria is chosen, has been always a central concern for researchers. Recently, the idea of using inverse optimization techniques (IOPTs) has pervaded in the area of studying human motor control. That is, for example, by collecting the preferable fingers' force pattern during a force sharing task, one can approximate the objective criterion applying IOPTs. In almost all studies using IOPT, the experimental data were collected during an adequate number of trials each had different static external condition. Using a dynamic external moment production during each trials we collect numerous data points rather than just one set of fingers' force combination. We investigate how this method of data collection influence IOPT; moreover, study the differences in approximated objective criterions derived for right, left, and both hand grasping task.