Effects of Target Locations on Torso Kinematics during Seated Discrete Reaching Movements in 3D

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Reaching movements requires the participation of the torso when the target is located beyond one's arm length. Sometimes, significant torso assistive motions may also be involved when the target is located closer than an arm length away. These types of movements occur in many vehicle driving tasks as well as other manual workplace tasks. To further improve the design these tasks requires an accurate model of the movements with a realistic description of the torso kinematics. This latter description helps reducing the kinematic indeterminacy and complexity associated with multi-segment reaching movements involving torso motions. It also facilitates a clearer understanding of human postural control and movement coordination mechanisms. The present study is an attempt to develop statistical models to predict the effects of target location on selected torso kinematic characteristics during seated reaching movements in three-dimensions (3D). Regression models that quantify 1) the amount of torso flexion and 2) the direction of the torso motion are presented. The seated reaching movements studied are discrete, volitional, and right handed. The findings suggest that the torso is an adept prime mover for common arm reaches, though constrained by its biomechanical construct as well as the specific seating conditions.

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