Task Effects on Three-Dimensional Dynamic Postures during Seated Reaching Movements: An Investigative Scheme and Illustration

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In this paper we describe a new scheme for empirically investigating the effects of task factors on three-dimensional (3D) dynamic postures during seated reaching movements. The scheme relies on an underlying model that integrates two statistical procedures: (a) a regression description of the relationship between the time-varying hand location and postural angles to characterize the movement data and (b) a series of analyses of variance to test the hypothesized task effects using representative instantaneous postures. The use of this scheme is illustrated by an experiment that examines two generic task factors: hand motion direction and motion completion time. Results suggest that hand motion direction is a significant task factor in determining instantaneous postures, whereas a distinctive difference in the time to complete a motion does not appear to have a significant effect. We discuss the concept of an instantaneous posture and its utility in dynamic studies of movements, some insights into human reaching movement control strategy, and implications for the development a 3D dynamic posture prediction model.

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