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Investigating motor styles in the ACT2 kinematics framework

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In everyday life, we all experience that some people move in a similar way to each other, while others appear more dissimilar in their gestures. However, a comprehensive approach to quantify and manipulate the degree of "motor similarity"between individuals has still to be consolidated.
To fill this gap, the ACT2 project built a wide upper-limb kinematics database of 90 healthy right-handed participants (M/F 41/49; 24.44⊠3.63 y), who performed movements falling into 6 classes: intransitive point-to-point and curvilinear movements, pointing, transitive reach to grasp towards objects with different size, different weight, or with different usage intention. High resolution kinematics data were collected through a motion-capture system consisting of 10 Vicon Vero cameras. This generated a dataset of 51478 movements. Based on this data, a Procrustes-based approach was used to measure motor distance between every couple of participants for each of the above mentioned 6 movement classes. The obtained distance matrices were compared through Mantel test.
Results showed that the pattern of motor distance among participants is significantly stable within transitive movements (weight vs size: r-mantel=0.50; empirical-p=0; weight vs usage: r-mantel=0.41; empirical-p=0; size vs usage: r-mantel=0.33; empirical-p=0.008) and intransitive movements (r-mantel=0.23; empirical-p=0.014). However, hierarchical clustering applied to the distance matrices revealed that at least four variations of this general pattern emerge, therefore suggesting the existence of motor-subtypes accounting for subject-to-subject variability. Finally, decision trees identified reach to grasp movement towards objects of different weight as the most informative movement to differentiate subjects between motor sub-types.

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No

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