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Assessment of human-likeness and naturalness of interceptive arm reaching movement accomplished by a humanoid robot

E Chiovetto[1], A Mukovskiy[1], F Reinhart[2], M S Khansari-Zadeh[3], A Billard[3], J S Steil[2], M A Giese[1] ([1]Dep. of Cognitive Neurology, University Clinic Tuebingen, Germany; [2]Faculty of Technology, Bielefeld University, Germany; [3]School of Engineering, Ecole Polytechnique Federale de Lausanne , Switzerland ; e-mail:enrico.chiovetto@klinikum.uni-tuebingen.de)

The generation of believable human-like movements is a key problem of humanoid robotics. A central biologically-inspired approach for the solution of the underlying high-dimensional control problems relies on learned low-dimensional dynamic movement primitives. METHOD: Three different control algorithms, based on different definitions of dynamic movement primitives, were trained with human motion-capture data from a double-step reaching task. The algorithms were applied to control an accurate physical model of the humanoid robot COMAN (developed by I.I.T). The generated movements were then used to animate a corresponding robot avatar model. In addition, the original human movements were retargeted to the same avatar model. Participants rated the 'human-likeness', the 'naturalness', and reported observed 'artifacts'. RESULTS: Interestingly, participants rated not the human but the most smooth trajectories as most 'natural' and most 'human-like'. This points to a non-veridical perception of human-likeness, which might be based rather on low-level properties of the observed motion than on the reproduction of details of complex human trajectories. [This research was supported by: AMARSi- EC FP7-ICT-248311; Koroibot FP7-ICT-2013-10/ 611909; DFG GI 305/4-1, DFG GZ: KA 1258/15-1; BMBF, FKZ: 01GQ1002A, FP7-PEOPLE-2011-ITN(Marie Curie): ABC PITN-GA-011-290011, HBP FP7-ICT-2013-FET-F/ 604102.]