Shall we dance together? the cognitive and motor processes of interpersonal coordination

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Background

Humans are experts in collaborative efforts when trying to accomplish tasks they cannot achieve alone [1]. Acting together, particularly in dance, requires flexibility in coping with the constraints associated with strenuous interpersonal coordination[2]. Such demands occur par excellence when dancing in a duet or in an ensemble. Historically, dance science has focused on the physical and mental challenges of sustained movement. Here, we will highlight a number of cognitive constraints that critically affect dancing together. Joint-action tasks require the ability to take into account one’s partner’s action capabilities as they relate to the collective goal of a particular task. Accordingly, the study of shared intentions and goals in a social context forms the plexus of much joint-action research in cognitive science. Experimental studies range from observing the interaction between speakers and their listeners’ eye movements, the continuous jointly realized force generation when lifting and balancing an object, distributing movements between one another while balancing together on a perturbed surface, to musicians’ temporal movement coordination in a music performance. The cognitive demands with which actors are confronted in such tasks are also inherent in dance. As an art form, dance indeed represents a special case of joint-action, requiring both high and low levels of cognitive processing as well as dynamic coordination between persons and their environment.

Methods

In our presentation we will focus on important insights into timing of behaviour to external cues from three cognitive science theories and their relevance in motor control. In particular, we will elaborate on information processing theory, dynamical systems theory, and ecological psychology, with particular emphasis on dance-relevant performance constraints due to the unicity problem, the degrees of freedom problem, action monitoring, sensorimotor delays, speed-accuracy trade-off, preferred amplitudes and frequencies, intrinsic dynamics, frequency coupling, and visual flow.

Findings and Discussion

In this conceptual analysis we aim to highlight cognitive constraints of shared task performance, provide a topical overview of neural structures and mechanisms that have been shown to be key in joint timing, and finally review current research in cognitive science on how dancers dance together at the same time.

References:
