

Relative phase dynamics in auditory-motor coordination: Towards perceptual support for artistic performance

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Among a variety of dance styles, street dance has a salient feature in that almost all the music beats are synchronized by the dancers' movements, requiring whole-body auditory-motor synchronization. Recently, we found two distinguishable coordination modes in basic street-dance exercise: up (knee extension on the beat) and down (knee flexion on the beat) movement (Miura, Kudo, Ohtsuki, & Kanehisa, 2011, *Hum. Mov. Sci.*). In our study, when participants are required to synchronize their knee extension or flexion to a metronome beat in a standing position, skilled street dancers can keep up movement in high frequency (e.g. 140 bpm) at which non-dancers' up movement is unintentionally entrained into down movement. That is, unintentional phase transition occurs in terms of relative coordination between metronome beats and movements. These results can provide a perceptual reason why beginners of street dance perform unstably and inelegantly, and suggests that the auditory-motor coordination of dancers can be differentiated from that of non-dancers by a dynamical parameter inducing bifurcation. This view is also supported by another finding that skilled drummers is distinguished from non-drummers by the control parameter that induces phase wanderings in the relative phase dynamics of bimanual drumming (Fujii, Kudo, Ohtsuki, & Oda, 2010, *J. Neurophysiol.*). Because rhythmic auditory signals not only specify the movement frequency but also contribute to the coordination dynamics (Byblow, Carson, & Goodman, 1994, *Hum. Mov. Sci.*; Jirsa, Fink, Foo, & Kelso, 2000, *J. Biol. Physics*; Kudo, Park, Kay, & Turvey, 2006, *J. Exp. Psychol.: Hum. Percept. Perform.*), in this symposium, we will discuss possible perceptual supports for enhancing artistic performance and implications for theoretical model.