

# Reaction-anticipation Transitions in Human Perception-Action Patterns

Engstrøm, D. A., Kelso, J. A. S. and Holroyd, T.

Program in Complex Systems and Brain Sciences, Center for Complex Systems, Florida Atlantic University, P.O. Box 3091, Boca Raton, FL 33431, US

## Abstract

We investigated the hypothesis that reaction and anticipation in human perceptual-motor performance are two coordinative modes of a single pattern-forming dynamical system, rather than separate behaviors. Subjects coordinated the onset of finger flexions with visual metronome flashes in each of three patterns: reactive, synchronized, or syncopated. The stimulus frequency was progressively increased (0.125–1.375 Hz) or decreased (1.375–0.125 Hz) in small steps (0.125 Hz) every 10 cycles. We observed qualitative transitions in both the time interval between stimulus and corresponding action ( $\tau$ ) and their relative phase ( $\phi$ ) at critical values of the stimulus frequency, corresponding to changes from 'reactive-to-anticipatory' and 'anticipatory-to-reactive' performance. Such transitions provide evidence of a single, multifunctional system, which can be adequately described by the dynamics of collective variables characterizing the respective perception~action patterns.

**Author Keywords:** Coordination dynamics; Reaction; Synchronization; Switching.

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