

WORKSHOP  
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## Motion dynamics in music performance

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### **Abstract**

Dynamical systems models have been applied to understand listeners reactions to the recurrent rhythmic structure of musical behaviors. We investigate the nonlinear dynamics of musicians finger movements as they produce the complex rhythms typical of Western music. The speed and accuracy of musicians fine finger movements, combined with the stimulus complexity, provides challenging time series data for modeling. We describe nonlinear dynamics in pianists performances and in finger tapping tasks, in which the trajectories of rapid finger movements provide consistent nonlinear signatures. We also describe applications of functional data analysis techniques (Ramsay & Silverman, 2005) that aid in identifying landmarks in finger acceleration trajectories that are associated with reduced timing error, offering an explanation for the high speed-high accuracy relationship commonly seen in skilled performance.