Behavioral Dynamics of Visually-Guided Locomotion

William H. Warren
Dept. of Cognitive, Linguistic, & Psychological Sciences
Brown University
Providence, Rhode Island, USA
Bill_Warren@brown.edu

Where does the organization in behavior come from? Behavioral dynamics argues that stable, adaptive behavior emerges from the interaction between an agent and its environment, under both physical and informational constraints. Two case studies illustrate this approach. First, *rhythmic ball bouncing* offers a model system for studying the dynamics of agent-environment interactions. Experiments reveal that humans don't simply exploit passive stability, but use information to modulate the dynamics. Second, *locomotor trajectory formation* can be similarly understood. Based on studies of human walking in a virtual environment, we have derived a pedestrian model of steering, obstacle avoidance, interception, and following, that predicts individual trajectories and the collective behavior of crowds. In each case, stable behavior emerges from the dynamics of the agent-environment interaction on-line, making world models and explicit planning unnecessary.