Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Data-Driven Classification of Animal Behavior GORDON BERMAN, WILLIAM BIALEK, JOSHUA SHAEVITZ, Princeton University — The last decades have seen an explosion in our ability to characterize the molecular, cellular and genetic building blocks of life; the ingredients out of which we try to explain the rich and compelling behavior of living organisms. Our characterization of behavior itself, however, has advanced more slowly. Since modern ethology was founded over a century ago, behavioral experiments have focused largely on a restricted set of behaviors within the scope of a limited environment. Moreover, the set of behaviors to be examined is often user-defined, creating the potential for human bias and anthropomorphism. The research presented here describes a data-driven methodology for analyzing animal behavior, focusing on the fruit fly, Drosophila melanogaster, as a model system. Towards this end, we have built an imaging system that can track single flies as they move about a relatively unencumbered environment. Utilizing this capacity to generate large data sets of animal behavior, we have developed a method for automatically identifying behavioral states using techniques from image analysis, machine learning, and nonlinear dynamics. Identifying these states provides the starting point for many analyses and creates the possibility for automatic phenotyping of subtle behavioral traits.

Gordon Berman
Princeton University

Date submitted: 11 Nov 2011 Electronic form version 1.4