

The rules of conflict in an animal society

Abstract

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June 23, 2011

This project involves collaboration with Bryan Daniels, Jessica Flack and David Krakauer in conflict dynamics embedded in time series data, collected by JF on pigtailed macaques, a gregarious species of monkey.

In a recent paper (“Inductive Game Theory and the Dynamics of Animal Conflict”), Simon Dedeo, JF and DK discussed possible interaction rule sets that could explain the rise of conflicts. They noticed, however, unexplained and significant time dependent fluctuations in their measured. Also, critics noted that their measure for time correlations may have precluded some other features of the data.

The purpose of this project is to investigate alternative measures of dependence that address these concerns: (1) capture other features of the data set potentially neglected by the original measures and (2) resolve the time anomalous observations made with the original measure with the new measure. Since an established methodology for measuring the underlying dynamics of conflict does not exist, we must first establish useful metrics that reliably convey the dynamics. If we fail to resolve the second goal, we will attempt determine the origin (e.g. noise or changing strategies) of the shifts.

Conflict dynamics are a fundamental part of complex systems. In abiotic systems, we can conceive of conflict occurring in boundaries straddling energy gradients such between tectonic plates. How stress has built up and how it is released is crucial in explaining the evolution of the landscape. Analogously, the creation and dissipation of conflict in social systems is fundamentally linked to the stability and evolution of the system. Conflict inherently destabilizes the configuration of the system, and it is of utmost interest to know what the causes of such instability are. To be able to figure out what rules macaques implement that result in the observed pattern will be a step to understanding the mechanics of conflict and the methods of investigating it.