

Experimental and modeling approaches to collective behavior in groups of organisms

Lecturer: Guy Theraulaz, Centre de Recherches sur la Cognition Animale, Université Paul Sabatier, Toulouse, France

Email: guy.theraulaz@univ-tlse3.fr

Web : cognition.ups-tlse.fr/_guyt/index.html

Disciplines/fields: Collective Animal Behavior, Computational modeling

The aim of this lecture is to give an introduction to the basic concepts and tools used to investigate self-organized collective behaviors in animal groups and societies (swarms of insects, schools of fish, bird flocks and human crowds). The methodology consists in the characterization and quantification of the behaviors both on the individual and the collective levels and to link these two levels of description through specifically chosen modeling techniques. The goal of the experimental approach is to identify the kind of information exchanged between individuals and how this information triggers specific individual behaviors. We will describe some data analysis techniques that are used to determine the laws governing individuals' interactions then how these data can be used to formulate a mathematical model of these interactions.

Literature:

- Camazine, S., Deneubourg, J.L., Franks, N., Sneyd, J., Theraulaz, G. & Bonabeau, E. 2001. Self-Organization in Biological Systems. *Princeton University Press*.
- Bonabeau, E., Theraulaz, G., Deneubourg, J.L., Aron, S. & Camazine, S. 1997. Self-organization in social insects, *Trends in Ecology and Evolution*, 12: 188-193