

Interaction Networks and the Regulation of Ant Colony Behavior

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Abstract

An ant colony operates without central control. Each ant uses only local information, mostly odor, and no ant can make global assessments about what needs to be done. No ant gives instructions to another. Through the local decisions of individuals, colonies adjust their behavior to current conditions.

An ant decides where to go and what to do based on its recent experience of brief interactions with other ants. Most interactions consist of antennal contact, in which one ant smells the other. Interactions are not targeted toward particular individuals. The rate of interaction, rather than any information transferred, influences task decisions.

Interaction networks explain how seed-eating harvester ant colonies adjust the intensity of foraging to the availability of food. Using field experiments that manipulate rate of interaction, we can test models of the algorithms that individual ants use to respond to interactions, producing the collective regulation of colony behavior. I will discuss the ecological and evolutionary consequences of differences among colonies in interaction networks, and the changes in interaction networks as colonies grow older and larger.