

OR251*Effective leadership in group food retrieval by Longhorn crazy ants***Aviram Gelblum, Ofer Feinerman**

Group food retrieval - the cooperative carrying of a food item back to the nest - is a remarkable collective phenomenon observed in several ant species. Foragers can coordinate their efforts and jointly carry food items far heavier than the weight of a single ant. Such coordination is not straightforward, it requires that the ants reach some consensus regarding the desired direction and divide their roles accordingly. Furthermore, carrying a large morsel of food impairs both vision and scent, leading to an inevitable loss of bearings. Indeed, some species display an embarrassingly incompetent form of uncoordinated cooperative carrying. We are interested in understanding how ants carrying the load are able to overcome these obstacles, coordinate their behaviors and successfully retrieve large items. To this end, we developed a joint experimental-image analysis system that enables us to track the behavior of individual *Paratrechina longicornis* ants during collective load carrying over very long distances. Our detailed dataset allows for an in-depth quantitative analysis of collective transport. First, we analyze macroscopic trajectory characteristics such as speed, spin and number of carrying ants. We show that retrieval of food becomes more efficient as the number of carrying ants grows. Second, we use single ant trajectories to show how rules used by individuals lead to the observed behaviors. Specifically, we investigate the role of detachments and attachments of ants from the load and demonstrate the importance of newly joined and detached ants as a driver of the dynamics. Group cognition is thus facilitated by ad-hoc, effective leaders that transfer information from the environment into the system, giving rise to efficiency in both collective decisions and retrieval rates.