

Group food retrieval – the cooperative carrying of a food item back to the nest – is a remarkable collective phenomenon observed in several ant species. Coordination plays a key role in efficient group transport, and is achieved by conformist alignment of individual actions. Once aligned, persistence in behavior allows the washing out of unwanted noise, which can impair transport efficiency. However, excessive conservatism comes at the cost of a decrease in the group's responsiveness to new incoming information needed for navigation through rough terrain. To understand how this conflict is resolved, 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. We show that while the carrying ants are able to carry efficiently by coordinating their forces, amplification of knowledge carried by informed leaders imbues the group with greater sensitivity to the surroundings. The ants strike an optimal balance between conformity and individualism, exploiting the advantages of both the individual and the collective; this balance is attributed to the near-critical nature of the system. Thus, our study is a unique opportunity to link criticality with measurable optimality of group function.