

## “Comparative analysis of behavioral rules in termites, nest building and pair movement coordination”

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In animal collective behavior, group-level phenomena emerge from individual-level behavioral rules for social interactions. The theory of complex systems predicts that there is no simple one-to-one relationship between variations in collective patterns and variation in individual behaviors; therefore, it is essential to know how actual behavior evolves to change pattern formation. Here I introduce my comparative approach to studying termite collective behavior in both group-level patterns and individual-level behaviors. First, I will show the mechanical relationship between termite tunnel structures and excavation behavior. Two related species excavate tunnels with a shared transportation mechanism but build tunnels with distinct branching patterns. On the other hand, a third species has independently evolved a similar tunnel structure to one of the first two species, but builds it using a distinct transportation mechanism (bucket brigade by legs). Second, I will show that tandem running behaviors observed in termites and ants are apparently similar but are mediated through diverse communication mechanisms. Even between closely related termite species, different species achieve a similar level of coordination via distinct sets of complementary leader-follower interactions. Combined together, I will discuss that the cryptic interspecific variation in individual-level behavior is a source of novelty for the evolution of animal collective behavior.