The evolution of handedness: Why are ant colonies left- and right-handed?

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Until recently, handedness, a preference for using a particular forelimb, was assumed to be unique to humans. However, the discovery of forelimb preferences in other mammals and a number of invertebrate species has falsified this assumption [1]. Remarkably, wood ants (*Formica rufa*) also exhibit coordination in their forelimb preferences at the level of the *colony*. Not only do individuals have a left/right forelimb preference, but each colony has a clear majority of either left- or right-handers. The size of this majority was found to be consistent across colonies in the study population, suggesting it may have evolved. Such evolutionary adaptation at the colony level is particularly viable in ants, as all members of a particular colony are the progeny of a small number of queens and are highly genetically related. However, even assuming colony-level adaptation, existing models for the evolution of handedness (e.g. [2]) cannot explain a left/right bias within colonies, raising questions about the selection dynamics that could be responsible. Here, we present a model that offers an evolutionary account of wood ant handedness by considering a range of interactions within colonies, between colonies, and between ants and their predators. Our model is able to reproduce the degree of handedness bias seen in colonies of *Formica rufa* by trading off adaptive predictability to colony mates against maladaptive predictability to predators.

References

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