

Are Twenty-Four Heads Better than One? Testing the Optimal Group Size for Decision-Making in a Social Insect

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Social insects possess the remarkable ability to make choices both as individuals and as part of a collective. Ants, particularly, are able to utilize large colony numbers in order to effectively navigate complex choices. In order to survive and flourish, decisions need to be balanced among all members of a group, with each individual employing a sophisticated algorithm comprised of effective communication and organization strategies. The purpose of this project is to further investigate the extent to which various factors (e.g., group size and behavioral group) influence the effectiveness of decisions made by social insects. This study uses a novel approach focused on varying ant group sizes making decisions about food rewards to determine if there is an optimal group size for making effective, reward-modulated decisions in *Dorymyrmex bicolor*. Results showed that medium-sized groups (four and six ants) of foragers were able to optimize decision-making. Specifically, medium-sized groups were significantly better at finding a food source, and identifying the better food source. These data indicate that individual ants do not have the support system necessary to make effective decisions while larger groups get too chaotic and spread out a decision too far amongst themselves, so medium-sized groups emerge as optimal. Findings shown in this study are critical to helping understand the evolution of behavioral mechanisms that optimize decision making, as well as indicate that all species may possess mechanism to optimize collective, reward-modulated decisions.

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