
Conceptions of Multilevel Selection and their Implications for Empirical Results

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Abstract

Biologists and philosophers continue to debate the concept of natural selection working in hierarchical biological systems. At the core of these 'multilevel selection' debates are questions about the best models and conceptual approaches to understand selection occurring across multiple levels of biological organization and how to define or identify levels or units of selection. Most of these discussions have focused on providing conceptual clarity without addressing how well these models and approaches can be used to identify levels or units in experimental studies. In this regard, it seems important to compare the varied approaches advocated by theoreticians and philosophers of biology with the approaches used by experimentally focused researchers, in order to understand if there are important consequences when interpreting empirical group and multilevel selection data. Here I will present the experimental design for a multilevel selection experiment using the parasitoid wasp *Nasonia* to serve as an in-principle model to which I will apply a selection of advocated analyses drawn from the theoretical, philosophical, and experimental literature. In doing so, my goal is to explore how the differences in proposed approaches can lead researchers to different conclusions, even when applied to the same empirical example. I will also highlight the ways in which the theoretical, philosophical, and experimental approaches to multilevel selection correspond and the ways they differ, and I will suggest some ways that these different approaches can be combined to contribute to future research.

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