

## Invited Commentary

**Everybody has a social life. Can social network analysis help us understand why not just how? Comment on Pinter-Wollman et al.**

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As Trivers (1985) noted in the preface to his book on social evolution, everybody has a social life: "Life is intrinsically social and it evolves through a process of natural selection which is itself social...social evolution refers not only to the evolution of social relationships between individuals but also to deeper themes of biological organization stretching from gene to community." Typically the study of social behavior and evolution has focused more on the characteristics of the socializing individuals rather than the social interactions themselves until recently. It is increasingly being recognized that understanding the processes that lead to the emergence of sociality and other higher order levels of organization requires an understanding of the social interactions themselves (e.g., Székely et al. 2010; McDonald et al. 2013): It is not necessarily the size of the group that matters but who is in the group and how you interact with them that counts.

Taking a social networks analysis (SNA) approach to studying the behavior of social organisms has many benefits, not least because it allows us to shift the emphasis away from variation in behavior among individuals to how interactions among these individuals shapes variation that natural selection acts on (Fewell 2003; Royle et al. 2012). However, despite the benefits, applying networks' approaches to problems in behavioral ecology are not as widespread as perhaps might be expected. This seems surprising given the availability of some excellent books (e.g., Croft et al. 2008) and review articles (e.g., Wey et al. 2008; Sih et al. 2009) that provide clear introductions to SNA and explanations of the potential for new insights to existing problems across a range of topics in behavioral and evolutionary ecology.

One reason for this may be the lack of, or lack of awareness of, the statistical tools needed to be able to test hypotheses. This is the central premise of the review by Pinter-Wollman et al. (2013). The statistical problems associated with analyzing networks data are not inconsiderable, and this has, to some extent, limited the scope for using SNA to test relevant ecological and evolutionary hypotheses. As a result, most studies using SNA are largely descriptive in approach. One of the main messages of this new review is therefore that we need to get beyond the descriptive and use SNA to answer functional questions about sociality. In order to facilitate this, Pinter-Wollman et al. (2013) provide an excellent users

guide to some recent advances in statistical techniques and more importantly the available software for running the analyses. In addition, they identify some of the more pressing conceptual challenges involved in applying SNA approaches to problems in behavior, ecology, and evolution and suggest effective ways to reenergize the field (e.g., sharing of databases via digital repositories such as Dryad).

Although the potential wider utility of some of the proposed approaches is not yet clear (e.g., the applicability of motif structure analyses beyond that of studying dominance interactions), without applying these approaches to data to test specific hypotheses we will not know how useful they are. Although the initial effort to get to grips with utilizing SNA to answer questions in behavioral ecology is not inconsiderable, this present review, in conjunction with introductory texts (e.g., Croft et al. 2008) and key review articles (e.g., Wey et al. 2008; Sih et al. 2009), provides an ideal springboard from which to leap. Hopefully, this new review will provide the appropriate encouragement for behavioral ecologists to use SNA to test hypotheses concerning social evolution and not just use it for describing social structure or, for that matter, writing more reviews (although obviously there is nothing wrong with either descriptive studies or reviews per se!). The rewards for doing so are likely to be high; SNA provides a rapidly improving toolbox for unlocking the complexities of social behaviors that can help us understand not just how we have a social life but why.

**FUNDING**

NJR's research is funded by the Natural Environment Research Council, UK.

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Received 9 May 2013; accepted 20 May 2013.

doi:10.1093/beheco/art055

**Forum editor:** Sue Healy

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