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Peer Review

Review of: "Social and Spatial Drivers of the Multitiered Structure of Zebra Finch Social Networks"

Mason Youngblood¹

1. State University of New York at Stony Brook, United States

This manuscript describes an interesting study about the multi-tiered structure of zebra finch populations. The data are remarkably fine-grained, and the analysis methods are standard and well-justified. The results and conclusions are mostly descriptive, but the use of null models allows the authors to interrogate some of the drivers of structure. In general, I think the authors assume a high level of expertise in network analysis on the part of their readers, and I think it would help a lot to introduce the core concepts in a clearer way. I would also recommend putting the "Methods" before the "Results", as there are several cases where concepts, terms, or methods appear in the paper before they are described in detail. Below are other comments in loose order of priority.

The logic of using a clustering algorithm that optimizes within- and between-cluster distances to identify the number of "tiers" in the social networks is not immediately obvious... Isn't the structure nested? So a cluster that includes tier 3 would also include 1 and 2? The authors need to expand on the logic here.

"... there is no evidence these sets of close associates act as stable social units." I may have missed this, but was this directly assessed in the analysis? Cosine similarities of 1 would be extremely unlikely, right? So above-chance cosine similarities indicate quite stable close relationships?

"Null Model 1" and "Null Model 2" are used early in the results but are not introduced and labelled 1 and 2 until later in the results and the methods. I would recommend introducing them sooner and consider using a more informative label (e.g., spatial and social null). In addition, the description of null model 2 in the methods is unclear. It reads "and the null model 2 by pair of zebra finch to be in physical contact on each day". What does that mean? It seems like the only place in the results where the replicates come into play is the results in Table 3, corresponding to the Louvain analysis. I imagine other findings were conducted across replicates, so it's probably worth making this more prominent.

Is the method for computing edge weights sensitive to the number of perches in the enclosure (i.e., the number of spatial locations that are accounted for)?

How are 95% CIs for the number of social partners calculated?

It would be helpful for the authors to introduce the term "fractal" in the context of network structure. It is explained in the results but should be defined when it is first used.

The goodness of variance fit index needs to be briefly explained when it first appears in the results.

Declarations

Potential competing interests: No potential competing interests to declare.