Movement Among Mating Arenas Predicts Individuals' Centrality In Some Social Networks

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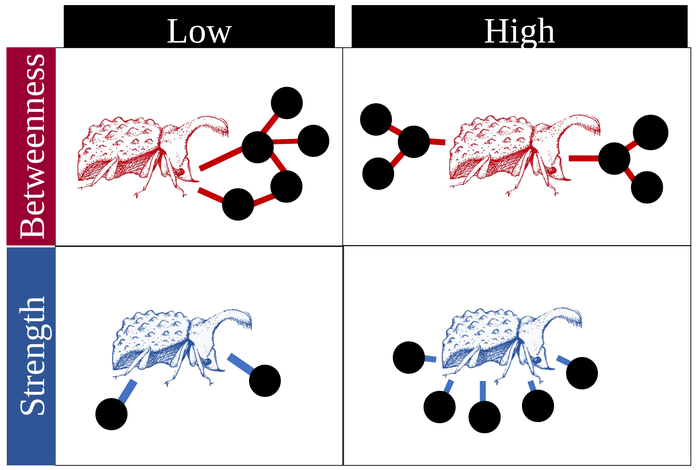
Introduction

- Because social interactions depend strongly on the location of the interacting individuals, understanding how movement affects social interactions could give us a better understanding of where individuals fit within society.
- Social networks quantify the social interactions and positions of animals within their societies.
- Forked Fungus Beetles (*Bolitotherus cornutus*) spend most of their life cycles on fungal brackets.
- Within these fungal social arenas, they exhibit a number of social interactions: fighting, courting, copulating etc.
- To measure position within social networks, we use measures of centrality like **strength** and **betweenness**.



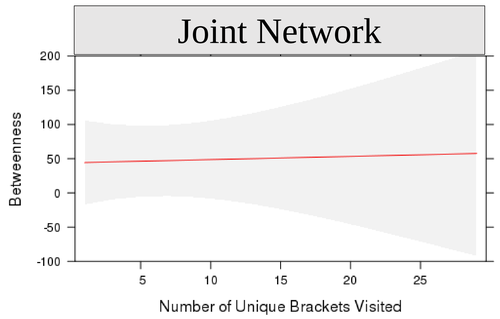
- This study investigates how **movement** within populations affects **betweenness** and **strength**.

Methods

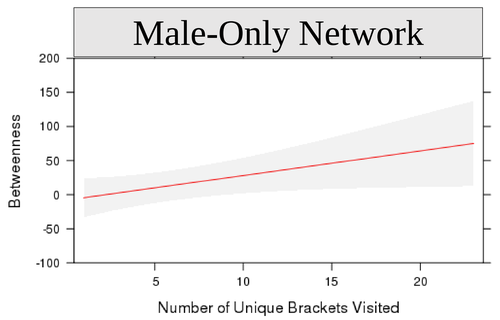
- To measure movement within populations, we used the **number of unique fungal brackets** each beetle visited during the 2016 breeding season.
- We used a general linear mixed model to assess whether movement among brackets predicted betweenness and strength.
- Number of observations, elytra size, sex, were used as fixed effects and population was a random effect.

Results

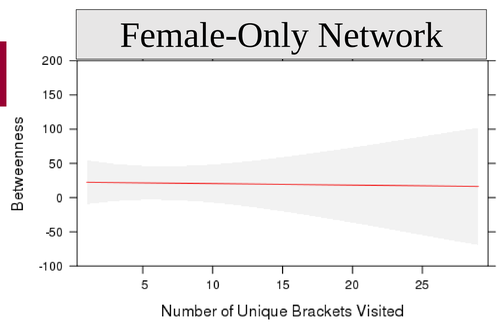
Betweenness



Chisq	Df	P value
0.02	1	0.88

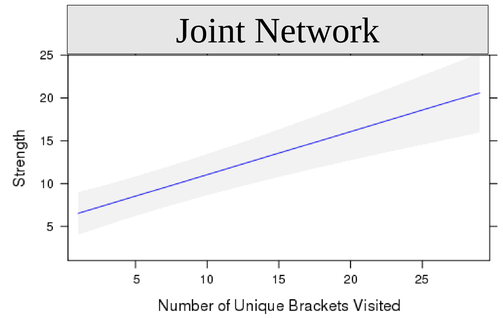


Chisq	Df	P value
4.2	1	0.04 *

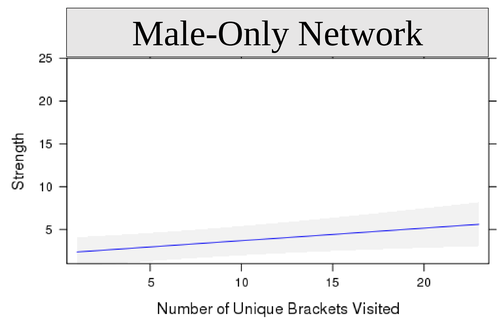


Chisq	Df	P value
0.014	1	0.91

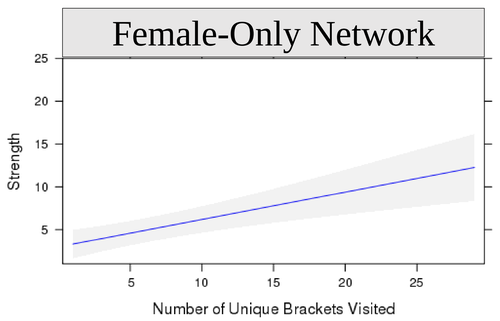
Strength



Chisq	Df	P value
32	1	<0.0001 ***



Chisq	Df	P value
6.3	1	0.01 *



Chisq	Df	P value
15	1	<0.0001 ***

Discussion

- Despite being correlated, **strength** and **betweenness** are affected by movement differently.
- As individuals go from bracket to bracket they are increasing their **strength**.
- The relationship between movement and betweenness differs among the sex-specific networks.
- Movement within male-only social networks affects both measures of centrality.
- As males move around they are connecting new sections of the social network while females are not .

References

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- Formica, V. A., Augat, M. E., Barnard, M. E., Butterfield, R. E., Wood, C. W., & Brodie, E. D. (2010). Using home range estimates to construct social networks for species with indirect behavioral interactions. Behavioral Ecology and Sociobiology, 64(7), 1199-1208. doi:10.1007/s00265-010-0957-5

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