

INTRODUCTION

- Sexual selection due to mate choice is an important cause of signal divergence and elaboration.
- Mate choice takes place in complex social environments where potential mates are compared.
- Rankings of attractiveness (mate preferences) may be “rational” (stable across social contexts) or “irrational” (varying with the social context) (Kirkpatrick et al. 2006).
- There is evidence of irrational mate preferences in humans, primates, & amphibians (Kirkpatrick et al. 2006; Lea & Ryan 2015).
- We tested for rationality-irrationality in the mate preferences of an insect: *Enchenopa binotata* treehoppers (Hemiptera: Membracidae).
- *Enchenopa* communicate with plant-borne vibrational signals, and pair formation involves male-female duetting.



HYPOTHESES & PREDICTIONS

H1: *Enchenopa* mate preferences are rational

P1: Preference rankings will be stable regardless of the social context

H2: *Enchenopa* mate preferences are irrational

P2: Preference rankings will change based on the social context

METHODS

- We collected *Enchenopa* nymphs near UWM, and reared them on potted *Viburnum lentago* host plants at the greenhouse.
- When females matured, we presented them with vibrational playback treatments of peak or nadir attractiveness to vary the social context.
- These playbacks were immediately followed by test playbacks of intermediate attractiveness-unattractiveness (Table 1).
- We recorded female duetting signals given in response to the playbacks with a laser vibrometer.
- Statistical model: dependent variable: number of female response signals; explanatory variables: treatment playback, test playback, and their interaction.

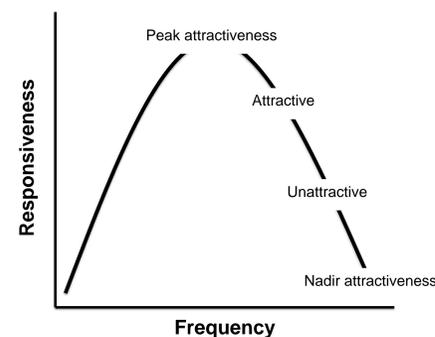


Table 1: Sequence of treatment and test playback stimuli presented to *Enchenopa*.

Treatment playback	Test playback
peak attractiveness (185 Hz)	attractive (195 Hz) unattractive (220 Hz)
nadir attractiveness (250 Hz)	attractive (195 Hz) unattractive (220 Hz)
control (no playback)	attractive (195 Hz) unattractive (220 Hz)

RESULTS

- *Enchenopa* females expressed preferences for the test playbacks as expected from prior work (significant test playback term; Table 2; Fig 1).
- These preferences remained stable across social contexts (non-significant interaction term; Table 2).
- The “nadir attractiveness” treatment tended to increase female responsiveness though not significantly (Table 2).

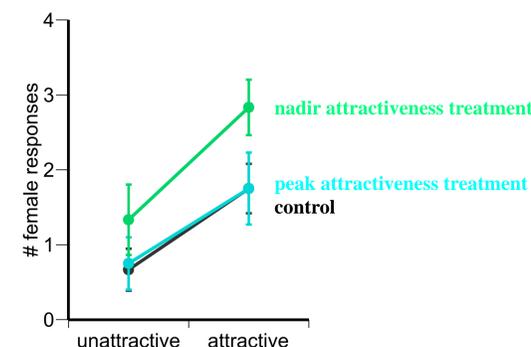


Figure 1: Variation in *Enchenopa* female responses to vibrational playbacks (unattractive-attractive) according to treatments of preceding peak or nadir attractiveness playbacks. Shown are mean \pm SE. $N=12$ per females/treatment

Table 2: Analysis of variation in *Enchenopa* female response signals to treatment and test playbacks.

Source	DF	F	P
Treatment playback	2	2.39	0.11
Test playback	1	22.93	<.0001
Interaction	2	0.38	0.68

DISCUSSION

- Our results support the hypothesis that *Enchenopa* females use rational mate choice.
- Mate preferences remain constant regardless of the social context.
- This suggests that patterns of mate choice and selection on signals should be robust to variation in composition of the aggregations during the mating season.
- Additionally, female responsiveness varied with the social context.
- This is consistent with evidence that *Enchenopa* females adjust their mate preferences to pursue preferred mate types while ensuring that mating occurs (Fowler-Finn & Rodríguez 2012).



REFERENCES

- Fowler-Finn KD & Rodríguez RL. 2012. Experience-mediated plasticity in mate preferences: mating assurance in a variable environment. *Evolution* 66, 459-468
- Kirkpatrick, M., A. S. Rand, and M. Ryan. 2006. Mate choice rules in animals. *Animal Behaviour* 71, 1215-1225.
- Lea, A. M. and M. J. Ryan. 2015. Irrationality in mate choice revealed by tungara frogs. *Science* 349, 964-966.