Female spadefoot toads do not discriminate against sterile hybrid males

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Background

- The spadefoot toads *Spea bombifrons* and *Spea multiplicata* co-occur in deserts of the southwestern US, where they sometimes hybridize[1,2].
- First generation (F1) hybrid males are sterile[3], thus females of both species should avoid mating with sterile F1 hybrid males because they are a dead end for fitness (no offspring).
- **We performed two types of behavior experiments with females of *S. bombifrons* and *S. multiplicata* to assess whether they discriminate against hybrid male calls.**

Experiment 1: Choice Tests

Do females choose pure species calls over hybrid calls?

Each female tested twice in circular pool with alternating synthetic calls from two speakers at edge (Fig. 1)

- Hybrid vs. conspecific call
- Hybrid vs. heterospecific call

Female **choice** indicated by swimming up to and touching platform containing a speaker (within 30 min)

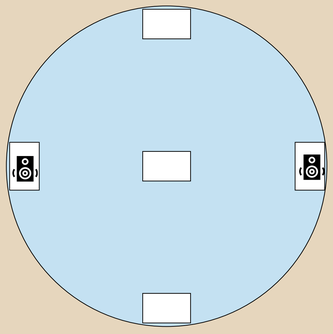

Figure 1 Arena design for choice tests. White rectangles represent platforms rising just above water level. Black icons represent speakers.

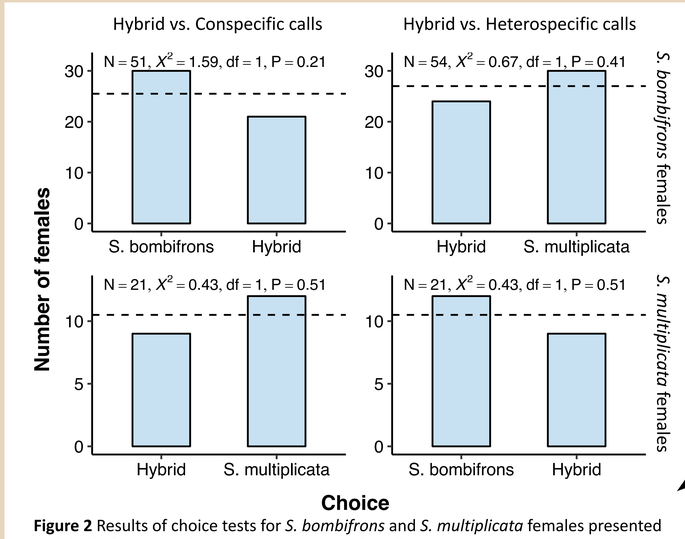

Figure 2 Results of choice tests for *S. bombifrons* and *S. multiplicata* females presented with hybrid versus either con- or heterospecific calls. No comparisons show significant deviation from random choice (dashed lines).

Females of neither species discriminate hybrid male calls from pure species male calls when presented in pairs.

Experiment 2: No-choice Tests

Do females associate less with hybrid calls than conspecific calls?

*Only performed with *S. multiplicata* females to date.*

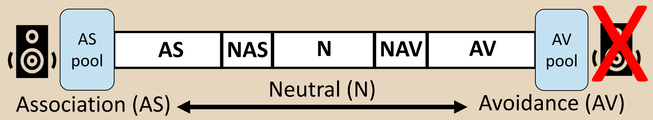

Figure 3 Arena design for no-choice tests. White represents PVC halfpipe, open on top, with association/avoidance zones indicated. One speaker playing call, one silent (X-ed).

- Single, continuous call (either conspecific or hybrid) from one speaker for 10 minutes.
- Recorded **time** spent in each **zone** (Fig. 3); **pool choice** (if any)

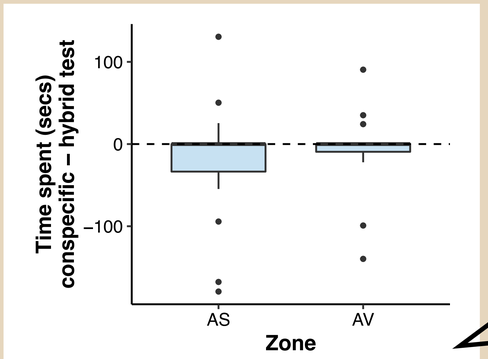

Figure 4 Time spent associating with (AS) and avoiding (AV) hybrid versus conspecific calls does not differ (paired t-tests, $p > 0.05$).

***S. multiplicata* females do not associate less with hybrid calls, or avoid them more, than conspecific calls.**

Conclusions

- Both experiments suggest that females are not discriminating between F1 hybrid and pure species male calls (Fig. 2, Fig. 4).
- Failure to discriminate against sterile hybrid males could cause a missed year of reproduction.

Future work

- Test heterospecific calls in **Experiment 2** setup. Do females associate more or less with heterospecific calls than hybrid calls?
- Repeat **Experiment 2** with *S. bombifrons* females. Do they also fail to discriminate against hybrid calls?

References (1) Pfennig, K. S., Simovich, M. A. 2002. Differential Selection to Avoid Hybridization in Two Toad Species. *Evolution*, 56(9), 1840-1848. **(2)** Pfennig, K. S. 2007. Facultative Mate Choice Drives Adaptive Hybridization. *Science,* 385, 965-967. **(3)** Wünsch, L. K., Pfennig, K. S. 2013. Failed Sperm Development as a Reproductive Isolating Barrier between Species. *Evol Dev*, 15, 458-465
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