Sensory processing during mate choice impacts the dynamics of sexual selection

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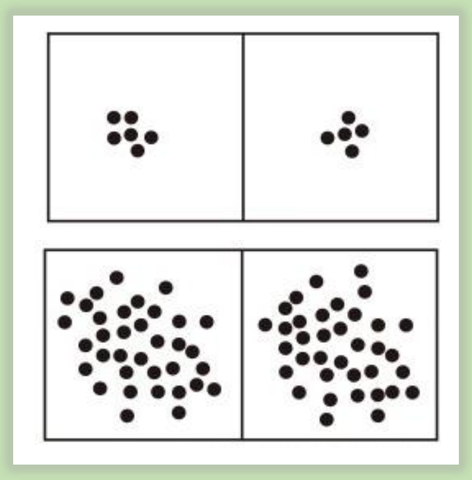
1 Background

During mate choice, the **magnitude of sexual signals** often **influences mating preferences**, where females can compare male stimuli in a **non-linear way**. An example of this is **Weber's Law**, where discrimination between signals is based upon their **proportional difference** rather than their absolute difference. This means that when comparing males, **a fixed absolute difference is easier to perceive at smaller magnitudes than at larger magnitudes**.

Discriminating clusters is easier the larger the proportional difference between stimuli



2 How could Weber's Law impact sexual selection?

Further signal exaggeration (chase-away selection)

No further signal exaggeration (relaxed directional selection)

Increased signal complexity (innovation over exaggeration)

No

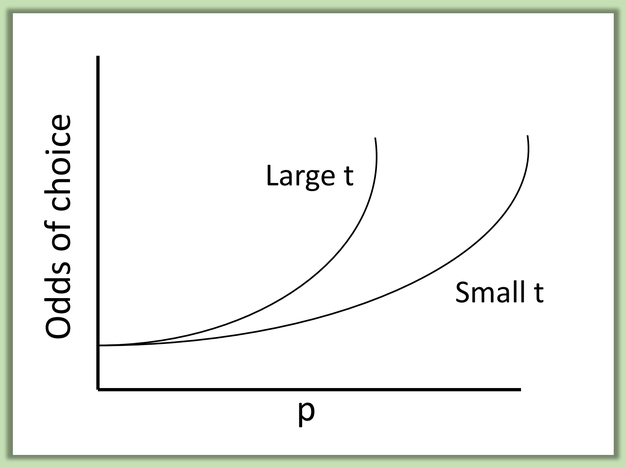
Yes

Sufficient signal variation to overcome the effects of proportional processing?

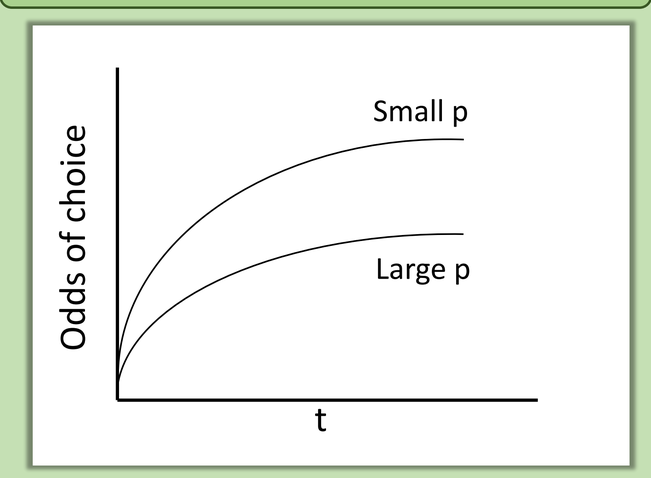
3 Agent-based models

Simulations of Fisherian sexual selection were run for populations of 5000 individuals over 150000 generations.
Individuals were diploid organisms, with loci for **male trait values (t)** and **female preference values (p)**.
Mate choice was run using either **open-ended or Weber preferences**.

Fisherian open-ended preferences

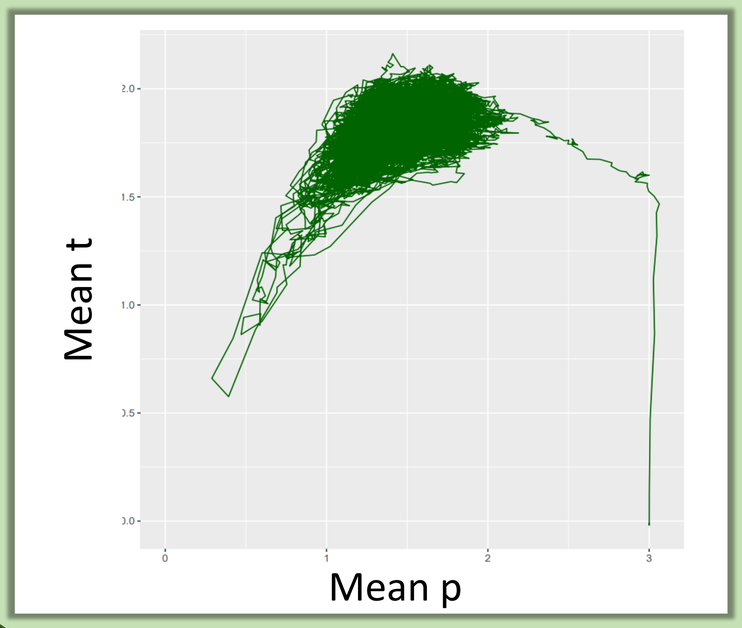


Fisherian Weber preferences

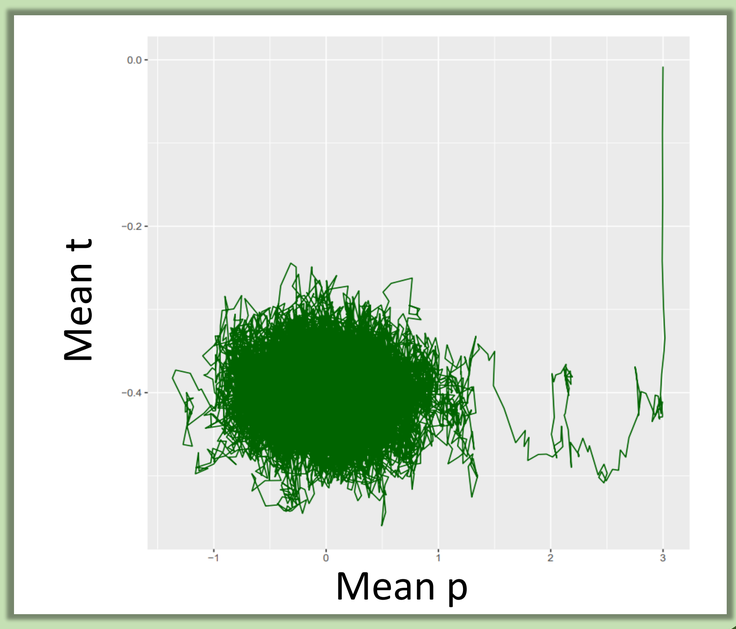


4 Unidimensional traits

Fisherian open-ended preferences

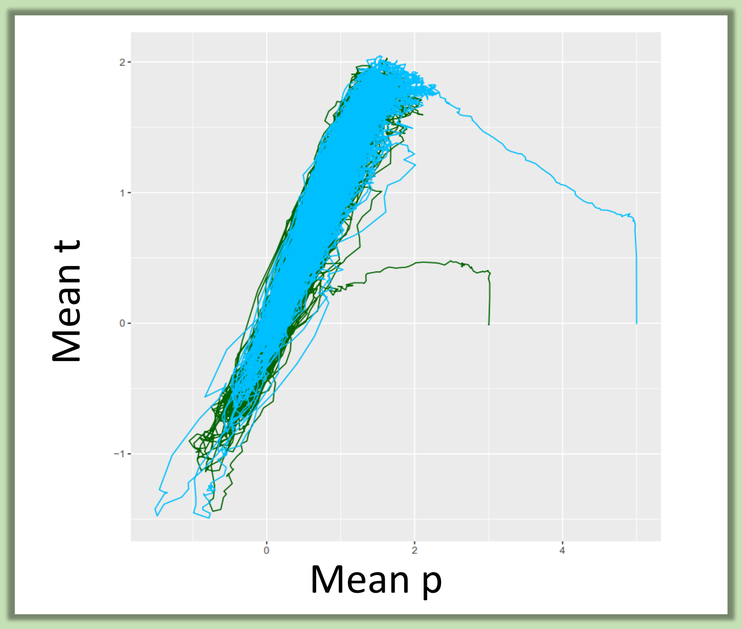


Fisherian Weber preferences

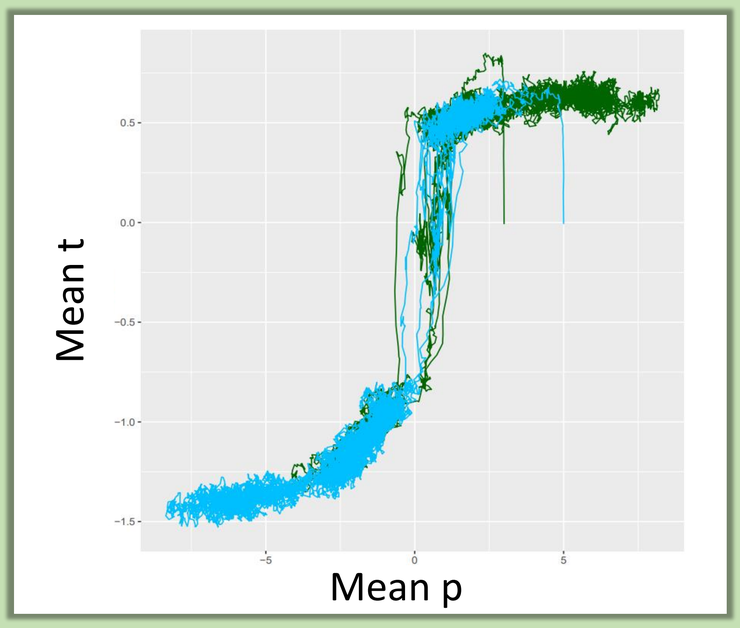


5 Multidimensional traits

Fisherian open-ended preferences



Fisherian Weber preferences



6 Conclusions

- Using Weber-based preferences in models of sexual selection **limits the exaggeration** of both **male traits and female preferences**
- When multiple traits and preferences are allowed to evolve, Weber-based preferences cause them to **diverge to two different equilibria**