

Betta Splendens Challenge Response to Comparative Size

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Figure 1. Butterfly Betta in tank displaying fins.

Does perceived comparative size influence fish aggressiveness?

Response to:

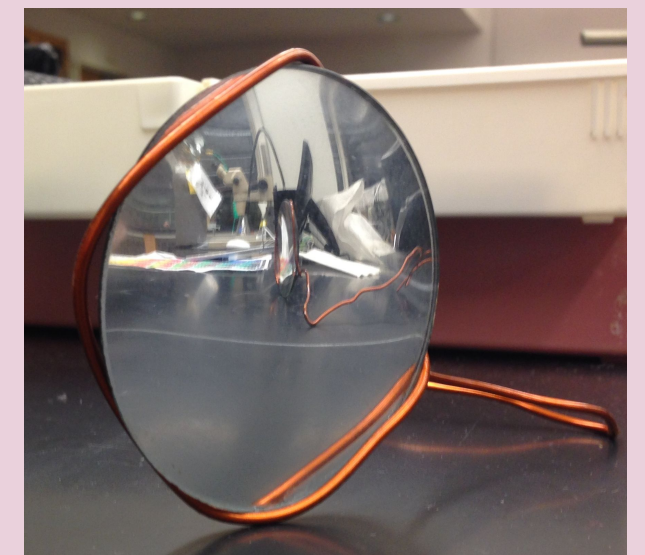
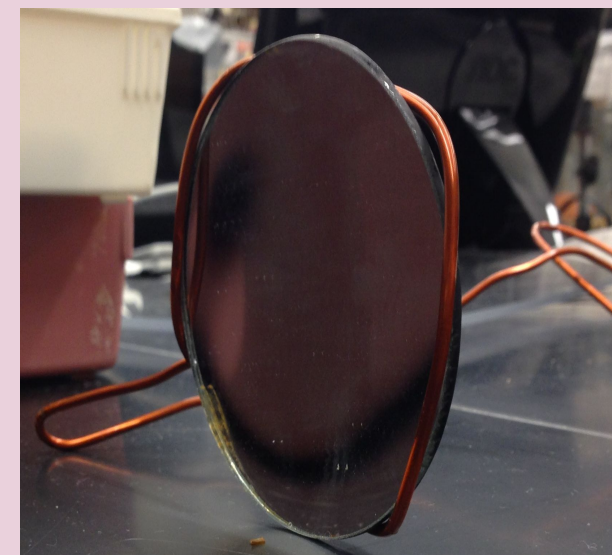
- **Larger reflection (concave mirror)**
- **Same size reflection (flat mirror)**
- **Smaller reflection (convex mirror)**

Aggressive Behaviors and Testosterone levels

Experimental Design:

Hypothesis: Fish will respond most aggressively to concave mirrors (bigger fish) and least aggressively to convex mirrors (smaller fish)

- 6 *Betta Splendens* Fish
 - 3 Butterfly and 3 VeilTail
- 3 Mirrors
 - Concave, convex, flat
- Randomized order
- **Experiment:**
 - 10 minute acclimation
 - 15 minute test period
 - 20 minute hormone collection
- **Behaviors analysis**
- **ELISA**



Experimental Results:

- **Behavioral**

- JWatcher Event Recorder

- **Ethogram:**

- **Aggressive:** Gill Flare, Bite, Lateral Quiver, Chase

- **Submissive:** Flee

- **Neutral:** Disengage, Free Swim, Excretion, Still

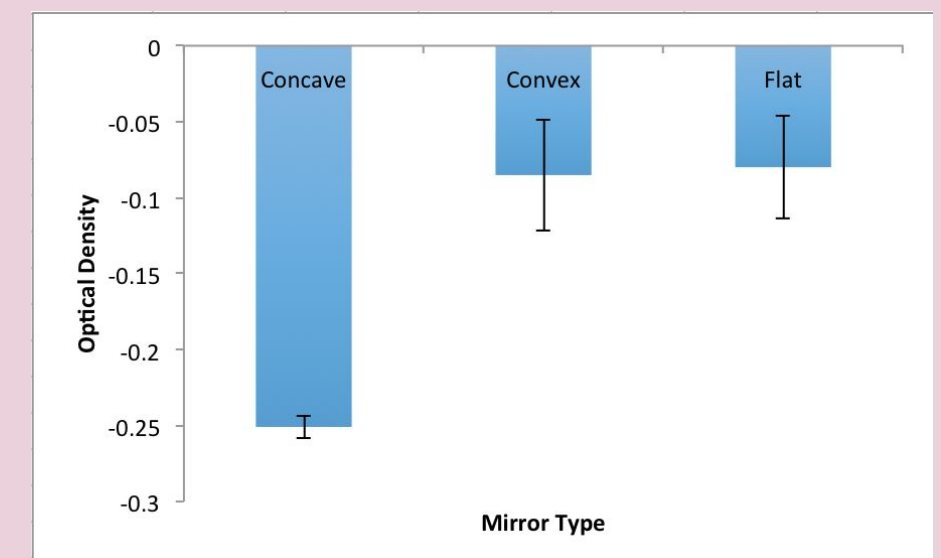
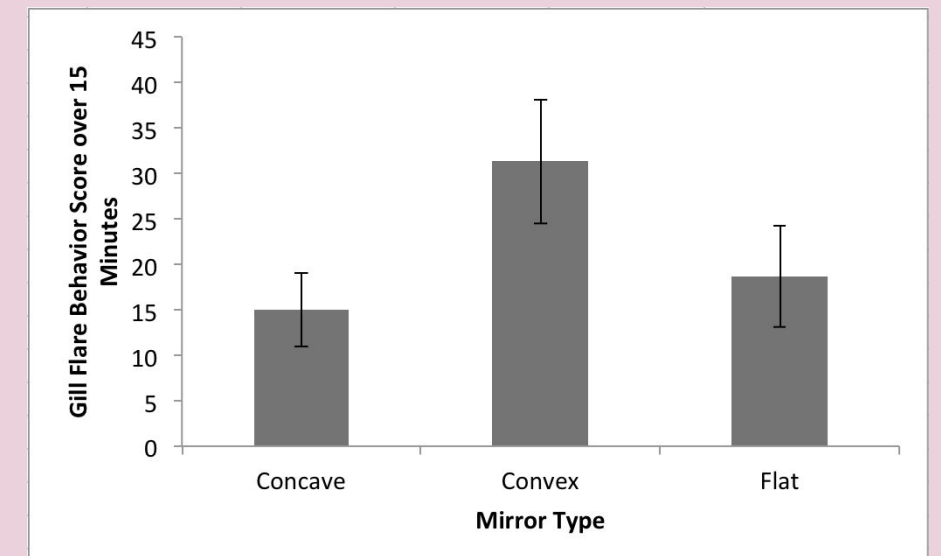
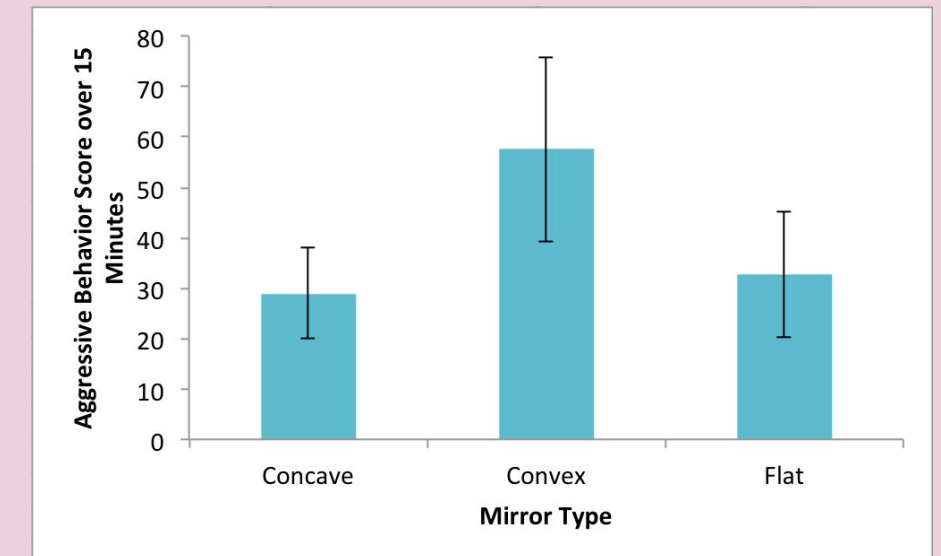
- *Figure 1. Composite aggressive behavior score*

- *Figure 2. Gill Flare score*

- **Hormones: testosterone comparison**

- Condition vs. Baseline

- *Figure 3. Optical density (greater density, lower testosterone)*



Conclusions:

Differential Responding

- There was differential responding
- More testosterone response to **flat and convex (larger opponent)**
- More behavioral response to **convex (larger opponent)**

Future Directions:

Different Techniques:

- Other species of fish
- Live fish
- Greater difference in size
- Different mirrors or mirror recording
- Competition in presence of a mate

References:

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<http://doi.org/10.1093/icb/ics057>
2. Desjardins, J., Fernald, R. (2010). What do fish make of mirror images. *Biol. Lett.* doi: 10.1098/rsbl.2010.0247
3. Elwood, R., Stoilova, V., McDonnell, A., Earley, R., Arnott, G., (2014) Do mirrors reflect reality in agonistic encounters? A test of mutual cooperation in displays. *Animal Behavior*,

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