

A Suppressive Effect of Light in *Betta splendens*

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In a recent overview of articles published during the past 50 years in the *Journal of the Experimental Analysis of Behavior*, Catania (2008) noted the sharp decline in research on aversive control and asked:

“Has the conduct and publication of research on punishment and escape and avoidance and conditioned suppression and related phenomena been punished? ... Have we learned enough about aversive-control phenomena in the past half-century that we do not need to study them any more? ... In a world so filled with aversive events that enter into various contingencies with behavior ..., can we entertain any extensions of our applications without continuing or expanding our experimental analyses of these phenomena?”

(pp. 114-115)

Research on aversive control typically has involved painful electric shock with birds and mammals. Non-painful aversive events with organisms that are lower on the phylogenic scale may be more palatable to researchers and review boards. We report on preliminary work conducted using a brief light flash as a potential mild aversive event with male Siamese fighting fish (*Betta splendens*).

Method

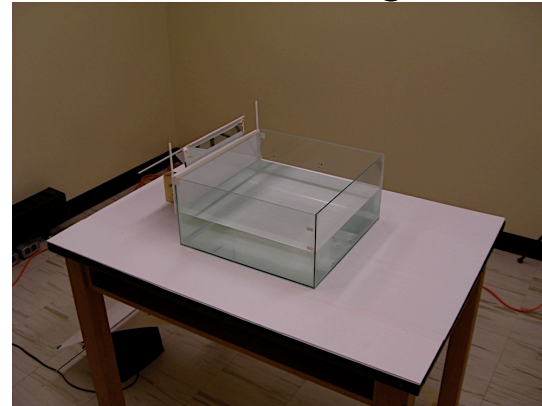
Subjects

2 *Betta splendens*
(Fish A and Fish B)

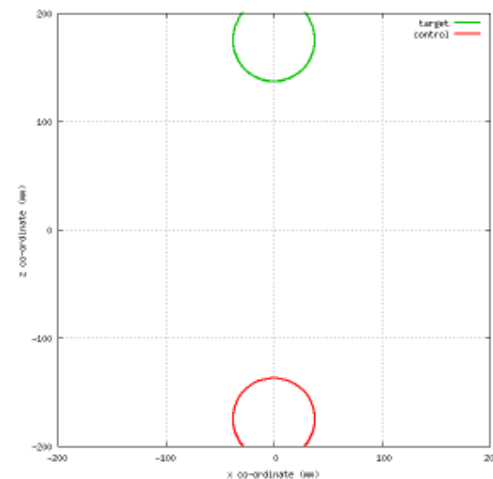
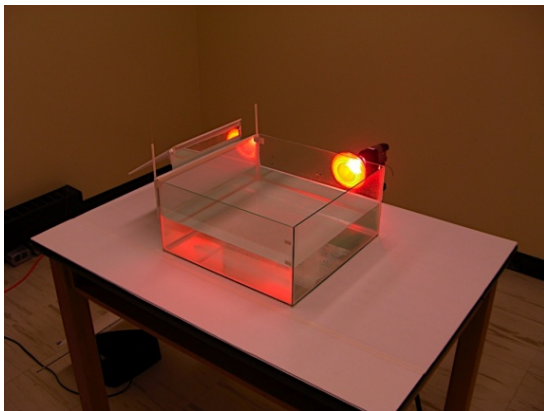


Apparatus

Tank containing a mirror and
a shutter covering the mirror.



Potential aversive event:
1-sec exposure to red
100-W flood light



Tank contained two virtual target areas – the
experimental target (in green) and the control
target (in red).

Experiment 1 - Procedure

Baseline – Treatment – Return to Baseline

Fish A

- Received 20-sec of mirror presentation contingent on contacts with experimental target in all three phases
- During Baseline, bulb was not present
- During Treatment, contact with experimental target produced 1-sec flash light from bulb
- During Return to Baseline, bulb was not present

Fish B

- Never received mirror presentation
- Bulb was present in all three phases
- During Baseline, there were no programmed consequences for contact with experimental target
- During Treatment, contact with experimental target produced 1sec flash from bulb
- Return to Baseline was the same as Baseline

Results - Fish A

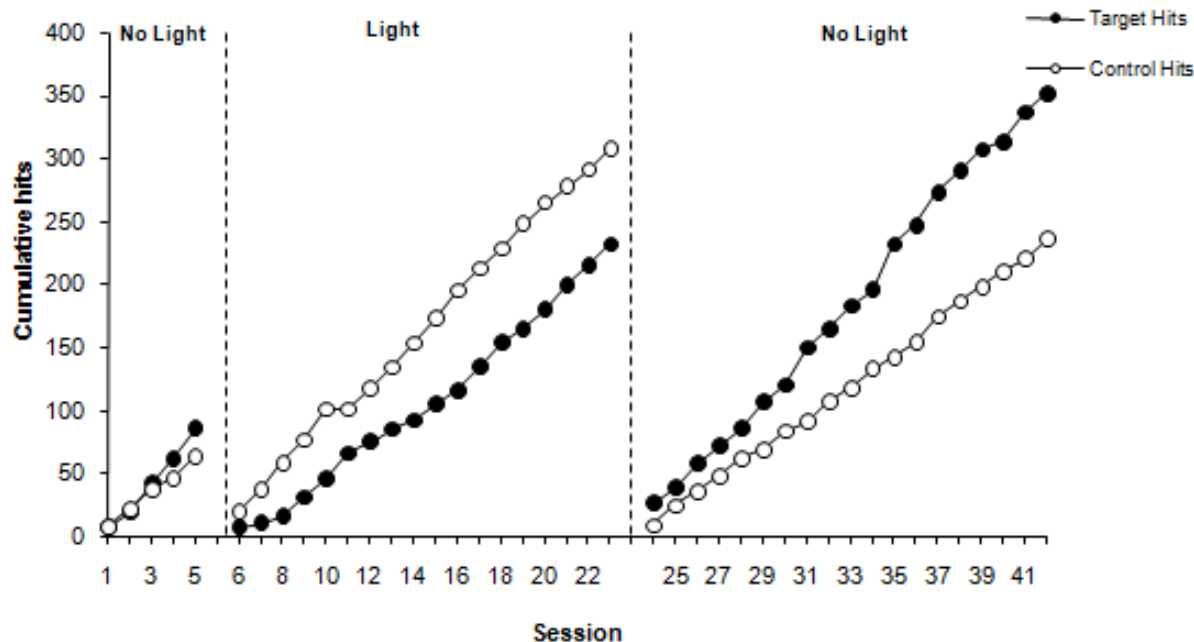


Figure 1. Fish A Cumulative control and target hits per session.

- In the Treatment Phase, there was an initial decrease in contacts with the experimental target
- In the Return to Baseline, contacts with experimental target increased to Baseline levels

Results - Fish B

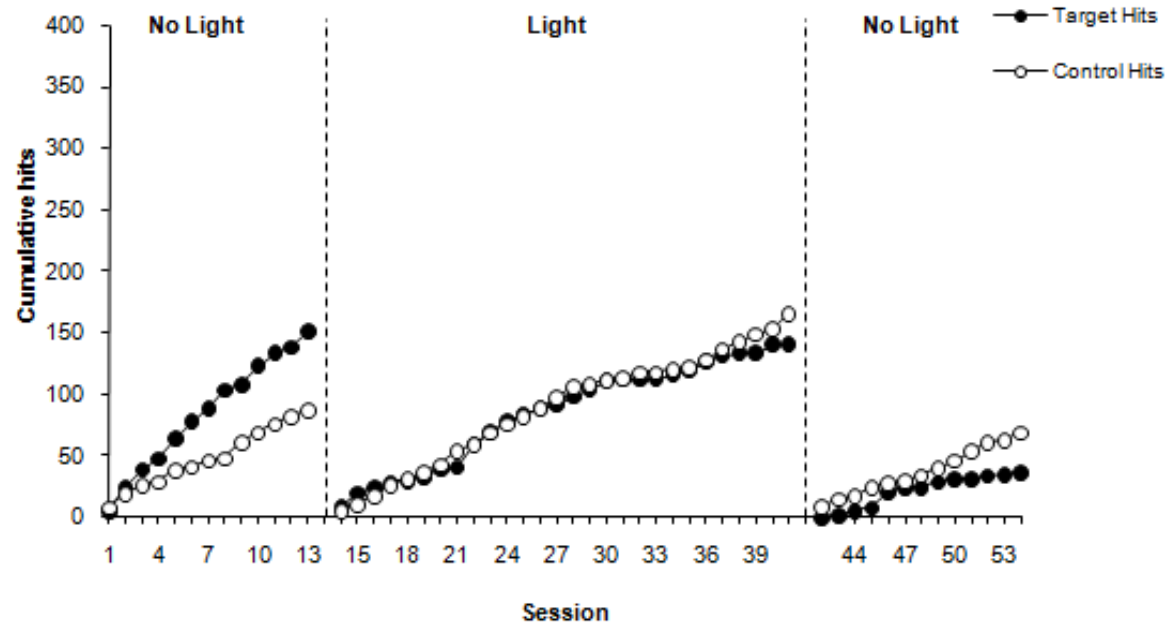


Figure 2. Fish B Cumulative control and target hits per session.

- During baseline, experimental target hits were higher than control hits
- During Treatment, decrease in contacts with experimental target
- During Return to Baseline, fish did not show recovery

Experiment 2 - Procedure

- Fish A
- Alternating sessions

Phase 1

| | | | | |
|----------|----------|-----|----------|----------|
| light | bulb | vs. | light | bulb |
| N | N | | Y | Y |

Phase 2

| | | | | |
|----------|----------|-----|----------|----------|
| light | bulb | vs. | light | bulb |
| N | N | | N | Y |

Mirror continued to occur contingent on contact with experimental target in both phases.

Experiment 2 - Results

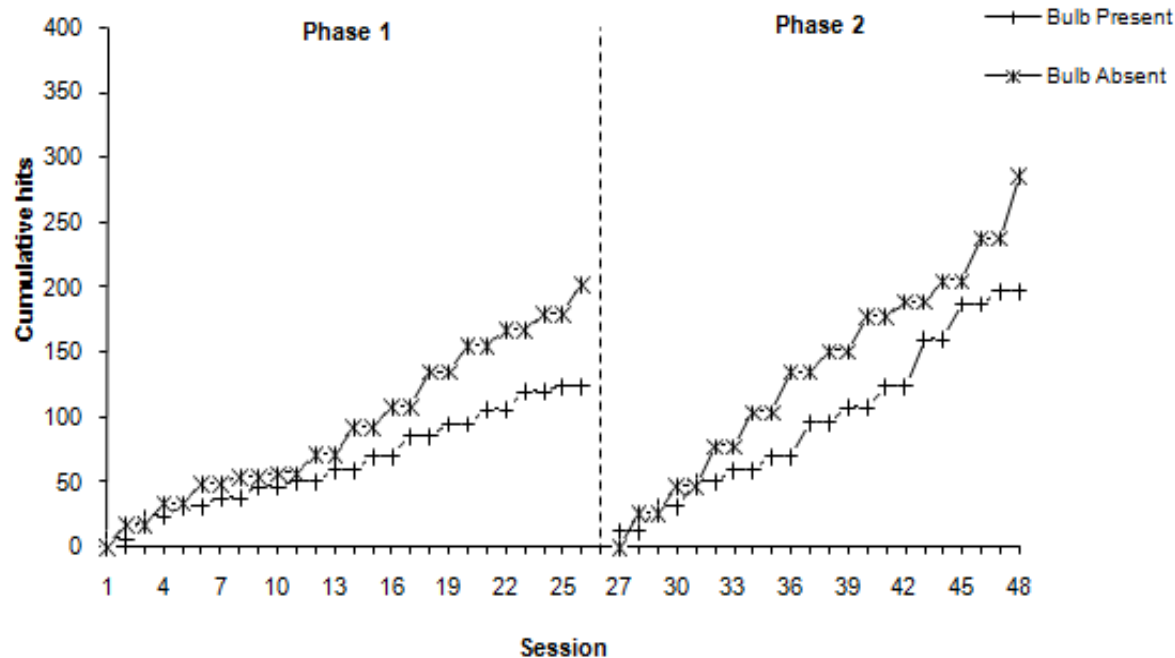


Figure 3. Fish A Cumulative target hits per alternating session. In Phase 1 when bulb was present, light was contingent on hits. In Phase 2 there was no light, even though bulb was present.

- Contact with target was lower when bulb was present than when it was not, even in Phase 2
- This again indicates light was acting as a mild aversive stimulus
- In addition, it shows the bulb acquired stimulus control over the punished response

Discussion

- For both fish, presenting the light contingent on contact with the experimental target appeared to suppress this contact but not eliminate it.
- Thus, the light acted as a mild aversive stimulus for both fish.
- As a result of pairing with light, the bulb suppressed responding on its own, demonstrating stimulus control of a punished response.
- The differences that occurred between fish could have been due to individual differences or differences in procedure.

Reference

Catania, A. C. (2008). *The Journal of the Experimental Analysis of Behavior* at zero, fifty, and one hundred. *Journal of the Experimental Analysis of Behavior*, 89, 111–118.