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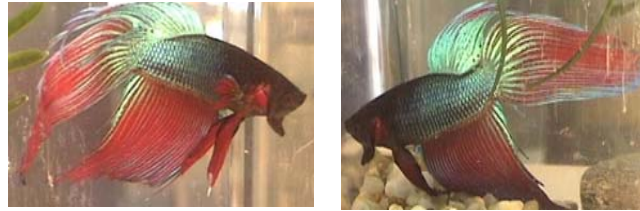
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# Differential habituation of male *Betta splendens* to qualitatively different stimuli

Lauren Beard

## Abstract

Habituation is a learning mechanism that functions to decrease the amount of energy and attention focused on a certain stimuli. Male Siamese Fighting Fish, *Betta splendens*, are territorial animals that defend their territories using a number of aggressive displays. Male Bettas have previously shown the ability to habituate to the presence of a conspecific male when visually exposed to each other. Due to the costly nature of many of the male Betta's displays, I hypothesized that male Bettas should differentially habituate to qualitatively different stimuli. I presented each of three groups of male *Betta splendens* with a different stimulus, each presenting a different level of interactivity. I predicted that the Bettas would be more likely to habituate to a less interactive stimulus than a more interactive one. No significant habituation was observed in any of the groups and no significant differences in latency to display or length of display between all three groups were observed. However, overall data trends suggest that habituation was indeed occurring and that the three different stimuli elicited different levels of display. The limited amount of visual exposure to the stimuli in this experiment might account for why results were insignificant.



## Introduction

Male Bettas are highly territorial and they defend their territories using a number of aggressive displays including:

- opercular display (gill-cover erection)
- fin erection
- color change
- biting
- tail beating
- territorial circling

Male Bettas will even perform these displays to their own mirror image

Male Bettas have the ability to habituate to the visual presence of male conspecifics with prolonged exposure

**Hypothesis-** male *Betta splendens* will differentially habituate to qualitatively different stimuli

**Prediction-** male Bettas will show higher levels of habituation when presented with a less interactive stimulus than when presented with a more interactive stimulus

**Prediction-** a video tape of an active conspecific male should be the least interactive, a mirror should be moderately interactive, and a live conspecific male should be the most interactive

## Materials and Methods

- a mirror, a live conspecific male and a video of an active conspecific male served as the three visual stimuli
- 21 male *Betta splendens* used (5 in each experimental treatment group, 5 as stimuli fish for the live conspecific group, 1 as the video stimulus fish)
- Each experimental fish was exposed to specific stimulus for 15 minutes a day for 7 consecutive days
- Both latency to display and length of total display, as well as types of display behaviors performed, were recorded for each fish for each day

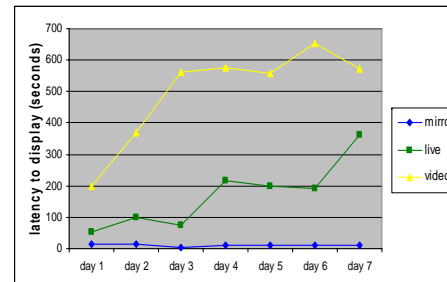


Figure 1: Mean latency to display for each treatment group over seven days

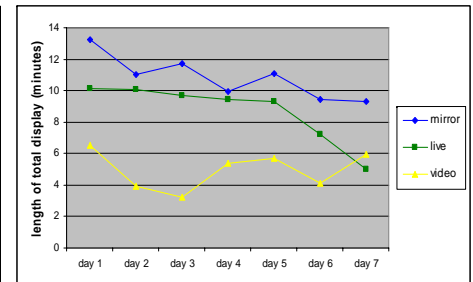


Figure 2: Mean length of total display for each treatment group over seven days



## Acknowledgements

I would like to thank Cathy Bevier for her moral support and assistance with care of the fish, as well as Austin Segel for his assistance in obtaining and caring for the Bettas.

## Results

• In each group there was no significant difference in latency to display or length of total display between day 1 and day 7 (pair-wise comparisons, Mann-Whitney U,  $p > .05$ )

• There was no significant difference in latency to display or length of total display between all three groups on day 1 nor on day 7 (Kruskall Wallance, day 1:  $n=10$ ,  $H=4.965$ ,  $p=.0835$ , day 7:  $n=10$ ,  $H=1.680$ ,  $p=.4317$ )

• There was a significant difference in length of total display between the mirror group and the video group on day one (pair-wise comparison, Mann-Whitney U,  $n=10$ ,  $U=2.00$ ,  $p=.0283$ )

## Conclusions and Discussion

• Since no significant habituation occurred in any of the groups and there was no significant difference in the display lengths or latencies to display over all three groups, my hypothesis that I would observe differential habituation was not supported.

• My prediction that the live conspecific would be the most interactive stimulus was also not supported, as the mirror generated the most lengthy displays and the least change in display length and latency to display from day 1 to day 7 (Figures 1 and 2).

• My prediction that a videotape of an active conspecific male would be the least interactive stimulus seems to be supported by the fact that the video elicited the least lengthy displays (Figure 2) and the greatest latencies to display (Figure 1).

• The overall trends seen in both Figure 1 and Figure 2 indicate that habituation was most likely occurring to some extent.

• The limited amount of visual exposure of each fish to the stimulus in this study could account for the insignificant results.

• The significant difference on day 1 between the mean length of total display for the mirror group and the video group suggests that Bettas, at least to some extent, preferentially display towards a more interactive or important stimulus.