# Comparison Between the Effects of Size and Color in Mate Choice Among Guppies

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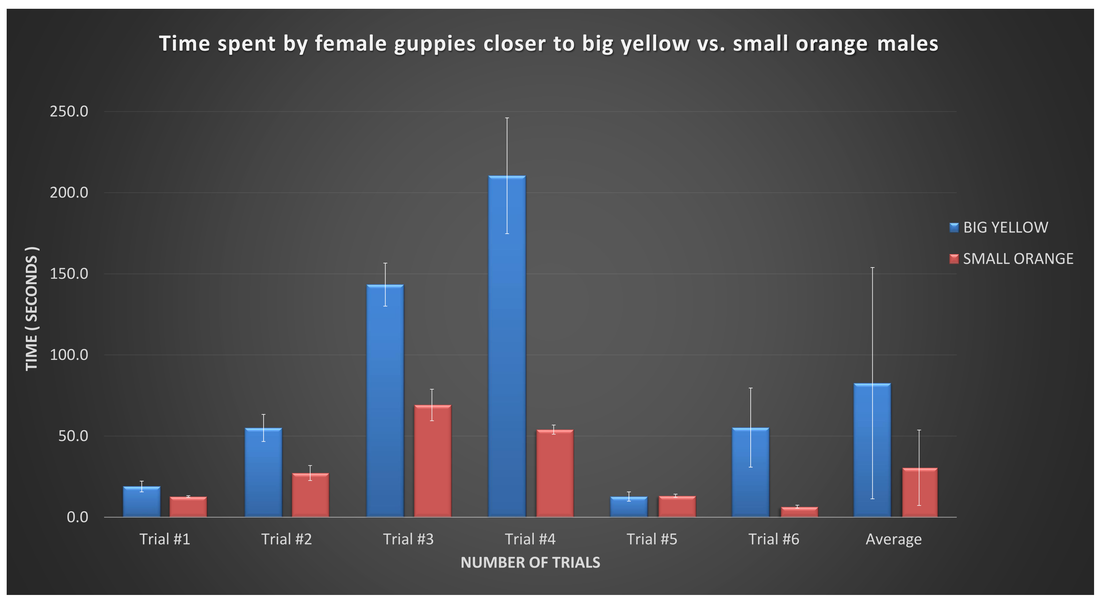
## INTRODUCTION

- The guppy, *Poecilia reticulata*, is a small freshwater tropical fish that is native to the rivers and lakes of South America.
- Guppies exhibit sexual dimorphism. Wild type female guppies are grey, 4-6 cm long and have large abdomens. Male guppies are 2.5 – 3.5 cm long, spotted, brightly colored and have large tails of various shapes. Females invest more in their offspring than males, thus female guppies are far choosier than males. Numerous studies have shown that larger, orange colored males are preferred by females over small male guppies of other colors (Houde, 1988). Both traits, large size and orange coloring, honestly advertise the phenotypic and genetic qualities of the males (Astrid, 1985).
- This study investigated whether large male size was more preferred by females than orange coloring. Six large male guppies of yellow coloring were compared against six small orange colored guppies to see if there is preference for size over color. Experiments were carried out in a tank divided into three compartments. Female guppies were placed in the middle compartment and the time they spent closer to the male on either side of the tank was recorded as their mate preference.

## RESULTS AND DISCUSSION




**Graph 1**: Time spent by female guppies with in 2.54 cm of the tank compartment of big yellow vs. small orange male guppies. Each trial consisted of a female placed in a middle compartment of a tank and two males placed in each of the end compartments. Data was collected for ten minutes – where the males were switched sides after five minutes of data collection.

- The collective amount of time spent closer to big yellow males was 495.5 seconds while the females collectively spent 182.8 seconds closer to the small orange males.
- Most of the females were observed to spend more time closer to the compartment containing the big yellow male. Although one did not seem to show any preference.
- As shown in Graph 1, on average, the females spent more time closer to big yellow males than they did with the small orange males. However, the paired t test showed that this difference was not statistically significant with a P value of 0.1429, which is greater than the conventional significance mark of 0.05.
  - t-value = 1.8197
  - P-value = 0.1429
  - Degrees of freedom = 5

## CONCLUSION

- Female guppies do not have a statistically significant preference for big yellow males over small orange males.
- Thus male size was not observed to be sexually selected for than male coloring in guppies.

## METHODS

- **Fish**: Six pairs of large yellow and small orange male fish, as shown in figure 1a and 1b, were used for comparison. The large yellow fish had an average length of 2.54 cm while the small orange fish had an average length of 1.5 cm. The two competing males in each pair were equivalent in other sexually selected traits such as spot number and level of activity. Six different females, that showed no signs of pregnancy, were used for each of the male pairs (figure 1.c).
- **TANK**: A 9.5 litter aquarium with dimensions 33.0 x 15.2 x 20.3 cm was used. The tank was heated to an optimum temperature of 22 - 26 $^{o}$C prior to testing. It was divided into three equal compartments by two transparent glass plates as displayed in figure 2a. As shown in picture 1, the tank was completely covered with white construction paper, except for one side of the middle compartment, to prevent female preference to one side of the tank due to outside colors (figure 2b).
- **Experimental design**: The two competing males were each placed in the two end compartments. A female guppy was placed in the middle compartment and was allowed to visually inspect the two males simultaneously. A timer was started when a female got within 2.54 cm of a male's compartment and stopped when she left that 2.54 cm space. The range of time the female spent within the determined proximity of either of the male compartments was continuously recorded for five minutes. After five minutes of data collection, the males were switched sides and time measurements were collected for five minutes as mentioned above. This was done to ensure that the female's preference for one side of the middle compartment was only due to the male present on that side and not due to other undetected variables. This experiment was performed six times. Data was plotted on graphs and analyzed using the paired student t-test.

**Figure 1a: Large Yellow Male Guppy**

**Figure 1b: Small Orange Male Guppy**

**Figure 1c: Female Guppy**

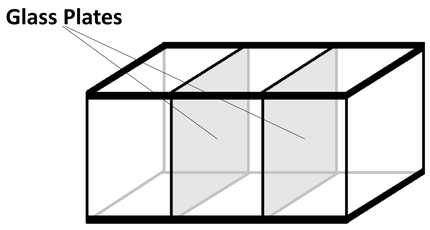



**Figure 2a: Tank with glass plate dividers**

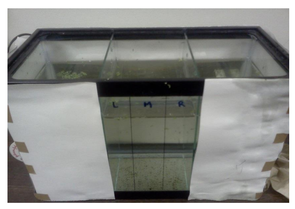


**Figure 2b: Tank covered with construction paper**

## REFERENCES

Houde, Anne E. (April 1988). "Genetic difference in female choice between two guppy populations". Animal Behaviour 36 (2): 511–516.

Astrid Kodric-Brown. (1985). "Female preference and sexual selection for male coloration in the guppy (Poecilia reticulata)" Behavioral Ecology and Sociobiology; Volume 17, Issue 3 , pp 199-205