Agonistic Behavior in *Betta splendens*
Designing a Research Project

by Dana Krempels and Adrienne DuBois

Once you have a complete ethogram for your species of interest, and are proficient at recognizing your animal's behaviors, you are ready to begin designing a protocol to address questions about its behavior.

I. Behavior Research: Example

When designing your project, consider the evolution and natural history of the species you are using as a model. Also consider the effect that artificial selection has had on its morphology and behavior. But the process of designing a sound research project is the same as what you have done before.

Consider the following imaginary example as a guide.

Observation:
All unicorns have horns. Male unicorns have either curly or straight horns, while females have small, straight horns.

Question:
Does the shape of a male unicorn's horn affect his reproductive success?

Overall Hypothesis:
The shape of a male unicorn's horn affects his attractiveness to female unicorns.

Experimental Hypotheses:

Null Hypothesis:
The shape of a male unicorn's horn ***will not affect*** the number of females who are interested in mating with him.

Alternative Hypothesis (two-tailed):
The shape of a male unicorn's horn will affect the number of females who are willing to mate with him.

OR

Alternative Hypothesis (one-tailed):
A male unicorn with a curly horn will attract more mates than a male unicorn with a straight horn.

The next step is to design an experiment that allows you to test your hypothesis via statistical data analysis. If your data indicate rejection of the null hypothesis, you must then consider possible explanations for your results.

- What might the shape of the male's horn "tell" the female about his suitability as a mate?
- Does horn shape affect the outcome of male/male competition (e.g., combat, display)?
- Do females who mate with a preferred male have greater reproductive success?
- Are the offspring of desired males more successful than the offspring of less desired males? In what ways?

This should lead you to additional questions and new hypotheses about your chosen system. A lifetime of research awaits you! See what you've gotten yourself into?

II. Paired vs. Independent Sample Tests

An experiment examining **independent samples** compares two sample means from **different populations** with respect to the same variable. In all the projects you have undertaken in BIL 151 and 161 so far, independent samples were the only type of data you were able to collect because of the nature of the samples.

An experiment examining **paired samples** compares two sample means from the **same population** with respect to the same variable at two different times. For example, one might measure the scores of students on a pre-test and a post-test. Because each individual student has a "before" and "after" value, the data are paired.

Paired samples are considerably more powerful than independent samples, as there are fewer variables that can affect the experimental outcome.