High sparrow body length decreases survival

A demonstration of Rmarkdown using Herman Bumpus’ data

Brad Duthie

# Abstract

Writing documents in Rmarkdown using Rstudio can make scientific workflow more efficient, and here I demonstrate how a scientific manuscript can be written using a classical data set first published by Herman Bumpus. I integrate Bumpus’ data with Rmarkdown to produce a sample manuscript, testing whether or not sparrow body length decreases survival following a storm in southern New England. Using a t-test, I show that surviving birds have lower body length than birds that do not survive. All analyses of data are incorporated into the underlying Rmarkdown document, including figures and a table. References are incorporated using BibTeX. The underlying code for this manuscript is publicly available [on GitHub](https://github.com/StirlingCodingClub/Manuscripts_in_Rmarkdown) as part of the Stirling Coding Club organisation.

# Introduction

In the late 1800s, there was a particulalry severe snowstorm in Providence, Rhode Island. At the time, Herman Bumpus was a professor of comparative zoology at Brown University. Bumpus noticed that the storm had a particularly negative effect on the local sparrow population (*Passer domesticus*) and decided to use the event to test Charle’s Darwin’s theory of natural selection (Darwin 1959). Bumpus collected 136 sparrows; some of these sparrows survived the storm, while others perished. Bumpus published a paper and all of the data that he had collected (Bumpus 1989). These data are now a classic data set in biology, and have been analysed multiple times (e.g., Johnston et al. 1972). Here I will use Bumpus’ data to demonstrate how to write a scientific manuscript in Rmarkdown.

The focus of this manuscript is therefore not on Bumpus’ data or survival of sparrows *per se*, but the process of scientific writing using Rmarkdown. I have chosen the Bumpus data set because it provides a useful tool for working through most key features of Rmarkdown that scientists might want to use when writing a manuscript. The example question that I will address through this data set and R analysis in Rmarkdown is whether or not increasing sparrow body length is associated with decreased survival following a storm.

# References

Bumpus, H. C. (1898). Eleventh lecture. The elimination of the unfit as illustrated by the introduced sparrow, *Passer domesticus*. (A fourth contribution to the study of variation.). Biological Lectures: Woods Hole Marine Biological Laboratory, 209–225.

Darwin, C. (1859). The Origin of Species. New York: Penguin.

Johnston, R. F., Niles, D. M., & Rohwer, S. A. (1972). Hermon Bumpus and natural selection in the House Sparrow *Passer domesticus*. Evolution, 26, 20–31.