MAST30027: Modern Applied Statistics

Assignment 2, 2019.

Due: 9am Tuesday September 17th

There is no unique answer for data analysis (e.g., this assignment).
This assignment is worth 12% of your total mark. To get full marks, show your working including the R code you use.

Data: The data come from an experiment aimed at evaluating the prosocial tendencies of chimpanzees. The experimental structure mimics many common experiments conducted on human students by economists and psychologists. A focal chimpanzee sits at one end of a long table with two levers, one on the left and one on the right (See the Figure 1 below). On the table are four dishes which may contain desirable food items. The two dishes on the right side of the table are attached by a mechanism to the right-hand lever. The two dishes on the left side are similarly attached to the left-hand lever. When either the left or right lever is pulled by the focal animal, the two dishes on the same side slide towards opposite ends of the table. This delivers whatever is in those dishes to the opposite ends. In all experimental trials, both dishes on the focal animals side contain food items. But only one of the dishes on the other side of the table contains a food item. Therefore, while both levers deliver food to the focal animal, only one of the levers delivers food to the other side of the table. There are two experimental conditions. In the partner condition, another chimpanzee is seated at the opposite end of the table, as pictured in the Figure 1. In the control condition, the other side of the table is empty. Finally, two counterbalancing treatments alternate which side, left or right, has a food item for the other side of the table. This helps detect any handedness preferences for individual focal animals.
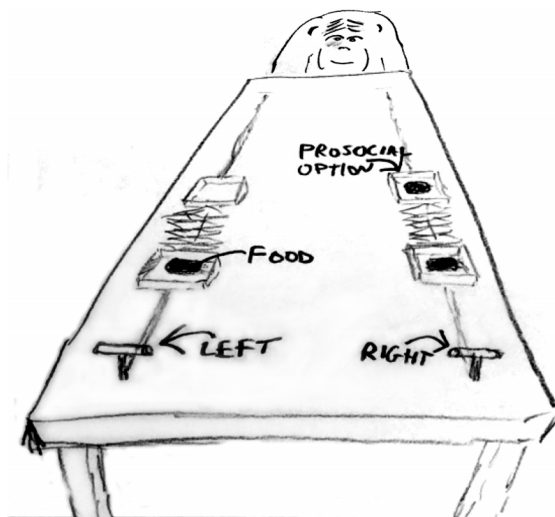

Figure 1: Chimpanzee prosociality experiment, as seen from the perspective of the focal animal. The left and right levers are indicated in the foreground. Pulling either expands an accordion device in the center, pushing the food trays towards both ends of the table. Both food trays close to the focal animal have food in them. Only one of the food trays on the other side contains food. The partner condition means another animal, as pictured, sits on the other end of the table. Otherwise, the other end was empty.

The data can be found in the file `assign2.txt`. The data has 504 rows representing each experiment. Each row has entries for:

- actor (1 to 7): chimpanzee ID (i.e., experiment has been conducted for seven chimpanzees)

- condition (0 or 1): indicator of whether the partner chimpanzee is seated at the opposite end of the table (1) or not (0)

- prosoc_left (0 or 1): indicator of whether the left-hand lever was (1) or was not (0) attached to the prosocial option, the side with two pieces of food; indicator of whether two food items are on left (1) or right (0).

- pulled_left (0 or 1): indicator of whether a focal animal pulled the left-hand lever (1) or not (0).

Problem: When human students participate in an experiment like this, they nearly always choose the lever linked to two pieces of food, the prosocial option, but only when another student sits on the opposite side of the table. The question is whether a focal chimpanzee behaves similarly, choosing the prosocial option more often when another animal is present. If your conclusion is that chimpanzees behave differently, describe their behaviour (i.e., interpret your final model).

Write a report on the analysis that summaries the substantive conclusions and includes the highlights of your analysis: for example, data visualisation, choice of model (e.g., Poisson regression, multinomial regression, etc), model fitting and model selection (e.g., using AIC), diagnostic, check for overdispersion if necessary), and summary/interpretation of your final model.

At each step of analysis, write why you do that and your interpretation/conclusion. For example, "I make an interaction plot to see whether there are interactions between X and Y", show a plot, and "It seems that there are some interaction between X and Y".