Lab 7: Contingency table analysis

Objectives

1) Use ^{2} tests and Fisher's exact test to detect association between two categorical variables.

2) Use the R functions chisq.test, table, t, pchisq, mosaicplot, and fisher.test.

Exercises

1. Yawning is contagious. When we see someone yawn, we are very likely to yawn ourselves. In one study, each participant was shown one of several pictures, including a picture of a man yawning, the same man smiling, and a yawning man with his mouth covered. Participants yawned much more when shown the yawner than the smiler. Surprisingly, an identical number also yawned when shown the picture with the mouth obscured. This suggests that something else, perhaps the eyes, is an important trigger of yawning. To test this, researchers counted the number of yawners and non-yawners among participants shown a picture of a yawning man with his eyes covered. They similarly counted the number of yawners and non-yawners among participants shown a picture of a yawning man with his eyes visible. The data are given in the file "yawn.csv".

   a. Read the data into R and convert them to a table.

   b. Make a mosaic plot of the results. Inspect the plot for evidence of an association between eye visibility and yawning contagion.

   c. Test for an association between eye visibility and yawning contagion. Use an appropriate test and clearly state the conclusions of the test. Do this test "by hand" in R.

   d. Repeat the test using an appropriate R function.

2. Vampire bats feed almost exclusively on blood. A bat must feed every day or it will starve to death, but bats do not always succeed in finding a meal. Perhaps for this reason, they roost in communal groups and sometimes share blood by regurgitative feeding. Researchers measured whether hungry bats were more likely to receive regurgitated blood than were partially fed bats. Eight bats were captured in the evening before they had fed and were held without feeding until the next morning. As a control, six bats were captured after naturally feeding. They were also held until the following morning. At that time, all the bats were returned to their groups. Five of the eight hungry bats were given regurgitated blood meals by group-mates, but none of the six well-fed bats were given a blood meal by other bats. Use an appropriate R function to test whether the probability of being fed by roost-mates varies according to hunger status. Explain your choice of test and clearly state the conclusions of the test.

Assignment: Turn in a Word file containing 1) your R script and 2) a brief summary of the results of each hypothesis test. In addition, submit a separate .R file with your R script.