

1. Suppose you have an experiment with 15 trials, each recorded as Success or Failure.
 - (a) Plot a probability distribution for the potential data if $w = 0.3$.
 - (b) Plot a probability distribution for the potential data if $w = 0.8$.
 - (c) Plot the likelihood function that arises if we observe $x = 11$ successes. What is the most likely value for w (i.e., the “maximum likelihood estimate”)?
2. In an experiment on ESP (extrasensory perception), participants are required to predict the color (red or black) of a card drawn randomly from a complete deck. Suppose that a set of participants correctly identifies the color on 38 out of 64 trials.
 - (a) If participants’ are performing at chance, what is the probability of observing $x = 38$ successes?
 - (b) Write the mathematical form of the null and alternative hypothesis for a binomial test of these data.
 - (c) Perform the binomial test, being sure to correctly and completely interpret the resulting p -value. What can you conclude about these participants’ performance on the task?
3. A researcher would like to assess the effect of a behavior therapy program on reducing smoking behaviors. Following therapy, 48 people showed a decrease in smoking, and 16 showed an increase. Was the therapy effective in reducing smoking behaviors? Use a model comparison / hypothesis test to support your claim, being sure to fully explain the relevant components of your procedure.
4. According to most estimates, 10% of the general population is left-handed and 90% are right-handed. A particular theory of handedness and cerebral dominance predicts that there should be a disproportionate number of left-handers among artists. For a sample of $N = 150$ artists, a researcher finds that 24 are left-handed. Is there a higher proportion of left-handers among artists than there is for the general population? Use a binomial model to support your claim.