Statistics and R

Wayne Stewart

The University *of* Oklahoma

Today

- What I want to do!
- What Statistics can do.
- What R can do.
- What you want to do!

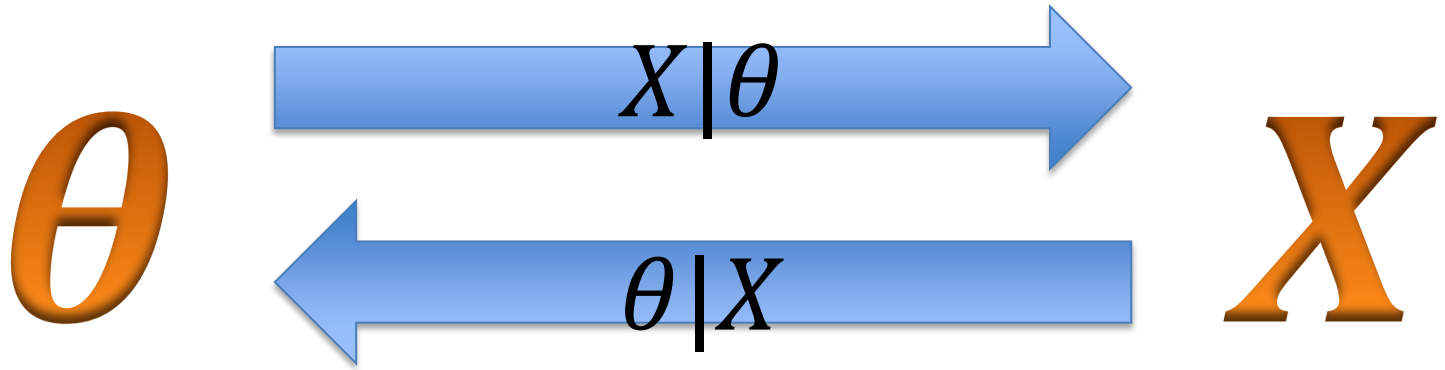
What I want to do

- Data data everywhere.
  - Build this seminar series for those who would like to increase their knowledge of STATS and R
  - Facilitate online resources for researchers and teachers.
    - Videos
    - Examples and template code
    - Ideas for how to present data for journals and other publications
  - Organize a "unit" of practitioners from different departments.
  - Develop additional seminars for advanced and introductory statistics applications to research.

What Statistics can do

- 2 major Paradigms of statistics:
  - Classical or frequentist.
  - Bayesian.
- Classical (Fisher, Neyman, Pearson, …)
- Bayesian (Laplace, Bayes, Jeffreys, …)

Parameter estimation done very differently



$$p(\theta|X) = \frac{p(\theta)f(X|\theta)}{\int_{\Theta} p(\theta)f(X|\theta)d\theta}$$ **Versus** $T(X)|\theta$

Statistics will help you to:

- Build competing models
- Choose models
- Test validity of models.
- Make inference with tests.
- Predict (point and interval estimation).
- Explain – say how a response relates to independent variables.
- Apportion error to satisfy a model.
- Organize and summarize (tabular and graphical)

What R can do

- It can be used to build and run sophisticated models.
- It can summarize statistics with high quality graphs.
- It can be personally configured in a plethora of ways using functions.
- R code can be packaged and shared.
- It is written in a way that facilitates statistics.

Lets Run R

- What I suggest:
  - Get R from cran (Windows,Mac,Linux)
    - Get Rstudio https://www.rstudio.com/
    - Or get Tinn-R http://sourceforge.net/projects/tinn-r/
- Play!

What you want to do?

- You will likely come from different departments and have genre specific data.
- The problems you wish to solve may have many overlaps with others.
- What would you like to cover?

Courses

- Bayesian Stats MATH 4803/5803
- Advanced Applied STATS MATH 4793/5793
- Applied Statistical Methods MATH 4753

Next time bring your laptop.