Some Notes Before We Get Started

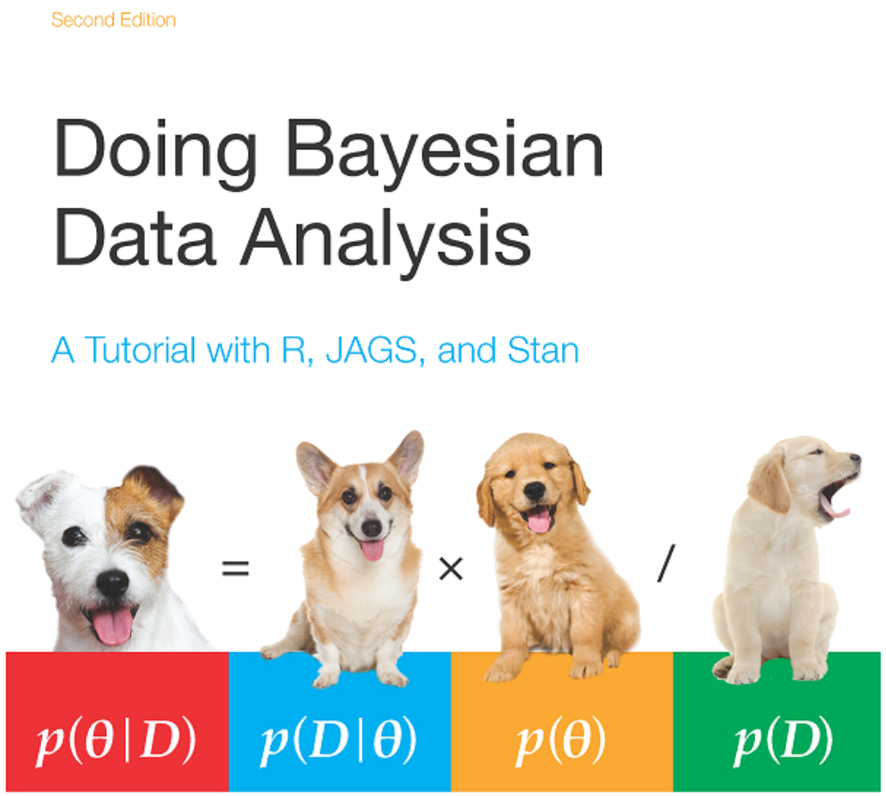
Tim Frasier

Note #1:

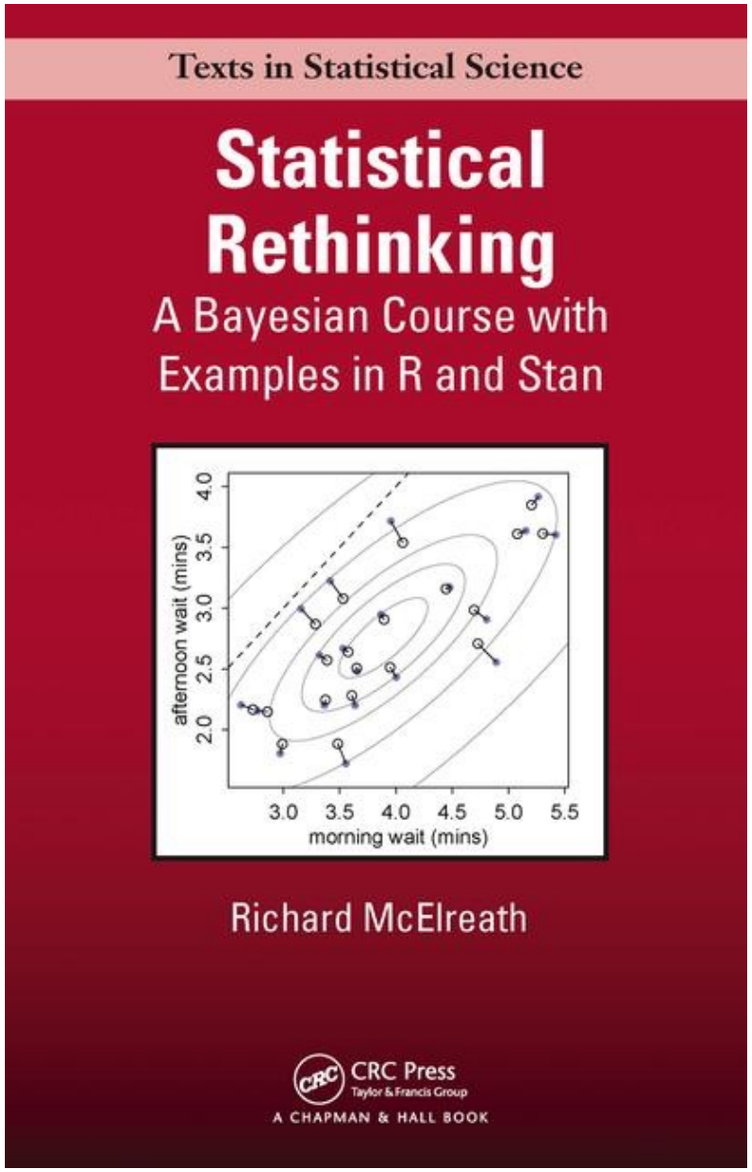
You will get out what you put into this course

(You should invest in a good book and explore other resources)

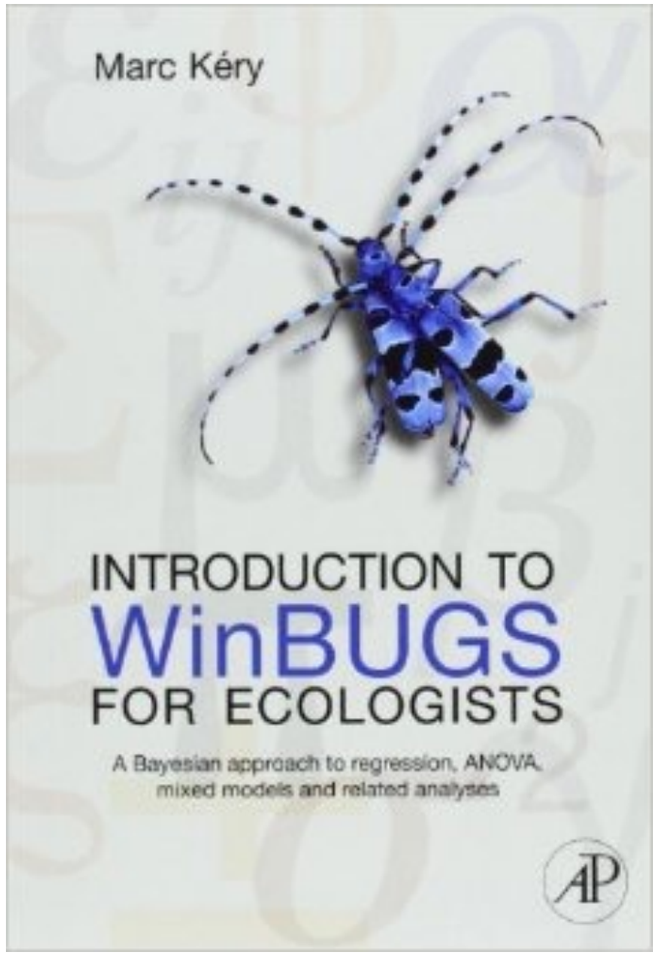
Main choice

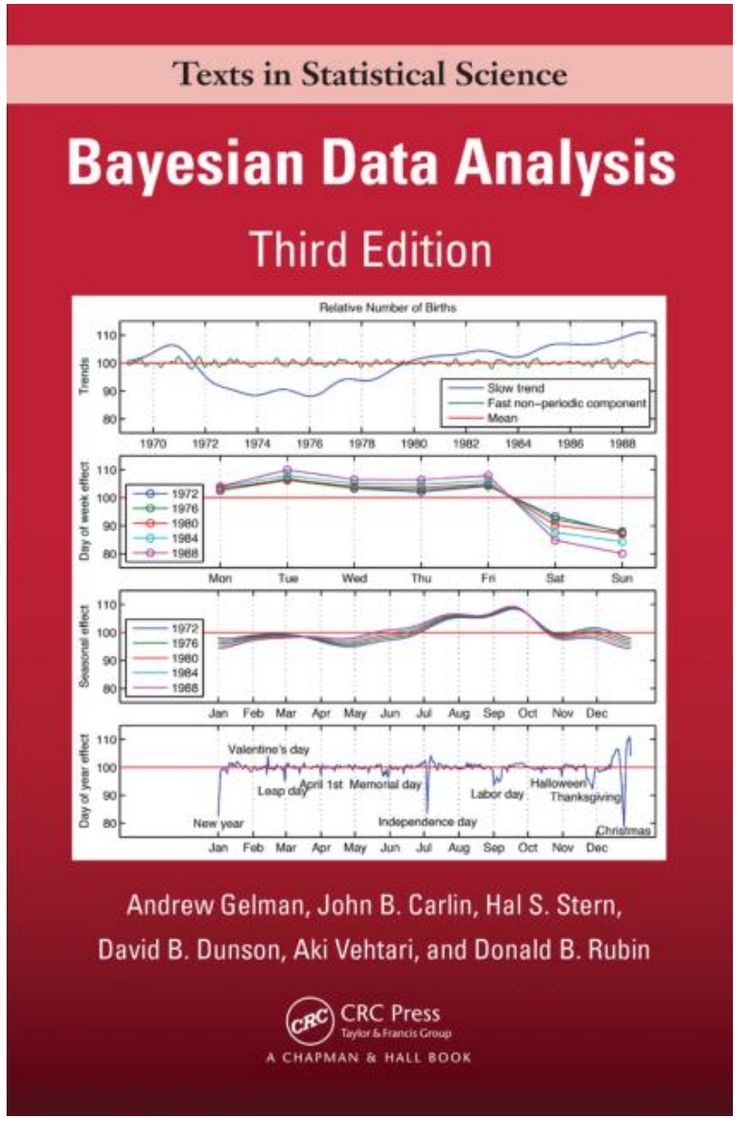


Second choice



Others

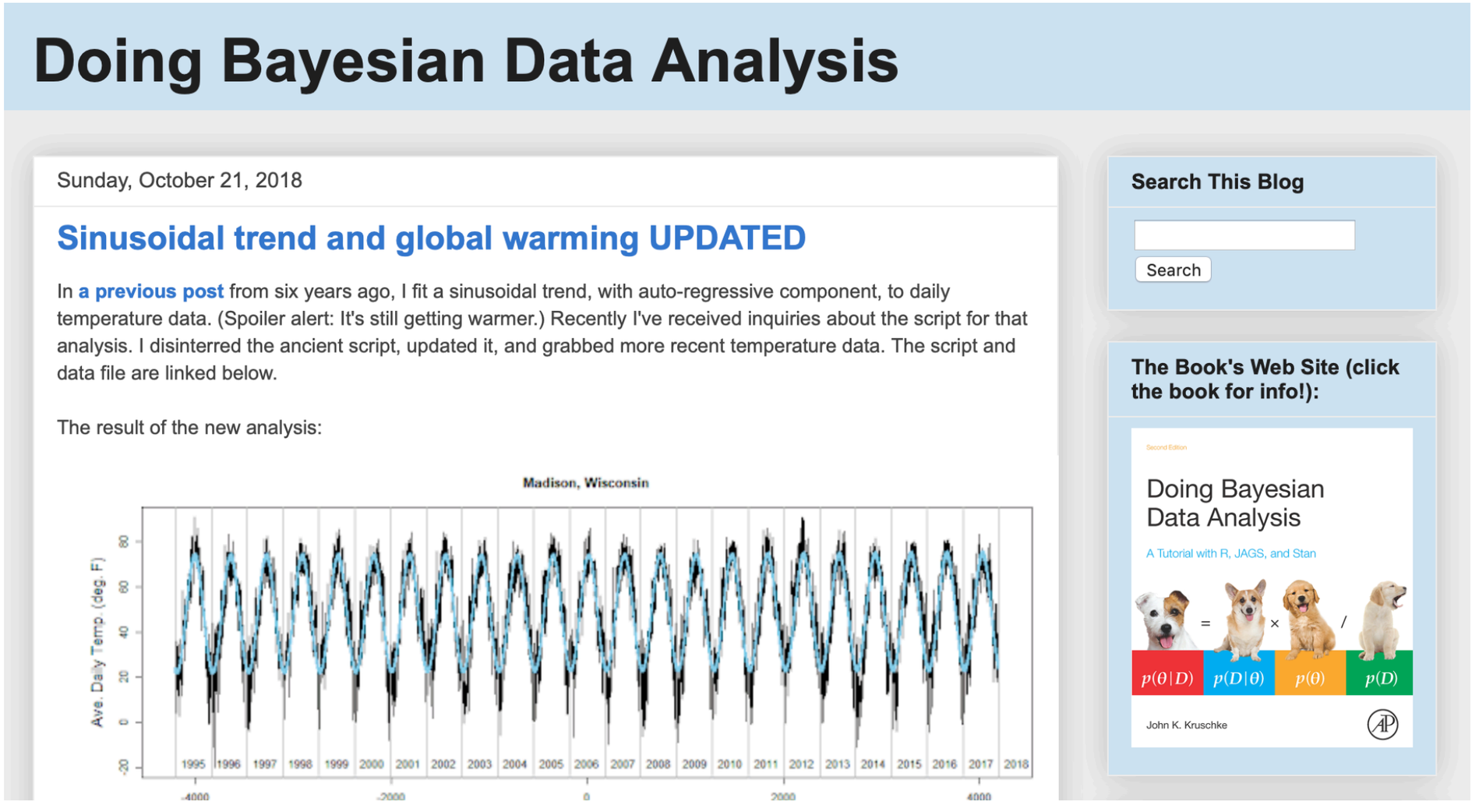

Marc Kéry
INTRODUCTION TO
WinBUGS
FOR ECOLOGISTS
A Bayesian approach to regression, ANOVA, mixed models and related analyses


Texts in Statistical Science
Bayesian Data Analysis
Third Edition
Relative Number of Births
Trends
Slow trend
Fast non-periodic component
Mean
Day of week effect
Mon
Tue
Wed
Thu
Fri
Sat
Sun
Seasonal effect
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day of year effect
Valentine's day
Leap day
April 1st
Memorial day
Labor day
Halloween
Thanksgiving
New year
Independence day
Christmas
Andrew Gelman, John B. Carlin, Hal S. Stern,
David B. Dunson, Aki Vehtari, and Donald B. Rubin
CRC Press
Taylor & Francis Group
A CHAPMAN & HALL BOOK

Other Resources

- John Kruschke's blog

http://doingbayesiandataanalysis.blogspot.com



Other Resources

- Andrew Gelman's blog

https://andrewgelman.com

Statistical Modeling, Causal Inference, and Social Science

HOME BOOKS BLOGROLL SP

Did she really live 122 years?

Posted by Andrew on 7 January 2019, 8:25 pm

Even more famous than "the Japanese dude who won the hot dog eating contest" is "the French lady who lived to be 122 years old."

But did she really?

Paul Campos points us to this post, where he writes:

> Here's a statistical series, laying out various points along the 100 longest known durations of a particular event, of which there are billions of known examples. The series begins with the 100th longest known case:
>
> 100th: 114 years 93 days
>
> 90th: 114 years 125 days
>
> 80th: 114 years 182 days
>
> 70th: 114 years 208 days
>
> 60th: 114 years 246 days
>
> 50th: 114 years 290 days

Other Resources

- Richard McElreath's blog

http://elevanth.org/blog/

Elements of Evolutionary Anthropology

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2 September 2018

Golden Eggs & Better Telescopes

You may not have heard of Alan Kay, but you've used his ideas. Kay is an American computer scientist who contributed major parts of some of the biggest ideas in human-computer systems, like graphical user interfaces. Kay and colleagues like Douglas Engelbart were part of the "golden age" of computer innovation, when teams of researchers got lots of support and freedom not only to solve defined problems but also to identify new ones.

~ Continue Reading ~

Other Resources

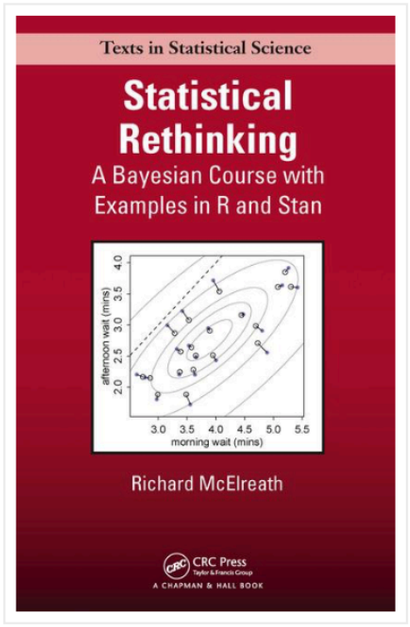
- Richard McElreath's videos

https://xcelab.net/rm/statistical-rethinking/

Statistical Rethinking

A Bayesian Course with Examples in R and Stan (& PyMC3 & brms too)

Materials



- Book: CRC Press, Amazon.com
- Book sample: Chapters 1 and 12 (2MB PDF)
- Lectures and slides:
  * Winter 2019 materials
  * Recorded Lectures: Fall 2017, Winter 2015
  * Lecture Slides: Speakerdeck
- Code and examples:
  * R package: rethinking (github repository)
  * Code examples from the book in plain text: code.txt
  * Examples translated to brms syntax: Statistical Rethinking with brms, ggplot2, and the tidyverse
  * Code examples translated to Python & PyMC3

Note #2:

R and Open Science

Note #2: R and Open Science

- Two ideas central to science are:
  - Reproducibility (by your future self, and others)
  - Access - Many people feel that everyone should have access to knowledge, and the information on which it is based

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- Using R (properly) helps these issues

Note #2: R and Open Science

R is Free (both in cost and in Open Access)

- Anyone can download R and use it without a fee
  - Compare to other statistical packages and license fees

Any ideas of how much statistical software costs?

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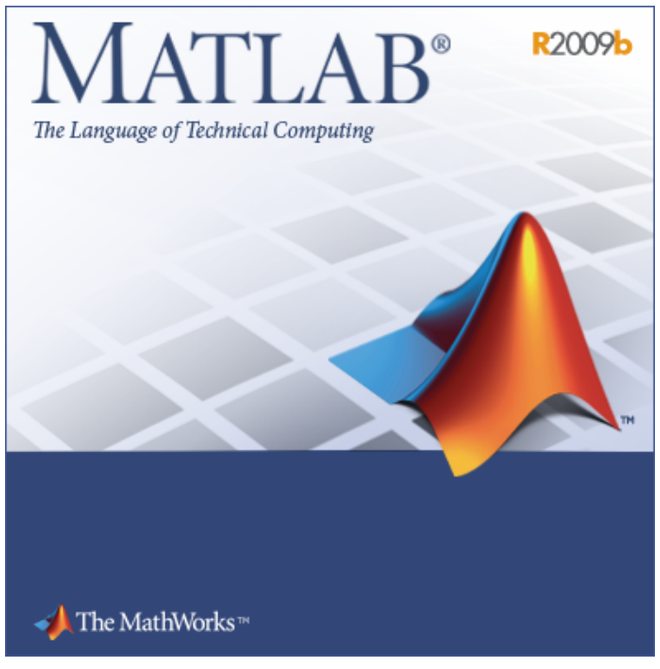

$2,150 for non-academic individuals

$500 for faculty

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$1,948.71 for single-use license

Note #2: R and Open Science

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- How can science be reproducible, and accessible, if most people don't have access to the appropriate software?

Note #2: R and Open Science

R is Free (both in cost and in Open Access)

- You can see (and modify) the code for everything that R does
  - Opens details up to peer-review and scrutiny
  - Exactly what is happening is clear

- Coding is proprietary in most commercial software packages
  - Can't scrutinize the details ("just trust the experts")

Where have I heard that before?

Note #2: R and Open Science

Scripting facilitates reproducibility

- You may not like the command line at first, but it actually really helps you (in many ways)
  - Can customize analyses as much as you want (not limited to a button)
  - If you save your commands for each analysis (which you should), along with the appropriate data file(s), you (and anyone else) can re-generate all of your analyses and figures almost instantly
    - Reproducibility at its best, by you and others

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Of course, for this to work you have to publish these data files, and your code, along with your paper

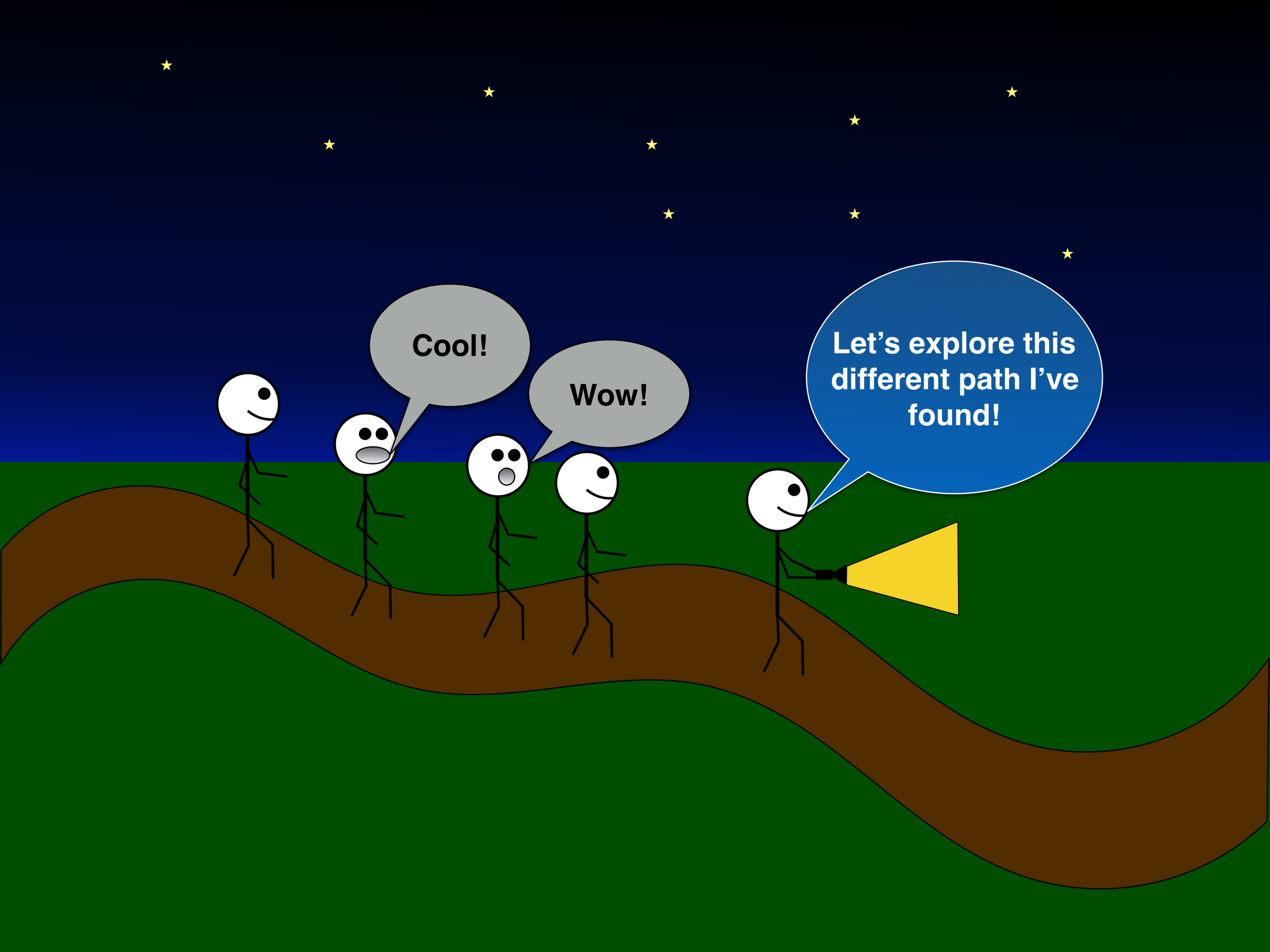
This is a Growing Movement

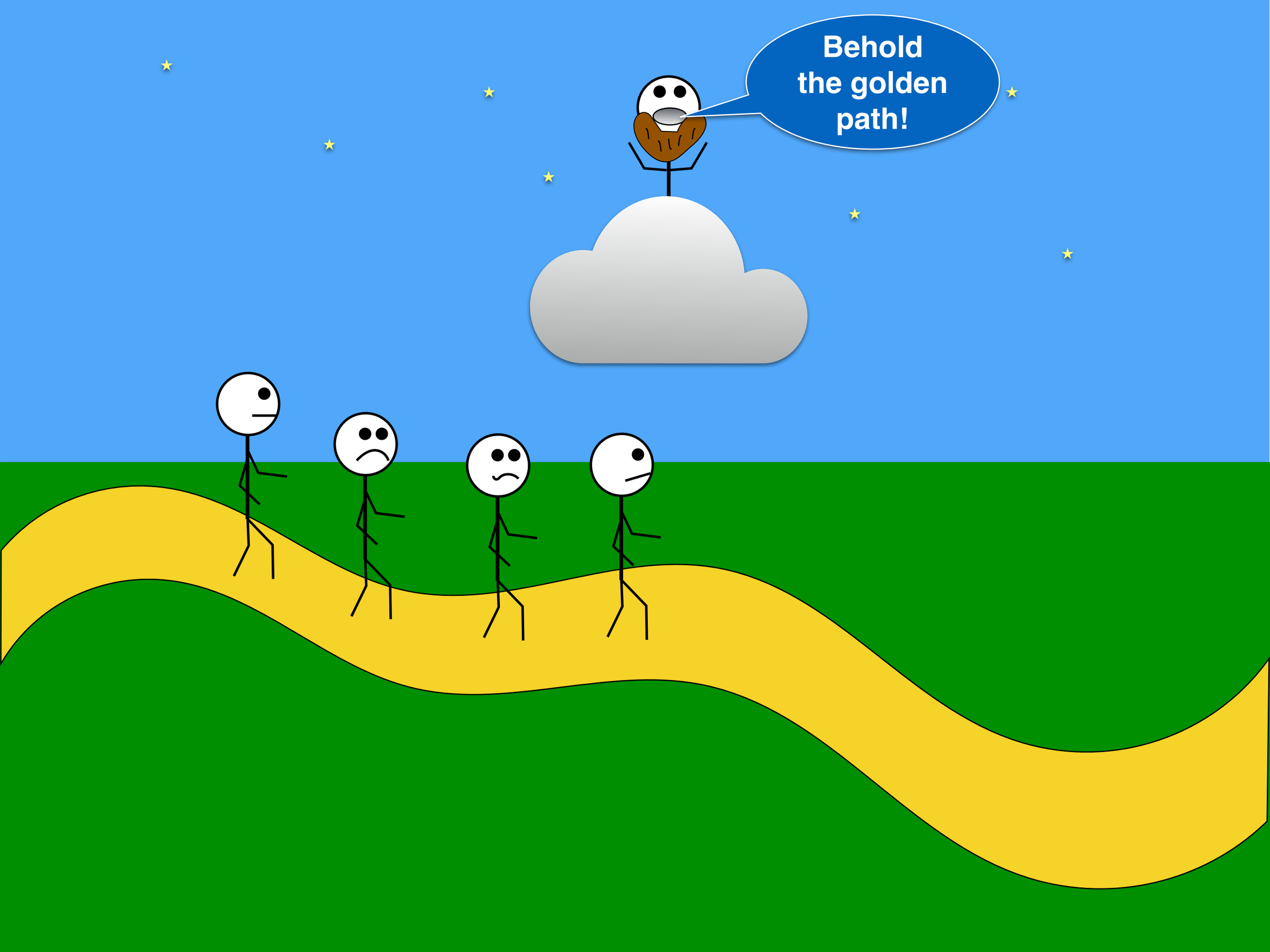
Click on images to go to websites

Note #3:

I am *not* a statistician...

I am still learning


Cool!
Wow!
Let’s explore this different path I’ve found!


Behold the golden path!

Note #4:

Spend a lot of time building foundations, required for mastery

Date	**Topic**
Jan. 10	Introduction to R
Jan. 17	Issues with p-values and null hypothesis significance testing
Jan. 24	Intro to Bayesian statistics and Markov Chain Monte Carlo (MCMC) processes
Jan. 31	Data types and probability distributions
Feb. 7	Binomial models
Feb. 14	Simple linear regression
Feb. 21	NO CLASS - Winter Break
Feb. 28	Linear regression with one categorical predictor variable
Mar. 7	Hierarchical models
Mar. 9	Multiple regression
Mar. 14	Binomial predicted variables
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Questions?