# thinking clearly about statistical evidence

## The big questions:

We collect a lot of data. We get a lot of training in the use of various statistics to do cool things with our data. But, at the end of the day, how do we go about evaluating evidence? How do we sort signals from noise? How do we test predictions against each other? How do we know when we have evidence for what? And how do we gauge the overall evidential value of lots of findings?

## What this is:

This’ll be a very informal reading and discussion group where we try to think clearly about evidence. What is it? How do we find it? How do we know when we’ve found it?

I’ll pick some readings to kick things off. This should set up some basics for all of us. Some of the readings will be so basic that you’ll think I’m a bit simple for choosing them. But they’ve helped me clarify my own thinking about evidence.

Then, I anticipate things will be open-ended. We can play with new techniques or methods a bit. Maybe we’ll check out what different software platforms can do for us. Who knows? After the basics, it’s up to everyone to help me chart a course.

## What this isn’t:

This isn’t a stats course.

This isn’t a soapbox. I don’t want to push any views on anyone. If you want to ignore all the readings, or disagree with them, that’s fine by me. I’ll just put some stuff out there for you to do with whatever you want. I found them useful. Maybe you won’t. That’s cool either way.

## Details:

We’ll meet Wednesdays at 2:30, location TBD, depending on how many people are interested. And if there’s considerable interest, but that time is shitty, I can pick something else. It’s gotta be on a Wednesday or Friday for me. I might have to skip some days for travel. And I’ve got a kid arriving sometime in November, so I can’t promise super regular attendance right after that whole business goes down. I’ll try.

## Tentative schedule

9-30. Introduction/discussion. What do we want our evidence metrics to give us? Pick one of these recent Psych Science papers and read it:

* + Forest, A. L., Kille, D. R., Wood, J. V., & Stehouwer, L. R. (2015). Turbulent Times, Rocky Relationships: Relational Consequences of Experiencing Physical Instability. *Psychological science*, *26*(8), 1261-1271.
  + Kupor, D. M., Laurin, K., & Levav, J. (2015). Anticipating divine protection? Reminders of god can increase nonmoral risk taking. *Psychological science*, *26*(4), 374-384.

10-7. Back to basics. Probability, conditional probability, etc. Probability is the backbone of our stats. But hey, I never learned it. Seems relevant.

* Hacking Ch 4-6

10-14. What do we mean by probability? belief vs. frequency.

* Hacking Ch 11-12

10-21. The stuff we know: Conceptual basics of frequentist stats

* Hacking Ch 16, 18-19

10-28. More frequentist thinking

* Dienes Ch 3

11-4. p-problems? Importance of stopping rules? are they evidence?

* Pick either:
  + Chapter from Kruschke’s text.
  + Stuff from Royall.
* and play with this: http://rpsychologist.com/d3/pdist/

11-11. Some stuff we don’t run across as much: Bayesian basics

* Hacking Ch 7, 13

11-18. Bayes II.

* <http://alexanderetz.com/2015/04/15/understanding-bayes-a-look-at-the-likelihood/>
* <http://alexanderetz.com/2015/07/25/understanding-bayes-updating-priors-via-the-likelihood/>
* Hacking 15

11-25. Bayesian hypothesis testing: Bayes factors

* Dienes Ch 4
* http://alexanderetz.com/2015/08/09/understanding-bayes-visualization-of-bf/

12-2. Practical intro to JASP and Bayes factors?

12-9. Tools for evaluating the strength of aggregated evidence (p-curve and whatnot)?

**Resources**

Here are three books I read recently that spurred me to do this. I’d suggest them in this order (and whatever order you pick, make sure Royall comes after Hacking…it makes more sense then).

Dienes, Z. (2008). *Understanding psychology as a science: An introduction to scientific and statistical inference*. Palgrave Macmillan.

Hacking, I. (2001). *An introduction to probability and inductive logic*. Cambridge University Press.

Royall, R. (1997). *Statistical evidence: a likelihood paradigm* (Vol. 71). CRC press.