IMPLICATIONS OF (DESIRE OF) TEACHING BAYESIAN STATISTICS TO UNDERGRADUATES

Bayesian statistics might help *Towards Improving Psychological Science*

→ Stop teaching only/mainly frequentist statistical techniques

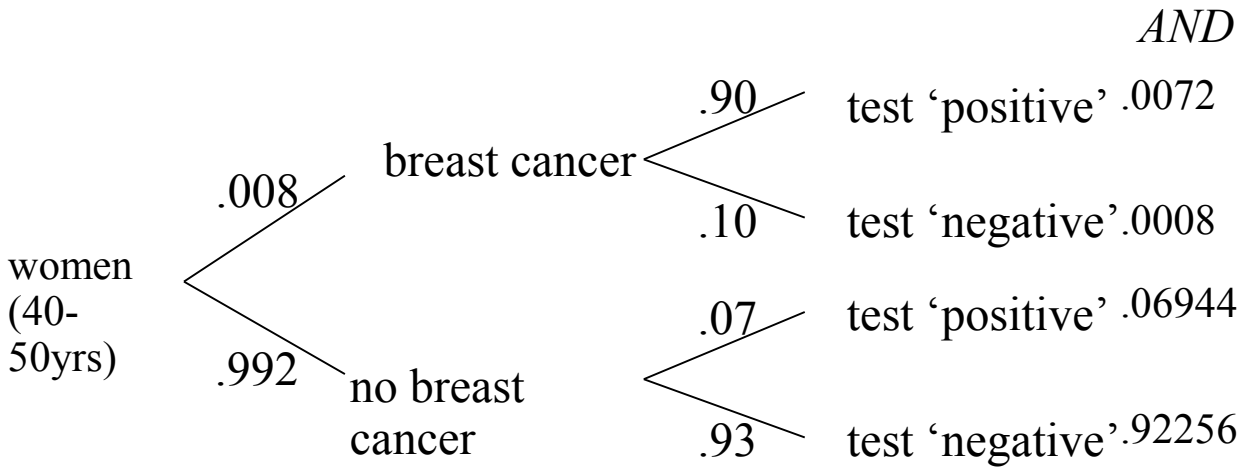
That'll be (y)our challenge.....

1. What to teach ?
2. What type of software?
3. How deal with frequentist statistics vs Bayesian statistics?
4. How to reach our nonstatistical colleagues?

1. What to teach? How deep should we go?

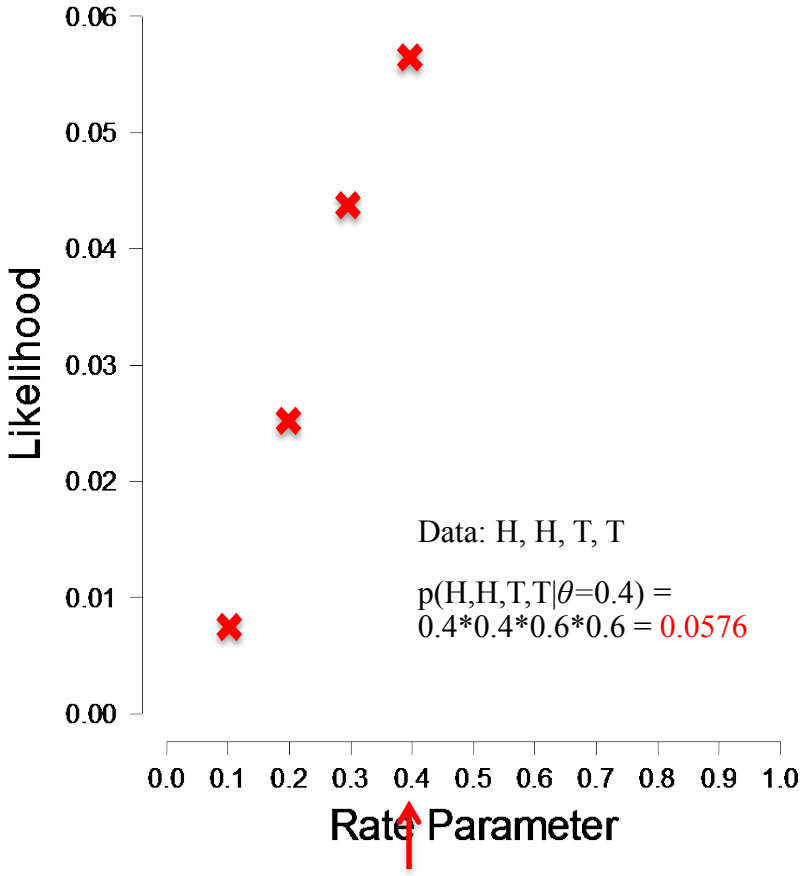
By hand? Dichotomous/Continuous data?

What is the probability that a woman has breast cancer when the mammogram result is positive? (Hint: Use Bayes' theorem)

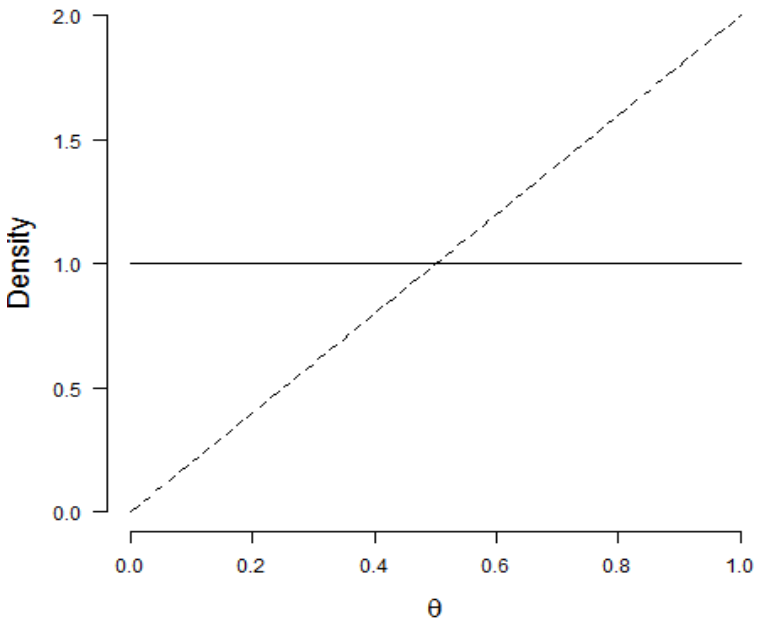


$$p(C|+) = \frac{p(+|C)\times p(C)}{p(+|C)\times p(C)+p(+|no\ C)\times p(no\ C)} = \frac{.0072}{.0072+.06944} = .094 \text{ (or 9.4\%)}$$

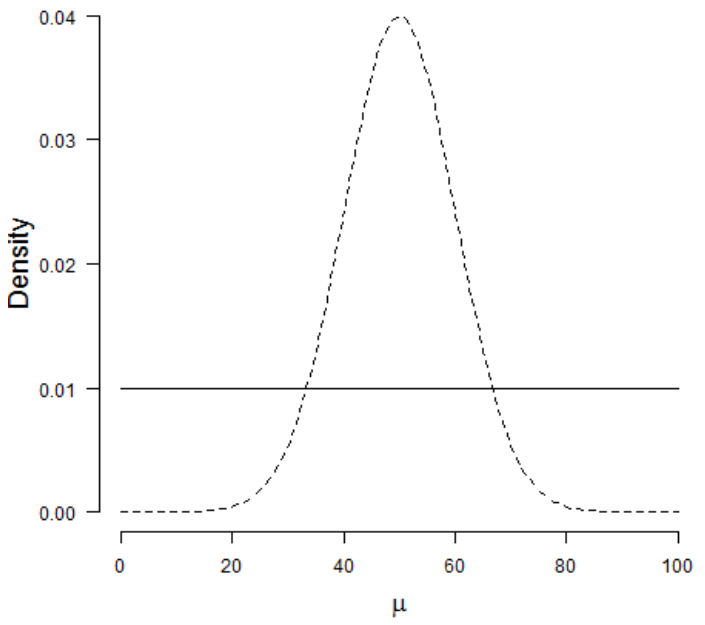
Based on this, what percentage of positive results are 'false positives'?



By software? Hard-code/custom made?

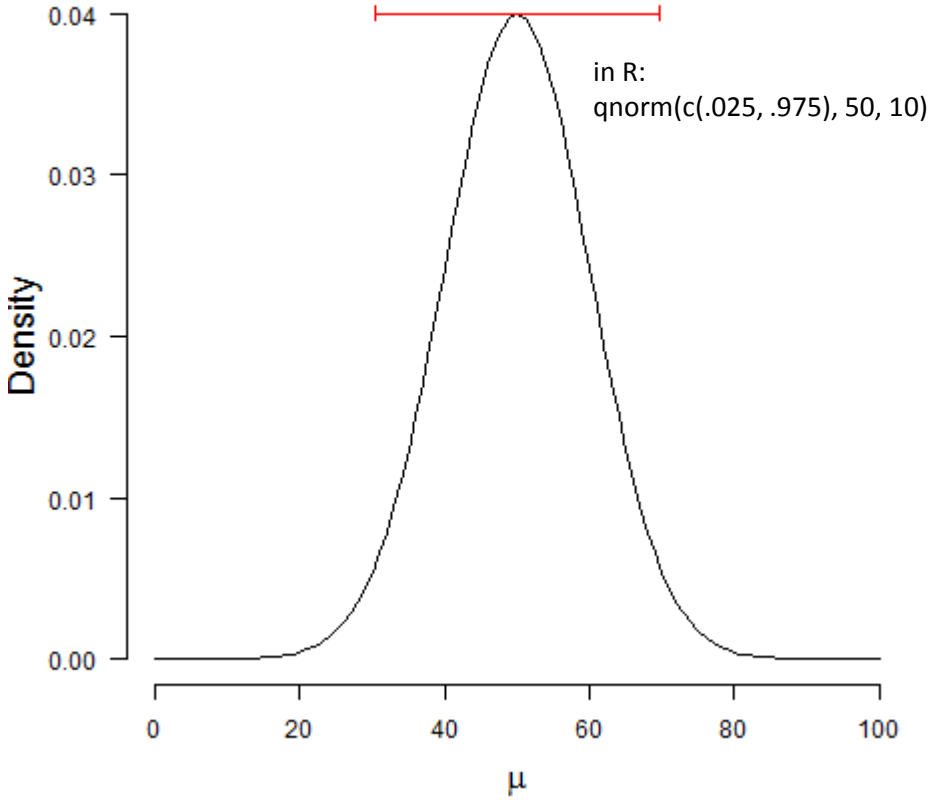


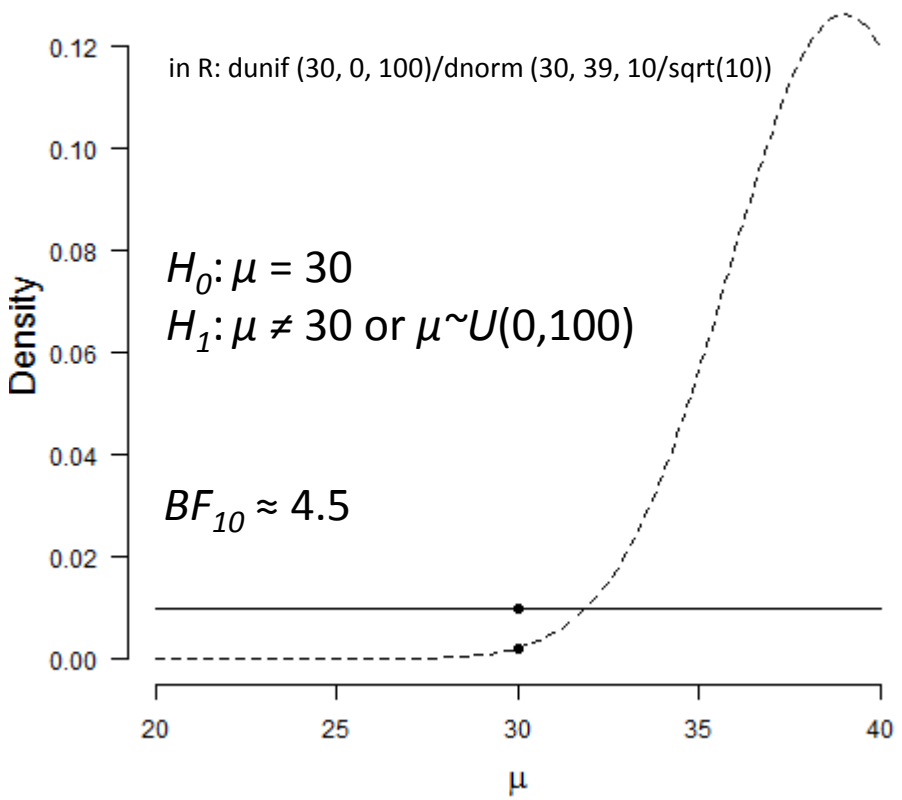
in R:
curve (dbeta (x, 2, 1), from = 0, to = 1)
curve (dbeta (x, 1, 1), add = T)



in R:
curve (dnorm (x, 50, 10), from = 0, to = 100)
curve (dunif (x, 0, 100), add = T)

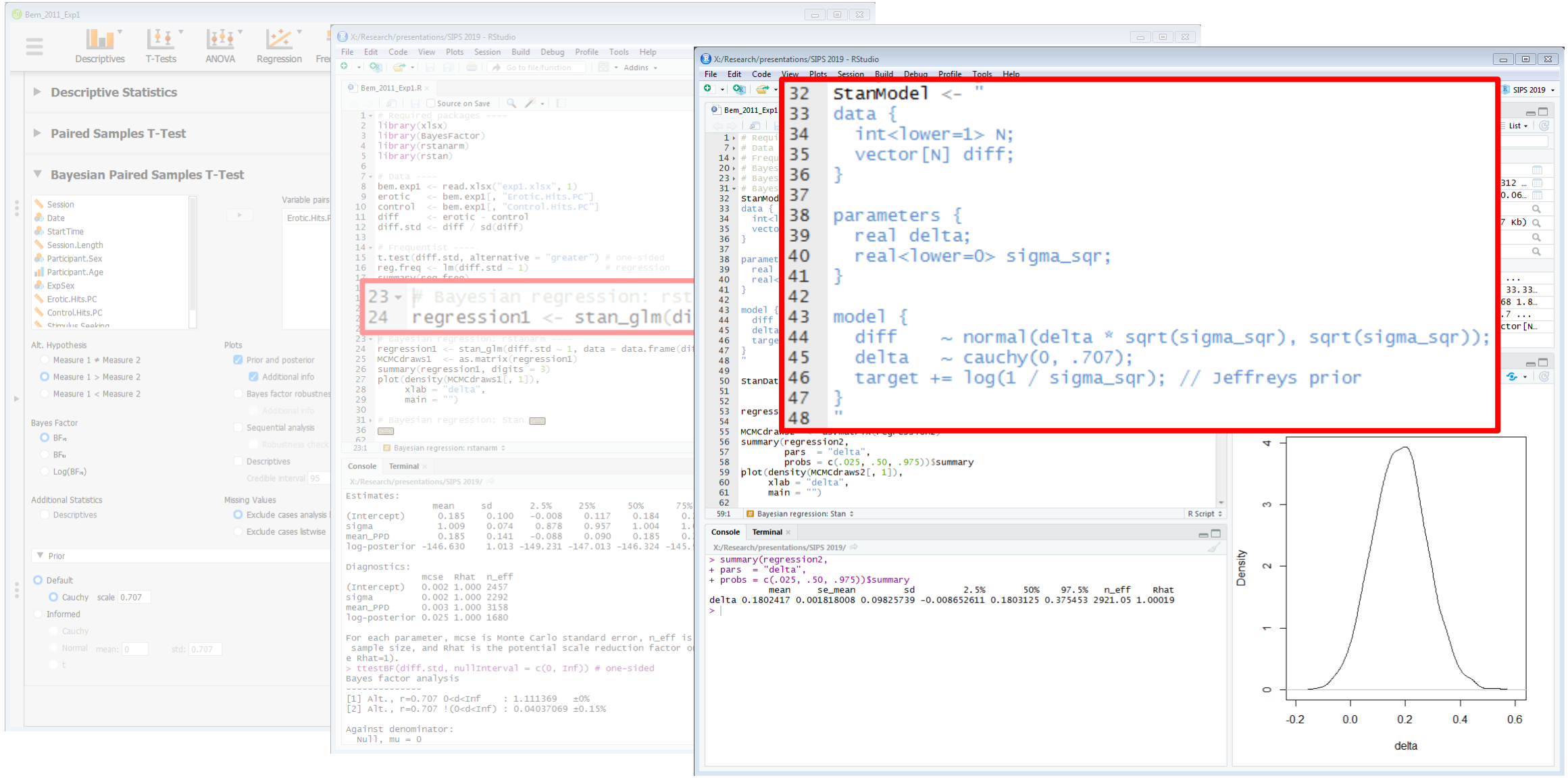
Estimation? Testing?





2. What *software* should we teach?

Previously: Writing Bayesian models



3. Teaching Bayesian Statistics fine, but what about Frequentist Statistics?

- Frequentist Statistics superfluous?
- At least teach what ‘old school’ people did (in the literature …)

But how?

- Freqs first (‘as default’), then Bayes as modern alternative approach
- Bayes first (‘as default’), then Freqs as almost obsolete approach
- Freqs and Bayes side by side
  (per type of research question, with pros and cons)
- Bayes as an extension of Freqs, justifying and/or correcting Freqs
- …….

4. How to reach nonstatistical colleagues? Are we ready for Bayes?

- Nonstatistical staff probably has no idea how to deal with Bayes.
- How to school those? Do they want to be schooled?

- “Most students don’t even understand simple testing now: Why bother students with something even more complicated?”
  - Is Bayes more complicated?
  - How can we convince people that Bayes is needed?