Reading Assignment 2 - P-value and Significance

Due Jun 11

The P-value and statistical significance

P-value is one of the most common statistics concepts that arise when statistics is applied to other sciences.

Ronald Fisher introduced this concept in his work Statistical Methods for Research Workers[1] almost a century ago. Since then the p-value has been introduced to the staple of statistics text books, and the value of 0.05 significance has become the set-in-stone industry standard for significance, for better or worse.

The p-value is a hot potato in statistics, and it particularly divides the Frequentist and Bayesian schools of statistics. The topic is still discussed as of today. Our very own legendary Professor Jim Berger (Duke) wrote recently an interesting recommendation[2] on increasing the threshold (lowering the p-value) for significance in applied sciences. The paper also sprouted many replies, such as McShane et al. [3], and many more that you may find on e.g. googlescholar.

The assignment

Write a short essay on the p-value, its meaning and original interpretation. In the essay discuss your own opinion on the p-value:

How does it fare as a measure of evidence? Has the idea outlived its time? What are the requirements for significance in the era of big data and machine learning? You can also discuss related topics close to your heart, such as multiple testing bias and p-value hacking, publication bias (i.e. bias to only publish results with p-value 0.05 or less) and its meaning to science, or Bayesian viewpoint of this topic. You may get some ideas on the interview[4] with Jim Berger, where he discusses this topic in an informal setting and points further material on the issue.

The essay should be relatively short, not to exceed 3 pages single-spaced. The limit is not absolute, so if you have a lot more to say, you can exceed the limit at your discretion, but please be informed of the scope.
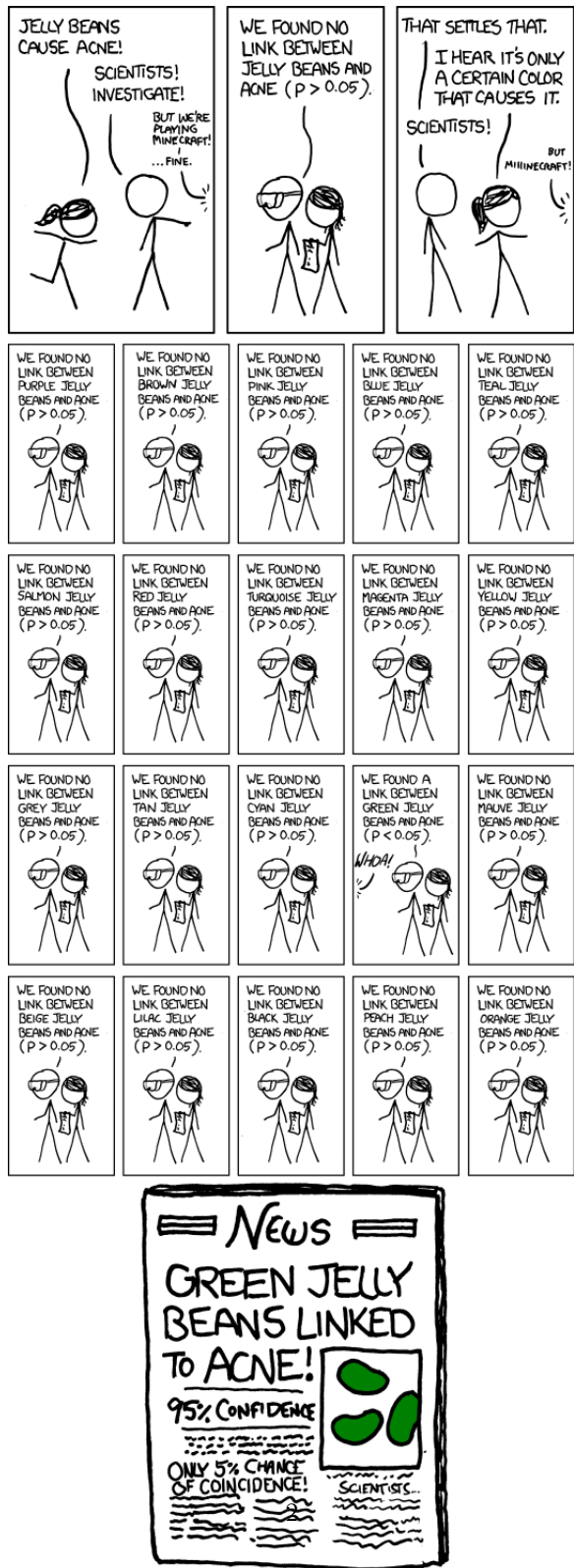
Figure 1: Image by Randall Munroe. Source: https://xkcd.com/882/

References

[1] Fisher R.A *Statistical Methods for Research Workers* `http://www.haghish.com/resources/materials/Statistical_Methods_for_Research_Workers.pdf`

[2] J. Berger et al.: *Redefine statistical Significance* `https://psyarxiv.com/mky9j`

[3] B.B.McShane et al.: *Abandon Statistical Significance* `https://amstat.tandfonline.com/doi/full/10.1080/00031305.2018.1527253#.XsvxVRZ7lhF`

[4] Eric-Jan Wagenmakers *Redefine Statistical Significance: An Interview with Jim Berger* https://jasp-stats.org/2017/07/27/jimberger/