

15 Bayesian rescue for the troubled scientist: Can we make Null Hypothesis Significance Testing (NHST) work?

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In recent years there has been an important discussion on the validity of methods for Null Hypothesis Significance Testing (NHST). As a worrying consequence of this controversy, statistical inference methods are losing the trust of sectors of the scientific community, as it is reflected by the recent editorial of Basic and Applied Social Psychology (Trafimow and Marks, 2015) banning the use of procedures as p-values, confidence intervals and related methods from the papers published in BASP. As the editors remark, “In the NHSTP, the problem is in traversing the distance from the probability of the finding, given the null hypothesis, to the probability of the null hypothesis, given the finding”. Increasingly large sections of the scientific community are speaking loud and clear: p-values should no longer be the deciding balance of science.

In an attempt to link simple and effective Bayesian procedures easily available to practitioners, we extend on the ideas in Pérez and Pericchi (2014), and introduce calibrations of p-values that not only provide an asymptotical behavior coherent with that of a Bayes factor, but also allow interpreting them as bounds of the posterior probability for the null hypothesis. For this we build on objective lower bounds presented, for example, in Sellke, Bayarri and Berger (2001) but include an adjustment with the sample size for controlling the asymptotic behavior. P-values may be bad, but they are available for virtually any statistical model. Calibration of p-values, may ironically be the fastest way to popularize the use of Bayes Factors.