Bayes Factors for Research Workers
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In this dissertation we advocate the use of Bayes factors in empirical research to replace or complement standard null hypothesis tests based on $p$-values. These Bayes factors were specifically designed to quantify the evidence for or against the existence of an effect. This was done by comparing two models with the same distributional assumptions, where the alternative model is an extension of the null model by incorporating one extra parameter. Instead of returning a decision to “reject” or “not reject”, a Bayes factor $BF_{10}(d)$ returns a non-negative number that represents the evidence provided by the observed data $d$ for the model that includes the effect. The returned number can be seen as a refinement of the binary decision with $BF_{10}(d) = \infty$ and $BF_{10}(d) = 0$ corresponding to definite rejection and acceptance of the null, respectively. Moreover, the Bayes factor allows its users to forgo the binary decision and acknowledge uncertainty, so that the evidence can be updated continually in light of new data, directly and easily. For empirical scientists to be able to use these Bayes factors, we implemented them in Jeffreys’s Amazing Statistics Program, JASP, which is freely available and open-source (url: https://jasp-stats.org).

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