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Toward evidence-based medical statistics. 2: The Bayes factor.

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Abstract

Bayesian inference is usually presented as a method for determining how scientific belief should be modified by data. Although Bayesian methodology has been one of the most active areas of statistical development in the past 20 years, medical researchers have been reluctant to embrace what they perceive as a subjective approach to data analysis. It is little understood that Bayesian methods have a data-based core, which can be used as a calculus of evidence. This core is the Bayes factor, which in its simplest form is also called a likelihood ratio. The minimum Bayes factor is objective and can be used in lieu of the P value as a measure of the evidential strength. Unlike P values, Bayes factors have a sound theoretical foundation and an interpretation that allows their use in both inference and decision making. Bayes factors show that P values greatly overstate the evidence against the null hypothesis. Most important, Bayes factors require the addition of background knowledge to be transformed into inferences--probabilities that a given conclusion is right or wrong. They make the distinction clear between experimental evidence and inferential conclusions while providing a framework in which to combine prior with current evidence.

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