Empirical Post Hoc Conditional Power Function

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Abstract:

Until very recently, many authors start using the so called post hoc power (also called a posteriori power, retrospective power, observed power or achieved power) in response to the demand of some scientific journals and editors especially when the outcome of the test is not significant or slightly significant. It is suggested as an estimator of the prospective power (also called a priori power or true power). This paper is raised at the time when misunderstandings and misconceptions abounded concerning retrospective power; it has been noticed that some authors disagree to calculate the post hoc power in the sense that it is unhelpful in the presence of the crude p-value and some others advocate the use of post hoc power in the sense that it has another interpretation than what we have from the crude p-value. This study tries to discover the nature of this concept, to summarize what is available in the literature and to dispel some confusion concerning this concept. Power function with new look within permutation approach (post hoc conditional power) is developed. Convergence of empirical post hoc conditional power to the empirical conditional power is investigated as well as the connection between them is studied. Real data application from the perspective of industry and simulation studies are considered.

Keywords: conditional power; effect size; prospective power; post hoc power; type I error; type II error