

Title: Characterizing the joint effect of diverse test-statistic correlation structures and effect size on false discovery rates in a multiple-comparison study of many outcome measures.

In their 2009 Annals of Statistics paper, Gavrilov, Benjamini, and Sarkar report the results of a simulation assessing the robustness of their adaptive step-down procedure (GBS) for controlling the false discovery rate (FDR) when normally distributed test statistics are serially correlated. In this study we extend the investigation to the case of multiple comparisons involving correlated non-central t-statistics, in particular when several treatments or time periods are being compared to a control in a repeated-measures design with many dependent outcome measures. In addition, we consider several dependence structures other than serial correlation and illustrate how the FDR depends on the interaction between effect size and the type of correlation structure as indexed by Foerstner's distance metric from an identity. The relationship between the correlation matrix R of the original dependent variables and R^* , the correlation matrix of associated t-statistics is also studied. In general R^* depends not only on R , but also on sample size and the signed effect sizes for the multiple comparisons.