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Lan Cheng* (lan.cheng@fredonia.edu), Department of Mathematical Science, SUNY Fredonia, Fredonia, NY 14063, and **Xuguang Sheng**, Washington, DC 20016. *Combinations of “combinations of p -values”*.

In this paper we investigate the impact of uncertainty over the number of false null hypotheses on commonly used p -value combination methods. Some methods, for example, Tippett’s and Simes’ methods, are powerful when there is only one or a few false individual null hypotheses. Others such as Fisher’s and Stouffer’s methods are powerful when there are many false null hypotheses. Since it is a priori unknown whether a few or almost all individual null hypotheses are false, no uniformly most powerful p -value combination method exists. We develop a combination of “combinations of p -values” (CCP) test that maintains good power properties in the presence of such an uncertainty, while at the same time controls type I error. Our test is based on a simple union of rejections decision rule, whereas the joint null hypothesis is rejected at the significance level α if at least one of the two p -value combination methods yields a rejection at the level γ . The value of γ depends on the significance level, sample size and the correlation of two p -value combination methods. Our results show that Tippett’s and Simes’ methods are almost perfectly orrelated, Fisher’s and Stouffer’ highly correlated, and Simes’(Tippett’s)and Fisher’s (Stouffer’s) almost uncorrelated. (Received August 24, 2010)