

Chirapa Chanhom 2007: Comparisons of Methods for Testing Factorial Effects with Unequal Variances. Master of Science (Statistics), Major Field: Statistics, Department of Statistics. Thesis Advisor: Associate Professor Ananchai Khuantham, M.S.
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The purpose of this research was to compare the methods for testing factorial effects with unequal variances by using four methods, namely, analysis of variance (ANOVA), Brown and Forsythe's test, the one-stage range test and the one-stage ANOVA test. The criteria of comparison were the ability to control probability of type I errors and the power of the test. The populations considered in this study were normally distributed with equal and unequal variances. There were three sizes of factorial designs: 2×2 , 3×3 and 3×4 , and two sizes of number of replications per cell: 6 and 10. The data were generated by the Monte Carlo simulation technique and each case was repeated 10,000 times. The results of study were as follows:

1. In the case of equal variance, ANOVA, Brown and Forsythe's test, and the one-stage range test could control probability of type I errors in all cases; the one-stage ANOVA test could also control probability of type I errors in all cases except when the number of replications per cell was 10, in testing interactions. When the variances were unequal, Brown and Forsythe's test, the one-stage range test and the one-stage ANOVA test could control probability of type I errors more effectively than ANOVA.

2. In the case of low difference in factorial effects and equal or unequal variances, ANOVA and Brown and Forsythe's test had higher test powers than the one-stage range test and the one-stage ANOVA test. In the case of high difference in factorial effects, the powers of all four tests were not different when the ratios of variances were equal or unequal (in the case that difference of variance was low).

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