

# Testing components of two-way interaction in bilinear models

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## Abstract

Experiments with two factors are commonly analysed using two-way analysis of variance, where testing significance of interaction is straightforward. However, using bilinear models, interaction can be analysed further. The “additive main effects and multiplicative interaction” (AMMI) model uses singular value decomposition for partitioning interaction into multiplicative terms, such that the first terms typically account for a large portion of the sum of squares, whereas the last terms are of minor importance. A recurring question is how to determine the number of terms to retain in the model. If data is replicated, which is usually the case, the  $F_R$  test [3] can be used for this purpose. The simple parametric bootstrap method [2] is another option, although this test was developed for unreplicated data. Since both these tests of significance may be applied in cases with replication, researchers need advice on which of the methods to use. It will be shown that the two methods address slightly different questions.

The AMMI model is related to the “genotype main effects and genotype-by-environment interaction effects” (GGE) model and principal component analysis. However, when variables are standardized to unit variance, a full parametric bootstrap method [1] is required for testing the significance of the principal components.

## Keywords

Analysis of experiments, Genotype-by-environment interaction, Principal component analysis.

## References

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