Estimation of variance components in balanced, staggered and stair nested designs[0]

Paulo Ramos[1], Célia Fernandes[1] and João Mexia[2]

[1]*Lisbon Superior Engineering Institute, Portugal*
[2]*Nova University of Lisbon, Portugal*

Abstract

Traditional balanced nested designs are the most popular form of nesting but we are forced to divide repeatedly the plots and we have few degrees of freedom for the first levels. Meanwhile the number of treatments increases rapidly with the number of factors and the number of levels in each factor. These designs are orthogonal and the estimators of the variance components are independent. As an alternative we have the unbalanced nesting. The most popular unbalanced nested design is the staggered nested design. This design requires less observations than the balanced case and the degrees of freedom are almost the same for the different factors. However this design is not orthogonal. Another alternative is the stair nested design. In this design we can work with fewer observations than the balanced case, the amount of information for the different factors is more evenly distributed and the number of degrees of freedom is not very different among the factors. However this design have an orthogonal structure unlike the staggered nested designs so they retain the simplicity associated with orthogonality in balanced nested designs. In this work we compare the results obtained for the estimators of the variance components using these three designs.

Keywords

Balanced nested designs, Staggered nested designs, Stair nested designs, Variance components.

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