A new and simple method to test interaction in block design

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In block design a test on interaction is difficult because of no replications within subclasses. Commonly interaction is assumed to be zero in this situation. Under this assumption mean square value for this interaction serves as error term for the test on main effects. As there is no information about existence of interaction in most experiments this presumption is rather speculative.
[3] introduced some restrictions to the structure of interaction, in particular that the interaction effect $\tau_{ij} = \lambda\alpha_i\beta_j$ (α_i ...effect of the factor, $i = 1, \ldots, a$; β_j ...block effect, $j = 1, \ldots, b$, λ = interaction parameter). Interaction is believed to be the product of factor and block effects. Firstly if there is no effect of one of these factor levels no interaction exists for this level. Secondly interaction depends on main effects in a non additive way. Similar, also to a certain degree less rigid restrictions can be found with [2] and [1].
In the proposed method the underlying model is identical to a common 2-factorial design and therefore is linear in its parameters. Constraints are related to arrangement of plots. Starting with latin square a restriction to the sum of interaction seems to be quit natural. The method as such however is not restricted to latin squares but can be generalized to a broad range of block designs. Power of the proposed method is high even if prerequisites are violated.

References

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