

A fresh look at effect aliasing and interactions: some new wine in old bottles

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Abstract Interactions and effect aliasing are among the fundamental concepts in experimental design. In this paper, some new insights and approaches are provided on these subjects. In the literature, the “de-aliasing” of aliased effects is deemed to be impossible. We argue that this “impossibility” can indeed be resolved by employing a new approach which consists of reparametrization of effects and exploitation of effect non-orthogonality. This approach is successfully applied to three classes of designs: regular and nonregular two-level fractional factorial designs, and three-level fractional factorial designs. For reparametrization, the notion of conditional main effects (cme’s) is employed for two-level regular designs, while the linear-quadratic system is used for three-level designs. For nonregular two-level designs, reparametrization is not needed because the partial aliasing of their effects already induces non-orthogonality. The approach can be extended to general observational data by using a new bi-level variable selection technique based on the cme’s. A historical recollection is given on how these ideas were discovered.

Keywords Conditional main effects · Fractional factorial designs · Nonregular designs · Orthogonal arrays

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