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# One D-optimal main effects design is not the other

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When the run size of an experiment is a multiple of four, D-optimal designs for a main effects model can be obtained by dropping the appropriate number of factor columns from a Hadamard matrix. Alternatively, one can use a two-level orthogonal array. It is well known that one orthogonal array is not the other, and this has led to a rich literature on the choice of the best orthogonal arrays for screening experiments with a number of runs that is a multiple of four. In this presentation, we explain that dropping any row from an orthogonal array results in a D-optimal main effects design for an experiment whose number of runs is one less that a multiple of four, provided the number of factors studied is not too large. We also show that the amount of aliasing between main effects and two-factor interactions as well as the amount of aliasing among the two-factor interactions strongly depends on the orthogonal array chosen and on the row dropped. We will illustrate our points by a complete study of all D-optimal designs that can be obtained by dropping a row from the complete set of orthogonal arrays with 12, 16 and 20 runs.

## Keywords

D-optimal design, orthogonal array, minimal aliasing

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