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DOE in Stages: Designs to Exploit Interim Results

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This talk focuses on one aspect of DOE practice. When applying DOE, we always seek to save time, money and resources, to enable further experimentation. After asking the right questions, we often encounter an opportunity to obtain some form of partial, interim results before a full experiment is run and complete results become available. How can we exploit this opportunity? How can we take it into account in advance when we build designs? Here we consider four such scenarios. Each deviates from the standard sequential design paradigm in a different way.

Scenario 1: A medium-sized or large experiment is planned, and a small subset of the runs will be run together first, as a pilot experiment. Which design should we build first, the chicken (main experiment) or the egg (pilot experiment)?

Scenario 2: Runs are expensive. One response, Y1, is cheap to measure, but a second response, Y2, is expensive to measure. We have the opportunity to first measure Y1 for all runs, then measure Y2 for a subset of runs.

Scenario 3: Identical to Scenario 2, but runs are cheap.

Scenario 4: The process itself is comprised of two stages. One set of factors is changed in the first stage, after which a response, Y1, is measured. For either all runs or a subset of runs, the process then continues to a second stage, with a second set of factors changed, and a second response Y2 is measured after the full process is completed.

This talk includes audience participation.

Keywords

DOE, practice, sequential

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