

SIMULTANEOUS EXPERIMENTAL DESIGNS



Where several systems touch customers (e.g. retail stores, online and call-center sales; patient care by different providers, or several marketing channels) the obvious way to run experiments is in each system separately, consecutively. It turns out though that they can all be run at the same time, with the following advantages:

- Faster improvements and contribution to EBITDA
- Since “noise” in each system typically reduces during a multi-variable test of 20+ changes, the best time to test each system is when the others are also being tested – this also improves statistical power and precision
- Since size of results (and therefore financial contribution) increases geometrically with the number of factors tested, that advantage further compounds with simultaneous experiments

At first glance it may appear 2-way interactions between systems would contaminate findings, but in fact these are easy to calculate. It turns out such interactions are not aliased with (meaning: not “tangled with”) anything else being tested.

There are important statistical rules for setting up and analyzing simultaneous experiments correctly (e.g. more than one randomization, executed in particular ways). The rules are different for systems in series (as in the 3 cases above) vs. in parallel (eq. manufacturing).

The mathematics proving all this is intricate, but it’s really just common sense, as follows:

Since randomization “removes” all variables outside the test (large or small, known or unknown) provided certain conditions at the outset are met or easily managed, then each test’s effects will be randomized out of all other simultaneous tests (and vice-versa for each test).

The graph below shows results from a set of 5 simultaneous tests where 10 factors significantly increased revenues (and 6 hurt) – over 3%-points on “comps”, long-term.



RESULTS

In cross-channel marketing optimization*, attribution models are not needed because attribution is given exactly by simultaneous experiments.

* Across PPC, SEM, digital, social, e-mail, OB, ROP, FSI, feet-on-the-street, etc.

