A Two-Phase Sensory Experiment

Brien (1983) describes a simple, sensory experiment to evaluate a set of wines made from the produce of a field trial in order to test the effects of several viticultural treatments. In the field trial, the treatments are assigned to plots according to a randomized complete block design. Then the produce from each plot is separately made into wine which is evaluated at a tasting inwhich several judges are given the wines over a number of sittings. One wine is presented for scoring to each judge at a sitting and each wine is presented only once to a judge. The order of presentation of the wines is randomized for each judge. This experiment is then a two-phase experiment (McIntyre, 1955). In the first, or field, phase the field trial is conducted, and in the second, or evaluation, phase the wine made from the produce of each plot in the field trial is evaluated by several judges.

The sets for this experiment are evaluations, wines and treatments, and the tiers are $\mathcal{F}_{\text{evaluations}} = \{\text{Judges}, \text{Sittings}\}$, $\mathcal{F}_{\text{wines}} = \{\text{Blocks}, \text{Plots}\}$ and $\mathcal{F}_{\text{treatments}} = \{\text{Treatments}\}$. There are two randomizations — treatments to wines and wines to evaluations — and they are composed. The crucial aspect of these two randomizations is that no account is taken of the randomized factors from the first phase, $\mathcal{F}_{\text{treatments}}$, when doing the randomization of the second phase; the only factors explicitly included in the second randomization are those from $\mathcal{F}_{\text{wines}}$ and $\mathcal{F}_{\text{evaluations}}$. However, the two randomizations taken together have the effect of randomizing treatments onto evaluations.

The randomization diagram in Figure 1 summarizes the randomization. Although Judges and Sittings are inherently crossed on the set of evaluations, the experimenter chose to ignore this inherent structure and randomize according to the group $S_{bt} \wr S_j$.

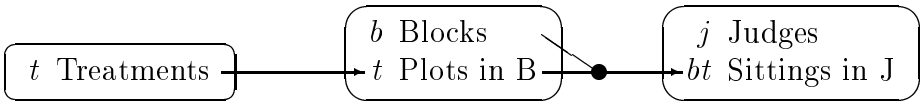

Figure 1: Composed randomizations in the two-phase sensory experiemnt

A more complicated two-phase sensory experiment is described by Brien and Payne (1999).