Information matrix of animals and treatments

Constructing the animal and treatment information matrix in the Within Runs and Tag stratum is not as straight forward compared to the example with the CRD. This because the block structure for CRD only consists of animal factor whereas the block structure for RBD consists of cage and animal within cages factors.

Record that the animal and treatment information matrices derived from the Within Runs stratum are essential to establish optimality criteria for choosing between different designs. The animal information matrix can be written as

\[Z\_{A}' Q\_{R \gamma}Z\_{A}\]

Where $Q\_{R \gamma}$ denote the orthogonal projector for the Within Runs and Tags and can be expressed as

\[ ' Q\_{R \gamma} = (I – P\_{R})(I-R\_{\gamma})\]

The cage information matrix can then be written as

\[Z\_{B}' Q\_{R \gamma}Z\_{B}\]

However, getting into the strata will required sweeping the cage information and then project into the between animals within cages space. This can be rather difficult to construct.

Record chapter (package paper), once the strata of Phase 2 experiment has been defined, the block structure of the Phase 1 experiment can be considered as the treatment structure.

Give the contrasts matrices for the cages and animals

Reduced normal equations for the treatment parameter for the Phase 1 block structure is fitted as the treatment parameters

The information matrix associated with Between Cages Within Runs

The SS for Between Cages Within Runs can be written as …..

the orthogonal projector associated with Between Cages Within Runs is …

because ….

Then using the orthogonal projector associated with Between Cages Within Runs the information matrix associated with Between Animals Within Cages Within Runs can be written as …

The SS for Between Animals Within Cages Within Runs can then be derived as ….

the orthogonal projector associated with Between Animals Within Cages Within Runs is

The treatment information matrix is then computed from the orthogonal projector associated with Between Animals Within Cages Within Runs

The contrast matrix for the treatment effects does not need to be derived for this case because we only concern the treatment effect itself.

Note that the tag effects assumed to be random while searching for optimal design because we want to find the design that the animals and treatments effects does not confound with runs and tags. Hence, we want to maximised amount of the animal and treatment information in the within runs and tags stratum.

in the analysis, the tag effects are still fitted as fixed effects.