**Section 2 Notation**

*y =X\beta +Zu + e*

*y \sim \mathcal{N}(X\beta,V)*

*u \sim \mathcal{N}(0,G)*

*e \sim \mathcal{N}(0,R)*

\mbox{V}  = \mbox{Var(y)} = \mbox{ZGZ}^T + R

**Section 3 Roy’s four tests**

**Test 1** Difference between the means of two methods. This test gives the bias and corresponding test statistic and p- value in the “solution for fixed effects” output.

**Test 2** Difference of “between subject” variability of the two methods.

**Test 3** Within subject variability of the two methods ( repeated measures)

**Test 4** Overall variability of the two methods.

\mbox{Block } \Omega_{i} = \mbox{Between Subj. Var. } + \mbox{Within Subj. Var. }

**Section 5 Variance Covariance Decomposition**

PB 5.1.3 Decomposing the Within Group VC structure.

Decompose WGVC into a variance structure component and a correlation structure component.

WGVC = V_{i}C_{i}V_{i}

(In PB, WGVC is denoted as \Lambda_{i})

V_{i} describes the variance of the within-group errors

C_{i} describes the correlation of the within-group errors

**5.1 nlme commands**

Varfunc function is used to specify WG variance models. The two main arguments are ‘value’ and ‘form’.

Corstruct function is used to specify WG correlation models.

corCompSymm implements the CS correlation structure.