**Phenotypic equation**:

* *yijk* : phenotypic value of trait y for individual *j* and group *k* at time *t.*
* *zijk* : phenotypic value of trait z for individual *j* and group *k* at time *t.*
* *i* : instance of time
* *j* : individual id
* *k* : individual group
* : population mean
* : individual-specific deviations (random-intercepts) for individual *j.*
* : population-wide response to general environmental influences *x*affecting allindividuals at time *i*.
* : population-wide response to general environmental influences *x*affectingindividuals independently at time *i*.
* : individual-specific response to general environmental influences *x* affecting all individuals at time *i*.
* : individual-specific response to special environmental influences *x* affecting individuals independently at time *i*.
* : population-wide response to environmental interaction influences *x1.x2* affecting individuals at time *i*.
* : individual-specific response to environmental interaction influences *x1.x2* affecting individuals at time *i*.
* *Kk* : higher-level grouping (clusters, groups, families etc.).
* *mijk* : measurement error at time I for individual *j* and group *k.*

**(Co)variance matrix for the intercept and the slope :**

**Measurement error:**

**Higher-level grouping:**

**Environment:**

* + D

**Sampling parameters**:

*Sduration* (individual sampling duration)

*μTot* (mean total time)

Δ*d* (difference between total duration and individual sampling duration)

­­­­

*μmin and μmax* (minimum and maximum mean sampling time)

**­­­**

*μj*: mean sampling time for each individual

*μmin,j and μmax,j* (minimum and maximum mean sampling time for each individual)

*NRi*: number of records for each individual

*Stime*: Sampling time for each individual