Result: $\sigma_G^2 = Var(V) = \underbrace{2pq\alpha^2}_{\text{additive genetic variance}} + \underbrace{(2pqd)^2}_{\text{dominance variance}}$

$$= \sigma_A^2 + \sigma_D^2$$

with $\sigma_a^2 = 2pq\alpha^2$

$\sigma_D^2 = (2pqd)^2$

Two Decompositions:

1. $V_{ij} = \mu + BV_{ij} + D_{ij}$
2. $\sigma_G^2 = Var(V) = \sigma_a^2 + \sigma_D^2$

By computation rules with variances:

Taking the variance of V_{ij} in 1.

$$\begin{aligned} Var(V_{ij}) &= var(\mu + BV_{ij} + D_{ij}) \\ &= var(\mu) + var(BV_{ij}) + var(D_{ij}) \\ &+ 2\,cov(\mu, BV_{ij}) + 2\,cov(\mu, D_{ij}) \\ &+ 2\,cov(BV_{ij}, D_{ij}) \end{aligned}$$

variance of a sum $(a+b)$

$var(a+b) = var(a) + var(b) + 2\,cov(a,$