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Variance of genotypic values V

$$\sigma_G^2 \; var(V_{ij}) = (V_{11}-\mu)^2 f(G_1G_1)$$
$$+ (V_{12}-\mu)^2 f(G_1G_2)$$
$$+ (V_{22}-\mu)^2 f(G_2G_2)$$
$$= (V_{11}-\mu)^2 \cdot p^2 + (V_{12}-\mu)^2 \cdot 2pq + (V_{22}-\mu)^2 q^2$$
$$= (a - [(p-q)a + 2pqd])^2 \cdot p^2$$
$$+ (d - [(p-q)a + 2pqd])^2 \, 2pq$$
$$+ (-a - [(p-q)a + 2pqd])^2 q^2$$

Use decomposition:

$$\sigma_G^2 = var(V_{ij}) = (BV_{11} + D_{11})^2 p^2 + (BV_{12} + D_{12})^2 2pq + (BV_{12} + D_{12})^2 q^2$$
$$= \ldots$$
$$= 2pq\alpha^2 + (2pqd)^2$$
$$= \underbrace{\sigma_A^2}_{\text{additive genetic variance}} + \underbrace{\sigma_D^2}_{\text{dominance variance}}$$

$$var(BV_{ij}) = (BV_{11} - E(BV))^2 \cdot p^2 + (BV_{12} - E(BV))^2 2pq + (BV_{22} - E(BV))^2 q^2$$
$$= BV_{11}^2 p^2 + BV_{12}^2 \, 2pq + BV_{22}^2 \, q^2 = \sigma_A^2$$