Matrix L:

- $u = L \cdot m$
- $(L)_{ij} = \frac{1}{2}(L)_{sj} + \frac{1}{2}(L)_{dj}$

Decomposition for var(u):

- Because $u = L \cdot m$

$$var(u) = var(L \cdot m)$$
$$= L \cdot var(m) \cdot L^T$$

- The vector m contains random mendelian sampling terms (m_i) for animal i:

Full sibs i and j with parents s and d

$$\left.\begin{aligned} u_i &= \tfrac{1}{2} u_s + \tfrac{1}{2} u_d + \boxed{m_i} \\ u_j &= \tfrac{1}{2} u_s + \tfrac{1}{2} u_d + \boxed{m_j} \end{aligned}\right\}$$

in general $u_i \neq u_j$ because i and j did receive the same sample of random alleles from parents

$m_i \neq m_j$

But m_i and m_j are independent

$\Leftrightarrow cov(m_i, m_j) = \emptyset$