

Fragments

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ABSTRACT. Fragments that will be some how incorporated in the book The Mathematics of the Life.

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Demography

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Demography

d is the distribution of the numbers of childs the parents have
 $d = d_0 + d_1 + \dots = 1$; d_0 is the probability that it has no child, d_1 one and so on.

The birth rate is then

$$v = 0d_0 + 1d_1 + \dots = v_0 + v_1 + \dots = \sum_{0 \leq c} v_c$$

If the number of childs depends on the generation
 a is the generation

$$d_t = d_{0t} + d_{1t} + \dots$$

$$p_{a+1} = p_0 \prod_{0 \leq t \leq a} (v_{0t} + v_{1t} + \dots)$$

If the number of childs depends also on the number of sibling of the parent
 p_{ts} is the population of parents that are s siblings in the generation t

$$p_{t+1s} = p_{t0}v_{st0} + p_{t1}v_{st1} + \dots$$

n is the maximal number of childs of siblings

$$p_{a+1} = \sum_{0 \leq c_0, s_0, c_1, s_1, \dots, c_a, s_a \leq n} p_{0s_0} v_{c_0 0 s_0} v_{c_1 1 s_1} \dots v_{c_a a s_a}$$

If the number of childs is determined by filiation

$$p_{a+1} = \sum_k \prod_{0 \leq t \leq a} p_{0tk} (v_{0tk} + v_{1tk} + \dots)$$

If the number of childs depends on both

$$p_{a+1} = \sum_k \sum_{0 \leq c_0, s_0, c_1, s_1, \dots, c_a, s_a \leq n} p_{0s_0k} v_{c_0 0 s_0 k} v_{c_1 1 s_1 k} \dots v_{c_a a s_a k}$$