BOTTOM UP band calculation algorithm:

For all states v and lengths d, calculate $\gamma_v(d)$, the probability of generating a sequence of length d from v.

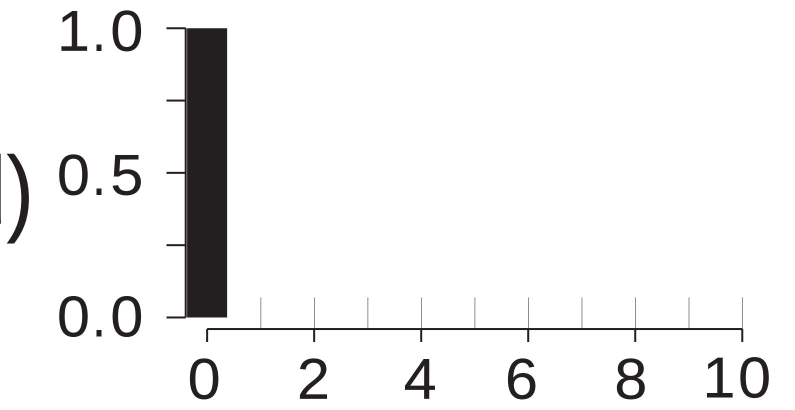
For v = 6 to 0; d = 0 to 10:

transition probabilities | # residues emitted | # possible transitions | d (length)

step 1 — state 6 E

$\gamma_6(0) = 1.0$ special case (end state)

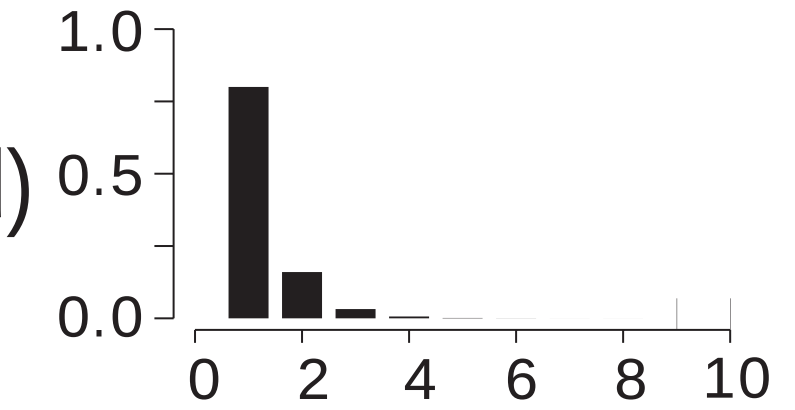
$\gamma_6(d)$



step 2 — state 5 L

$$\gamma_5(d) = 0.2 * \gamma_5(d-1) + 0.8 * \gamma_6(d-1) \quad 2$$

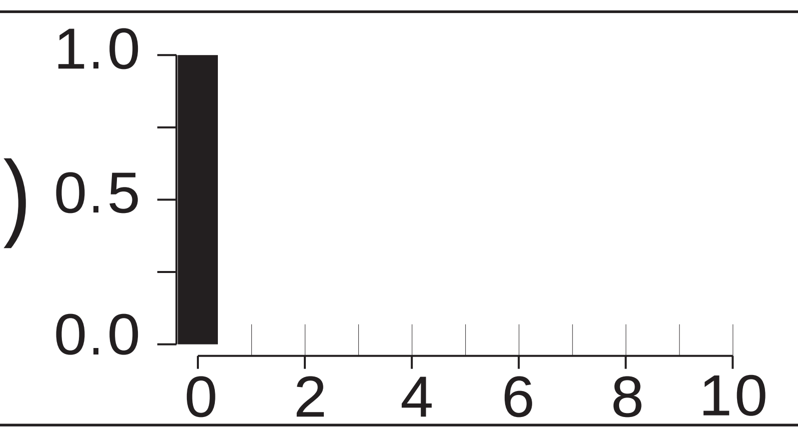
$\gamma_5(d)$



step 3 — state 4 D

$$\gamma_4(d) = 1.0 * \gamma_5(d-0) \quad 1$$

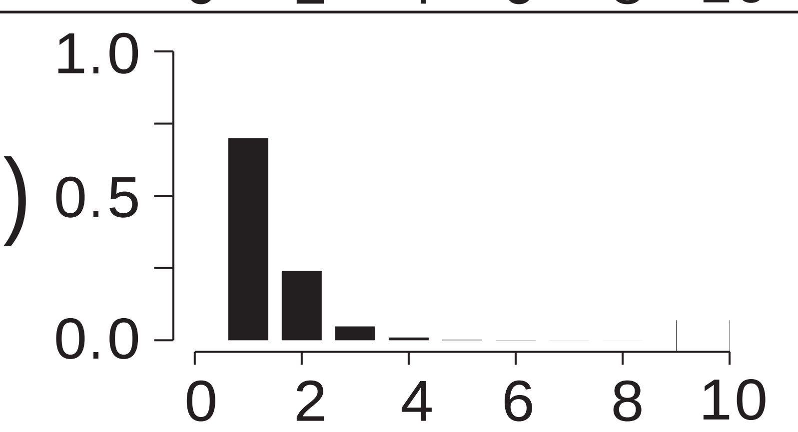
$\gamma_4(d)$



step 4 — state 3 L

$$\gamma_3(d) = 0.3 * \gamma_5(d-1) + 0.7 * \gamma_6(d-1) \quad 2$$

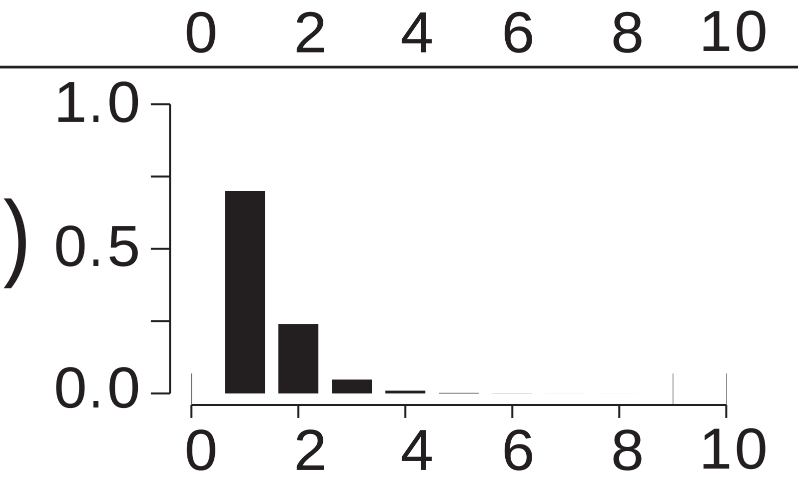
$\gamma_3(d)$



step 5 — state 2 D

$$\gamma_2(d) = 1.0 * \gamma_3(d-0) \quad 1$$

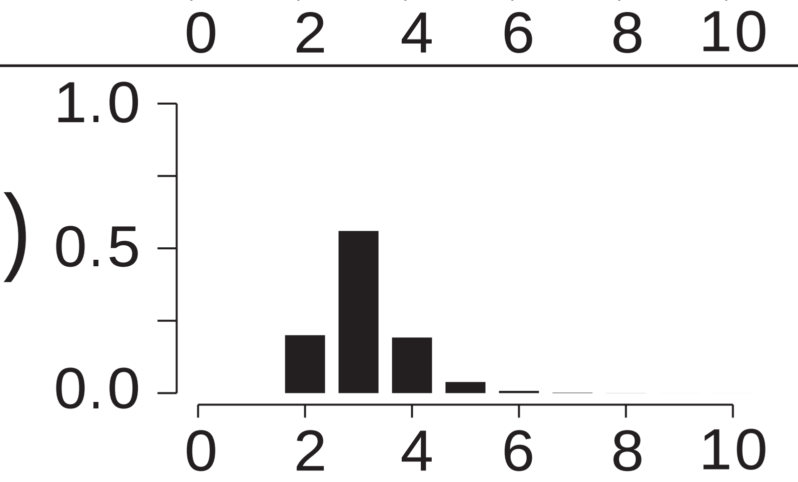
$\gamma_2(d)$



step 6 — state 1 P

$$\gamma_1(d) = 0.8 * \gamma_3(d-2) + 0.2 * \gamma_4(d-2) \quad 2$$

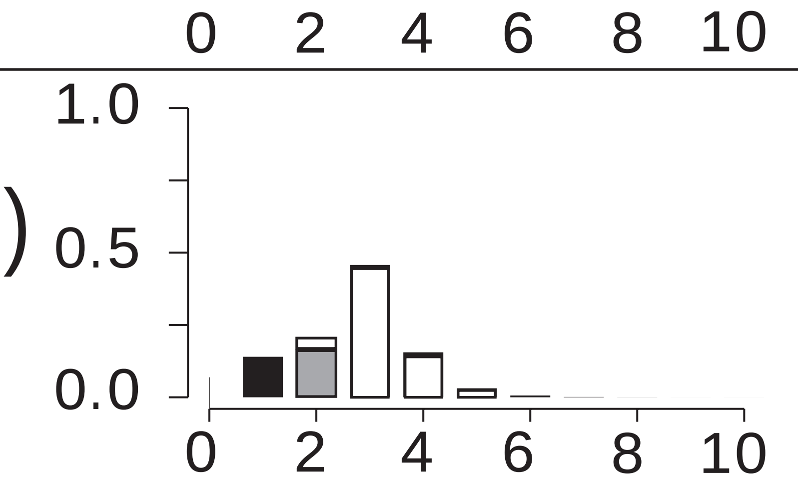
$\gamma_1(d)$



step 7 — state 0 S

$$\gamma_0(d) = 0.8 * \gamma_1(d-0) + 0.2 * \gamma_2(d-0) \quad 2$$

$\gamma_0(d)$



final step

Define band (dmin and dmax) on each state (only shown for state 0), such that:

$$\sum_{d=dmin}^{dmax} \gamma_v(d) >= (1-bandp)$$

bandp is 0.01 for this example (in practice bandp <= 10^{-6})

$\gamma_0(d)$