HMM for the prior

$$p(f, a | e) = \prod_{j=1}^{J} p(a_j | a_{j-1}, I, J) p(f_j | a_j, e)$$

Transition probabilities
$$d(a_j | a_{j-1}, I, J)$$

Translation table
$$t(f_j | e_{a_j})$$

e: All cats are grey in the dark.

f: В темноте все кошки серы.