Add probability to the "mux".

\[ D_i = \{ \text{decisions} \} \]

\[ P_d (\Gamma, i, j, \Gamma, j) = \quad \text{Probability of arriving at } j \\
\quad \text{taking time } \Gamma \quad \text{(given decision in } D_i) \]

\[ \sim \quad \Gamma + 1 \]
Problem: choose for each \((r, i)\) a decision \(d^*_r(r, i) \in D_{ijr}\) that minimizes the expected time to go from \(S_k\) to \(F_r\).

\[
f_r(i) = \text{minimum expected time to get from } (r, i) \rightarrow F
\]

\[
= \min_{d \in D_{ijr}} \left[ \sum_{j, b} \rho_d(r, i, j, b) \{ t + f_{r+1}(i) \} \right]
\]

decision first, dice roll second
Roll dice, make decision:

\[ \rho(t, i, \{ (j, t_j) : j = 1, 2, \ldots, N_{r+1} \}) \]

= \rho_j (\text{time to go from } i \text{ to } j \text{ in } t_j \text{ for } j = 1, 2, \ldots, N_{r+1}) .

Let \( X \) denote a possible outcome of

\[ \{ (i, t_i) : i = 1, 2, \ldots, N_{r+1} \} \]

\[ f_j(i) = \sum_{X} \rho(s_i, X) \min_{t_j + f_{i+1}(j)} \]