

$$\begin{aligned}
p(X_a, X_b \mid h_1) &= \int_R \int_X p(X_b|X)p(X|X_a, R)p(X_a)p(R) \, \mathrm{d}X \, \mathrm{d}R \\
&= \int_R \int_X p(X_b|X)\delta(\tau^{(\frac{R}{r})}(X_a, r) - X)p(X_a)p(R) \, \mathrm{d}X \, \mathrm{d}R \\
&= p(X_a) \int_R p(X_b|X_R)p(R) \, \mathrm{d}R \approx p(X_a) \cdot Z
\end{aligned}$$