We would like to make a Markov chain of which stationary distribution is the posterior.
Conditional Independence

Given $c$, $a$ and $b$ are independent under the condition $c$.

$$a \perp b \mid c$$

$$p(a, b \mid c) = p(a \mid c) \cdot p(b \mid c)$$

$$p(a \mid b, c) = p(a \mid c)$$

Illustrations by Akane MURAKAMI
Joint $p(A, B) = p(A|B)p(B)$

Bayes

$p(z_d = k, W, z_{\backslash d}|\alpha, \beta) \propto p(z_d = k|W, z_{\backslash d}, \alpha, \beta)$

$p(z_d = k, W, z_{\backslash d}|\alpha, \beta) = \frac{p(z_d = k, W, z_{\backslash d}|\alpha, \beta) p(\alpha, \beta)}{p(\alpha, \beta)}$
Posterior for d-th document belongs to topic k

\[
p(z_d = k|W, z_{\setminus d}, \alpha, \beta) \propto p(z_d = k|W_{\setminus d}, z_{\setminus d}, \alpha, \beta) \frac{p(W|z_d=k, z_{\setminus d}, \alpha, \beta)}{p(W_{\setminus d}|z_{\setminus d}, \beta)}
\]