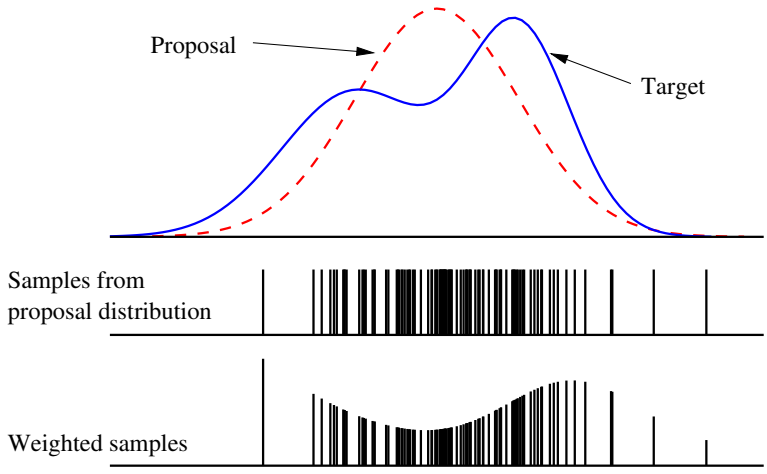

Figure 13.5 Samples cannot be drawn conveniently from the target distribution (shown as a solid line). Instead, the importance sampler draws samples from the proposal distribution (dashed line), which has a simpler form. Below, samples drawn from the proposal distribution are drawn with lengths proportional to their importance weights.

To determine the importance factor, it will prove useful to calculate the actual proposal distribution of the path particles in the temporary set. Under the assumption that the set of path particles in Y_{t-1} is distributed according to $p(x_{1:t-1} \mid z_{1:t-1}, u_{1:t-1}, c_{1:t-1})$ (which is an asymptotically correct approximation), path particles in the temporary set are distributed according to:

$$p(x_{1:t}^{[k]} \mid z_{1:t-1}, u_{1:t}, c_{1:t-1}) = p(x_t^{[k]} \mid x_{t-1}^{[k]}, u_t)\, p(x_{1:t-1}^{[k]} \mid z_{1:t-1}, u_{1:t-1}, c_{1:t-1}) \tag{13.19}$$

The factor $p(x_t^{[k]} \mid x_{t-1}^{[k]}, u_t)$ is the sampling distribution used in Equation (13.12).

The *target distribution* takes into account the measurement at time z_t, along with the correspondence c_t:

$$p(x_{1:t}^{[k]} \mid z_{1:t}, u_{1:t}, c_{1:t}) \tag{13.20}$$

The resampling process accounts for the difference of the target and the proposal distribution. As usual, the *importance factor* for resampling is