Gradients

$$\nabla_w f(w, \phi) = \sum_i \int q(t_i \mid x_i, \phi) \, \nabla_w \log p(x_i \mid t_i, w) dt_i$$

$$= \sum_i \mathbb{E}_{q(t_i \mid x_i, \phi)} \nabla_w \log p(x_i \mid t_i, w)$$

$$\approx \sum_i \nabla_w \log p(x_i \mid \widehat{t}_i, w)$$

$$\widehat{t}_i \sim q(t_i \mid x_i, \phi)$$