Regularized EM-algorithm

E-step:

$$p(t|d,w) = \frac{p(w|t)p(t|d)}{p(w|d)} = \frac{\phi_{wt}\theta_{td}}{\sum_{s \in T} \phi_{ws}\theta_{sd}}$$

M-step:

$$\phi_{wt} = \underset{w \in W}{\text{norm}} \left(\sum_{d \in D} n_{dw}\, p(t|d,w) + \phi_{wt}\frac{\partial R}{\partial \phi_{wt}} \right)$$

$$\theta_{td} = \underset{t \in T}{\text{norm}} \left(\sum_{w \in d} n_{dw}\, p(t|d,w) + \theta_{td}\frac{\partial R}{\partial \theta_{td}} \right)$$