eq. 11 introduces a probability distribution over all possible spike trains of an ouput neuron Y_i given an input spike train $\mathbf{X}$:

$$P_{\mathbf{w}_i}(Y_i|\mathbf{X}) \approx \left[\prod_{t' \in Y_i} \phi(v_i^*(t')) \right] \exp\left(-\int_0^T \phi\Big(v_i^*(t)\Big) dt \right)$$

where

$$\left[\prod_{t' \in Y_i} \phi(v_i^*(t')) \right]$$

is the probability of having a spike at $t' \in Y_i$ and

$$\exp\left(-\int_0^T \phi\Big(v_i^*(t)\Big) dt \right)$$

is the probability of having no spikes elsewhere in the spike trains. The function $\phi(v_i^*(t'))$ (if I understand correctly) maps some activity $v_i^*(t')$ to the range [0, 1], i.e. it is a sigmoid.

I don't see how the probability of having no spikes elsewhere in the spike train is

$$\exp\left(-\int_0^T \phi\Big(v_i^*(t)\Big) dt \right)$$

and not

$$\prod_{t \in Y_i} (1 - \phi(v_i^*(t)))$$

Thanks!