

## Mean-field variational inference

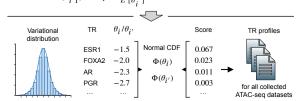
## Coordinate ascent mean-field variational inference

Mean-field variational family

Update the expectation of factors

$$E\left[z_{ijk}\right] = \begin{cases} E\left[\theta_{ij}\right] + \phi\left(E\left[\theta_{ij}\right]\right)/(1 - \Phi(E\left[\theta_{ij}\right])) & \text{use coordinate ascent to find optimal:} \\ e\left[E\left[\theta_{ij}\right] - \phi\left(E\left[\theta_{ij}\right]\right)/(\Phi(E\left[\theta_{ij}\right])) & \text{g}^*_{j}(\theta_{j}) \propto \exp\left\{E_{-j}\left[\ln\left(p\left(\theta_{j}\right|\Theta_{-j}, X\right)\right)\right] & \text{g}^*_{j}(\theta_{j}) & \text{g}^*_{j}(\theta_{$$

Similarly for all factors 
$$E\left[\theta_{ij}\right] E\left[\theta_{i}\right] E\left[\mu\right] \\ E\left[z_{ijk}\right] E\left[\theta_{i'}\right] E\left[\theta_{i'}\right] E\left[\tau^{2}\right] \\ E\left[z_{i'1k}\right] E\left[\theta_{i'}^{2}\right] E\left[\theta_{i'}^{2}\right] E\left[\sigma_{0}^{2}\right] \\ E\left[\theta_{i'1}^{2}\right] E\left[\theta_{i'}\right] E\left[\theta_{i'}\right] E\left[\sigma_{i}^{2}\right] \\ \end{bmatrix}$$
 Minimize KL divergence:  $KL\left(q_{opt}||p\left(\Theta|X\right)\right)$ 



## Integration results for TRex online portal d

