

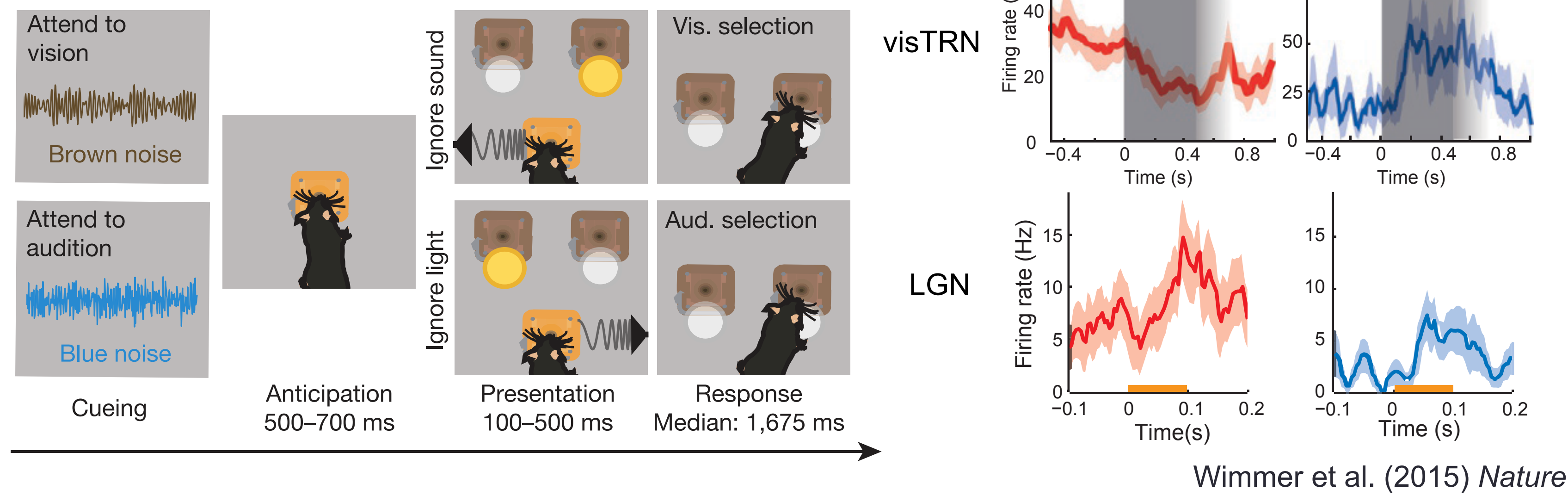
# Computational circuit mechanisms underlying thalamic control of attention

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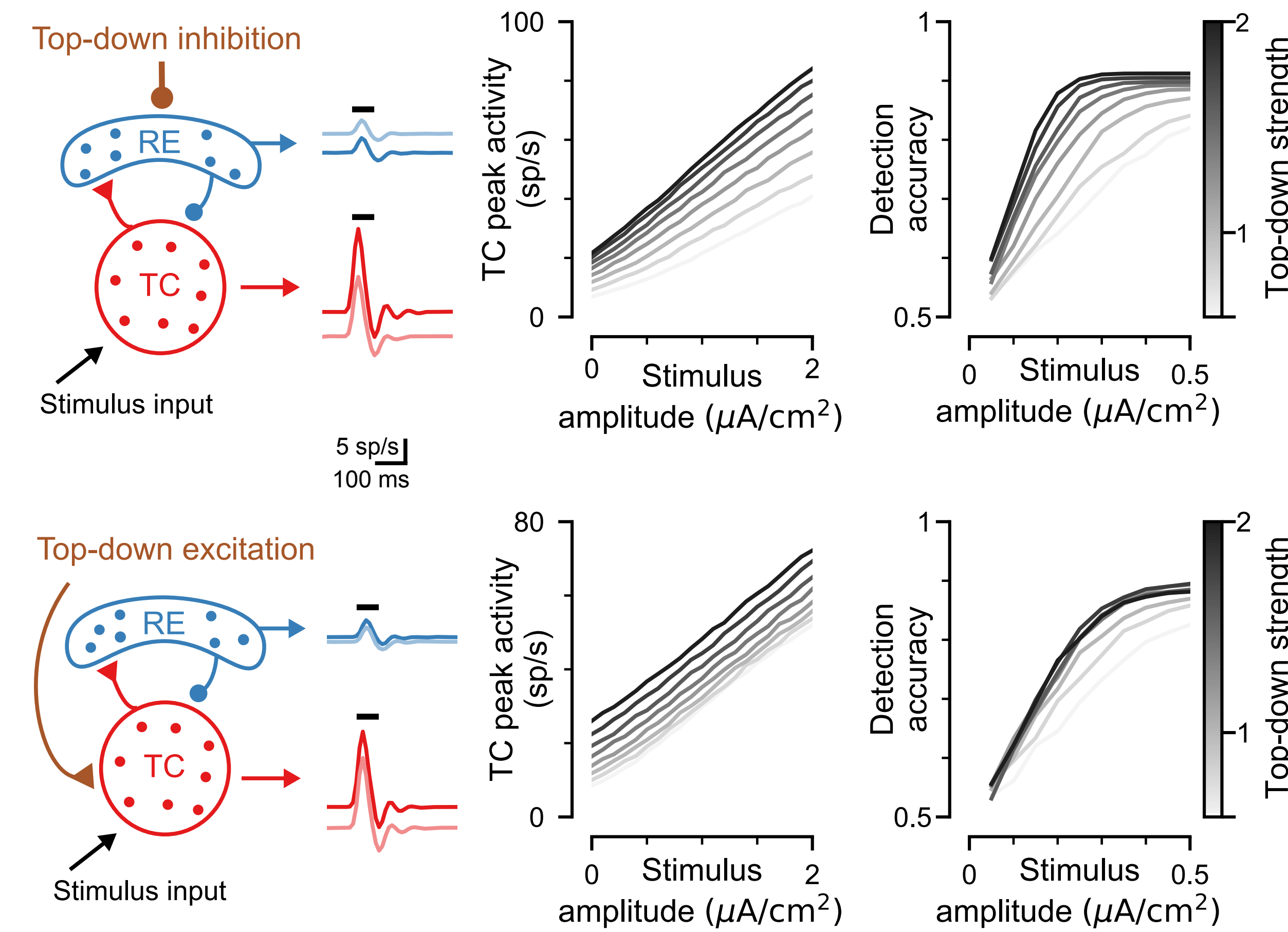
<sup>1</sup>Yale University, <sup>2</sup>Massachusetts Institute of Technology; Contact: [qinglong.gu@yale.edu](mailto:qinglong.gu@yale.edu), [john.murray@yale.edu](mailto:john.murray@yale.edu)



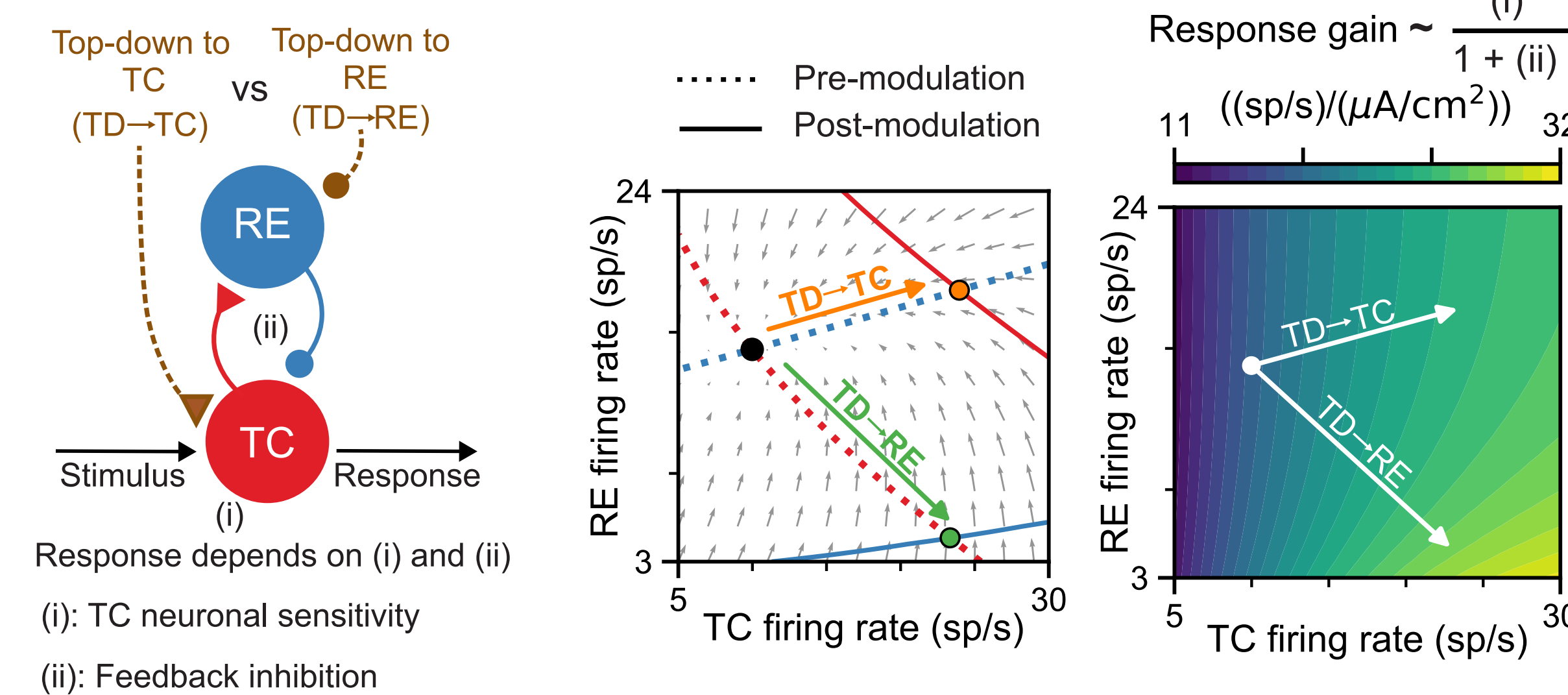
## Top-down control of selective attention in thalamic circuits



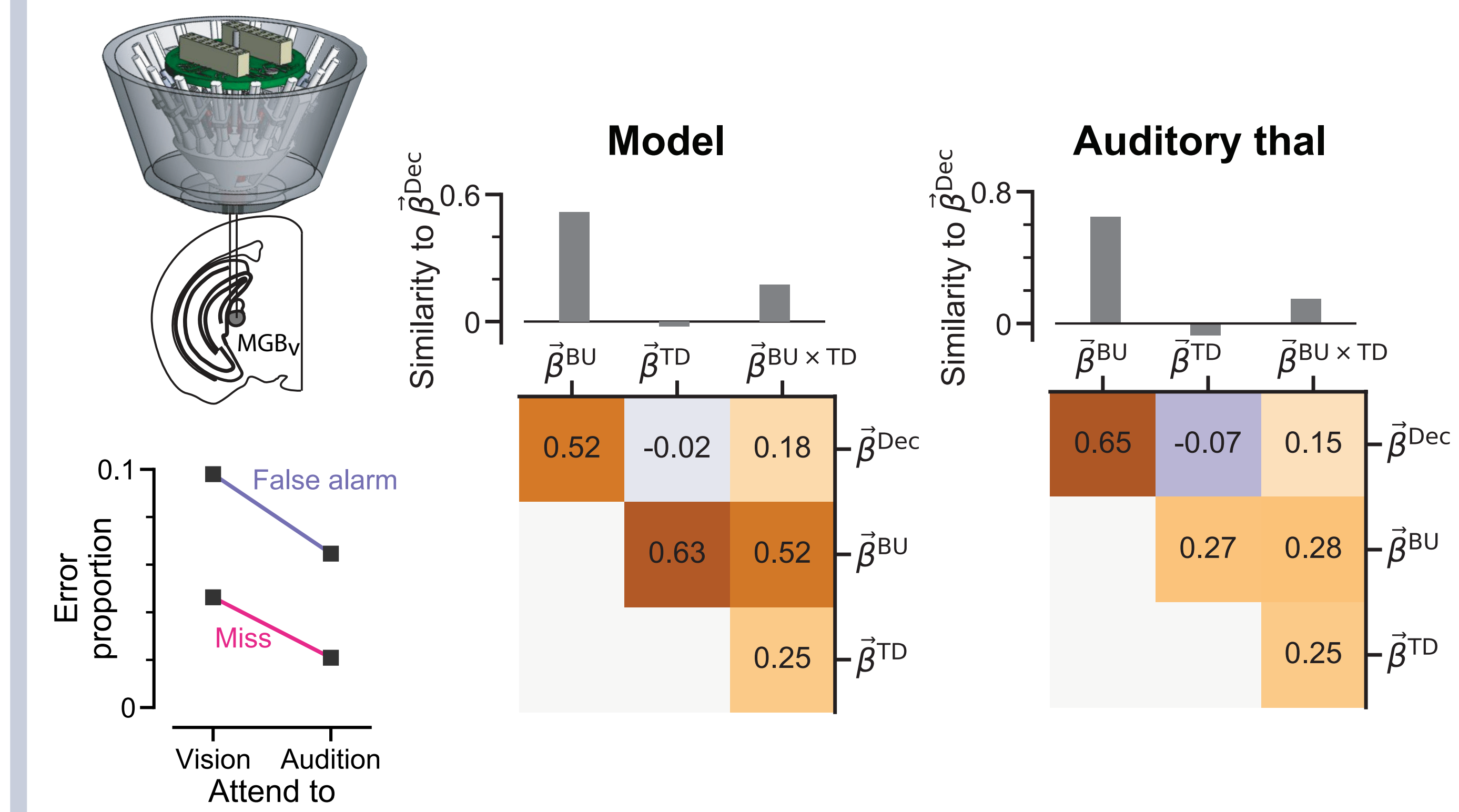
## Stronger attentional modulation from disinhibition via TRN



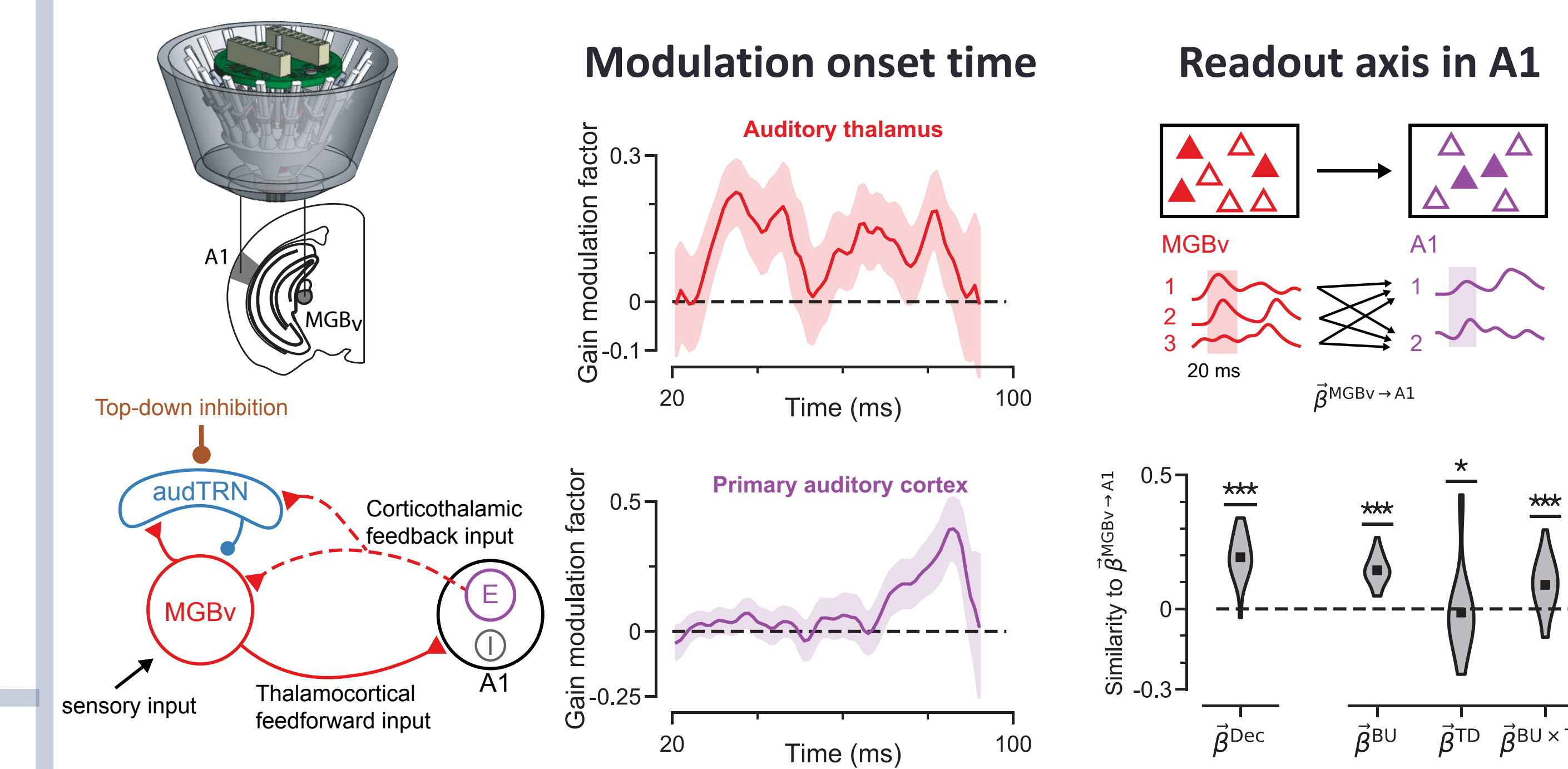
## Mean-field model analysis



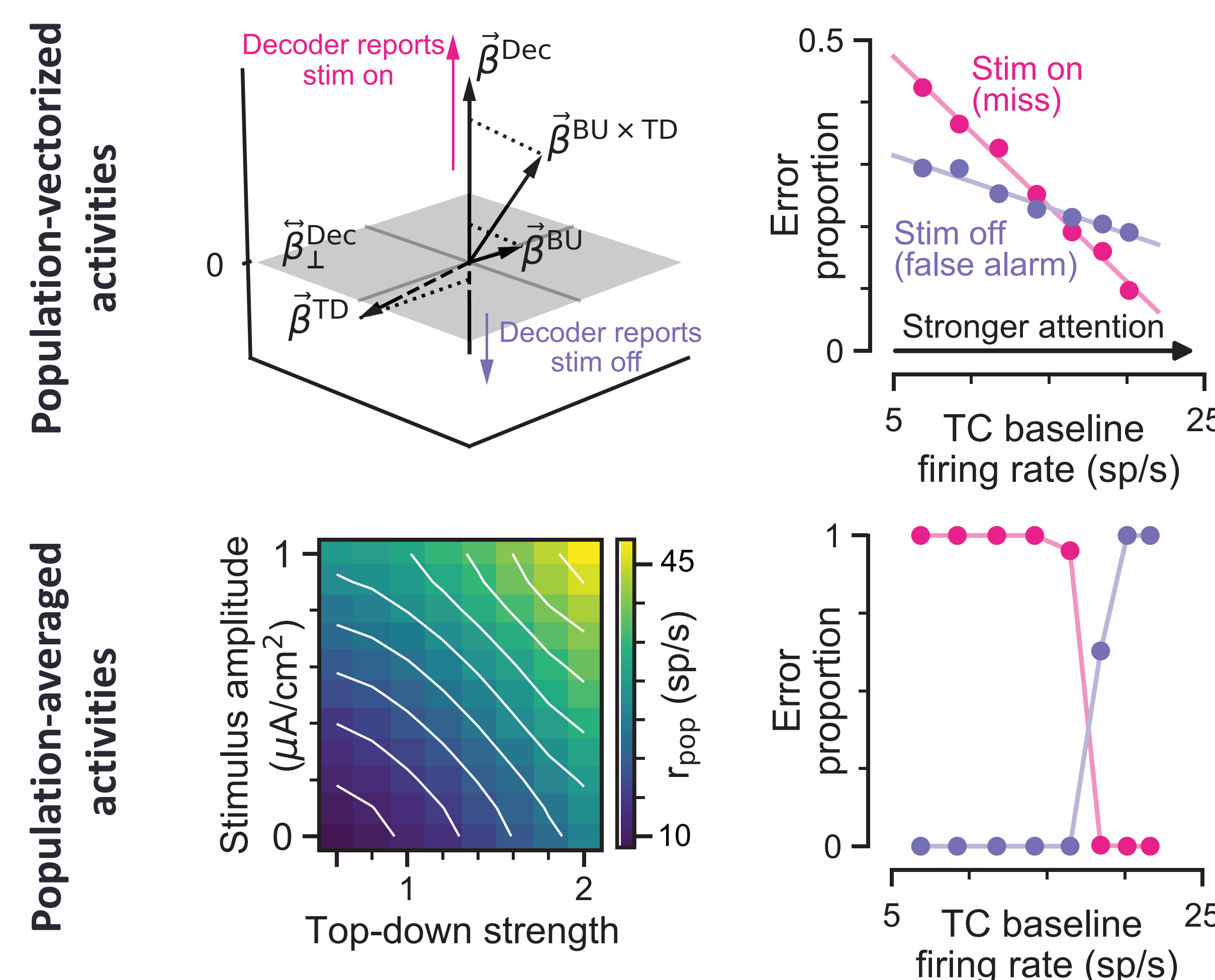
## Auditory thalamus exhibits heterogeneous population coding structure



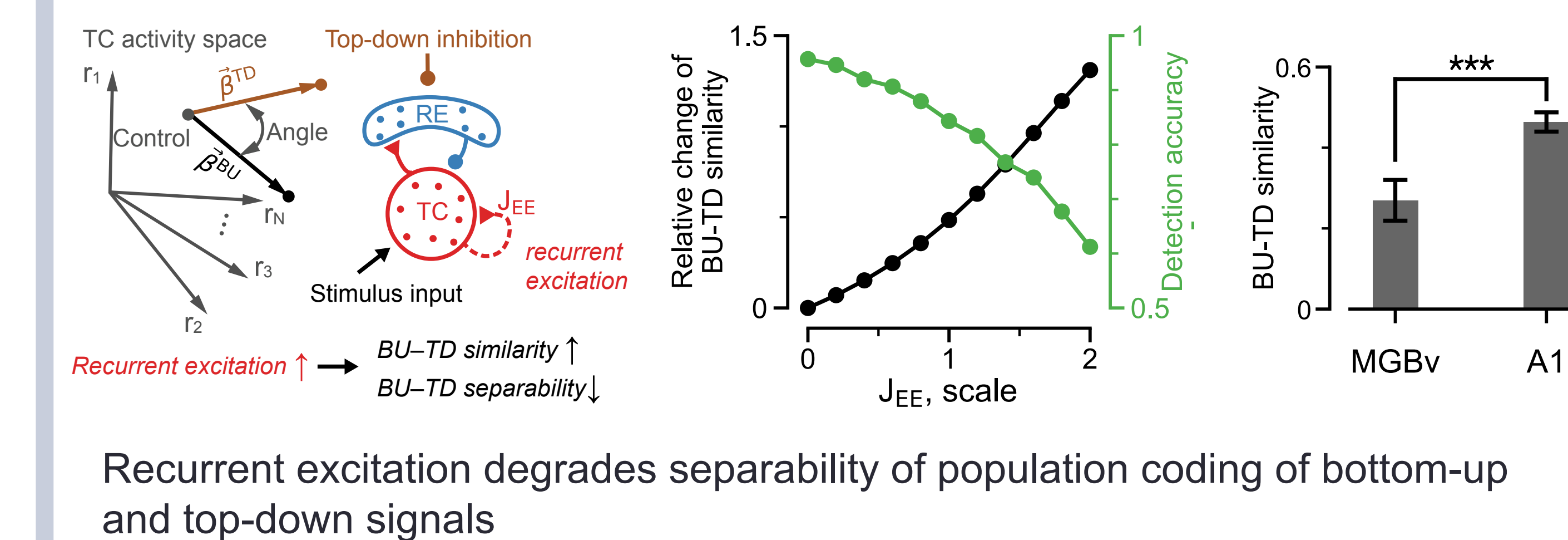
## Primary auditory cortex reflects readout of attentional modulation



## Attention improves detectability through heterogeneous population activity



## Recurrent excitation degrades separability of population codes

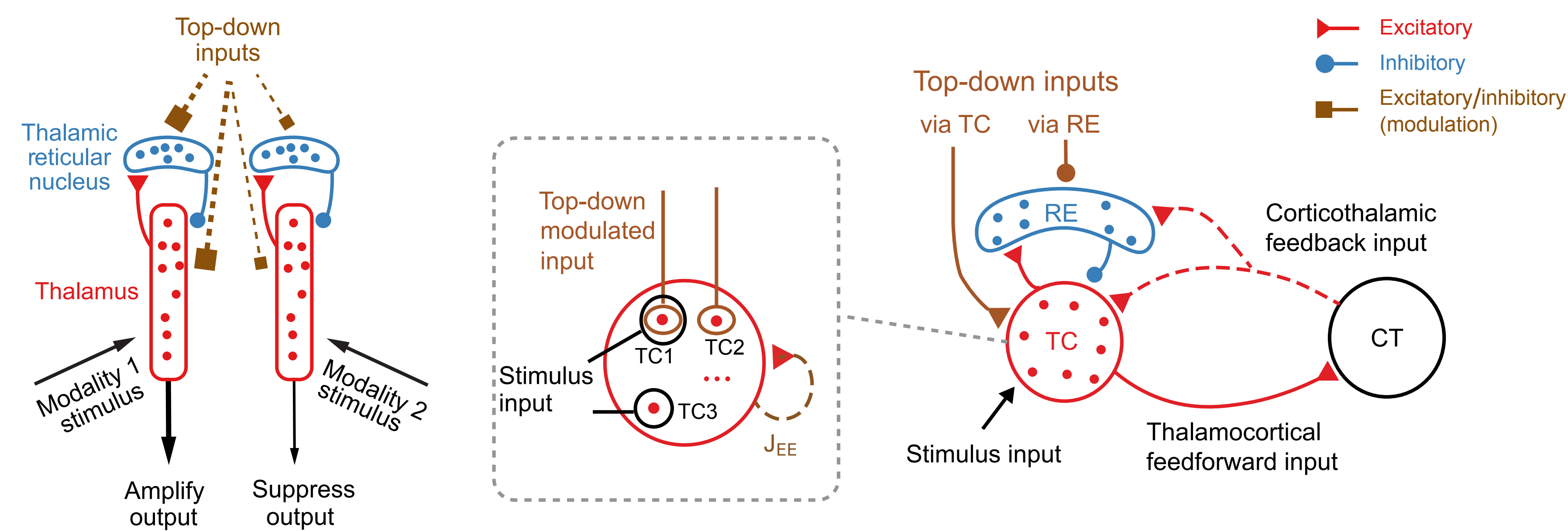


**References:** Halassa et al. (2011) *Nat Neurosci*; Wimmer et al. (2015) *Nature*; Halassa & Acsády (2016) *Trends Neurosci*; Nakajima et al. (2019) *Neuron*

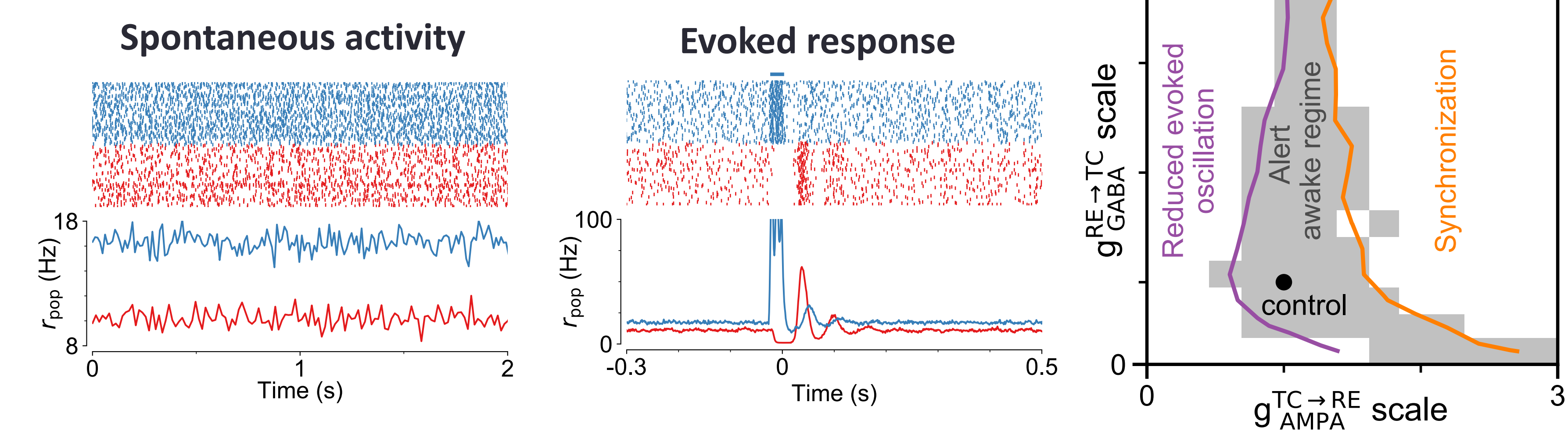
Gu et al. (2021) *bioRxiv*: <https://doi.org/10.1101/2020.09.16.300749>

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## Architecture of thalamic circuits



## Circuit model in the awake *in vivo* regime



## Perturbation analysis reveals E/I sensitivity

