Supplemental Table 1. Structural parameters of model neurons.

	Length (μm)	Diameter (μm)
Pyramidal Cell		
Soma	86.3	10.14
Basal Dendrite	150	1
Proximal Apical Dendrite	400	2.6
Distal Apical Dendrite	400	2.6
Axon	113.22	1.1
FS Interneuron		
Soma	27	29
Dendrite	22	7
Axon	115	1.5
RS Interneuron		
Soma	42	42
Dendrite	22	7
Axon	113.22	1.1
IS Interneuron		
Soma	27	27
Dendrite	22	7
Dendrite	22	7
Axon	113.22	1.1

Supplemental Table 2. Active and passive ionic properties of pyramidal neurons.

Pyramidal Neuron, mechanisms	Soma	Axon	Basal dendrites	Proximal Apical Dendrite	Distal Apical Dendrite
Sodium conductance, S/cm^2	0.108	1.08	0.0108	0.0432	0.0216
Delayed rectifier K^+, S/cm^2	5.4e-3	5.4e-3	4.86e-4	2.16e-5	5.4e10-6
Persistent sodium, S/cm^2	18e-7	0	18e-7	54e-7	18e-6
sAHP, S/cm^2	0.025	0	2.5e-5	0.0025	-
A-type K^+, S/cm^2	7e-4	0	7e-4	7e-4	7e-4
N-type calcium, S/cm^2	2e-5	0	6e-6	6e-6	0.0001
T-type calcium, S/cm^2	6e-6	0	6e-6	6e-6	6e-7
CaR, S/cm^2	3e-8	0	9e-9	9e-9	15e-8
L-type calcium (a1D)	3e-5	0	3e-5	0	-
L-type calcium (a1C)	1e-5	0	1e-5	1e-5	3e-6
D-type K^+, S/cm^2	6e-4	0	0.0006	0.0006	0.0006
fAHP, S/cm^2	2e-4	0	2.2e10-6	2.2e-4	2.2e10-6
H-current, S/cm^2	9e-6	0	9e-6	9e-6	9e-5
Calcium diffusion model	Yes	No	Yes	Yes	Yes
C_M ($\mu F/cm^2$)	1.2	1.2	2.4	2.4	2.4
R_A (ohm/cm)	150	150	150	150	150
R_M ($k\Omega$ cm^2)	11	11	6	6	6

Supplemental Table 3: Desyncrhonization index at different NMDA-to-AMPA ratios on the pyramidal neuron model

	STIMULATION SPIKE-distance	se	PERSISTENT SPIKE-distance	se
NMDA 1.25	0.117	0.003	0.274	0.001
NMDA 1.5	0.135	0.005	0.253	0.002
NMDA 1.75	0.143	0.004	0.232	0.002
NMDA 2	0.141	0.002	0.227	0.002

Supplemental Table 4: Desyncrhonization index at different NMDA-to-AMPA ratios on the FS interneuron model

	STIMULATION SPIKE-distance	se	PERSISTENT SPIKE-distance	se
NMDAIN 0.1	0.132	0.004	0.253	0.002
NMDAIN 0.2	0.140	0.005	0.261	0.002
NMDAIN 0.5	0.117	0.003	0.274	0.001
NMDAIN 0.8	0.105	0.002	0.288	0.004
NMDAIN 1	0.110	0.002	0.297	0.002

Equations of all biophysical mechanisms used

Almost all equations for the intrinsic and synaptic biophysical mechanisms have been published in Papoutsi et al, 2013, and have not been changed for the current model. Below, we present those equations that have been modified for use in our model.

The NMDA receptor on pyramidal neuron models and interneuron models.

The NMDA receptor (Wang et al., 2008; Wang and Gao, 2009)

$$I = g \cdot (V - E_{rev}) \quad (1)$$

$$g = (R_{on} + R_{off}) \cdot 1(ohm^{-1}) \cdot B \quad (2)$$

$$B = B(V) = \frac{1}{1 + \exp(0.072(mV^{-1}) \cdot (-V)) \cdot (Mg / 3.57(mM))} \quad (3)$$

$$\frac{dR_{on}}{dt} = \frac{synon \cdot R_{\inf} - R_{on}}{R_{\tau}} \quad (4)$$

$$\frac{dR_{off}}{dt} = -\beta \cdot R_{off} \quad (5)$$

$$R_{\inf} = \frac{C_{\max} \cdot \alpha}{C_{\max} \cdot \alpha + \beta} \quad (6)$$

$$R_{\tau} = \frac{1}{C_{\max} \cdot \alpha + \beta} \quad (7)$$

Where, $E_{rev} = 0(mV), Mg = 1(mM), C_{\max} = 1(mM), \alpha = 4(ms^{-1}mM^{-1}), \beta = 0.015(ms^{-1})$

The above β=0.015 (ms^{-1}) is used in the pyramidal neuron model, the RS and IS neuron models. For the FS and RS neuron models, β=0.02 (ms^{-1})

The AMPA receptor

$$I = g \cdot (V - E_{rev}) \quad (8)$$

$$g = (R_{on} + R_{off}) \tag{9}$$

$$\frac{dR_{on}}{dt} = \frac{synon \cdot R_{\mathrm{inf}} - R_{on}}{R_{\tau}} \tag{10}$$

$$\frac{dR_{off}}{dt} = -\beta \cdot R_{off} \tag{11}$$

$$R_{\mathrm{inf}} = \frac{C_{\max} \cdot \alpha}{C_{\max} \cdot \alpha + \beta} \tag{12}$$

$$R_{\tau} = \frac{1}{C_{\max} \cdot \alpha + \beta} \tag{13}$$

where $E_{rev} = 0(mV), C_{\max} = 1(mM), \alpha = 10(ms^{-1}), \beta = 0.11(ms^{-1})$

The above β value is used in the pyramidal neuron model. In the FS, RS and IS neuron model, β=0.18 (ms^{-1})

The equation for the fast sodium channel $I_{Na(fast)}$ for the FS neuron model has been previously published in (Sidiropoulou and Poirazi, 2012).

Sidiropoulou K, Poirazi P (2012) Predictive Features of Persistent Activity Emergence in Regular Spiking and Intrinsic Bursting Model Neurons Morrison A, ed. Plos Computational Biology 8:e1002489.

Wang H-X, Gao W-J (2009) Cell Type-Specific Development of NMDA Receptors in the Interneurons of Rat Prefrontal Cortex. Neuropsychopharmacology 34:2028–2040.

Wang H-X, Stradtman GG, Wang X-J, Gao W-J (2008) A specialized NMDA receptor function in layer5 recurrent microcircuitry of the adult ratprefrontal cortex. proceedings of the National Academy of Sciences 105:16791–16796.