README file: ModelDB Accession Number 256610

These are files to accompany the manuscript entitled **"Network models predict that pyramidal neuron hyperexcitability and synapse loss in the dlPFC lead to age-related spatial working memory impairment in rhesus monkeys"**, by Sara Ibañez, Jennifer I. Luebke, Wayne Chang, Danel Draguljić, and Christina M. Weaver. The manuscript was submitted to Cerebral Cortex on 5/8/19.

The ZIP file contains examples of two spatial working memory tasks: the Delayed Response Task (DRT) or oculomotor task & the Delayed Recognition Span Task in the spatial condition (DRSTsp), as well as a README file.

These MATLAB files are modifications of code provided by Klaus Wimmer (accompanying the publication Wimmer et al. 2014 in Nature Neuroscience), revised by Sara Ibañez. These files were verified to function properly in MATLAB\_R2016a.

**DRT model**

Model for the (oculomotor) Delayed Response Task based on the bump attractor dynamics. The network is an excitatory-inhibitory network of the prefrontal cortex with 640 excitatory neurons and 160 inhibitory neurons. Model neurons described by the firing-rate model. The model shows 3 different outputs: an under-excited network (persistent activity ends before the end of the delay), a network maintaining persistent activity tuned to the stimulus location until the end of the delay, and a partially over-excited network (all excitatory cells start firing at the same rate), for 3 different values of the “excitability parameter”, vce. This parameter controls the "slope" of the f-I curve for the individual neurons. That is, their firing activity for each input current.

**DRST (spatial) model**

Simple model of the Delayed Recognition Span Task (in the spatial condition) based on the Delayed Response Task setup (with bump attractor dynamics). The network is an excitatory-inhibitory network of the prefrontal cortex with 640 excitatory neurons and 160 inhibitory neurons with short-term synaptic facilitation in the excitatory synapses of the excitatory neurons. Model neurons described by the firing-rate model. The model shows examples of “young”, “middle-aged” and “aged” networks, described by the excitability parameter vce.