Loss of sensory input causes rapid structural changes of inhibitory neurons in adult mouse visual cortex

- UH Biocomputation group journal club -

Ankur Sinha

University of Hertfordshire - Biocomputation group

28 April 2017

2017-04-28

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Outline

Cortical rewiring

2017-04-28

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Context

Biology

Paper 1 - layer 5 pyramidal neurons

Paper 2 - inhibitory neurons

My work - modelling

I'm looking at:

the functional effects of cortical rewiring following loss of input.

Cortical rewiring
└Context
└I'm looking at:

2017-04-28

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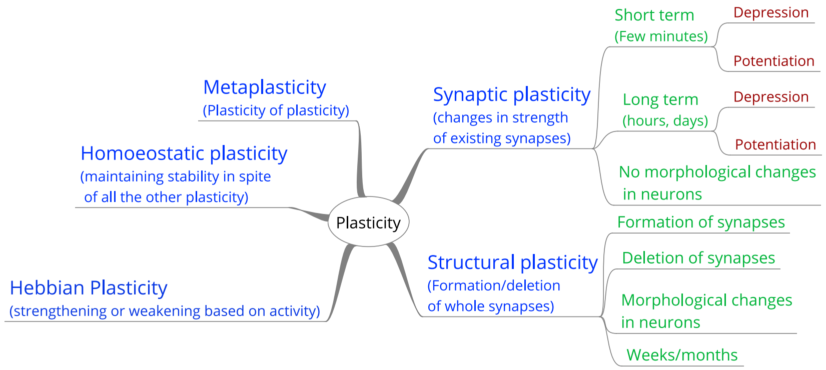
Plasticity - refresher



Cortical rewiring
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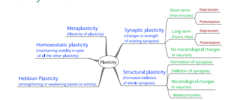

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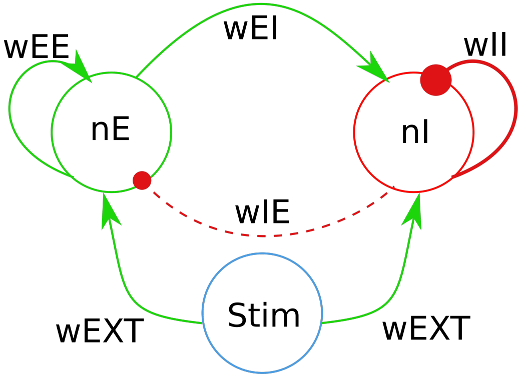
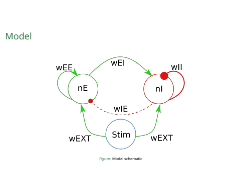


Figure: Model schematic



General observations

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- Observe the cortex over time
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2. Keck et al. use a cranial window technique. There's also a thinning skull technique. Both of which I do not know much about
3. Various species, various cortices, but a lot of work has been done on the visual cortex
4. Several weeks and months
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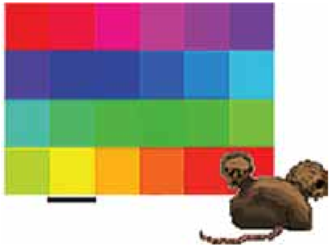

Figure: Drifting grating stimuli

Cortical rewiring
└ Biology
└ Mapping

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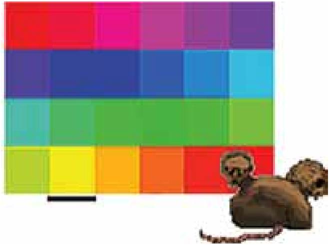

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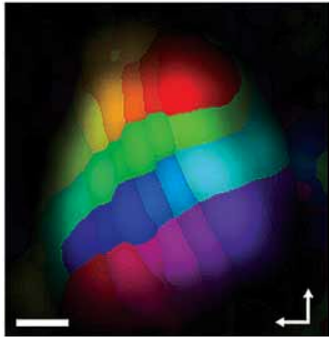

Figure: Pre lesion mapping

Recovery - remapping

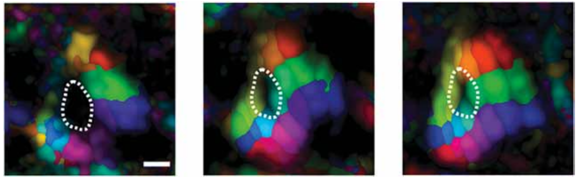

Figure: Time lapse for a particular mouse - days 0, 11, 74

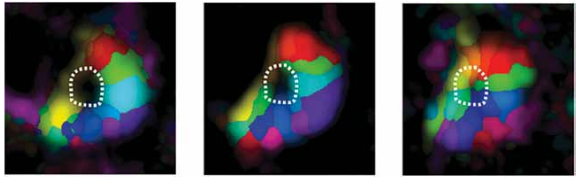

Figure: Time lapse for a particular mouse - days 7, 12, 17

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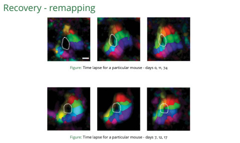
Cortical rewiring
└ Paper 1 - layer 5 pyramidal neurons
└ Recovery - remapping



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Cortical rewiring
└ Paper 2 - inhibitory neurons
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└ Paper 2 - inhibitory neurons
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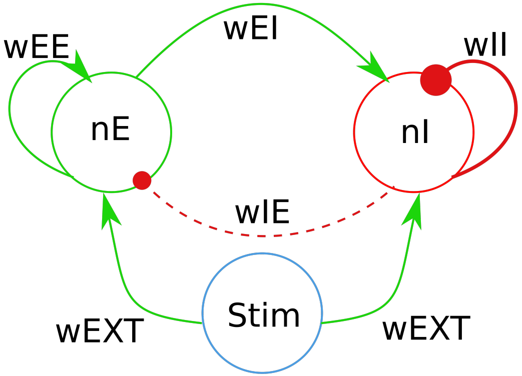

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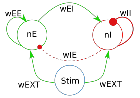

Without repair - firing rates

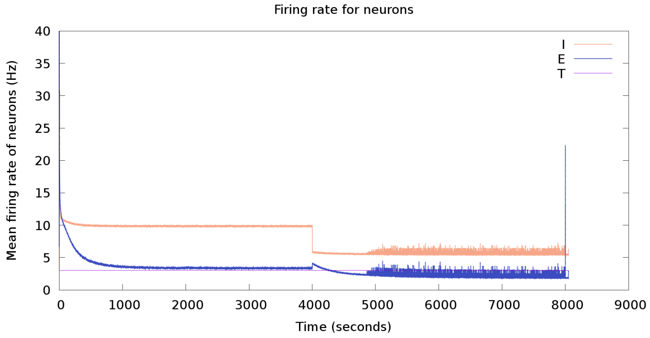

Figure: Firing rates after lesion, without structural plasticity repair

Cortical rewiring
└ My work - modelling
└ Without repair - firing rates

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Without repair - firing rates

Figure: Firing rates after lesion, without structural plasticity repair

Without repair - conductances

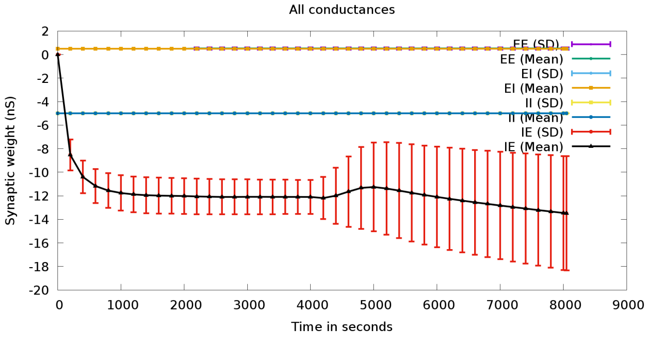

Figure: Conductances, without structural plasticity repair (negative conductance implies inhibitory)

Cortical rewiring
└My work - modelling
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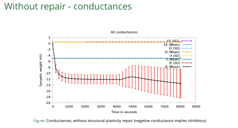

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