

Want to know what goes on behind the lab door?
Physics research talks 2023-24

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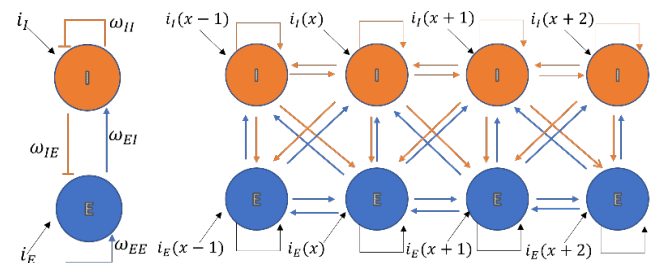
How does the brain process information?

Cortical neural waves in processing of visual information

Wed 20 Mar 2024, 16.00 DAV1.102

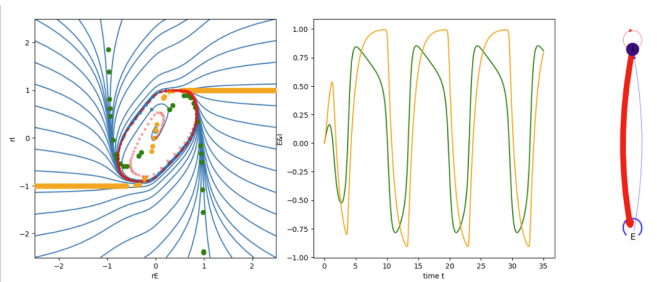
We want to understand the brain, so we ask the question: how does the brain work? That question is daunting and vague. So we ask a more precise question that relates to how the brain works: how do the networks that comprise the cortical regions of the brain process external information? We can go a step further and ask “how does the visual pathway process visual information?”. Providing an answer means we have to be precise with our question: what do we mean by *processes*? what do we mean by *information*? Most fundamentally, to process can be the ability of a thing to compute, that is to apply a logical structure (however small or large) that takes some input and produces an output. This could be logical statements as seen with coding, equations and/or a network of nodes. Information in this context is the input: at the retina it is photons, converted to neural activity which propagates into our visual cortex.

My work looks at how a neural network connected in such a configuration is able to process information: what does the network look like if its function is sensory, memory or even cognitive? Added to this, we have to consider *neural waves*, the propagation of neural activity spreading over cortical regions aiding in the computational process of these networks – but why and to what extent do neural waves help in this manner?



Using psychophysics (a method used to measure human perception) and electrophysiology

(electro-probes used to measure voltage spikes), one can test how well this model accurately describes neural waves/cortical networks. Delving deeper into a neural network that is comprised of excitatory (neurons that excite) and inhibitory (neurons that inhibit) neurons, we ask what properties manifest. That is, if the equations state one thing, what is the biological implication? How is information processed?



All welcome!

<https://www.lboro.ac.uk/departments/physics/events/seminars/research-talks/>

If you would like to give a talk in this series, please contact John Samson