Project Title - Neurobiologically Realistic Modelling of Language Processing

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Summary

A fundamental understanding of the brain's language system remains a formidable scientific challenge. Tremendous progress has been made, from linguistics to the neurobiology of language [1], still, an integrated understanding of the underlying mechanisms is missing and theoretical models that have been put forward seriously lack in neurobiological realism [2]. Recent progress in computational systems neuroscience combined with core insights from linguistics and the neurobiology of language offers a novel opportunity to bridge this gap [1, 3].

We are building computer models of language processing in spiking recurrent networks which shares similarities with a recent framework called reservoir computing [4]. This is well-suited for testing the computational role of various neurobiological features, adaptation/learning mechanisms, and network architectures in the context of language processing [5]. This will clarify the role of (a) brain connectivity, (b) memory at various time-scales and (c) unsupervised, local learning mechanisms, in the language system's capacity to reconstruct structured semantic interpretations from sentence input.

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