Abstract Submitted
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Modeling the Kinetics of a Memory-Associated Immediate Early Gene's Compartmental Expression After Sensory Experience[1] ADAM WILLATS, Georgia Intsitute of Technology and Emory University: Dept. of Biomedical Engineering, TAMARA IVANOVA, ASTRID PRINZ, ROBERT LIU, Emory University: Dept. of Biology — Immediate Early Genes (IEGs) are rapidly and transiently transcribed in neurons after a sensory experience. Some of these genes act as effector IEGs, which mediate specific effects on cellular function. Arc is one such effector IEG that is essential for synaptic plasticity and memory consolidation in hippocampus and cortex. The expression of Arc in neurons has previously been examined using an imaging method known as Compartmental Analysis of Temporal Fluorescent In-Situ Hybridization. Previous work found that the time course of Arc expression within the nuclear and perinuclear cytoplasmic compartments of a neuron is altered by prior sensory experience. We explore a simple model of the kinetics of IEG transcription and nuclear export, with the aim of eventually uncovering possible mechanisms for how experience alters expression kinetics. Thus far, we characterize our compartmental model using phase-plane analysis and validate it against several IEG expression data sets, including one where prior experience with vocalizing mice alters the time course of call-induced Arc expression in the auditory cortex of a listening mouse. Our model provides a framework to explore why Arc expression may change depending on a receiver's past sound experience and internal state.

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