A Biologically Plausible Account of the Computational Utility of Consciousness

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Abstract: According to Mathis and Mozer (1996), visual awareness requires internal representations to be stable over time. They demonstrated that attractor dynamics in a hand-wired, abstract, connectionist model could both produce this stability and also explain behavioral differences between conditions of subliminal and supraliminal stimulus presentation. One such demonstration involved a lexical decision study by Marcel (1980), in which conscious perception of an ambiguous prime word, disambiguated by previous context, sped lexical decision of a subsequent target word only when the target was related to the context-cued meaning of the prime. In contrast, subliminal presentation of the prime produced facilitation for targets related to either meaning of the prime. Here, we show that the attractor dynamics needed to explain this effect naturally arise from the balance of excitatory and inhibitory connections in cortex, as modeled in the biologically constrained Leabra framework, providing some neuroscientific support for this account of visual awareness.