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**Adaptation tunes cortical dynamics to a critical regime during vision**[1] WOODROW SHEW, WESLEY CLAWSON, University of Arkansas, JEFF POBST, YAHYA KARIMIPANAH, NATHANIEL WRIGHT, RALF WESSEL, Washington University, St. Louis, SHEW LAB TEAM, WESSEL LAB TEAM — A long-standing hypothesis at the interface of physics and neuroscience is that neural networks self-organize to the critical point of a phase transition, thereby optimizing aspects of sensory information processing. This idea is partially supported by strong evidence for critical dynamics observed in the cerebral cortex, but has not been tested in systems with significant sensory input. Thus, the foundations of this hypothesis – the self-organization process and how it manifests during strong sensory input – remain unstudied experimentally. Here we report microelectrode array measurements from visual cortex of turtles during visual stimulation of the retina. We show experimentally and in a computational model that strong sensory input initially elicits cortical network dynamics that are not critical, but adaptive changes in the network rapidly tune the system to criticality. This conclusion is based on observations of multifaceted scaling laws predicted to occur at criticality. Our findings establish sensory adaptation as a self-organizing mechanism which maintains criticality in visual cortex during sensory information processing.

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