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A Role for Antennal Lobe Baseline Activity in Odor-Related Predictive Coding

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The brain is at every moment confronted with large amounts of sensory data; how it effectively processes this information and orchestrates appropriate responses is an important question in neuroscience. One proposed mechanism for this is predictive coding, whereby the brain uses information from memory and context to predict sensory input. What are the neural substrates underlying predictive coding? We examine the role of spontaneous activity in the locust antennal lobe in context of odor coding. We ask: how do the baseline activities in projection neurons of the antennal lobe change with repeated presentation of an odor? And how do these changes aid the function of the antennal lobe in odor detection? Based on extracellular PN recordings of responses to regular puffs of a single odor, interlaced with trials of a novel "surprise" odor, we report robust changes in antennal lobe baseline activity with repetitive odor stimulation that function to enhance the salience of odor-evoked activity. We propose that these changes in baseline activity in the antennal lobe carry odor-related information and thus may be a correlate of predictive coding.