

The rate of information transfer of natural stimulation by graded potentials

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Summary

The performance of graded signals in neurons has been measured using white noise stimulation assuming linear responses and additive noise. We now measure the signaling performance of *Calliphora* photoreceptor responses to natural and artificial stimulation, and find that especially for natural stimulation the responses are nonlinear and noise is nonadditive. For these experiments we developed a method to calculate the rate of information transfer in graded systems without assumptions about the stimulus or responses. The phototransduction machinery affects signal and noise differentially depending on the time scale, structure and speed of the stimulus. Different signaling strategies for short and long term and dim and bright light are found for a graded system when stimulated with natural light changes.