

## **CORRELATION ENHANCED INFORMATION TRANSFER IN ELECTRORECEPTORS OF WEAKLY ELECTRIC FISH**

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Accurate detection of sensory stimuli is essential for the survival of a species. Using simple and accurate models of electroreceptor activity, we show that negative interspike interval (ISI) correlation coefficients (i.e. the tendency for short ISI's to be followed by long ones and vice-versa) increase the detection of weak slowly varying signals that the fish might get from prey. This increase is due to a reduction in spike train variability and is maximal for a counting time at which spike train variability is minimal. Further, using information theory, we show that these correlations increase the mutual information for time varying stimuli. This increase is due to the differential effects of these correlations on the entropy of the spike train and the entropy of the spike train given the stimulus. Our study suggests that the hyperacuity observed in these fish is due in part to the correlations displayed by electroreceptors.