

# Coincidence-enhanced stochastic resonance: Experimental evidence challenges the psychophysical theory behind stochastic resonance

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Stochastic resonance (SR) is the counterintuitive phenomenon in which noise enhances detection of sub-threshold stimuli. The SR psychophysical threshold theory establishes that the required amplitude to exceed the sensory threshold barrier can be reached by adding noise to a sub-threshold stimulus. The aim of this study was to test the SR theory by comparing detection results from two different randomly-presented stimulus conditions. In the first condition, optimal noise was present during the whole attention interval; in the second, the optimal noise was restricted to the same time interval as the stimulus. SR threshold theory predicts no difference between the two conditions because noise helps the sub-threshold stimulus to reach threshold in both cases. The psychophysical experimental method used a 300 ms rectangular force pulse as a stimulus within an attention interval of 1.5 s, applied to the index finger of six human subjects in the two distinct conditions. For all subjects we s