Title:	Logical stochastic resonance
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Abstract:	In a recent publication it was shown that, when one drives a two-state system with two square waves as input, the response of the system mirrors a logical output (NOR/OR). The probability of obtaining the correct logic response is controlled by the interplay between the noise-floor and the nonlinearity. As one increases the noise intensity, the probability of the output reflecting a NOR/OR operation increases to unity and then decreases. Varying the nonlinearity (or the thresholds) of the system allows one to morph the output into another logic operation (NAND/AND) whose probability displays analogous behavior. Thus, the outcome of the interplay of nonlinearity and noise is a flexible logic gate with enhanced performance. Here we review this concept of "Logical Stochastic Resonance" (LSR) and provide details of an electronic circuit system demonstrating LSR. Our proof-of-principle experiment involves a particularly simple realization of a two-state system realized by two adjustable thresholds. We also review CMOS implementations of a simple LSR circuit, and the concatenation of these LSR modules to emulate combinational logic, such as data flip-flop and full adder operations.
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