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Dynamical analysis of Bayesian inference models and its relation to connectionist neural network models for the Eriksen task YUAN LIU, Department of Physics, Princeton University, ANGELA YU, Center for the Study of Brain, Mind, and Behavior, Princeton University, PHILIP HOLMES, Program in Applied and Computational Mathematics, Princeton University — We analyze Bayesian compatibility bias and spatial uncertainly models for the two-alternative forced choice Eriksen task, in which subjects must correctly identify a central stimulus and disregard flankers that may or may not be compatible with it. We simplify the models, deriving linear, uncoupled, discrete dynamical systems and their continuum limits: stochastic differential equations. Analytical solutions of these allow us to describe how posterior probabilities and psychometric functions depend upon parameters. We compare our results with numerical simulations of original inference models and show that agreement is good enough for them to be useful in parameterizing such models. Our analysis also reveals that Bayesian updating is closely related to a simple drift diffusion process that can be derived from neural network models.

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