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How stability can lead to variability: An example from eukaryotic gene expression GABOR BALAZSI, WILLIAM BLAKE, Applied BioDynamics Laboratory, Boston University, FARREN ISAACS, Genetics Department, Harvard Medical School, KEVIN MURPHY, JAMES J. COLLINS, Applied BioDynamics Laboratory, Boston University — Eukaryotic genes have the potential for transcriptional reinitiation, resulting in repeated rounds of transcription from a scaffold of proteins assembled near the promoter region. We use stochastic simulations and mathematics to analyze the effect of the promoter-scaffold stability on gene expression noise for various steady-state levels of induction. In agreement with experimental observations, we find that decreasing transcription scaffold stability results in lower levels of noise at the protein level. We track the cause of this decrease through mRNA expression down to the level of an engineered GAL1 promoter.

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