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Kempner Colloquium

Real and complex dynamics for symbolic sequences of logistic maps

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The behavior of orbits for iterated logistic maps has been widely studied since the dawn of discrete dynamics as a research field. Existing results refer not only to the family of real polynomials $f : \mathbb{R} \to \mathbb{R}$, $f_\mu(x) = \mu x(1 - x)$, for $\mu > 0$, but also to the context of complex maps $f : \mathbb{C} \to \mathbb{C}$, parametrized as $f_c(z) = z^2 + c$, with $c \in \mathbb{C}$. However, little is is known about orbit behavior if the map changes along with the iterations.

We investigate how the theory changes if the dynamical scheme involves two functions, f_0 and f_1, iterated according to a prescribed binary sequence of 0s and 1s. In particular, we observe the effects of the structure of the symbolic sequence (periodicity, complexity, etc) on the complexity of the resulting system and (visually) on the topological structure of its Julia set.

This direction is of potential interest to a variety of applications (including genetic and neural coding), since it investigates how an occasional or a reoccurring error in a replication or learning algorithm may affect the outcome.

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