Converting Intellectual Understanding of Complexity into Evaluation Practice: Insights for Program Theory

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A very strange attractor

Best I can do is show some examples

- A few general insights from complex behavior
- A few specific examples

Statistics

"I will analyze the data with statistics"

- Which statistics?
- What is the desired method good for?
- How does it work?

Statistical Reasoning

"I will analyze the data using statistical reasoning"

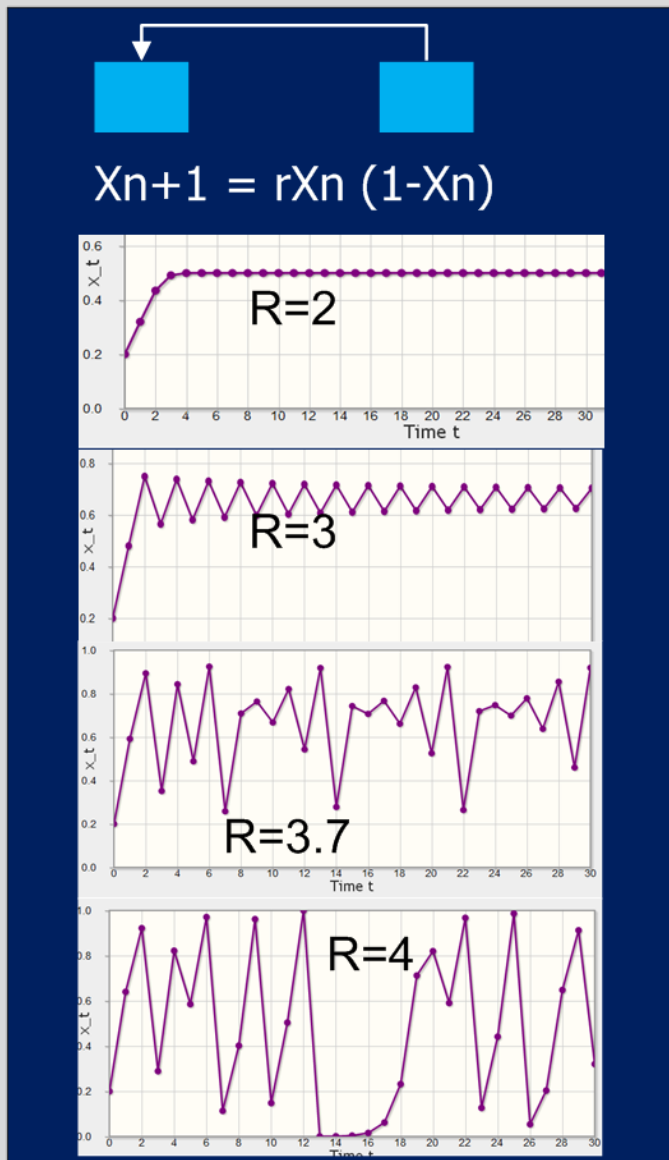- 1-2 hour lecture could pull it all together

Complexity

"I will analyze the data with complexity"

- What aspect of complexity?
- What is it good for?
- How does it work?

Complexity Reasoning

- No grand unifying theory
- There may never be one

An insight from dynamical systems is that "simple" systems <u>might</u> behave in elaborate/chaotic ways

$$X_{n+1} = rX_n (1-X_n)$$

R=2

R=3

R=3.7

R=4

- It is *possible* for systems like "B" to behave in odd ways with NO input from the environment.
- Implications for program theory that assumes change comes from external influence?

Program

A

Policy environment

Research evidence about effective treatment

Program

B
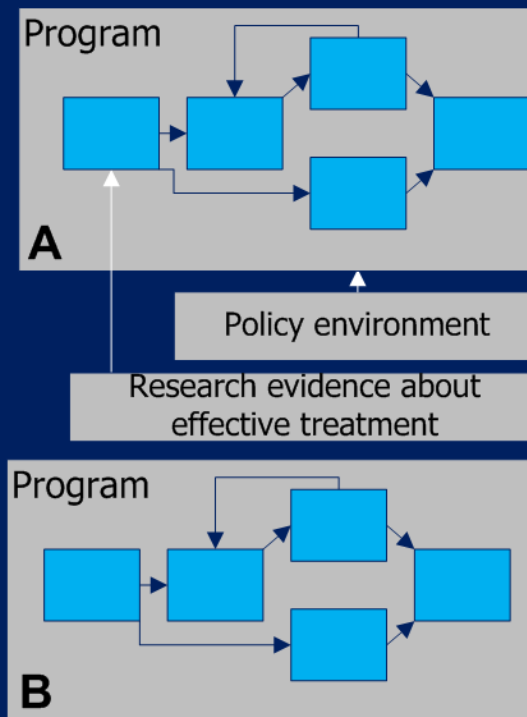
An insight from complexity is that elaborate systems *might* behave in simple ways

Think of all the many reasons people might move in ways that will segregate a neighborhood.

Or, they may be following a simple rule: Move until 70% or more of my neighbors are like me.
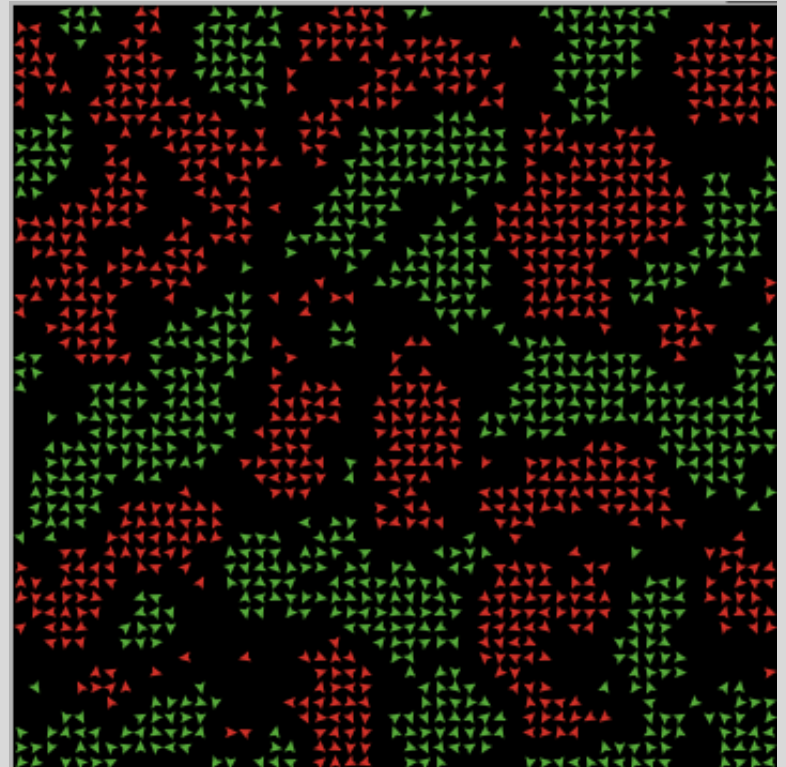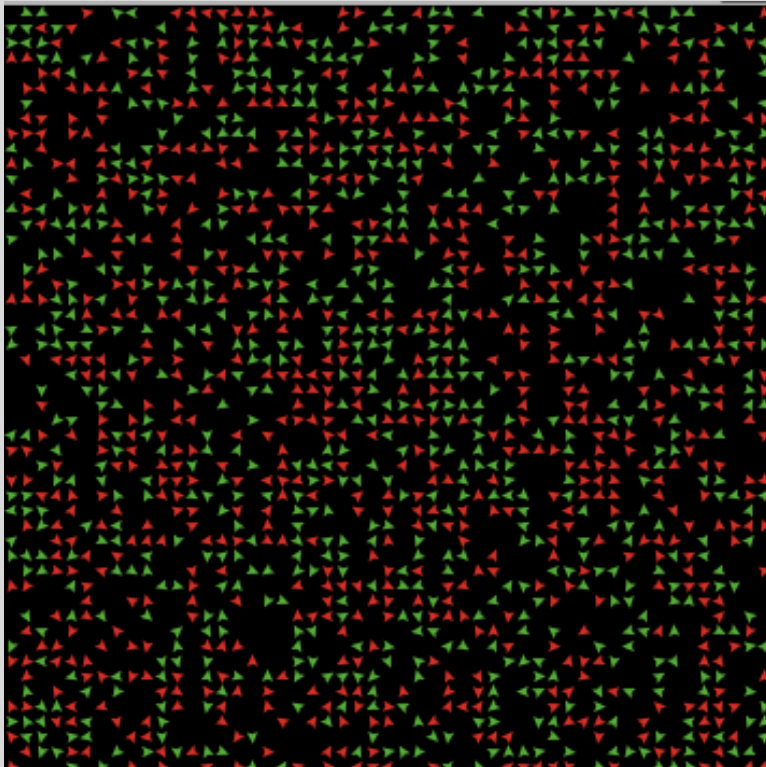
Systems can be very stable and predictable and at the same time show chaotic behavior

- Enter the state space and the "object" will always end up on the attractor.
- Once there we can't know exactly where it will be from one instant to the next

If a program behaves this way what are the implications for predicting its condition and outcome?
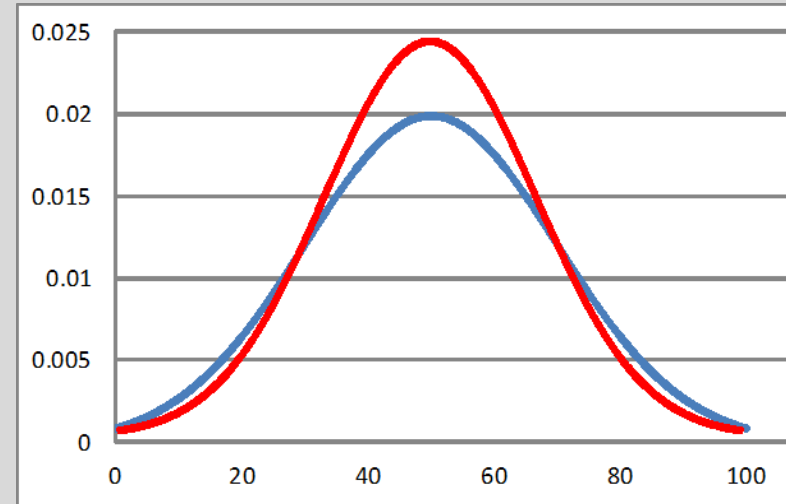

Lorenz attractor
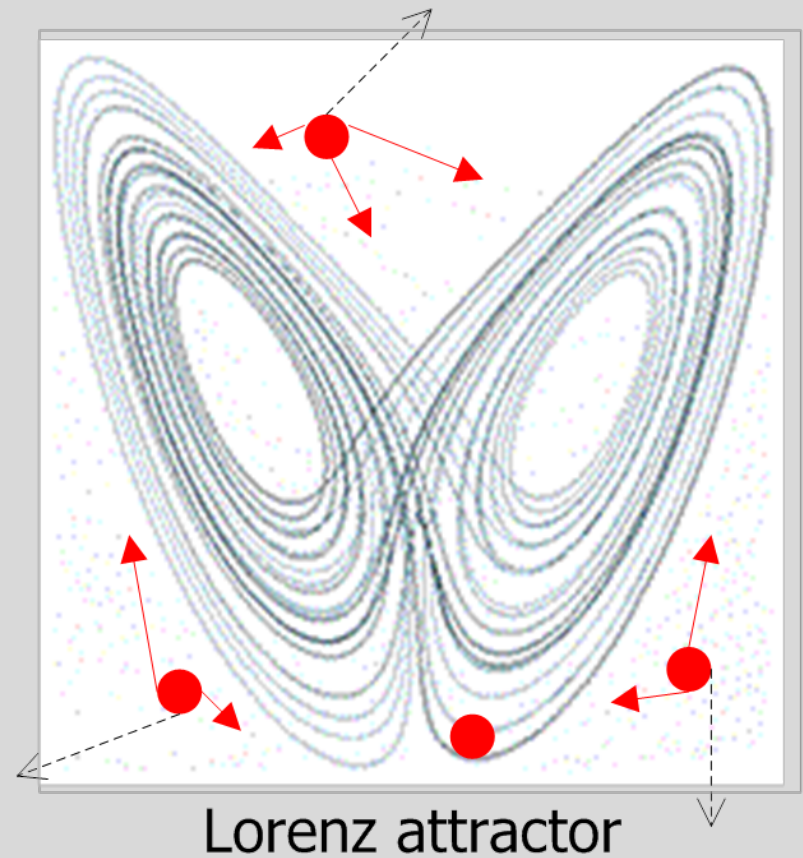
Policy Implications of Outcome Distributions

We are used to outcomes like this
- How much do kids learn with a new math curriculum?
- How do infection rates change with hospital infection control policies?

Average change over all measures is a useful number

But complex behavior generates lots of power law distributions
- Small business incubators – average number of jobs created says little about what to expect
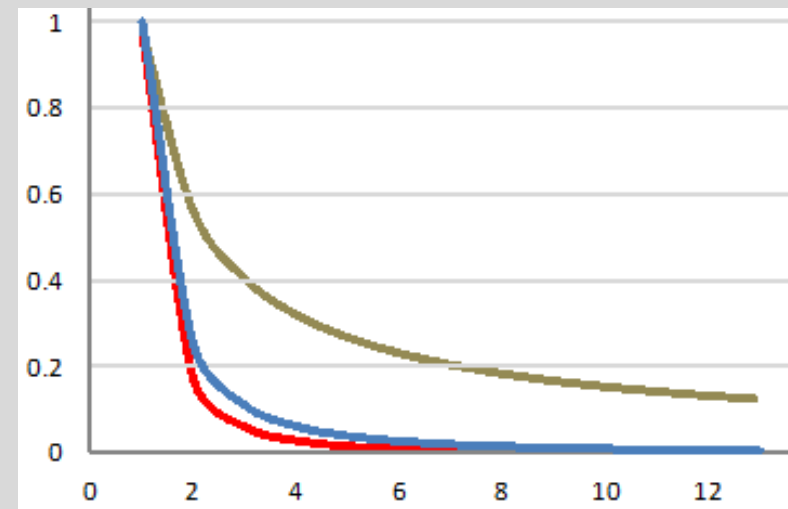
Program to link community organizations

What are the implications for timing of data collection and expectations about success if linkages work like "A" or "B"?

Workshops and Webinars

- Logic Models As Simple Pictures - and So Much More
- Strong evaluation designs for programs with unexpected consequences
- Workshop based on *Evaluation in the Face of Uncertainty.* Webinar, Slide deck
- Logic Models - Beyond the Traditional View: Metrics, Methods, Expected and Unexpected Change
- Integrating Agent-based modeling and traditional evaluation Demo available upon request. Presentation/Webinar
- Conducting Program Evaluation by Combining "Traditional" Knowledge and Complex Adaptive System Understanding of how the World Works
- Integrating Evaluation into Planning for Impact: Using Computer Simulation to Aid Program Implementation and Evaluation part 1 part 2, part 3

Published Work

- Morell, J.A. (2010) *Evaluation in the Face of Uncertainty: Anticipating Surprise and Responding to the Inevitable Morell*, J.A., Guilford Press, N.Y.
- Morell, J.A., Hilscher, R., Magura, S. and Ford, J. (2010) Integrating Evaluation and Agent-Based Modeling: Rationale and an Example for Adopting Evidence-Based Practices *Journal of Multidisciplinary Evaluation*, Vol. 6, No 14, 35 - 57
- Parunak H. V.D. and Morell, J.A. (2014) Emergent Consequences: Unexpected Behaviors in a Simple Model to Support Innovation Adoption, Planning, and Evaluation in Kennedy W.G., Agarwal N. and Yang, J. S. eds. *Social Computing, Behavioral-Cultural Modeling, and Prediction* 7th International Conference, SBP 2014 Washington, DC, USA, April 1-4, 2014

Blog Posts

- Complexity is about stability and predictability
- How to evaluate complex health interventions?
- Matching management systems to system behavior
- What is the relationship between path dependence and system stability? With explanation of why I care.
- Using an evolutionary biology view to connect the intellectual development of evaluation and the development of the evaluation community