Emergence

what are emergent structures?

- ant colonies
- flocks of birds
- neighborhoods
- economies

"from the bottom-up"

Emergent properties?

- arise from interaction of "lower-level" entities, none of which show it.

E.g. - The volume of a gas, or its pressure or temperature, which are not properties of any individual molecule, though they depend on the properties of those individual molecules.

- stable pattern induced by local interaction of agents.

emergent properties

are self-organizing

- display systematic group behavior
different, and not necessarily predictable
from the behavior of individuals in the group.

not everything is self-organizing

self-organizing systems

Non-Linear Voter Model

- 2 colors, two political parties
- each cell polls its immediate neighbor
- if all neighbors are of its current opinion, cell retains opinion.
- else flips a coin.
Majority Voting Model

- 2 colors for the two parties.
- each cell poll neighbors and switches to whichever opinion the majority

What good are these models?

- How real?
- What can expect from them?
  
  understand the dynamics better
  
  distinguish correlations from causes

U and me

Universality
Self-organizing criticality (SOC)

Fractal scale-free everywhere

bibliography

Bak, P. & Chen, K. Self-organized criticality

For images I used:
http://www.cs.umd.edu/~crshalizi/Self-organization/soup-done/nvm/