

CSC2720H: Systems Thinking for Global Problems

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http://www.cs.toronto.edu/~sme/SystemsThinking

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How Big Changes Happen

→ Fractals and Scale-Free Systems

- Sty Try this: https://tinyurl.com/Shofract
- Suggested shapes:



→ Multi-Scale Systems

→ Panarchy Theory

- Secological Origins
- Sexplaining Multi-level change



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Fractals!









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Stewart Brand's 6 S's from How Buildings Learn







Ecology at multiple scales

















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r-K Selection Theory

K species (equilibrium): Low growth rate, Few offspring, High survival

r species (opportunistic): High growth rate, Many offspring, Low survival





Active

Weak -

Strong



Connectedness -

Growth

Department of Computer Science









Adaptive Cycle Examples

→ Physical Systems (e.g. tectonic plates, sand piles)

- ✤ Little scope for evolution/innovation
- ✤ Tend to repeat cycles rather than evolve (organized criticality)

→ Ecosystems with unpredictable conditions

- ✤ Highly adaptive responses to opportunity
- 🤟 Tend to oscillate between α and r phases

→ Ecosystems & human systems with predictable conditions

- ✤ Can have significant internal regulation
- ✤ Tend to exhibit the full boom and bust cycle

→ Biological entities

- ✤ System variables remain in homeostatic equilibrium
- ♦ Adaptive cycle operates at higher scale (community/ecosystem)

→ Human systems with foresight

- ✤ Predictive capacity used to stabilize variables and exploit opportunity
- Solution Adaptive cycle operates at lower sale (individuals/entrepreneurs)