AS living Systems - Lecture 10

final lecture

last lecture = self-organising

Systems Definition of life = Autopoieses
↳ cybernetics terms

Entrophy & organisation

GAS/Molecule example
- Starts low entrophy & moves to high entrophy
- Statistically possible to move from high to low but extremely impossible
- oxygen in room example
- Moleculs find the natural high entrophy State

relationship between entrophy & organizatin
- the amount of work required the reverse high entrophy situation

the amount of work it takes to go from high ent to low ent
↳ shows us how organised the State was to start with

↳ hard to recreate an unorganised structure

liquid mixing example

frog, blender, soup example
- Frog = highly organised, very hard to recreate

order is the reciprocal of entrophy ← schrodinger

All systems decay (second law)

All systems are moving towards "soup"

* Project ~~Aerse~~ relevant point

if there is a local reduction in entrophy
↳ elsewhere there will be a rise in entrophy
↳ normally in the systems environment

Example: pumping water uphill leads to a cost of entrophy (energy loss)

reversing ~~ener~~ natural energy flows cost entrophy

Autopoietic Systems

Greek For self-producing
(maturana & varela)

Systems that produce & maintain themselves

According to M & V, All living systems are Autopoietic on ~~som~~ some level

Mainly about Bio systems but could apply to social systems

Autopoietic Systems

Definition of an alive System

Example: A system that recursively makes itself in order to make itself

Make house → make materials to make house → make mats to make mats

Case Study

Autopoiesis in the game of life

Randall Beer
↓
good @ analysis systems

How to determine if system is Autopoietic?

- Self-Bounded
- Self-Producing
- Self-perpetuating

} varela but summarised by Beer

John Conway – Game of life

lattice

- 2D matrix of cellular automaton
- Cells produce shape in finite space
- Cell = 2 States = alive or dead, [0, 1]
- States change in iterations (synchronously)
- Cell update rules:
  1. Dead w/ 3 alive neighbours becomes live
  2. live w/ 3 alive = alive
  3. else cell = Dead

- Complex patterns emerge