

COGS 300

Emergence 03

Oct 28/25

Last week, we learned about cellular automata, particularly extensions of Conway's Game of Life. Importantly, the Agent-world distinction was not really there for these automata.

As we move into swarms, although our simulations are at a higher level, I want you to imagine that there is an underlying automata behind every pixel. Automata are sort of "atom" level, whereas swarms are sort of "cell" level.

For swarms, we start to move towards an agent-world distinction. But some agents directly reconfigure their worlds. (like Conway's Ant).

Physarum is a slime mold.

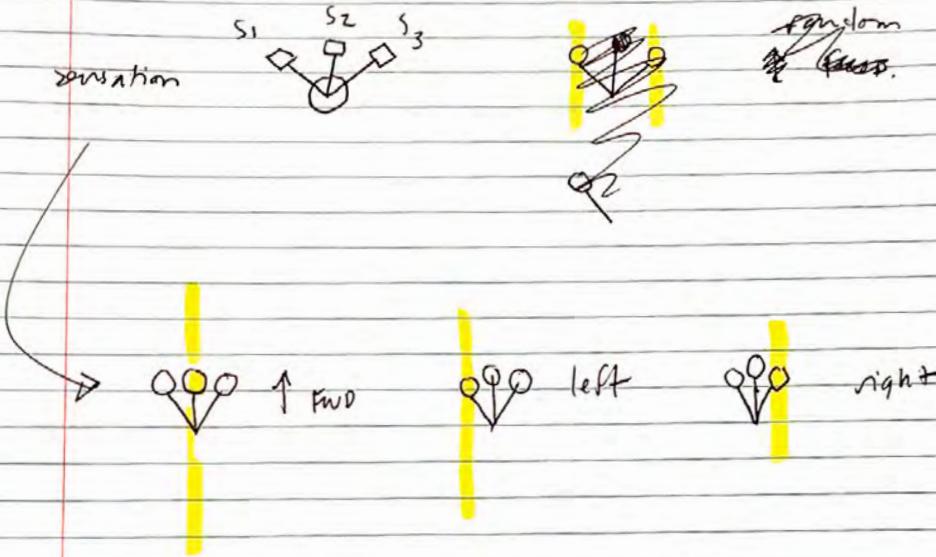
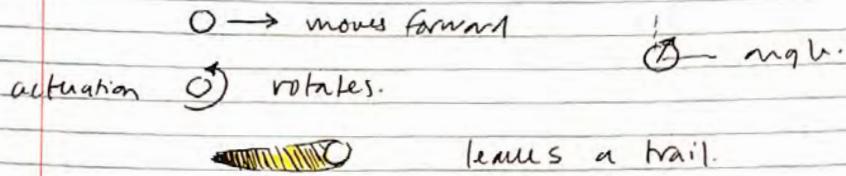
→ Video

Despite the simplicity of a slime mold relative to us, it is both intelligent and hard to simulate. We'll explore a simple agent-based particle simulation.

→ sage jensen's simulation.

(2)

Agent



* play w/ snake's sim to discover agent effects.

- Scale of effect
- structure vs. random
- forms (tentacles vs ...)

↳ compare to Langton's ant + GOL

* traffic waves. \rightarrow emergent effect.

\hookrightarrow nD behavior. \sim 1D env.

* flocking (simulation).

2D sim.



$O \rightarrow \leftarrow O$ cohesion force

$\leftarrow OO \rightarrow$ sep. force.

* what controls "agents"?

\hookrightarrow try different thresholds of force + ad.

\rightarrow measure statistically?

\rightarrow design experiment.

If time: make agents goal directed.

\rightarrow live/die? \rightarrow resources?

\rightarrow hints in env?

phys forces

ct.

↑

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Warm up: Make a shape emerge by only varying one property. Eg. shape:

what's
↓
0 0 0 0 0
0 ★ 0 ★ 0
0 0 0 0 0
0 0 0 0 0
0 ★ ★ ★ 0
0 0 0 0 0

size:
0 0 0 0 0
0 □ 0 □ 0
0 0 0 0 0
0 □ 0 □ 0 □ 0
0 0 0 0 0

alignment? colour? Think "magic eye"

