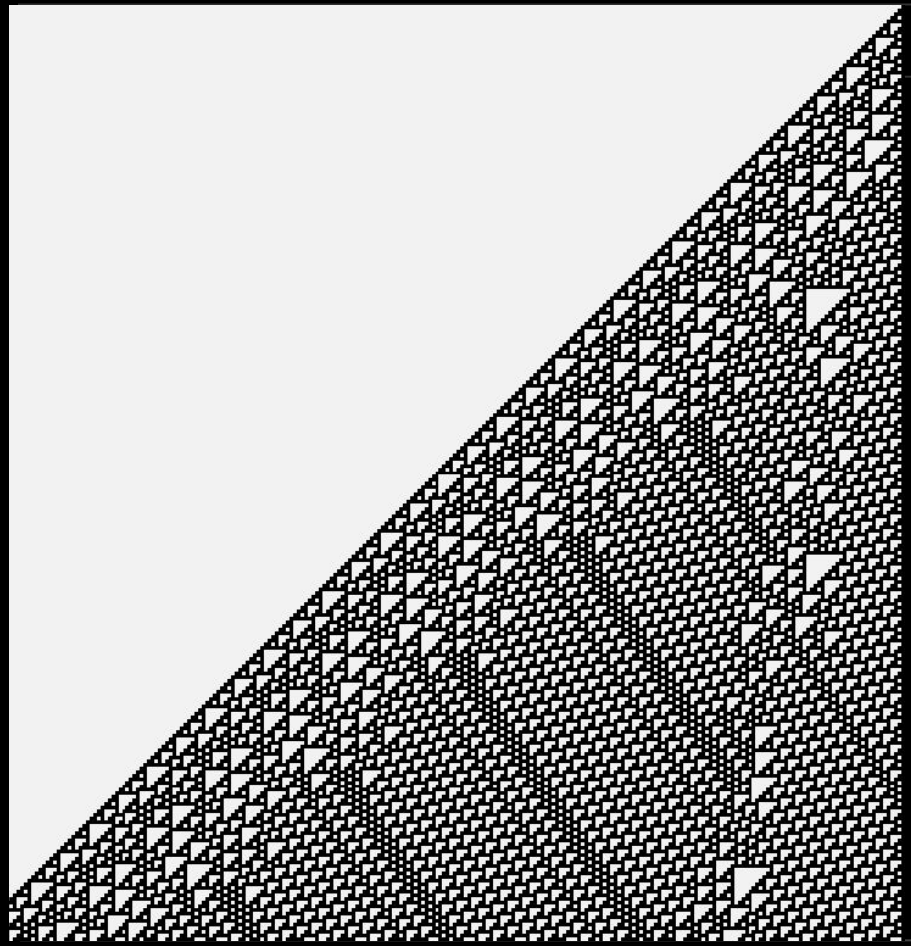
Beyond ALife:

Towards Digital Species

MAT200A

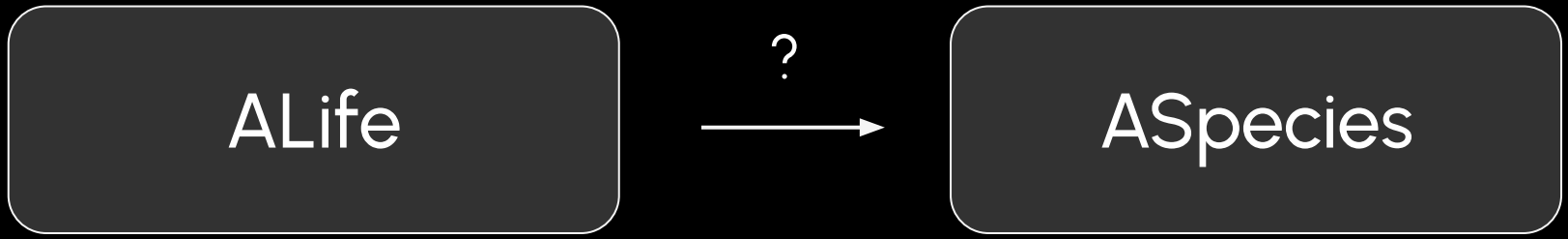
Presented by

Xue Gao



"Media systems can exhibit life-like behavior when rules, feedback, and environmental conditions allow autonomous actions."
— Biomedia,
Peter Weibel(2023)

Elementary cellular automata, Rule 110



Systems where simple agents follow rules and collectively produce lifelike behavior.

Stable, recurrent, differentiated adaptive lineages emerging within A-Life systems.

Questions

1. Rules

How are the behavioral rules of digital species defined?

2. Inhabitation

What kinds of environments or ecosystems do these species inhabit?

3. Co-living

How do these species interact with other species within the ecosystems?

Lens

A. Topic-based Comparison
How do different artists and scientists response to the 3 inquiries through variation of a single topic?

Conway's Game of Life Variations

B. Artist-based Comparison

How do an artist response to the 3 inquiries across different projects?

Karl Sims

Rules

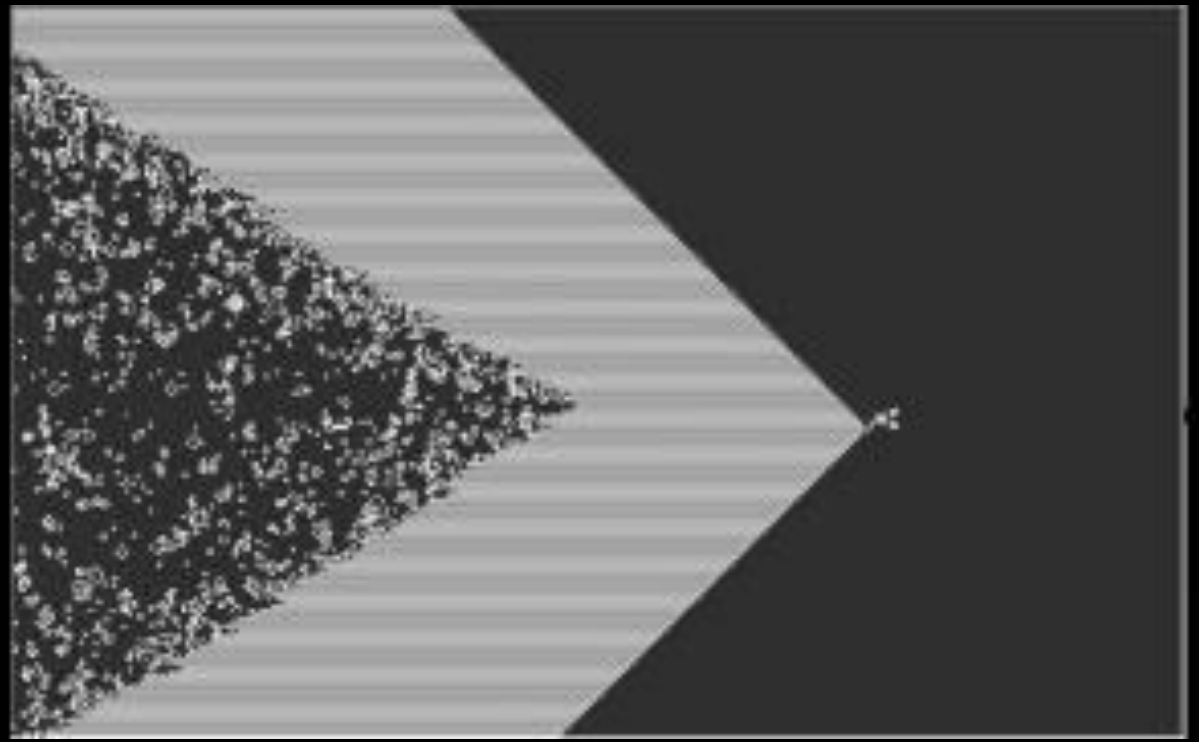
Conway's Game of Life (1970)

1. Survival: A living cell with 2 or 3 living neighbors stays alive.

2. Underpopulation: A living cell with fewer than 2 neighbors dies.

3. Overpopulation: A living cell with more than 3 neighbors dies.

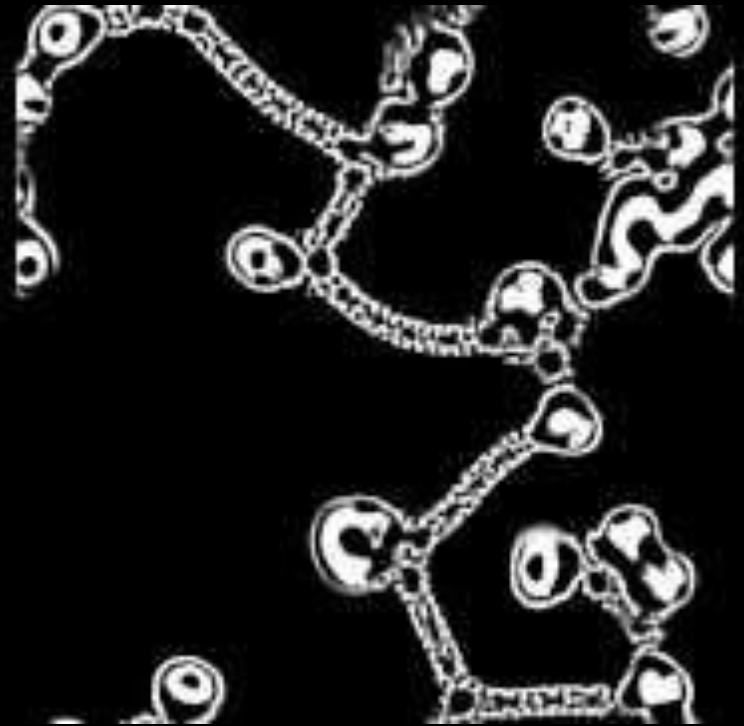
4. Birth: A dead cell with exactly 3 living neighbors becomes alive.



Inhabitation

Smooth Life ,
Stephan Rafler(1970)

- No grid but a **smooth, continuous** field.
- Cells no longer have binary states but a density value **between 0–1**.
- Inner & Outer Radius



Co-living

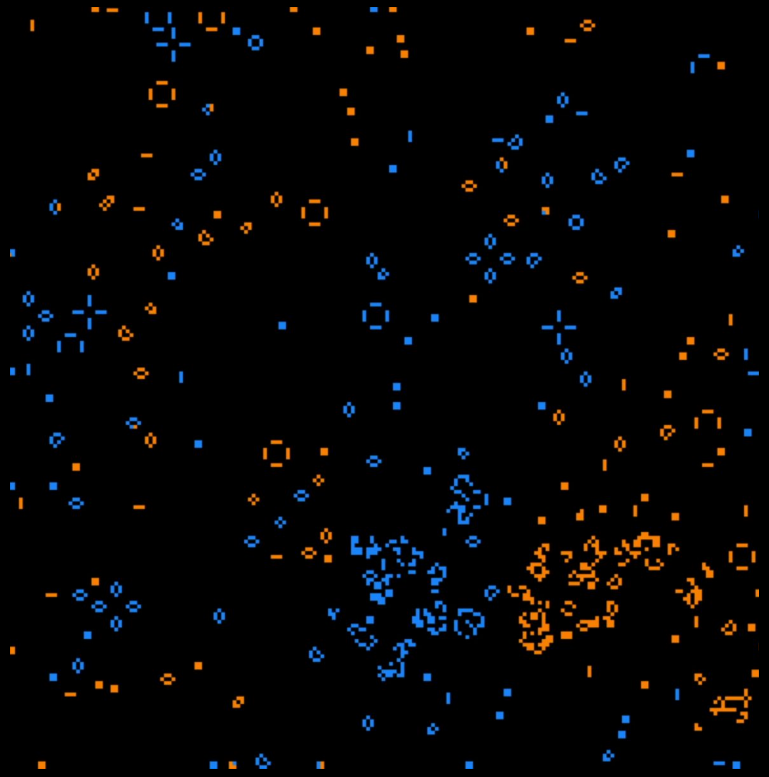
Immigration variation,
Don Woods (1971)

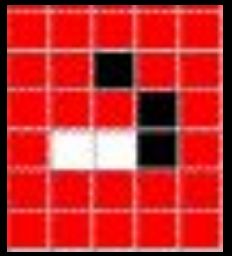
- **Two species (two colors)**.
- A newborn cell color: **majority within its neighborhood**.

This introduces inter-species competition and coexistence.

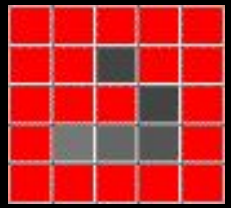
Rainbow variation

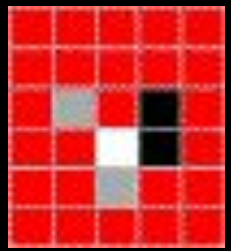
- New cell color: **average** of its neighborhood





Immigration variation





Rainbow variation

Rules

Panspermia,
Karl Sims (1990)

Rules of evolution

1. Genes = mathematical functions (sine, noise, multiplication).
2. Genes mutate or recombine to create new organisms.
3. The system selects organisms based on behavior and aesthetics.
4. Organisms re-render every frame, creating life-like dynamic motion

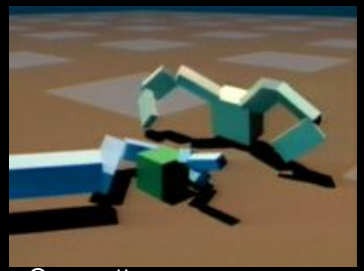
Inhabitation

Evolved Virtual Creatures,
Karl Sims (1990)

Through artificial evolution, the creatures evolve themselves to perform different tasks in different simulation environment.

Chasing Light

Jumping



Competing

Swimming

Co-living

Galápagos ,
Karl Sims (1997)

How organisms evolve is based on **human**'s aesthetic preference and **selection**.

More to Explore

- How can digital species develop **memory** or **learning** beyond fixed rules?
- How can digital species develop **inner differentiation and specialization**?
- What ethical or philosophical questions arise when artificial species gain complexity?

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Reference

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