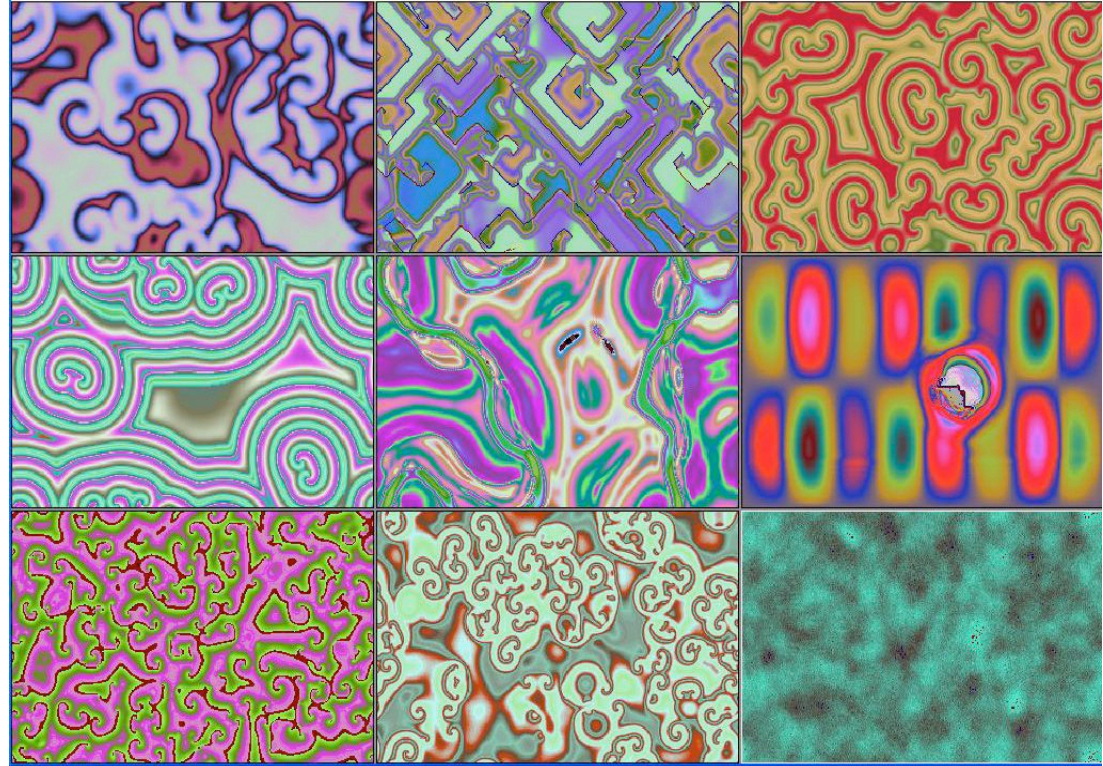


Life is a Gnarly Computation

by *Rudy Rucker*

Talk for the Kyoto
“What is Life”
Conference

October 17, 2007



www.rudyruicker.com

Hylozoism

- ***Hylozoism:***

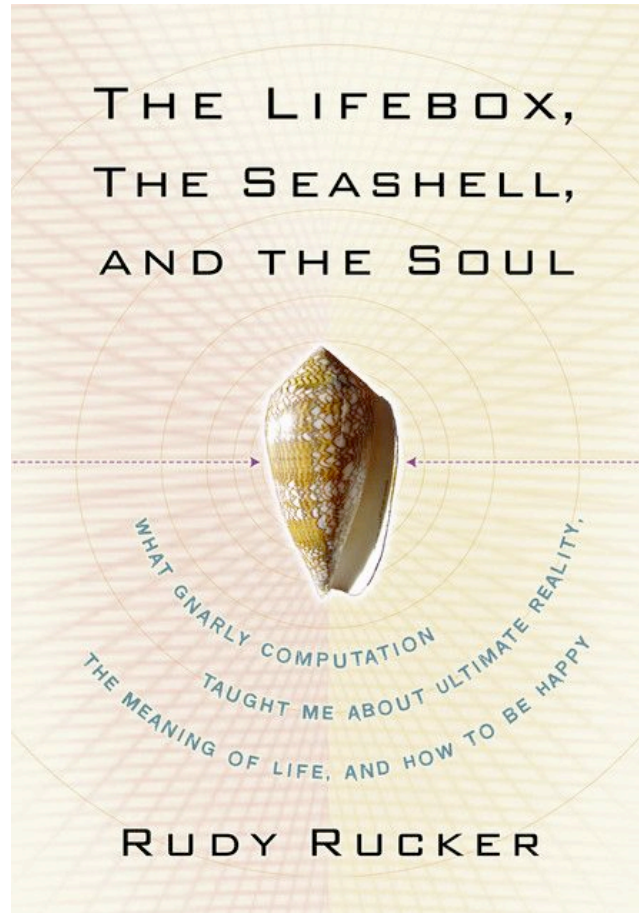
Every object is alive and conscious.

Hylozoism = *hyle*, matter + *zoe*, life.

- Rocks, planets, atoms, air currents, electrons, galaxies....
- Test question: *Is a fluttering flag alive?*

Dialectic

- I like dialectic. I am Georg Hegel's great-great-great grandson!
- Some ideas for this talk are from my non-fiction book with a dialectic title.
The Lifebox, the Seashell and the Soul.



The Lifebox, the Seashell and the Soul

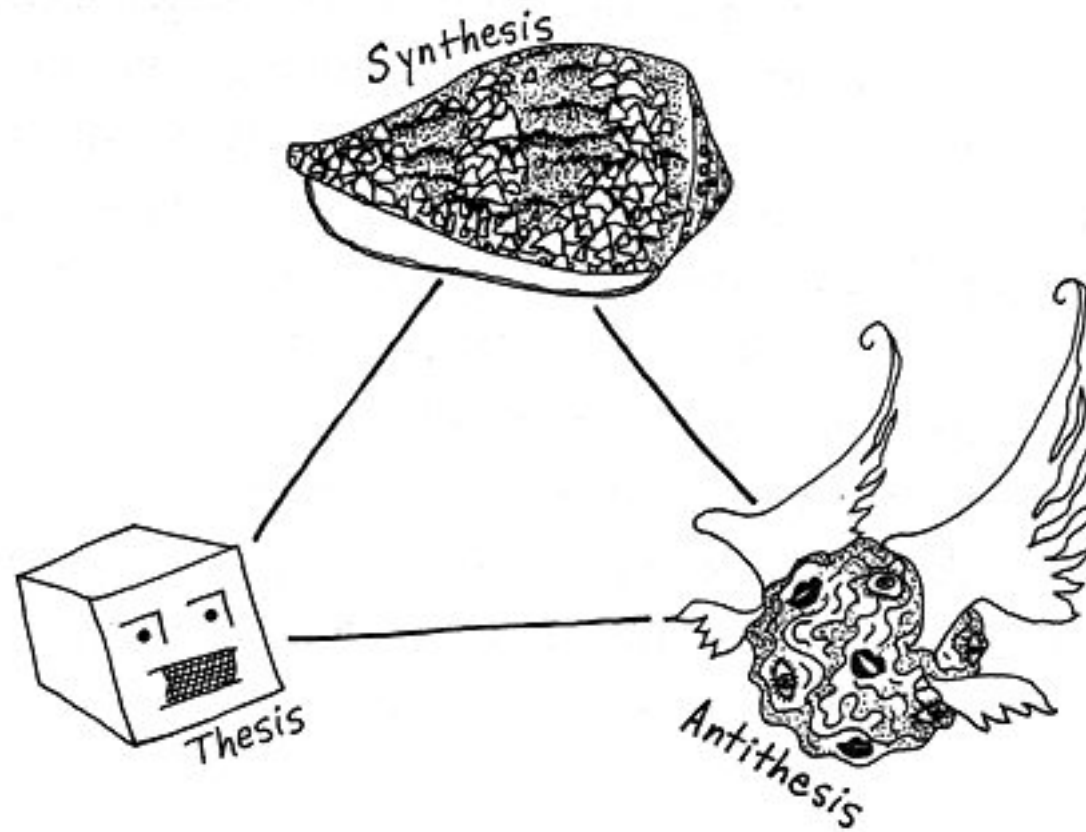
**What Gnarly Computation
Taught Me About
Ultimate Reality,
The Meaning of Life, and
How to be Happy**

(Thunder's Mouth Press, 2005)

My Book Title is a Dialectic Triad

<i>Thesis</i>	Lifebox
<i>Antithesis</i>	Soul
<i>Synthesis</i> <i>(Escape)</i>	Seashell

Dialectic Triad



THESIS: “Universal Automatism”

The world is made of computations.

- ❑ A *computation* is a process that obeys finitely describable rules.
- ❑ The world consists of *many* computations at high and low levels. There need not be a single underlying master computation.
- ❑ The *human mind* can be modeled as a collection of data and algorithms that I call a **lifebox**.

ANTITHESIS: Life Doesn't *Feel* Like a Computation

- The feeling of being alive. “I am.”
- Consciousness as merging with the world.
- Dreams.
- Visions of God.
- The **soul**.

SYNTHESIS (Escape):

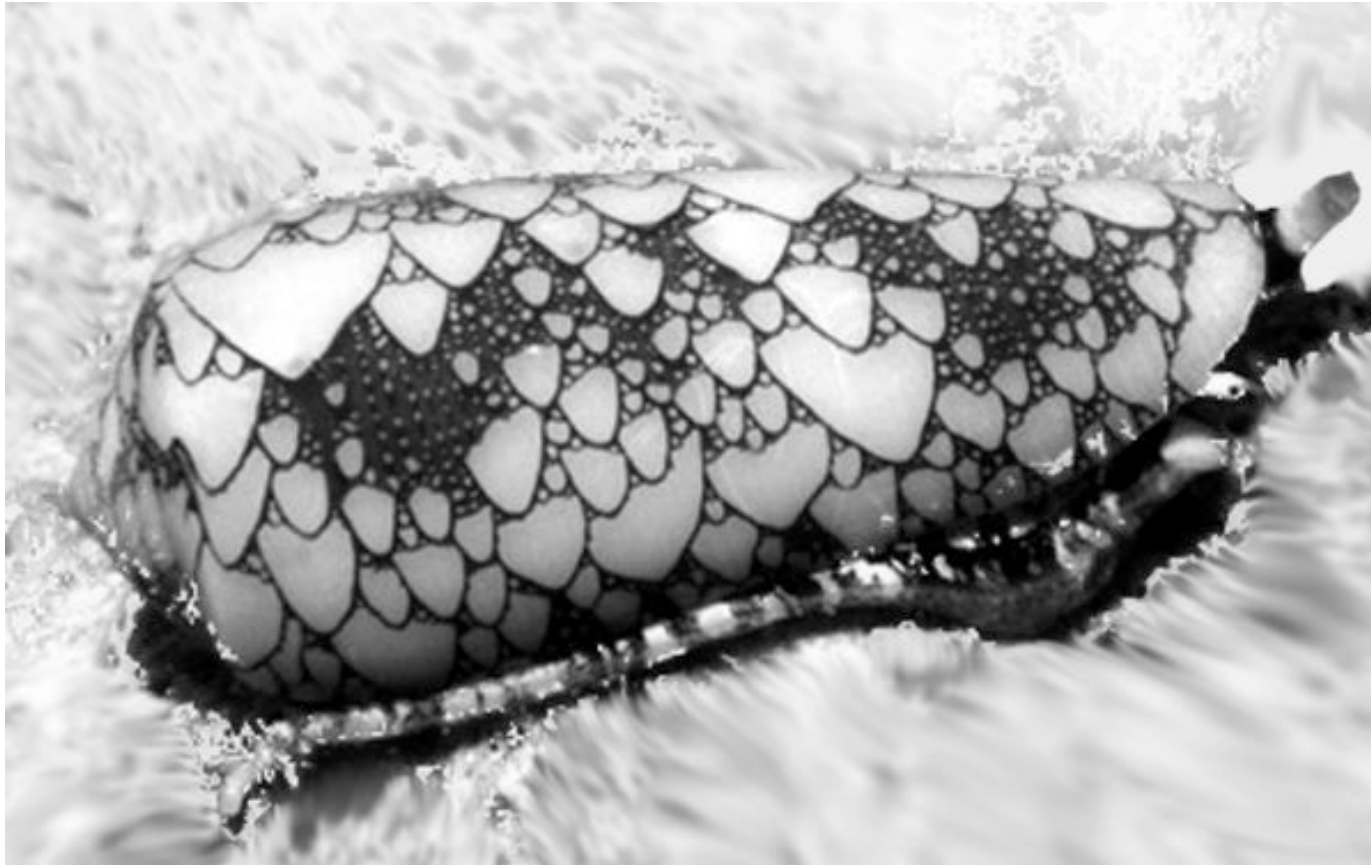
***Gnarly* Computations Are Lifelike.**

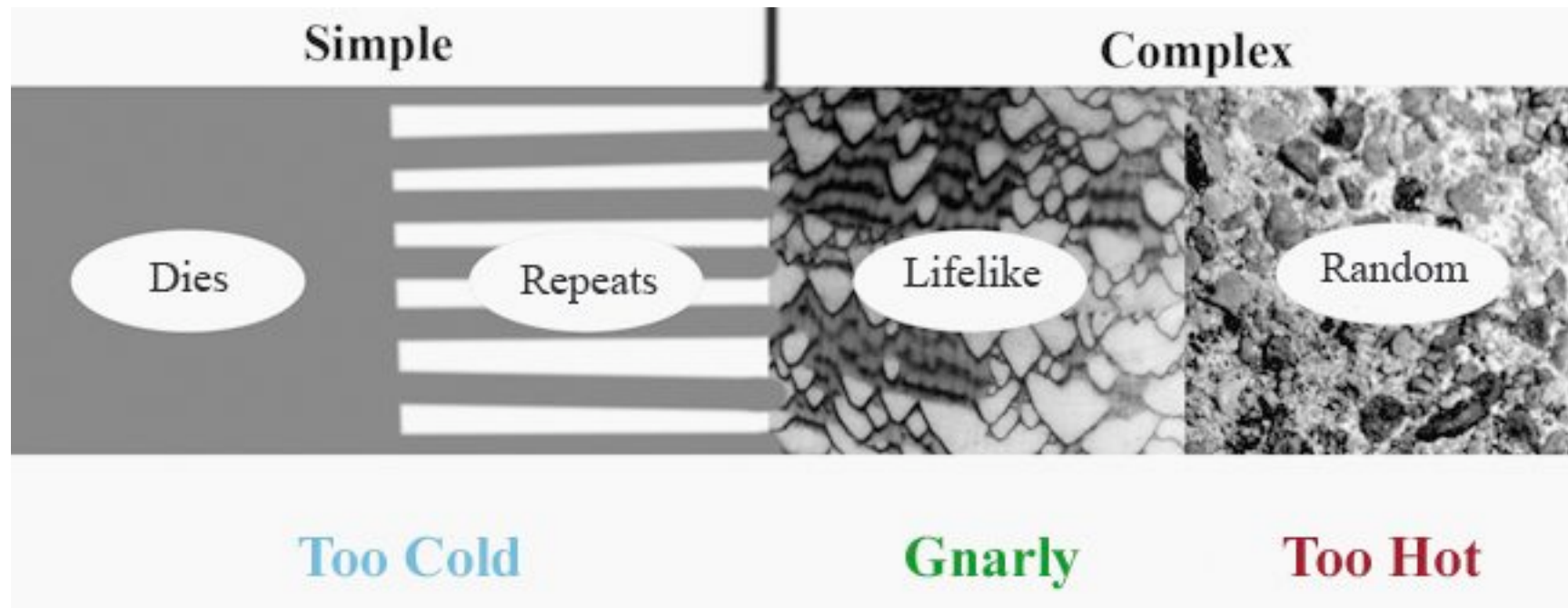
(Gnarly = Complex and unpredictable)

- *Thesis*. Living things are computations.
- *Antithesis*. Living things don't seem like computations.
- *Synthesis(Escape)*: Living things are gnarly computations.

A Seashell Example

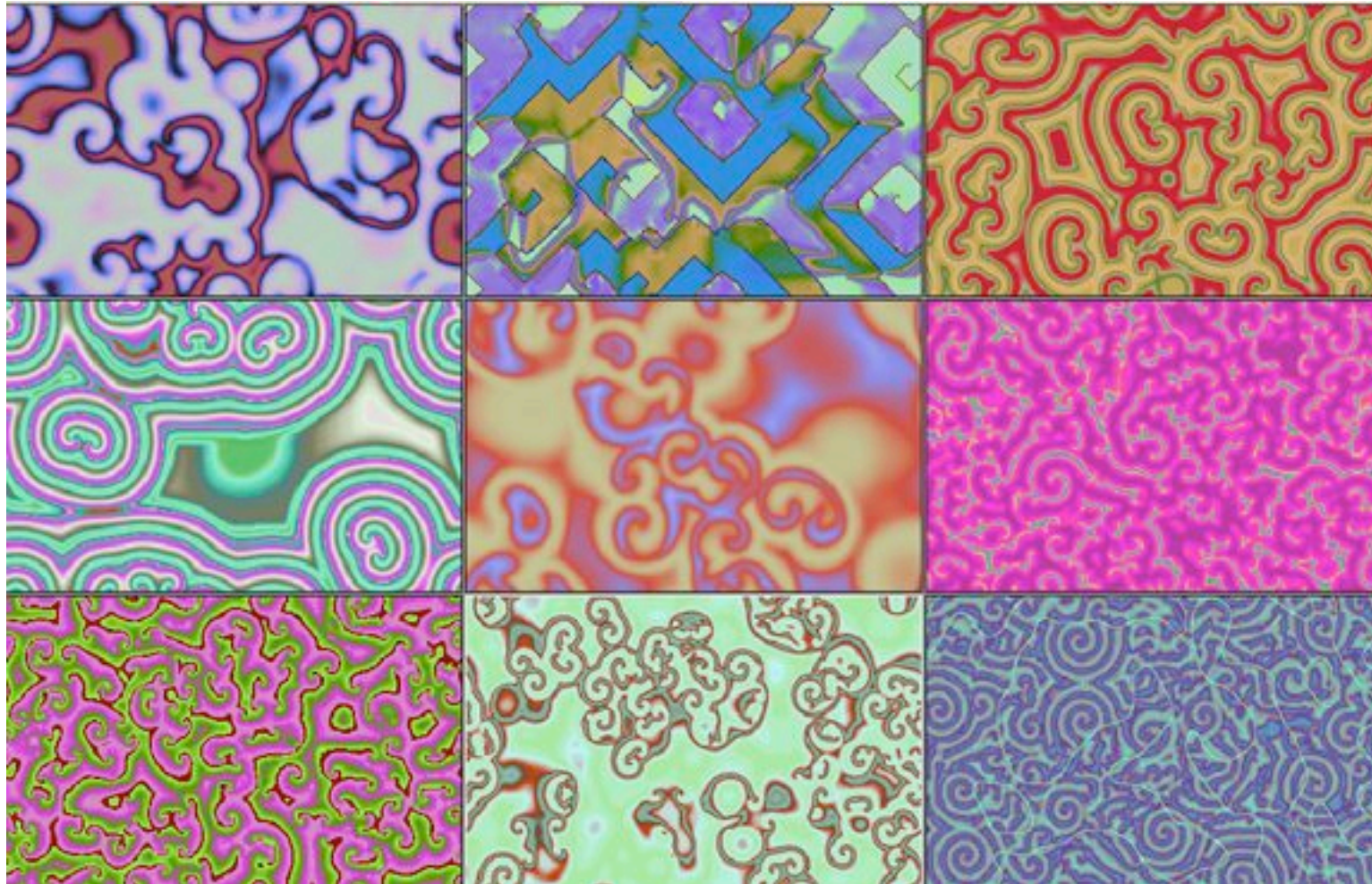
Cone Shell With Gnarly Cellular Automata Computation.





- **Simple (Too Cold):** Dies Out or Repeats.
- **Gnarly (Just Right):** Complex, moving, unpredictable. Life. Natural processes.
- **Looks Random (Too Hot):** Seething.

Gnarly 2D CAs: CAPOW Zhabotinsky Scrolls



Two Principles of Natural Computation

- (*Principle of Computational Equivalence*).
Nearly everything in nature is gnarly.
Nature is full of universal computations.
- (*Principle of Unpredictability*)
Gnarly natural processes are unpredictable.
Nature can't be simulated faster than events occur.

Gnarl is Everywhere

- Even a motionless rock is gnarly.
- Think of the atoms as balls connected by vibrating springs.
- Or think of the rock as a massed quantum computation.

But What About Life?

Surely life is more than just a gnarly computation. What else is needed?

- **Life = Gnarly Computation + Memory**

Memory in Living Things

- *Genetic* memory: DNA.
- *Organism* memory: Immune system.
- *Behavior* memory: Neural patterns.

Is A Fluttering Flag Alive?

- A fluttering flag is a gnarly computation.
Is it alive?
- Recall:
$$\text{Life} = \text{Gnarly Computation} + \text{Memory}$$
- So, to be “alive,” the flag must remember its earlier states?

Koan

- *Thesis: **Flag** is moving.*
- *Antithesis: **Wind** is moving.*
- *Synthesis (Escape): **Mind** is moving!*

Can The Flag Remember?

- *Thesis*: Natural systems are dissipative, they don't remember.
- *Antithesis*: A universal memory upgrade adds memory to every point in space! (See my novel *Postsingular*.)
- *Escape*: The One Mind already remembers for each object. The upgrade is in place!

Rudy Rucker,

The Lifebox, The Seashell and the Soul

Nonfiction. (Thunder's Mouth Press, 2005).

www.rudyrucker.com/lifebox

Postsingular

Novel. (Tor Books, 2007).

www.rudyrucker.com/postsingular

Blog: www.rudyrucker.com/blog