Gnarly Computation

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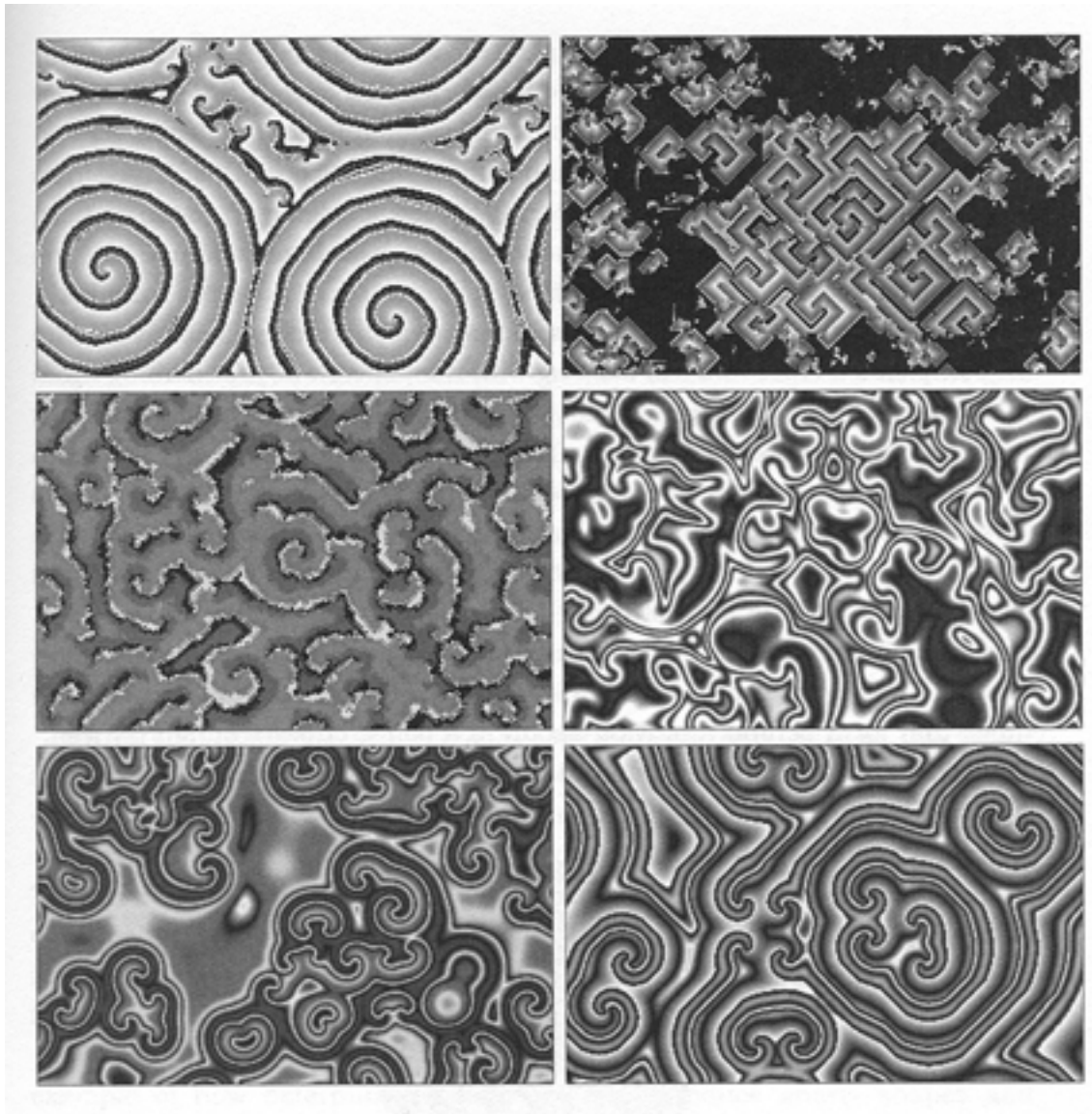
September 26, 2005



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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, Fall, 2005)

My Book Title is a Dialectic Triad

The *Thesis*, the *Synthesis*, and the *Antithesis*

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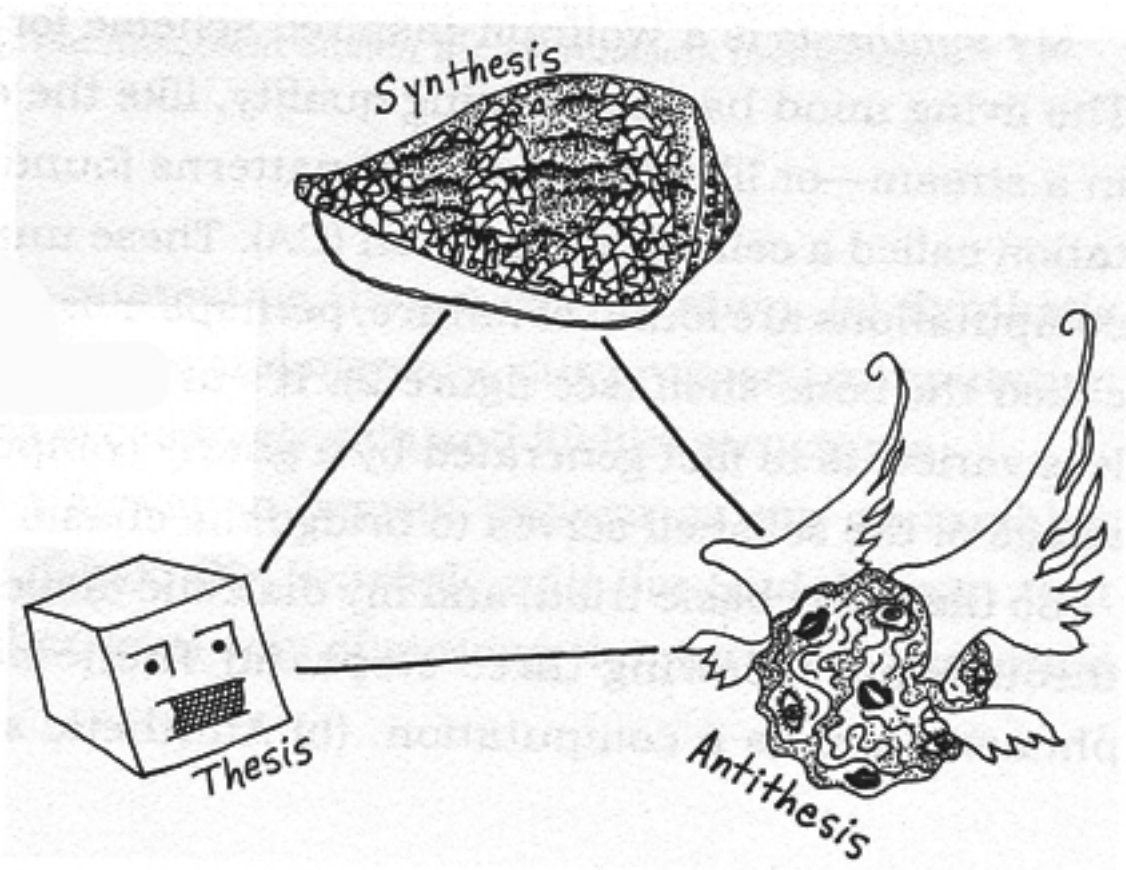
The *Lifebox*, the *Seashell*, and the *Soul*

Dialectic Triad



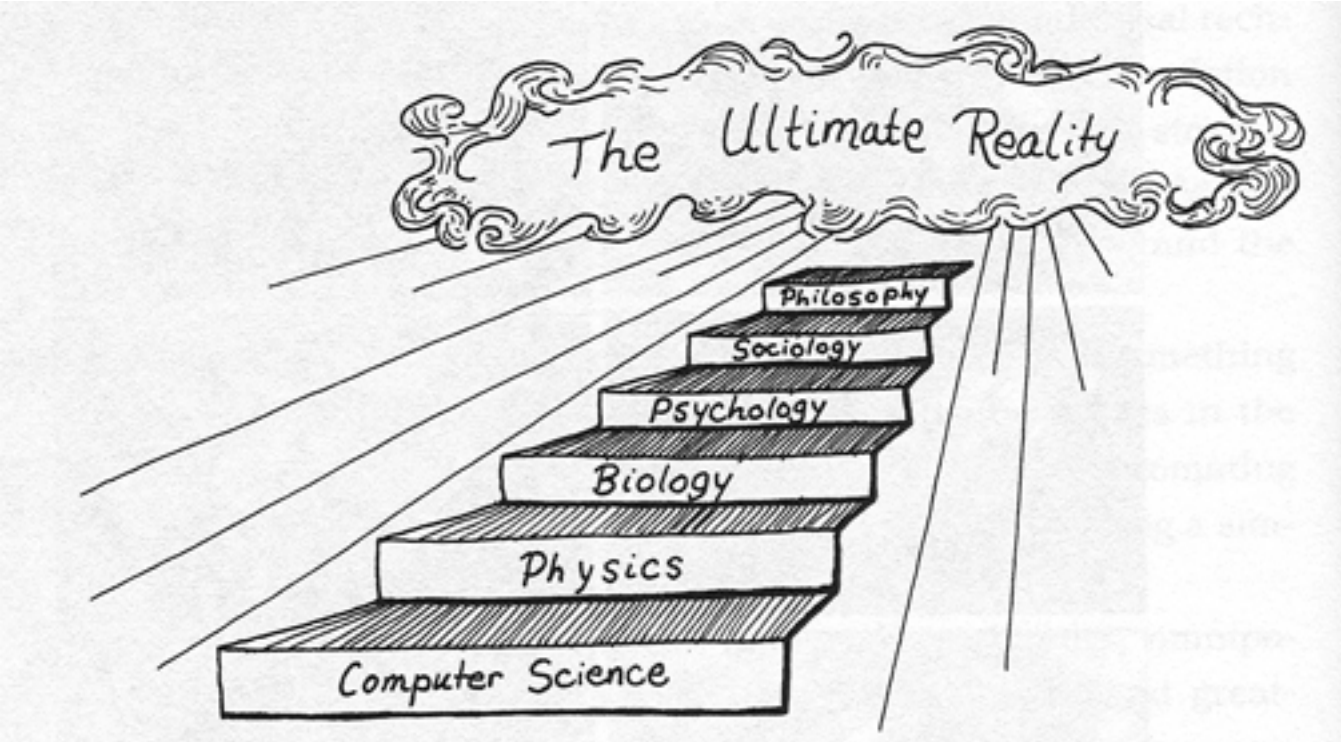
THESIS: “Universal Automatism”
The world is made of computations.

- That is, the world is made up of lots of high-level and low-level deterministic processes, each of which obeys some finitely describable rule, with the rules varying from process to process.

- There may or may not be some one master computation underlying it all. This isn’t the point.

- *The Human Mind is made of computations:* percepts, emotions, intentions, plans, consciousness as a self-symbol in a feedback loop.

Ordo Sciendi, or,
The Stairway to
Heaven



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

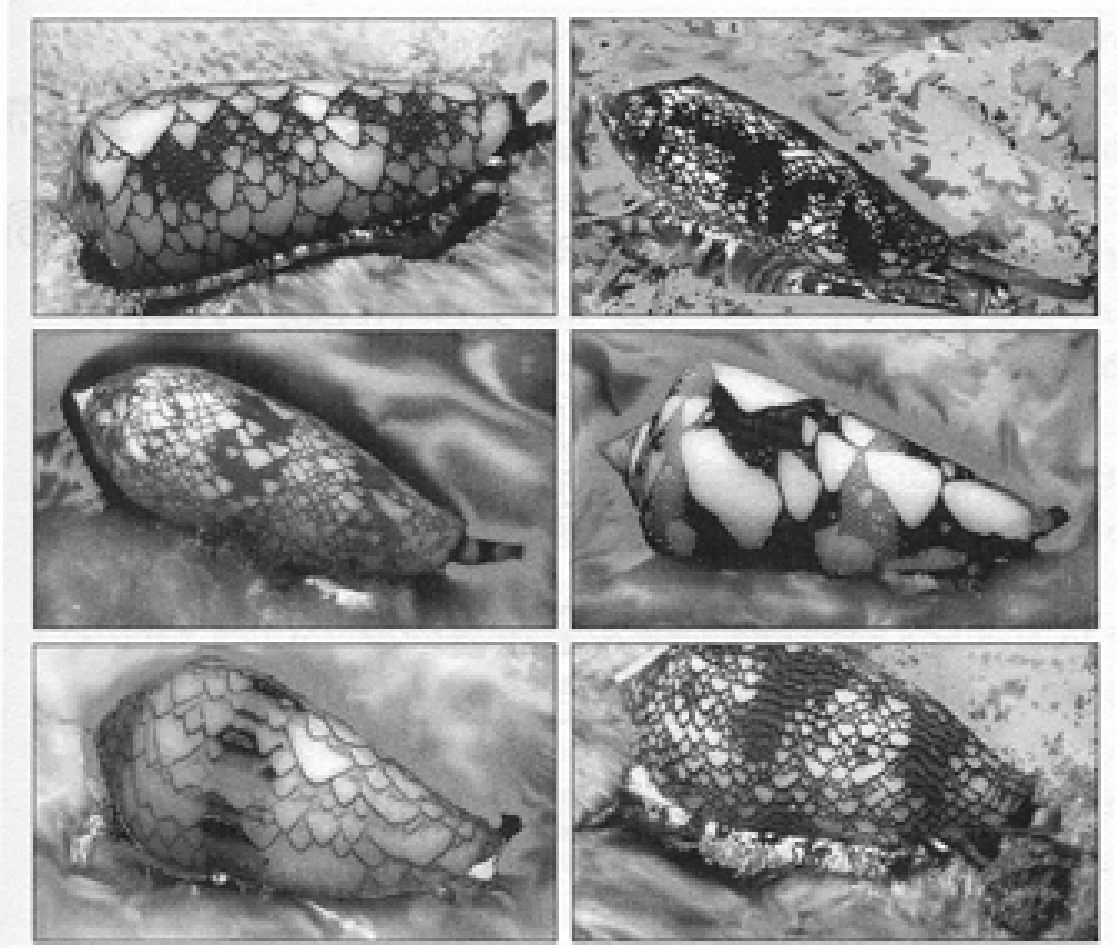
- The feeling of being alive. "I am."
- Consciousness as merging with the world.
- Dreams.
- Visions of God.
- The soul.
- (Not to mention quantum mechanics).

SYNTHESIS:
Gnarly Computations Are Lifelike.

Example: Free Will

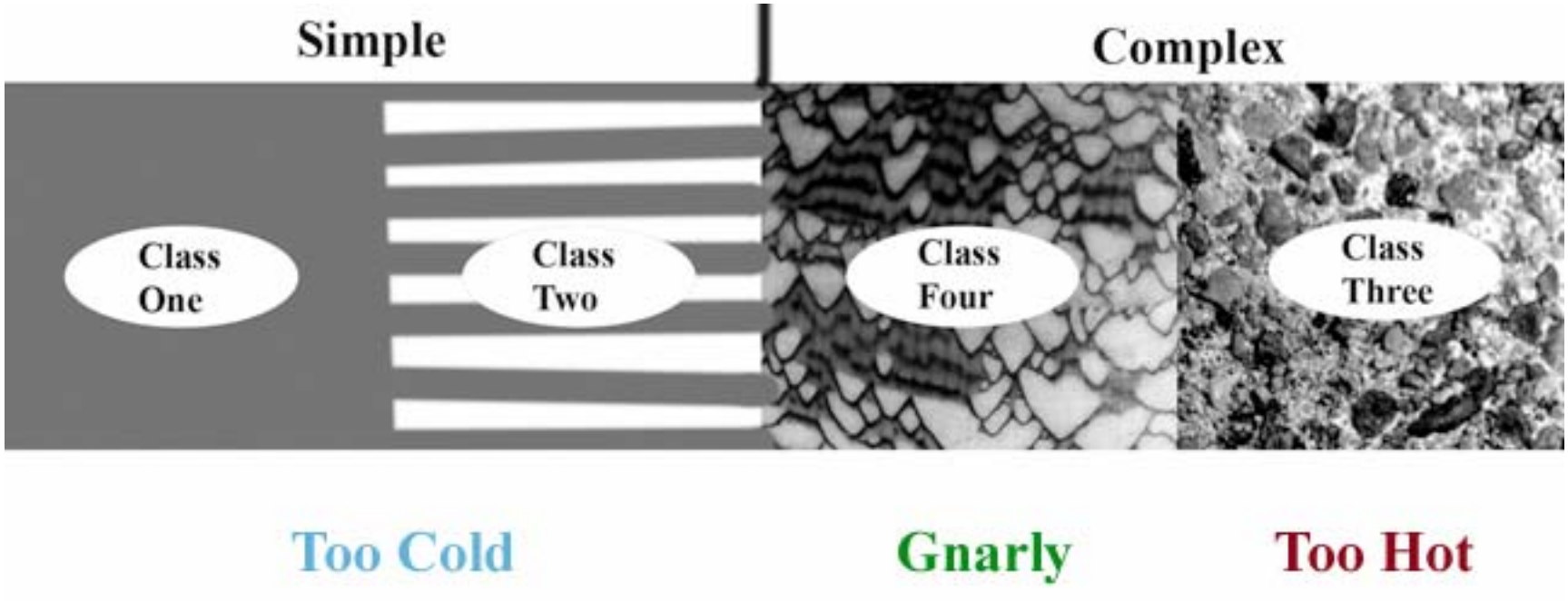
- Suppose a gnarly AI lifebox simulates a person.
- Gnarly computations are *deterministic*.
- But gnarly computations are *unpredictable*.
- The AI can think it has free will.

Why “Seashell”? Cone Shells Show Naturally Occurring Gnarly Computations.



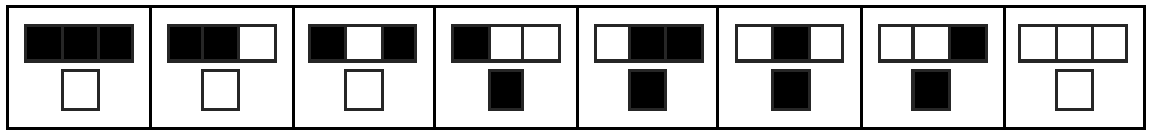
A Taxonomy of Computations

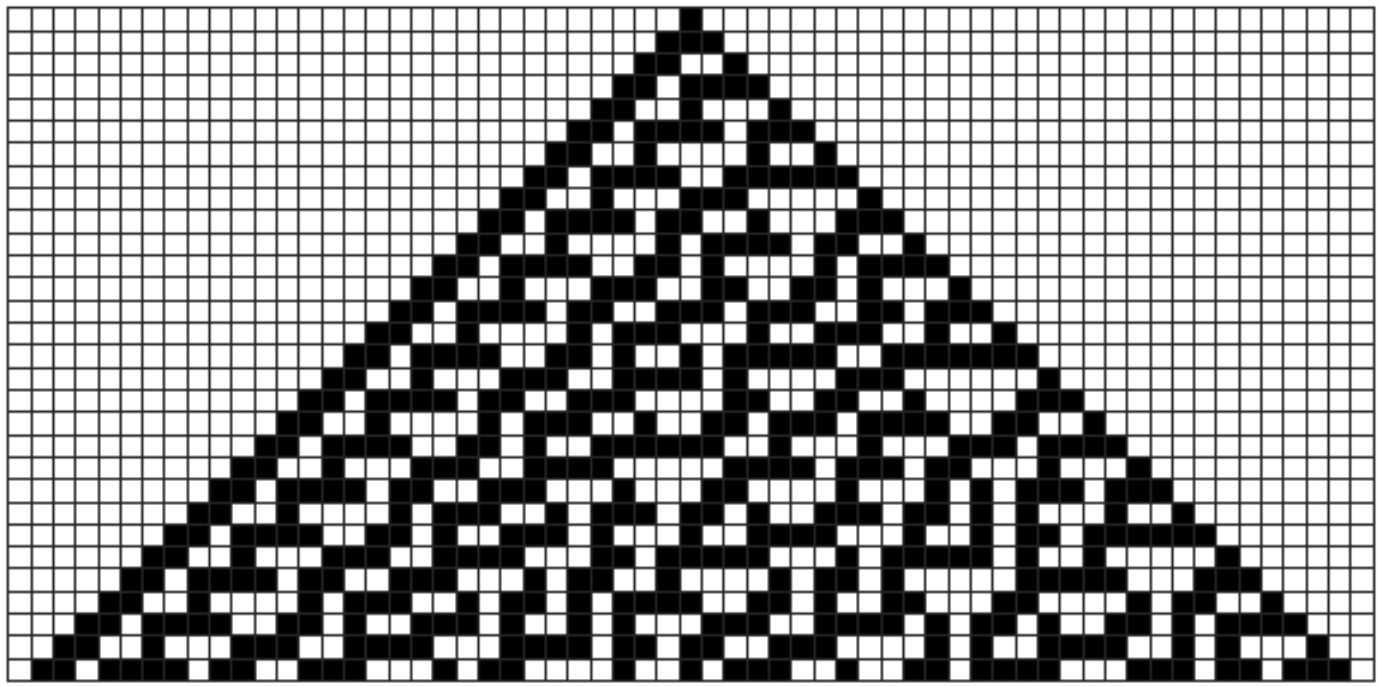
- What kinds of **computations** exist?
- If everything is a computation, this study gives insight into what kinds of **phenomena** can exist.
- This is experimental computer science in an **observational** sense. Stephen Wolfram led the way with his A New Kind of Science.



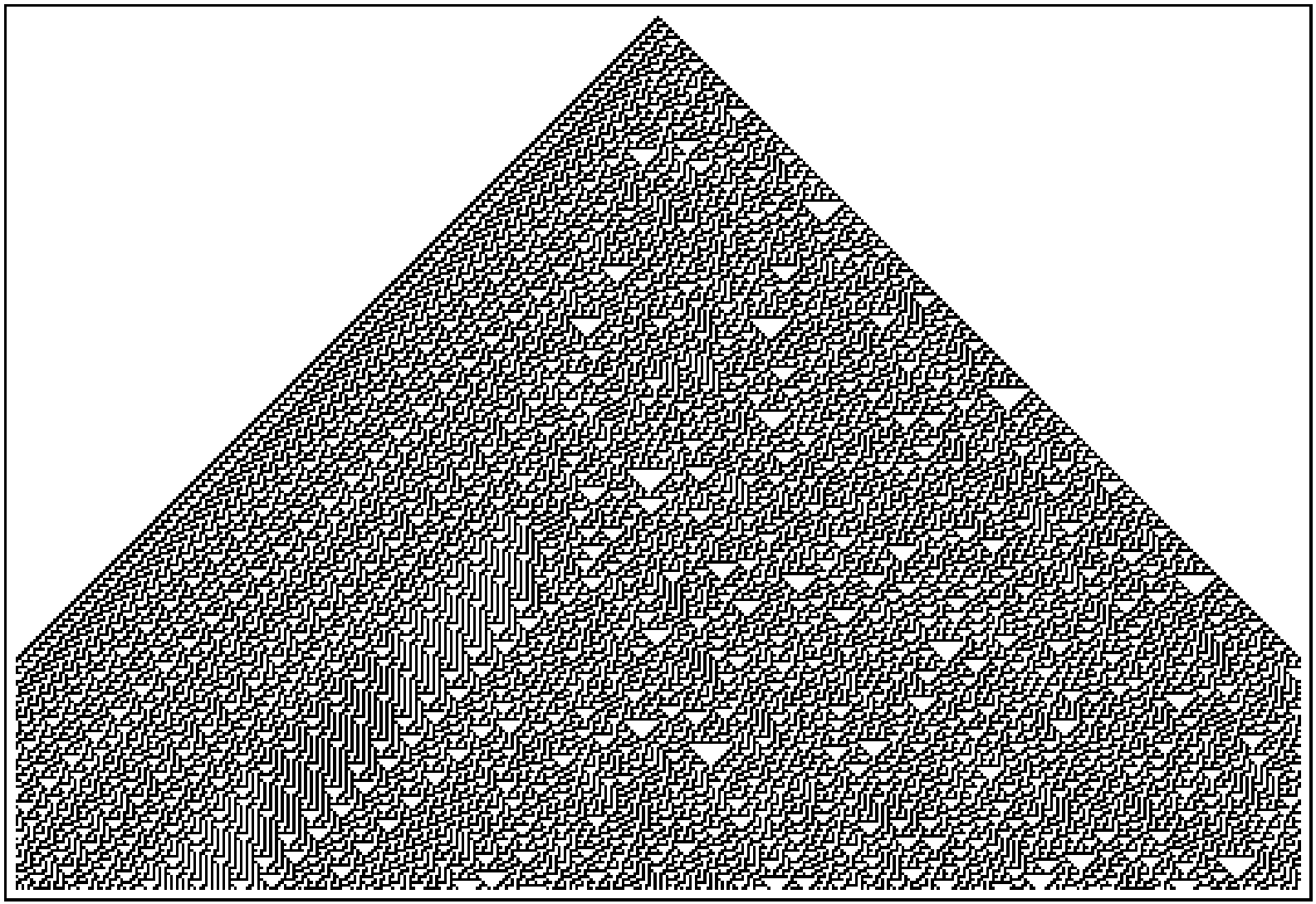
- **Simple (Too Cold):** Dies Out or Repeats. Wolfram classes 1 and 2**.**
- **Gnarly (Just Right):** Complex moving patterns. Natural processes. Wolfram class 4.
- **Looks Random (Too Hot)**: “Seething Dog Barf” --- Bill Gosper. Wolfram class 3.

CA Rule 30 is Pseudorandom (Too Hot, Seethes, Class 3)

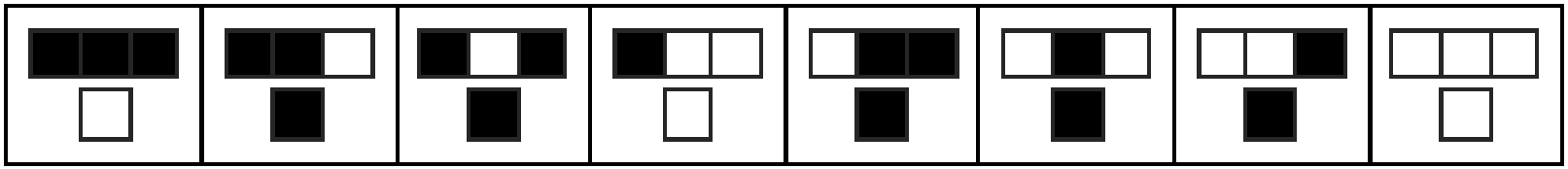


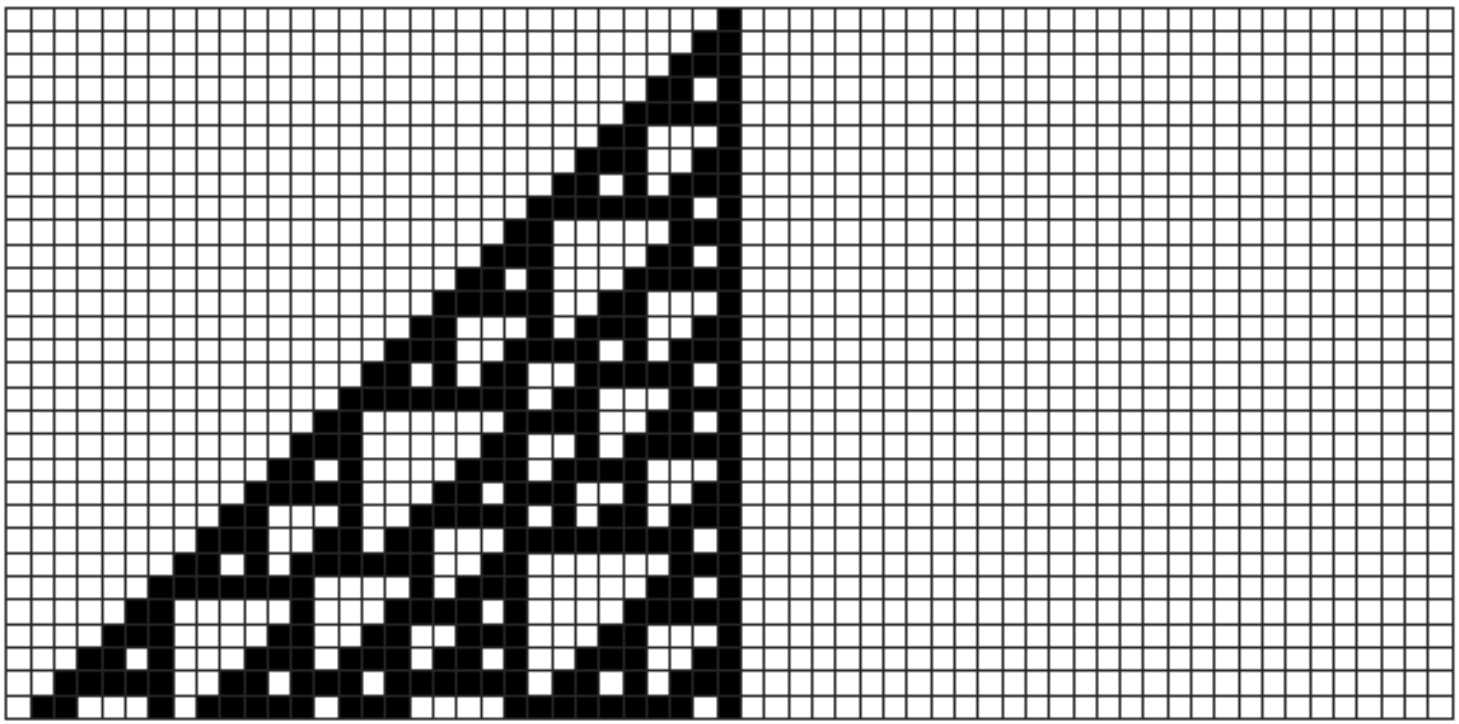


Rule 30 Seethes

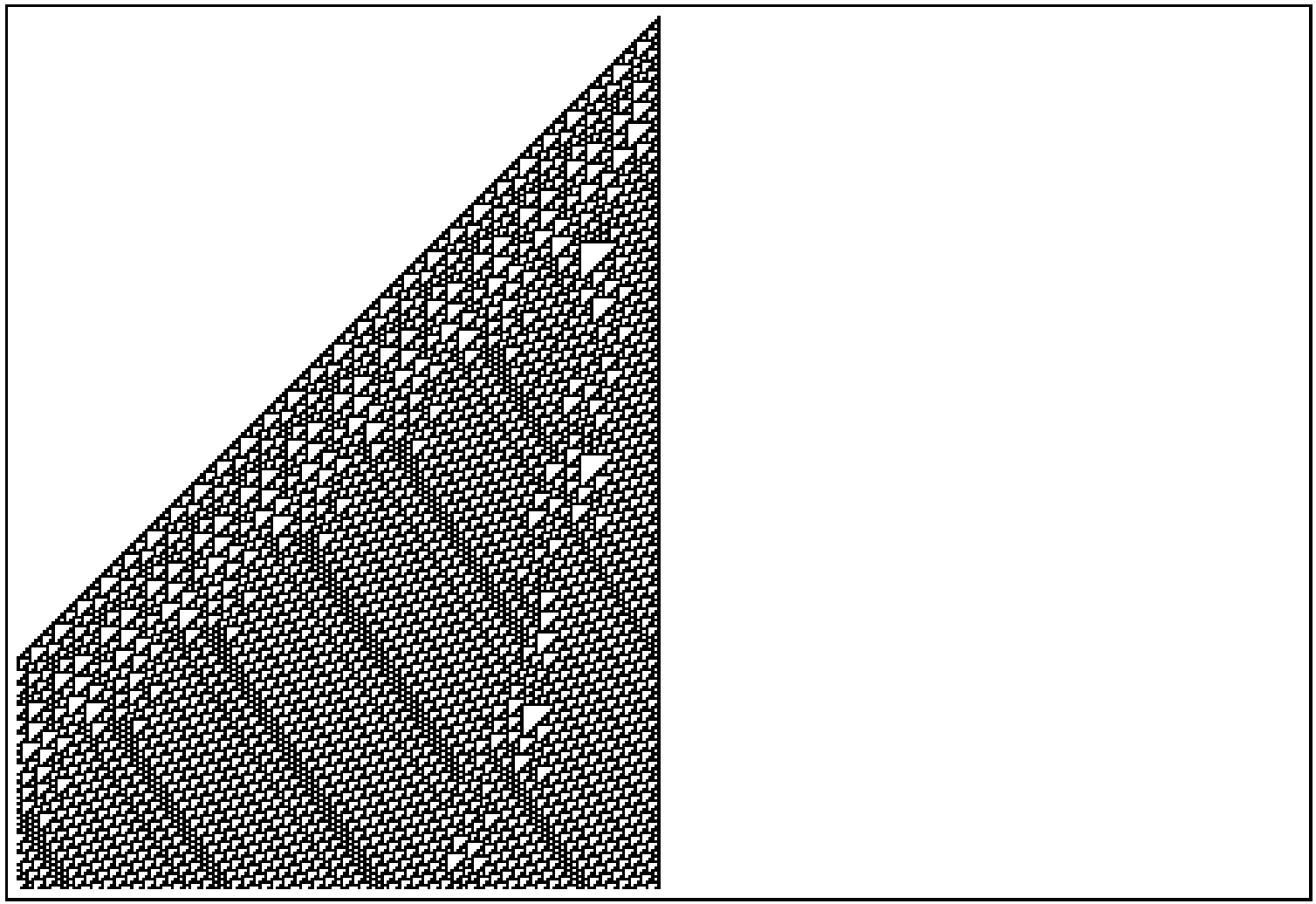


Rule 110 Has Gliders (Gnarly, Class 4)

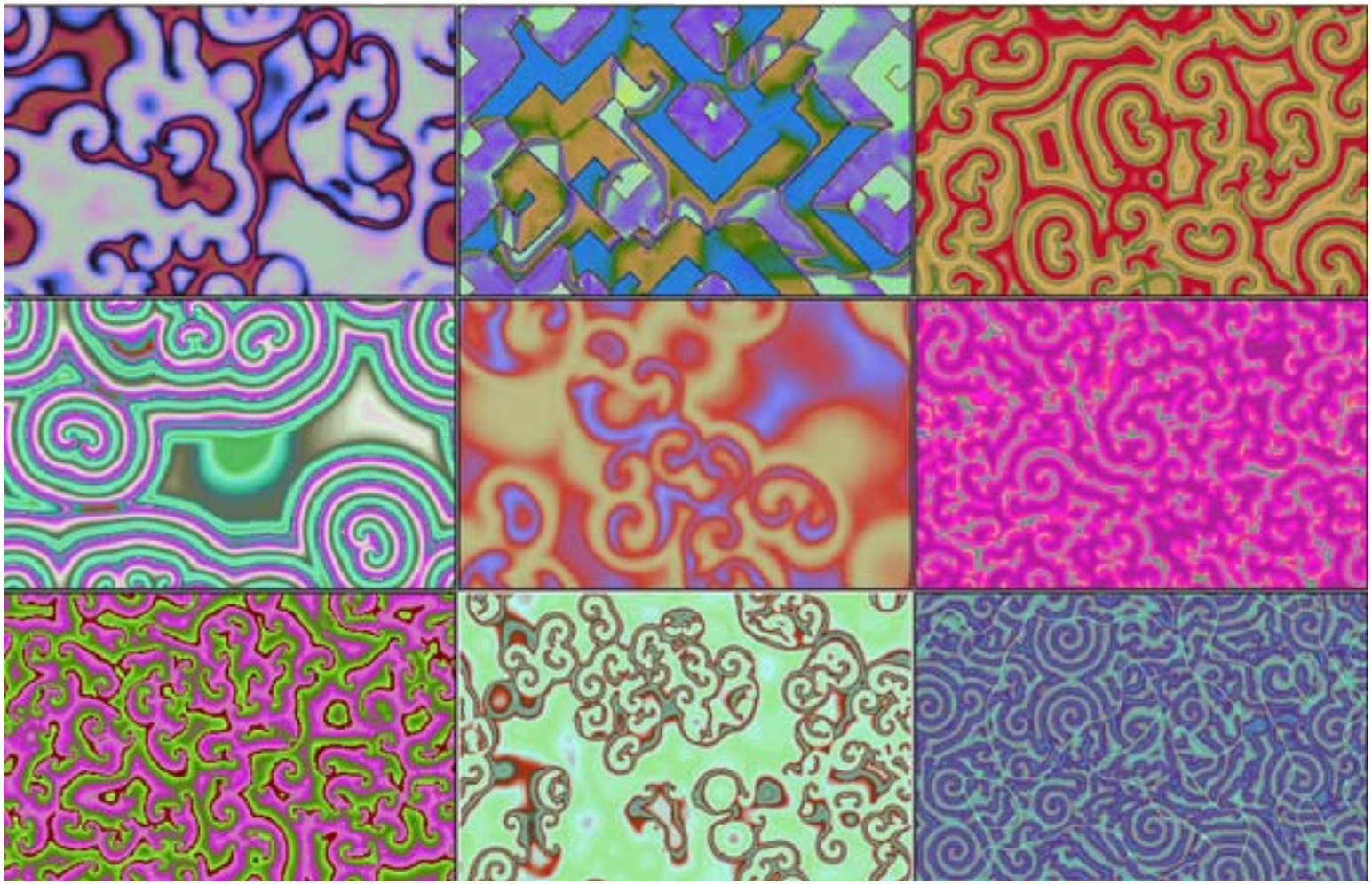




Gnarly Rule 110 Is Provably Computation Universal!



Gnarly 2D CAs: CAPOW Zhabotinsky Scrolls



Consequences

- Formally uncomputable problems are **absolutely unsolvable**. Probably quantum computation isn't going to help.
- (Wolfram PCE). Naturally occurring processes are **universal** computations. Nature is rich.
- Most natural processes are **unpredictable** (irreducible), that is, they can't be emulated much faster than they occur.
- Given any formal theory and any complex natural process, there are statements about the process which are **formally undecidable** by the theory.

Good News

- Nature uses **complex, gnarly solutions**, and we can too.
- **Stable patterns emerge** even when we use we use computing systems that we can't understand. Make CS more empirical.
- Use gnarly CA rules to grow **new materials**.
- Lots of **basic science** still to do on the taxonomy of computation.

How to Be Happy

- CS. **Turn off the machine**. Nature computes better.
- Physics. **See the gnarl**. The world is interesting.
- Biology. **Feel your body**. Your body is complex.
- Psychology. **Release your thoughts**. Avoid repetition.
- Sociology. **Open your heart**. Others are complex as you.
- Philosophy. **Be amazed**. The universe is a miracle.

Book sample, software and more at
www.rudyrucker.com/lifebox

Rudy Rucker, ***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, Fall 2005).