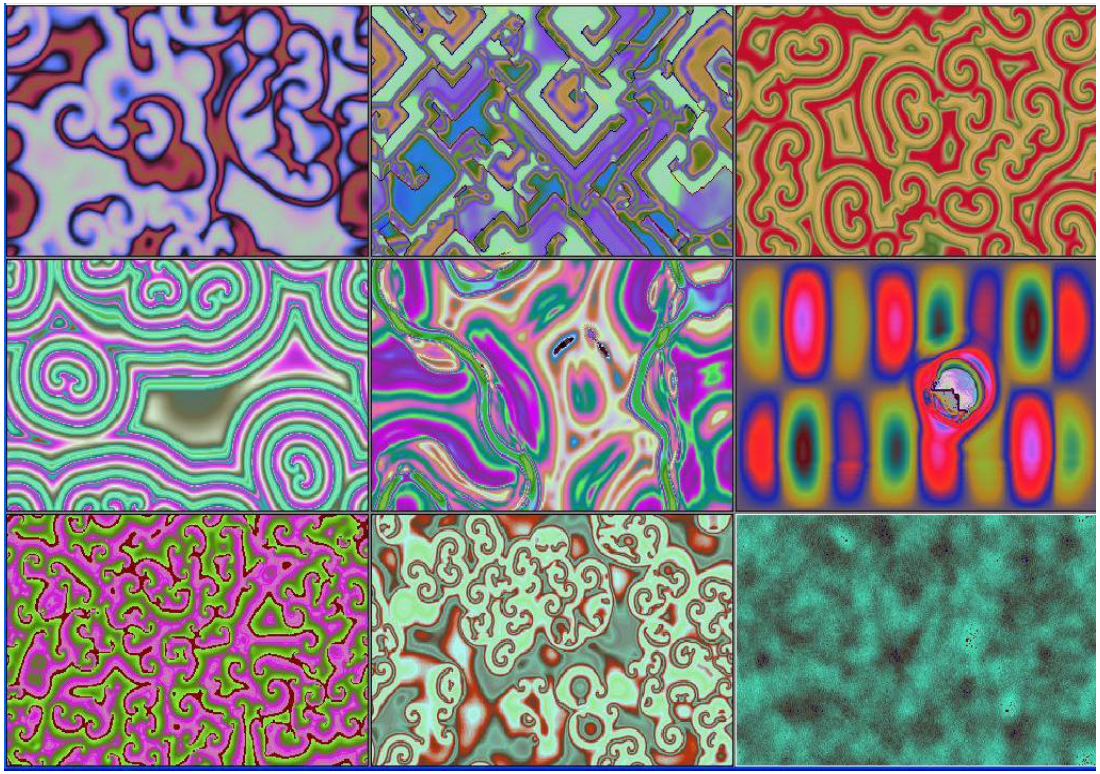
Everything is a Computation

by *Rudy Rucker*

Talk for IFTF Meeting: "When Everything is Programmable"

October 13, 2009



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THESIS:
The world is made of computations.

- A *computation* is a process that obeys finitely describable rules.

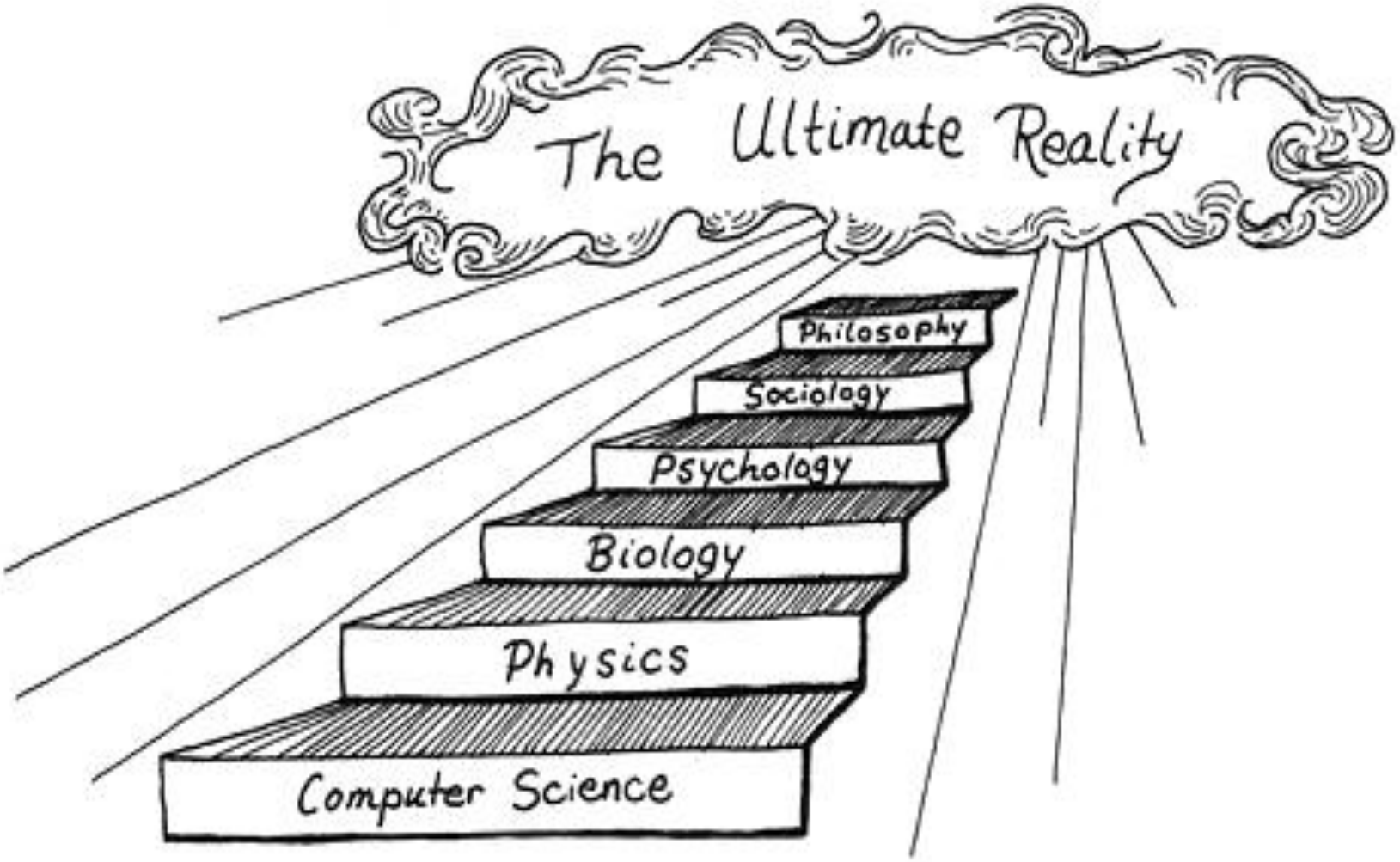
- The world can be viewed as *many* computations at high and low levels.

- We're talking about parallel, networked computations. *Not* a single underlying master computation---no scary "Big Computer Voice."

At some level,
"**Everything is a Computation**"
Is Only a Metaphor.

But Let's Push It
As Far As We Can!

Levels of Computation



Physics is Computation

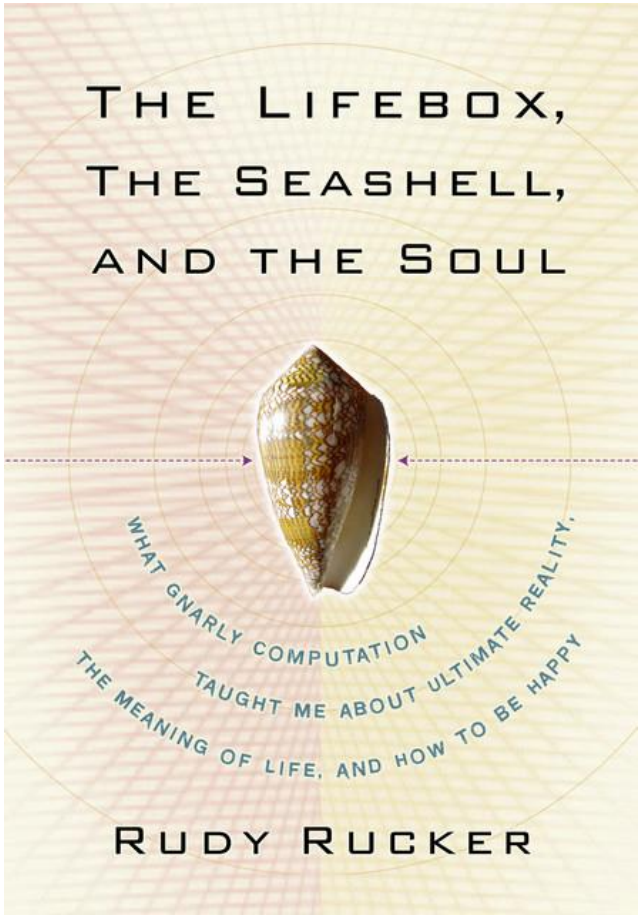
- Even a motionless rock is carrying out a computation.
- Think of the atoms as balls connected by vibrating springs.
- Or think of the rock as a massed quantum computation.

Biology is Computation

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

You Are A Computation?

- It's interesting to view a human mind as a mixture of data and algorithms.
- Like a smart website.
- I call this a "lifebox."



The Lifebox, the Seashell and the Soul

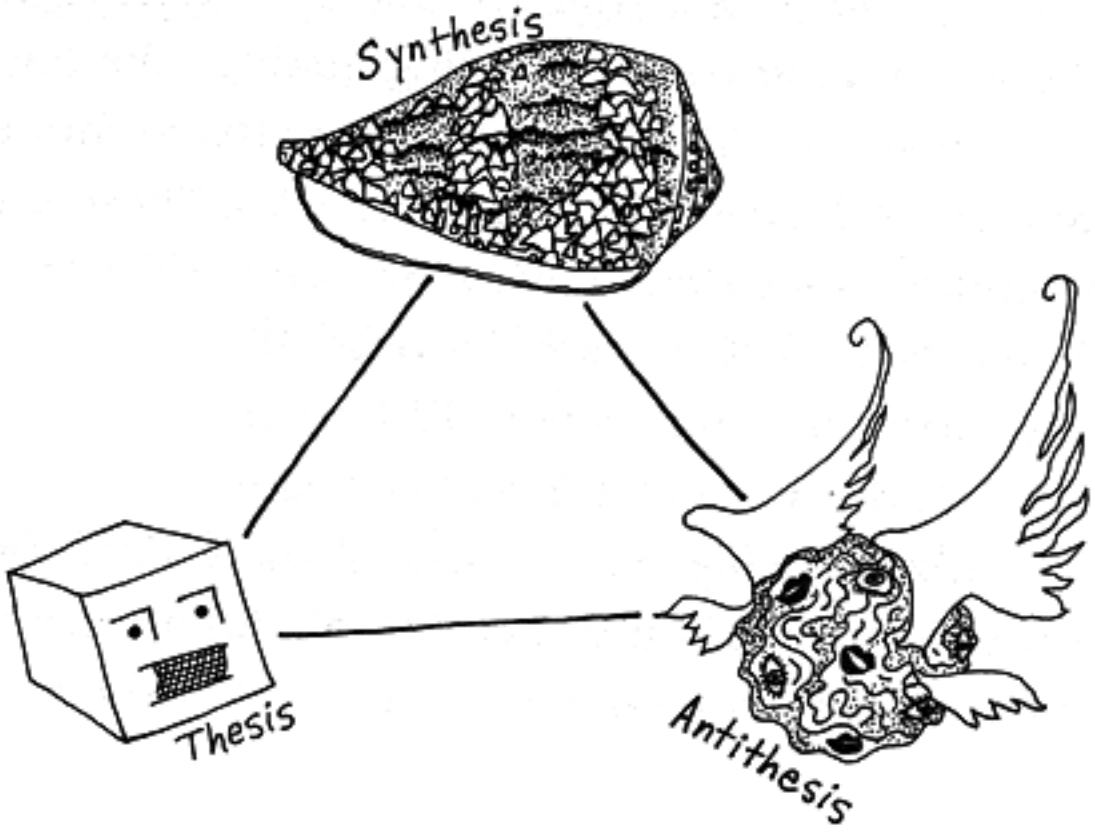
What Gnarly Computation Taught Me About Ultimate Reality, The Meaning of Life, and How to be Happy

(Basic Books, 2005)

My Book Title is a Dialectic Triad

Thesis	**Lifebox**
Antithesis	**Soul**
Synthesis (Escape)	**Seashell**

Dialectic Triad



THESIS: Reality is Made of Computations.

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

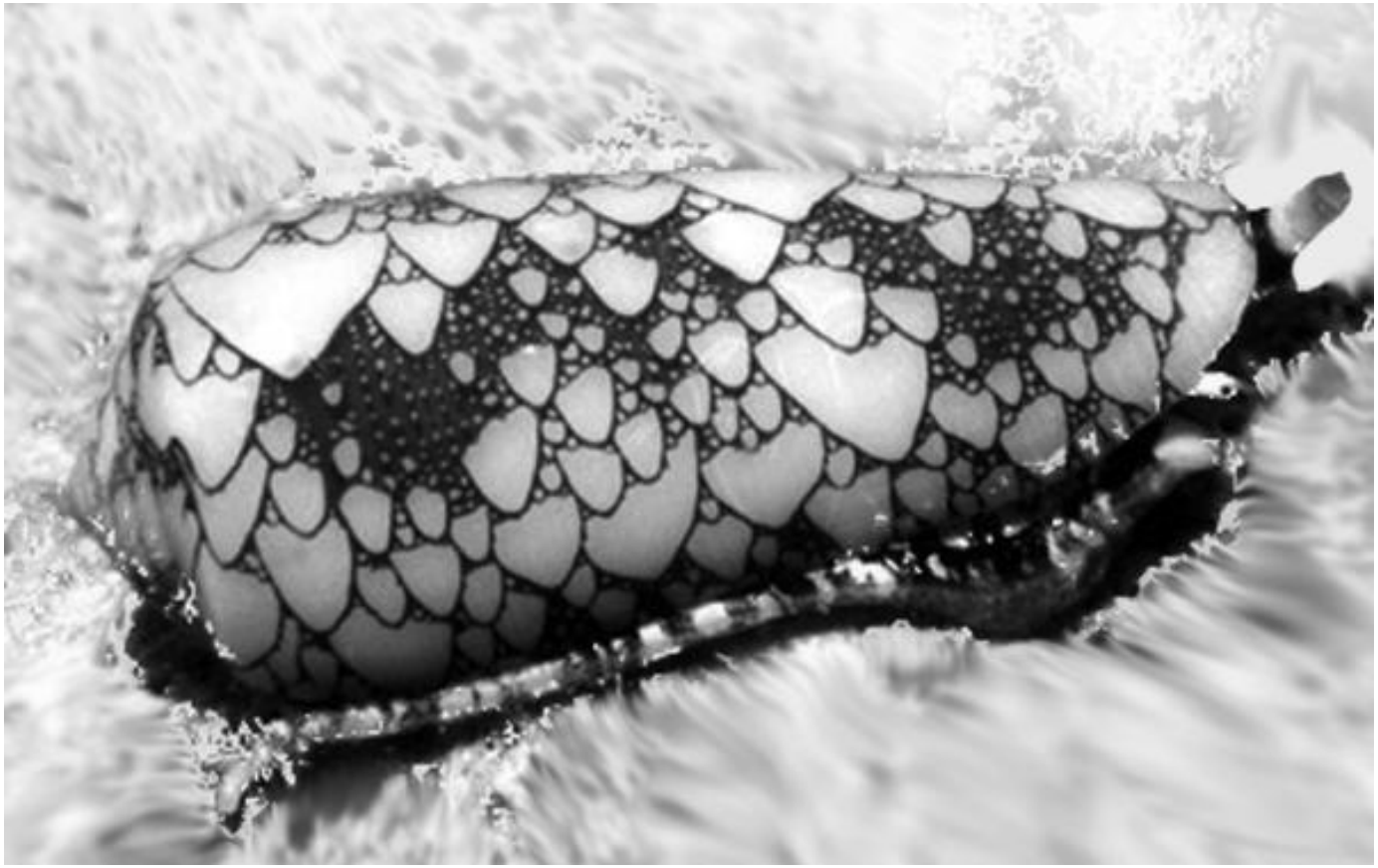
- The feeling of being alive. "I am."
- Consciousness as merging with the world.
- Dreams and Visions.
- The **soul**.

SYNTHESIS (Escape): *Gnarly* Computations Are Lifelike.

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

(Why a Seashell?)

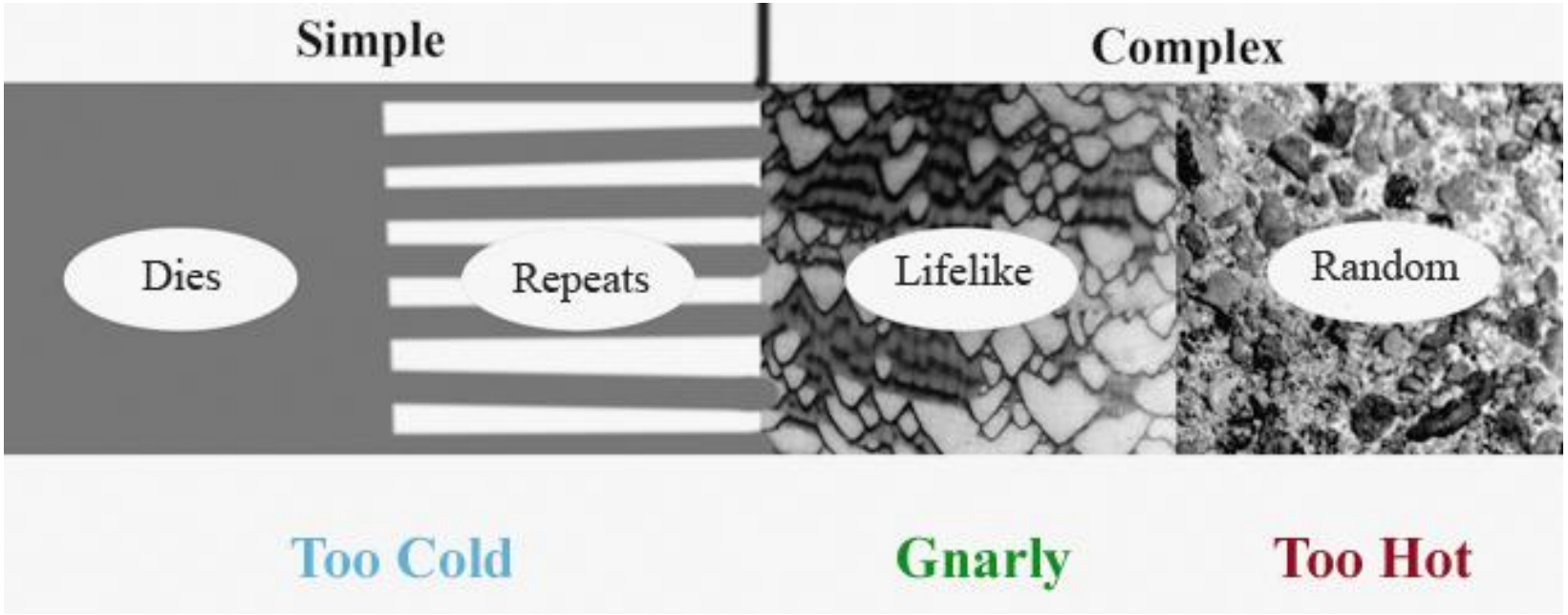
Because a Cone Shell Pattern is a Gnarly Computation.



A Taxonomy of Computations

- What kinds of **computations** exist?
- Tells us what kinds of **phenomena** can exist.
- This is **observational** computer science.

Gnarl in the Spectrum of Complexity



- **Simple (Too Cold):** Dies Out or Repeats**.**
- **Gnarly (Just Right):** Universal, Lifelike.
- **Looks Random (Too Hot)**: Seething.

Universal Computation

- A universal computation is a system that can imitate any other computation.
- It's easy to be a universal computer. PCs, cell phones, even a set of dominos…
- Alan Turing : It's impossible to predict the behavior of a universal computer.

Everything We Care About Is…

- A Gnarly Computation… ***AND***
- A Universal Computation!
- And this leads to two things:

Two Principles of Natural Computation

- **Natural processes are gnarly and universal.**

  That's why the world is surprising and rich.

- **Nature is Unpredictable.**

  Nature can't be simulated faster than real time.

Social Computation

- *Thesis*: Dream of predicting society and getting rich.

- *Antithesis*: All simple “gambling systems” fail.

- *Synthesis*: Understand that society is an unpredictable and chaotic computation.

Economics

- *Thesis*: Dream of central control.
- *Antithesis*: Central control is always corrupted and inefficient.
- *Synthesis*: Let the parallel computation of multiple agents rule.

Design

- *Thesis*. Dream of finding an ideal and lasting design.

- *Antithesis*: All designs are made obsolete by reality's progress.

- *Synthesis*: Gear up for rapid and ongoing revisions and upgrades.

(New Product Request)

- Build a “lifebox” program so people can automatically create websites that are memoirs.
- On the site: writings, photos, tapes, video.
- Plus a smart search algorithm.
- “Hi, Grandpa!”

The Lifebox, The Seashell and the Soul

Nonfiction. (Basic Books, 2005).
www.rudyrucker.com/lifebox

Postsingular *and* ***Hylozoic***

Two Novels. (Tor Books, 2007 and 2009).
http://us.macmillan.com/postsingular

Rudy's Blog: www.rudyrucker.com/blog