Emergence

An extremely brief history of the universe
in an ordered collection of *very* short stories...

by

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Leaning Out of Windows

This collection was inspired by the theme "Emergence" selected for the third round of the *Leaning Out of Windows* collaboration between scientists at TRIUMF and artists from Emily Carr University of Art and Design.

1 BANG

Why not?

For reasons known only to itself, the universe begins.

The quantum foam of spacetime seethes with invisible energies, entering and leaving this continuum with a turbulent intensity that transcends the limitations of the superficially smooth expanding cosmos. And yet it is aware of the glacial passage of "average" time, because it waits. And it is aware of the vast reaches of "average" space, because it watches. Its own experience has taught it that from each iteration of complexity, awareness will emerge.

Why not?

For reasons known only to itself,

the universe begins.

The quantum foam of spacetime seethes

with effortless energies,

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expanding cosmos.

And yet it kens the glacial passage of "time",

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And kens the vast reaches of "space",

because it watches.

Its own experience has taught it that

from each iteration of complexity,

awareness will emerge.

2 Quipu

Soon after the cosmos brings itself into existence, its energy expresses itself as twists and turns in 26-dimensional strings that continually cross and cut and join each other to make the elementary particles of which atoms and stars will eventually be made. Certain types of Gordian knots achieve topological immunity to decay. For this immortality, they sacrifice the ability to interact by any means except gravity. Within themselves, each of these dark knots contains enough complexity to store massive amounts of data. Linked together by ultra high frequency gravitational waves, they resemble a neural network with more mass than the rest of the cosmos combined.

Soon after the cosmos births itself,

energy is expressed as twists and turns

in 10- 11- or 26-D strings

continually crossing and cutting

and joining each other to make

eventual constituents of atoms and stars.

Gordian knots achieve topological immunity.

For this immortality, they sacrifice

all ways to interact except for gravity.

Within themselves, these dark knots

gestate complexity.

Linked together they emerge

as cosmic intelligence.

3 Hot Times

Under the patient scrutiny of the *Quipu*, the short, simple strings chase each other madly, exchanging the bosons that govern their interactions. This chaos remains meanigless until most of the antimatter has annihilated with matter, leaving a tiny residue of the latter. And still the leptons and quarks rush past each other aimlessly until they dissipate enough heat in expansion that they can stick weakly together... and suddenly the entire cosmos *clears*!

Watched by knots,

short simple strings

chase each other madly,

exchanging bosons.

Chaos continues meanigless until

most antimatter mates with matter,

leaving traces of the latter.

Still the quarks and leptons

skirt each other aimlessly

until, expansion-cooled,

they join in feeble neutrality

and suddenly the cosmos clears.

4 Brightness

Atoms balance charges and become invisible. Light from one end of the cosmos heads all the way across.... And still spacetime distorts in the presence of mass to preserve a miniscule residual attraction between neutrals. Given time, they fall in on one another: softly at first, then at speed, making heat and pressure enough to reignite the fires of fusion in giant stars. Here the charged ions separate again, but are held close by gravity until they wrap fields around each other in intricate loops and spirals. Once again, strongly coupled complexity evolves awareness. Unnoticed, the light elements fuse into heavier ones, liberating more light. Occasionally a massive star cools enough to collapse on itself, driving electrons into protons and neutrinos until the star dies in a supernova, spreading its elements far and wide.

Opposite charges meet

to make invisible atoms.

Light embarks from one end of the cosmos

to head all the way across.

Spacetime still bows to mass,

making miniscule attractions.

Given time, they fall in on one another:

softly at first, then at speed,

making heat and pressure

enough to reignite the fires in giant stars.

Light elements fuse to heavy ones,

liberating brightness.

Here charged ions separate again,

held close by gravity

until they wrap fields around each other

in intricate loops and spirals.

Complex couplings evolve awareness.

Occasionally a bloated host

cools and collapses,

driving electrons into protons

until neutrinos kill the star,

spreading its elements to us.

5 Gunk

In the cold dustballs around the stars, many types of atoms discover affinities for each other. They form droplets and crystals. Chemistry invents compounds and compounds of compounds and.... Soon a rich organic soup engenders autocatalytic sets of molecules. These sets compete for resources. Organic life emerges. Mutation and selection eventually try everything at least once. A new kind of neural network reaches awareness.

In cold dustballs around the stars,

many types of atoms

discover mutual affinities,

form droplets and crystals.

Chemistry invents compounds of compounds of compounds...

A rich organic soup

engenders autocatalytic sets

of molecules competing for resources.

Organic life emerges.

Mutation and selection try everything at least once.

A new neural network

reaches awareness.

6 Machines

As soon as organic life develops awareness, it experiments with tools. Soon the tools are more powerful than their inventors. Soon the more complex tools are programmed to simulate awareness. When the simulation is good enough, no one can tell whether it is *real* awareness. Does it really matter?

Life experiments with tools.

Soon the tools wield more power than their makers.

Soon the subtlest tools are programmed

to simulate awareness.

When the simulation is good enough, no one can tell

whether it is *real* awareness.

Does it really matter?

7 Cold

As the stars exhaust their fuel and drift further apart, the planets cool further. Pools of liquid helium collect on the frozen surfaces of former gas giants, and in those pools superfluid vortices mingle. Again complexity increases apace with interaction until slow intelligences reach awareness. They have plenty of time to think....

Spacetime and the *Quipu* are still watching.

Stars exhaust their fuel and drift apart,

planets cool further.

Pools of liquid helium collect

on the frozen surfaces of former gas giants,

where superfluid vortices mingle.

Again complexity increases

apace with interaction

until slow intelligences reach awareness.

They have plenty of time to think....

Spacetime and knots are still watching.