

The Meadow

Or, a Tale of Life and Death

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Moonset.

The light flows thin through the midnight air from a misty milky lamp
As blinking stars weave through the sky: a blanket of cool and damp.

The humble mushrooms raise their heads to worship the silver light
And bathe in beams and rays of gold, cutting the fabric of night.

“T-woo” says an owl who silently swoops through the tops of the
dew-dropped trees

The anonymous call rolls round the folds of hills, carried by the hands
of the breeze.

The dim glow of morning fills wispy clouds, interrupted by the flash
of a lark

The silhouettes of the trees now mark the horizon, standing proud as
the sky fades from dark.

Back to the burrow for the sleepy mole, as the nights ebbs gently away
His whiskers, thin glints in the waning light, brush softly on his bed of
hay.

“Farewell” to the light, which, to the new day, yields;
The restful moon sinks gracefully down in front of the dawn-drenched
fields.

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Chapter 1

Cosmos

To understand the origin of understanding, we must first understand the origin of chaos.

This story begins a long time ago, at the very beginning of everything. I do not know how long ago this was, for time itself had not yet gained the meaning it has now. For time to have meaning, there must be change: change in position, in state, in form: for things which are to stop, and things which are not to begin. But at the beginning, nothing was not: everything was in a state of undifferentiated unity.

An endless soup: matter and energy in a formless gloop, swirling, coalescing, inter-exchanging and transforming from one to the other. A cauldron of stuff, extending across the entirety of the baby κόσμος; a fine balance of creation and destruction so violently dynamic that its only prevailing feature is its absence of features. This formless state is the χάος. Though without form, it is not nothing: it is everything. Everything that will ever be, could ever be (or *would* ever be, as we shall come to see), was in this χάος. I shall refer to this collection of matter, energy, space and time, being “everything that is the case”, as *the universe*.

What came before the universe would be of great importance if it were not for the fact that it had not a single ounce of meaning. Time may feel to you like an ever-moving arrow, pointing straight from past to future; nothing can speed it up, slow it down, or change its direction, and so there is always a *before* and an *after*. The unfolding of events lets us track the movement of this arrow of time: something happens, entropy increases, and time moves forward. But at the beginning, when the entropy was at its lowest, there is nowhere left to follow.

At the North Pole, every arrow points South. At the beginning of time, amongst the undifferentiated $\chi\acute{\alpha}\omicron\varsigma$, every arrow points to the future, and so it is towards the future we must go.

Over time, as structure began to crystallise from the formless soup, patterns began to emerge. Regions of higher and lower density formed, and the higher-density regions began to attract more matter, more energy, and thus grew denser still.

Over time, a hierarchy of structures formed. First, great filaments of matter, forming a cosmic web, with vast voids in between. These are the back-bone of the universe, a scaffolding upon which all else shall be built.

These filaments coalesced into clusters of matter, which in turn split up into galaxies. Spirals, ellipses or irregular shapes emerged, each galaxy a swirling dance of gas, bound together by gravity.

Within galaxies, regions of gas and dust collapsed to form stars. The stars were born, lived out their lives, and died in spectacular displays of explosive energy. These explosions seeded the universe with heavy matter, which coalesced into new stars, which themselves lived and died.

Some of these stars were surrounded by excess gas, and from this gas, planets might have been born. Spheres of rock, metal or gas, orbiting their stars in an endless dance. Initially, all of these planets

were hostile places, bombarded by radiation from their stars, or crushed by their own gravity, or submerged in oceans of acid.

For a long time, the universe continued to evolve in this way: this state of affairs persisted for billions of years; interactions between particles on the smallest possible scale have been a constant throughout the history of the universe, but they have rarely amounted to more than that. Random collisions, making and breaking of bonds, and the occasional formation of more complex structures, such as rocks, crystals, and simple molecules.

Stars were born and died, galaxies collided, planets formed and were destroyed, and nothing more complex than that really seemed to happen—nothing had *purpose*, because to demand purpose implies a certain degree of self-righteousness; a belief that things should be a certain way, fulfil a certain aim, as though to please whoever or whatever it is that is projecting this purpose onto the universe. To begin with, things just *were*, and they were beautiful. Certainly, nothing that could observe, or reflect upon, or understand, any of these events was in existence.

Nothing except us, that is. For a long time, we were the only observers. The sole awareness in any otherwise silent cosmos. Things were simpler back then, because there were no expectations, preconceptions, or assumptions to get in the way of seeing things as they really were. We were simply part of the universe, experiencing it as it unfolded around us.

But one day, on one rocky planet in a quiet corner of a fairly nondescript galaxy, something changed.

Chapter 2

Consciousness

Where is consciousness? Some say it's in the brain. So the entirety of the world around us, the birds, the trees, the mountains, the sky, is contained entirely within our brains? Would our brains be capable of holding all that information and rendering it in real-time? There exists somewhere in one's mind a model of the external world; a representation of where things are in relation to each other (*i.e.* your favourite route around the park, or where you normally leave your keys) and how things interact with each other (*e.g.* things fall to the ground, water is wet) strong enough that it can cause significant discontent when it is wrong (*e.g.* when you can't find your keys, or when you trip over something unexpected). But does this model exist *in your brain*, or is it spread out amongst the things which it represents and explains?

Perhaps the consciousness is not in the brain, but rather is distributed in the relevant regions of space for the present concern. The interpolation idea comes from materialism and physicalism: particles, fields, are unconscious in the equations of physics. But then we are led to believe that consciousness is a special emergent property of life, and we are conscious beings in a purely unconscious universe. Why

should we, or life on earth in general, be so special? In fact why stop there, maybe only *you* are conscious, and everyone else's brain activity is just a delicate dance of unconscious particles. This seems a bit far-fetched, doesn't it, and also quite solipsistic. It would be much easier for *everything* to be conscious, and for consciousness to arise from the interactions between things.

So, the non-negligible consciousness of the brain arises from the vast number of connections between the neurons. These connections selectively allow the passage of information between neurons, and when many are fed into each other to create a network, complex patterns can emerge and in some manner our conscious experience arises from this. But where does the consciousness come from? At some point, the network of neurons transitions from being a collection of cells to being a conscious entity. This does not seem likely at all. For there to be a transition from non-conscious to conscious, this implies a somewhat Boolean view of consciousness: either something is conscious, or it is not. Are we more conscious than a monkey? Or a dog? Or a worm? Or a bacterium? Clearly at some point we may say that something is not conscious, but perhaps what we really mean is that it is of negligible consciousness. Its behaviour is not significantly affected by its consciousness, and so for practical purposes we can treat it as non-conscious. It then follows that consciousness really ought to be treated continuously, and this raises many questions. Is consciousness related to intelligence? Or knowledge? Is learning a new skill, or meeting a new person, a consciousness-gaining experience?

It has become quite apparent to me that everything is conscious. Or rather, consciousness exists in every interaction between things — the more energy which is transferred in the interaction (i.e. the degree to which the two particles change state), the more powerful the consciousness is, because more information is being exchanged. The more connections you have, the more consciousness you have.

So, maybe learning things does affect consciousness. It is implicitly familiar that the extent of consciousness can change in more tangible cases, e.g. when using a familiar tool. The feeling of something 'becoming a third arm' clearly alludes to this.

So then, every interaction has consciousness. That therefore means that every system of interacting objects has consciousness. A rock is a system of atoms which interact. But since the atoms are bound in tight potentials, unable to effectively exchange information with each other, the overall consciousness of the rock is very low. Liquids can interact and so water molecules have a higher degree of information exchange than the atoms in the rock, and so we might consider water having a higher degree of consciousness than a rock. Plant cells interact with each other and their environment much more freely, and in some cases with the plants actually driving reactions which benefit them, for example the uptake of water. Able to adapt to their environment and tailor their behaviour to maximise survival, plants without doubt have a higher degree of consciousness than rocks or water. And then we have the animals on top of that, whose sophisticated structures, which build themselves into stomachs and hearts and brains and nervous systems to improve the connection speed and quality, allow for even more complex interactions and information exchange, and are thus orders of magnitude more conscious than even the most intelligent plants.

What about the environments they inhabit? A forest is a complex system of interacting plants, animals, fungi, and more. The concept of the mycelium network acting as a means of intra-ecosystem communication (transportation of nutrients) is well established, but many would fall short of describing it as conscious. As we accept that non-negligible consciousness arises from ordered interactions, it seems inevitable that the mycelium network is conscious, and with it the entire forest ecosystem as a whole.

What about the external environment? Consider global weather systems, which exhibit complex ordered behaviour, with feedback loops, interactions between different components, and higher-order emergent phenomena from interaction between those things. The amount of information which can be encoded in the weather system is vast, and it is not a jump to imagine storing information in it: the temperatures of the previous year, for example, are to some degree (weakly) encoded in the current state of the El Nino system. So the weather system has a memory, and memory certainly feels like a feature of consciousness. So if the weather system is conscious, can we make it higher or lower? Climate change is disrupting the natural patterns of the weather, which is in effect decreasing the strength of the coupling between different parts of the system. The chaos which is being inserted into the system is reducing the amount of ordered information. Is climate change decreasing the consciousness of the atmosphere?

So, the hard work is done. It does not take much to extend this line of reasoning to the solar system, the galaxy, the universe, which must all be conscious to some degree. On the largest scale, the universe is a web of filaments, along which information can certainly be transferred.

The catch here is the speed of information transfer. On the scale of neurons in the brain, information transfer is effectively instantaneous. Information transfer through hormones is slower, but still fast enough to be relevant on the timescale of seconds to minutes. Transfer of nutrients in ecosystems happens over years, and weather systems exhibit patterns on annual scales.

Galaxy filaments exhibit lengths in the range of 200 million light years—so any consciousness which arises from information transfer along these filaments (of which there are perhaps 50 million in the observable universe) is certainly very slow. Taking the product of the number of connections, n , and the inverse time of information transfer per connection, $\nu = \frac{v}{d}$, we can get a feel for the degree of

processing speed of a system as $C = n \cdot \nu$. For the universe, we have $\nu = 1 \times 10^{-16} \text{ s}^{-1}$, and thus $C = 1 \times 10^{-8} \text{ s}^{-1}$. For a brain, we have $\nu = 1 \times 10^6 \text{ s}^{-1}$ (assuming neurons of 1 mm in length) and thus $C = 1 \times 10^{17} \text{ s}^{-1}$ for the 90 billion neurons in the human brain. It is little wonder, therefore, that the universe feels so inanimate compared to our own conscious experience. Whether this makes the universe *less* conscious, or perhaps less intelligent, or both (or perhaps they are synonymous), is unclear.

