Quantum Thoughts: A Simple Definition of the Universe

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The Universe

I love thinking about the universe. However, when people hear **universe** they usually ponder about *galaxies*, *stars*, and *black holes*. And even though I doubt this will be the last you hear from me about these topics, especially since my latest growing interests in books like *A Brief History of Time* by *Stephen Hawking*, this cosmological sense of the word **universe** is not the one I want you to consider right now. For now, think of **universe** as **everything**. This obviously includes the aforementioned galaxies, stars, and black holes, but also contains trees, mountains, people, the internet, love, suicide, philosophy, science, imagination, and—oh yeah—*literally* anything else.

Perceptions of Everything

Considering this magnificent agglomeration of objects and concepts alike, how could it be possible to even grasp the understanding of even the simplest aspect of *everything*? The answer to this question varies greatly with who you ask, and their specialty will often influence their perception, even only subconsciously. An **ignoramus**, literally coming from the Latin *we do not know* but later used by the English as a term of idiocy or ignorance, would mutter “Who cares?”. A vexing, naive, innocent, sometimes aspired-to individual that just lives, loves, and laughs, having not a single conscious worry besides the day they experience today. Why would you care about how something works, as long as it just *does*? And how wonderfully effortless this sounds, history has shown us that most human beings do not sit around and just expect the do’s as they are. If not for something’s underlying functional understanding, we will always contemplate the enigma of *why*. This question is enough to put the bread on the table of common **philosophers** and will often lead to complex and sometimes unanswerable quandaries endlessly argued back and forth between some of the greatest minds to walk the earth. But for the *how* we must turn our gaze toward **scientists**, where science can be seen as the study of *anything*, but often not quite *everything*.

Anything and Everything

Both *anything* and *everything* can be considered in two ways, one way aiming towards essentialism and the other towards emergence. A *thing*, as a part of *anything*, can be seen as its most *essential* components. What the Greeks used to call *atoms*, meaning indivisible, could describe a thing to its smallest and simplest constituents. Thus, any *thing* is nothing more than a collection of other things, where the only *true thing* is this essential *atom*. But on the other hand, a thing could also be seen as more than just a conglomeration, where the meaning of the thing *emerges* from the specific order and behavior of the essential things. A *poetic naturalist*[1] would define something as a *thing* when it is *useful* for us to give it that definition—independent of the fact that, in its essence, it is only an alternative variation of the same things that made another *thing*. As I said, we can also divide *everything* into these two paths. In the context of emergence, *everything* is exactly as we defined it before: a collection of every single *thing* that we *defined*, like mountains, love, and philosophy. It is this that is everything, for there is nothing besides that, which we define as something. However, arguing from an essentialist viewpoint, everything that we have defined as something is exactly the opposite—which is **nothing**—for the only true thing is the essential thing. And *everything* can be seen as *only* the essential thing, for nothing is more than a sequence of interactions between those.

The Atom

Let us define then this essential thing, while avoiding the obvious paradoxical implications of defining. With modern education and understanding, even a child would comprehend the concept of an atom: “the *thing* that makes up everything, for there is nothing smaller.” And you could argue that this conviction is sufficient for a nonscientist, since to them it would not matter to what capacity we could further examine the atom as we now understand it to be. The scale of an atom fluctuates around an Angstrom[2] (Å), which is ten orders of magnitude smaller than a meter ($1\ \text{Å} = 10^{-10}\ \text{m}$). Most of us are aware of the difference between various elements, nicely ordered in the Periodic Table of Elements[3]. However, defining the atom as the true essential *thing*, would require the preposterous notion of at least 118 distinct essential things. A common person would already be able to clarify the structure of these elements, consisting of protons, neutrons, and electrons, where the protons and neutrons establish the nucleus, surrounded by an ever-shifting electron. This repudiates the suggestion of true *atomic* essence, shifting the query to even more incomprehensibly small things. Where chemistry often limits itself to the nucleus and the electrons, physicists tend to dive deeper into the elemental particles that make up this

nucleus, and more specifically, construct the protons and neutrons themselves. Protons and neutrons are roughly one femtometer ($1\ \mathrm{fm} = 10^{-15}\ \mathrm{m}$), which is ten thousand times smaller than an Angstrom. This already bring a colossal existential enigma, because it means that most of matter as we know it is *empty* space. Both the proton and the neutron consist of three quarks, where the most common occurrences are the up quark (with a charge of $+2/3$) and down quark (with a charge of $-1/3$). A proton consists of two up quarks and one down quark leading to a total charge of +1, and a neutron of one up quark and two down quarks, resulting in a total charge of 0. Can we now conclude these three particle types—the up quark, the down quark, and the electron—to be the *essential thing* we keep referencing? Well, not quite. We know of the existence of at least 14 different elemental particles. So is there something *smaller*, something truly elemental, some essential thing? Although it is a field that can only be explained completely through years of mathematical expertise and concepts that will consume the life of any scientist who dares to try and study it, *string* theory[4] is one of the most compelling current ideas for a unified description of *everything*. Any thing is just a string that vibrates and behaves differently, but in its essence, the string itself is identical for every single *thing*.

My Universe

I guess my definition of **Universe** would be this concept of essential things, like string or anything analogous to this. For the **Universe** is just this. And nothing else. However, it would be ignoramus-like naivety for me to say we ought to stop there. Whether we define emergent *things* as real things or not, the have a dramatic effect on our lives, and thus, we ought to take them serious. Or in a true poetic naturalist fashion:

> “There is only one world, the natural world — yet within it, we find many ways of talking about it, each true in its own domain.”[5]

If you enjoyed this and want to support more writing like it, it is possible to ☕ buy me a coffee. Thank you very much!

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1. A **poetic naturalist** is someone who seeks truth through the lens of science and reason, yet expresses it with the language of meaning and wonder. The idea is central to *Sean Carroll*'s *The Big Picture*, where he describes poetic naturalism as a worldview that accepts one natural world, governed by physical laws, while allowing for many equally valid ways of describing it.↩

2. The **Angstrom (Å)** emerged in the mid-19th century from the work of Swedish physicist *Anders Jonas Ångström*, who studied the spectra of sunlight and gases. In spectroscopy, precise wavelength measurement was essential, but existing centimeter-based units were too coarse. Ångström introduced a smaller, more practical scale to express the wavelengths of light with manageable whole numbers instead of long decimals.↩

3. The **Periodic Table of Elements** was conceived in 1869 by Russian chemist *Dimitri Mendeleev* who recognized that when elements were placed in increasing atomic mass, a pattern of emergence revealed periodically repeating properties. He predicted the existence and traits of elements that were yet undiscovered, which were later confirmed to prove this vision.↩

4. If you're curious about **string theory** and the search for a unified understanding of the universe, *Brian Greene*'s ***The Elegant Universe*** is a perfect place to begin. It introduces the ideas of relativity, quantum mechanics, and—adequately named—the elegance of string theory with remarkable clarity and narrative grace.↩

5. Carroll, S. M. (2016). *The Big Picture: On the Origins of Life, Meaning, and the Universe Itself.* New York: Dutton.↩