

The Big Picture

On the Origins of Life, Meaning, and the Universe Itself

Sean Carroll

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At the accepted rate of one picture per thousand words, Sean Carroll's magnum opus, *The Big Picture: On the Origins of Life, Meaning, and the Universe Itself*, would be worth about 100 pictures. Carroll, a theoretical physicist at Caltech, could have easily titled his book *Poetry for Physicists*, touching as it does on the deepest chords of existence, from astrophysics to zoology.

We can begin, as Carroll does, with definitions. Consider the word "universe." Religious interpretations have it originating from the words "one" and "verse," or from "word," as in the word said to be spoken by God "in the beginning." The Roman philosopher Lucretius, one of the founders of naturalism and a peripheral character in the book, is said to have coined the word—whose Latin translation means "one roll"—to evoke "everything rolled, or combined, into one." The disparate views on this seemingly innocuous word perfectly capture the richness of *The Big Picture*.

Although there aren't many new ideas in *The Big Picture*, it shines as a juxtaposition and synthesis of what we physicists do know. Carroll's book contains the definitive treatment of a wide range of subjects, including quantum entanglement, Bayes's theorem, the Turing test, abiotic evolution, the physically relevant aspects of philosophy, the multiverse, and, of course, the standard model of physics. The standard model is the main focus of the tome, which Carroll calls the "Core Theory," a term coined by Frank Wilczek. Readers also receive fresh insights into old standards such as the anthropic principle.

Although credulity might be stretched in describing a 480-page book as "lively," Carroll's humor shines in wry passages such as those describing "full employment for philosophers" and "abducting God." He is as adroit at quoting the secular Søren Kierkegaard as the

religious evangelist Rick Warren. He can mix Immanuel Kant's categorical imperative with Bill and Ted's own imperative, "Be excellent to each other!" Few authors so deftly mix the weighty with the buoyant, and that compels us to read on. From working in the bowels of particle accelerators to being a lab rat inside an MRI machine, Carroll skillfully pulls off a synthesis of all his intellectual peripateticism.

Carroll's fundamental thesis is that we know enough about the core theory to describe all that can affect us. We should not fear the paranormal or the astrological: If they have any reality whatsoever, they must obey the laws of nature. New observations may require us to expand or adapt the core theory, of course, but as Carroll puts it, "We know enough to draw very powerful conclusions about the limits of what we can do."

One need only take a cursory look at the many extant glowing reviews of *The Big Picture* to be convinced it's worth purchasing. I feel duty bound, therefore, to focus on my few qualms with the book. Some of the material in *The Big Picture*, including Carroll's descriptions of concepts like entropy and the arrow of time, seems to be more or less adapted from his earlier books. Jettisoning some of that material might have somewhat reduced the book's heft, but retaining it is forgivable; Carroll's descriptions are worth reading twice.

The Big Picture also takes the ambitious step of addressing ethics alongside its physics. Carroll is devoutly secular but not vituperative. His bias toward naturalism is evident, but he implores physicists, philosophers, and theologians to engage in serious, respectful dialog. Can one imagine a humanist's Ten Commandments? Carroll takes a crack at just that. Although that may seem like a fool's errand, Carroll's version delights

and inspires. If we do not agree with it, we must at least grapple with it.

While believers must confront the question of theodicy—the existence of evil in a universe governed by a good God—humanists must confront the existence of goodness in a world governed by survival of the fittest. How does one explain performing acts of self-sacrifice or giving alms to the poor in a purely physical world, so "red in tooth and claw," to quote Alfred Lord Tennyson? Carroll admits that there cannot be an absolute morality without God, but that doesn't prevent him from trying to establish ethics from scientific principles. Carroll sees humans as good. However, he must grapple with the fact that although individuals are good, humanity as a whole has a very mixed record. In the end, Carroll's claim that human values can emerge from "patterns" is unconvincing. If there is indeed a sociological "arrow of time" toward goodness and caring, as asserted, it is difficult to appraise the initial conditions that impelled it to be so.

Religious texts aren't scientific texts, they're not intended to be read as science, and they haven't been cited for scientific purposes since Giordano Bruno's time. But can physicalism, catalyzed by the core theory, actually provide spiritual meaning? At the end, Carroll admits, we cannot dispense with the claims of religion in its own domain. So why bother trying to extend physics into the religious or ethical realm? Clearly religion fills lacunae in people's lives. For the gaps that remain, there is *The Big Picture*—a manual for the majestic, poetic existence of all that is.

Paul Dirac famously quipped, "In science one tries to tell people, in such a way as to be understood by everyone, something that no one ever knew before. But in the case of poetry, it's the exact opposite!" Unification of physics escaped Dirac. Carroll's version of poetic naturalism attempts to unify the physical with the ethereal. With its delightful blend of evocative love paeans and four-dimensional integrals, *The Big Picture* offers a uniquely physical vision of life's meaning. This is poetry. For Carroll, it comes naturally.

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