

PHYSICS

Material to meaning

Robert P. Crease assesses Sean Carroll's attempt to construct morality out of quantum field theory.

I don't think I have ever read anything with a bigger ambition than *The Big Picture*, physicist Sean Carroll's latest book. Physics, Carroll writes, gives us a complete picture of the foundations of nature. Although that view has had an enormous impact on cosmology, materials science and other scientific fields, its implications for meaning and morality have yet to be determined. "Our values," writes Carroll, "have not yet caught up to our best ontology." In this book, he conducts a quest to catch up.

Carroll creates his big picture as follows. Quantum field theory provides a unified perspective on the subatomic realm. Carroll calls that the "Core Theory", noting that its behaviour is fully captured by a formula called a Feynman path integral. Some features of the macro world can be directly tethered to it; others, including many concepts of thermodynamics, cannot. He calls these "emergent" features, ways of talking about the world that are not incompatible with Core Theory, yet cannot be grounded in it.

In the fun parts of *The Big Picture*, Carroll demonstrates the absurdity of adding to the Core Theory to explain the possibility of things such as an afterlife or a transcendent underlying purpose. These are easy targets. The narrative begins to get awkward when it comes to, say, conscious experiences. These, Carroll writes, are "not part of the fundamental architecture of reality"; they are emergent, a handy way of talking about what brains do. Like entropy, he argues, consciousness is a concept that "we invent to give ourselves more useful and efficient descriptions of the world". He calls his approach "poetic naturalism". By using "poetic", he means to give his blessing to ways of describing the world other than through fundamental physics — ways that, he says, can be meaningful if they are useful and don't violate the Core Theory.

Carroll has a fluid, often engaging style, and the passages that explain science — including his appendix about the Feynman path integral — are excellent. The book brims, however, with avuncular clichés such as "Life is short, and certainty never happens". Carroll confidently defines many concepts, including belief and consciousness, as if 2,500 years of philosophy have yielded little relevant to the subject; he dismisses the task

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of drawing careful distinctions and heeding subtleties as "ontologically fastidious". All he finds in philosophical literature are a few interesting puzzles. It's like getting a whirlwind tour of a city from a tour guide who doesn't live there, but enthusiastically gives you capsule descriptions of favourite sites.

It is hardly surprising, therefore, that Carroll's philosophical conclusions sound profound but leave us with disappointingly empty propositions, such as, "Morality exists

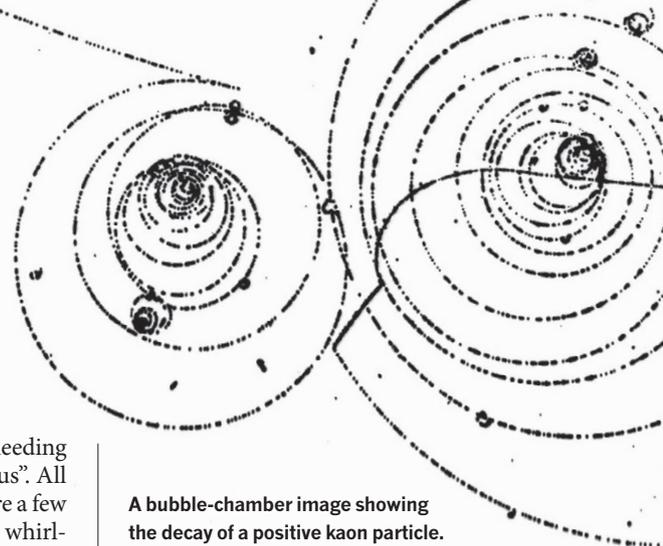
"Like entropy, consciousness is a concept that we invent to give ourselves more useful and efficient descriptions of the world."

only insofar as we make it so, and other people might not pass judgments in the same way that we do." Outlining his own moral approach, Carroll offers a poetic naturalist's version of the Ten Command-

ments, the "Ten Considerations": greetings-card-like homilies such as "It Takes All Kinds".

What's fascinating about *The Big Picture* is that Carroll's clarity and directness make its fundamental assumptions easy to spot, and whether you like this book will depend on whether you share them. Laboratories, as Carroll well knows, are workshops, controlled environments with unusual equipment, regulated conditions and specially trained workers. He writes from the perspective of such a worker who has come to believe that a mathematical physicist's way of thinking is just how people think — or should think — about everything, even when they are not in a workshop or when they ponder values or the existence of God. Carroll describes deciding how to be morally good, for instance, as similar to a dinner-table conversation in which, like scientists collaborating, we "talk to others about their desires and how we can work together, and reason about how to make it happen". Our group, he adds, "may include both vegetarians and omnivores, but with a good-faith effort", universal satisfaction should result.

Reality, too, is just what things look like



A bubble-chamber image showing the decay of a positive kaon particle.

from a physicist's perspective — and if it looks different to others, that is an illusion. When Carroll discusses time, he means the quantity that scientists measure. Everyday experience leads us to think that time flows in one direction, but he assures us that "in reality, both directions of time are created equal". The ontologically fastidious would say, "Not so fast!" Time as lived by humans is something else again. Both outside and even inside workshops, to be bored or expectant, to hear a melody or to plan and execute an action is not to register one moment after another, but to retain previous ones and anticipate the next in an asymmetrical flow. Determining time in the workshop is an elaborate process, and assumes that you can mark it off as you can space, and then measure the spatial movement of something, whether it is the motions of heavenly bodies in ancient times or electronic transitions in caesium atoms in ours. Yet according to Carroll, this is real time.

If we accept the strict ontology of the workshop, as Carroll does, then we get his big picture and regard lived time, conscious experience and the rest of pre-workshop life as poetic and emergent. But there are broader ontologies in which the same things — which belong to the world described by the humanities and branches of biology, for instance — are regarded as fundamental, and as the driving force for workshop activity. Carroll's is a naturalistic metaphysics.

Carroll brings tremendous passion to his writing. He is sure that honest human beings who care about the world make an effort to understand it as he does. He is right that science springs from certain basic human impulses to achieve goals and ward off threats. But where do his passion and certainty about this come from? They, too, are imported from and continue to be rooted in pre-workshop life. To find a way to talk about how scientific workshops emerge from life rather than the other way around — that would be a big picture indeed. ■

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The Big Picture: On the Origins of Life, Meaning, and the Universe Itself
SEAN CARROLL
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