

Whitehead's Multiverse

Leemon McHenry

Department of Philosophy, California State University, Northridge, CA 91330

Key words: cosmic epochs, multiverse, process metaphysics, unified theory

Introduction

Alfred North Whitehead advanced a version of multiverse theory in 1929¹ that bears a remarkable affinity to the revolutionary ideas of current cosmological speculation.² He postulated his theory for some of the very same reasons as those advanced today by leading cosmologists and physicists such as Martin Rees, Lee Smolin, Stephen Hawking, Max Tegmark and Steven Weinberg, but his theory has largely gone unnoticed. While Whitehead knew nothing of the great advances in big bang theory, expansion, inflation and the unification of physics in post-Hubble cosmology when he wrote *Process and Reality* in the 1920s, he sought to explain the origin of our universe from its predecessor and to unify the fragmentary theories of physics into a grand theory.

The Theory of Cosmic Epochs

From the smallest scale of quantum phenomena to the largest scale evolution of cosmos and beyond, Whitehead argued that process is the fundamental idea. Part of his metaphysics involves a mereological theory that explains the whole-part relations in the extensive continuum of nature. Our universe, he conjectured, was born from the disintegration of a predecessor universe and another will emerge from the disintegration of ours. It is merely one cosmic epoch nestled within others spread out in temporal succession and spatial extension. A cosmic epoch is the largest society of events that are governed by a certain set of laws of nature. The term 'society' is here used in a mereological sense to specify the manner in which events form whole-part relations unified by some definite pattern, e.g., electron, atom, molecule, cell, ... planet, solar system, galaxy, cosmic epoch.... More specifically, a cosmic epoch is a vast structured society which includes the vast nexus of interstellar space and the constituent structured

galactic societies existing within a larger geometrical society permitting the possibility of diverse dimensionalities of space. Whitehead identifies *our* cosmic epoch as the four-dimensional 'electromagnetic society,' of which he credits James Clerk-Maxwell with the discovery of its general character.³

Within this context of post-Hubble cosmology, what Whitehead calls "*our* cosmic epoch" is the electromagnetic society that began at a space-time singularity known as the big bang roughly 14 billion years ago and has been expanding and cooling ever since. By the best measurements of astronomers at present, we are able to make observations of the most distant objects now in our cosmic epoch at about 4×10^{26} m away.⁴ This sphere of the radius is our *horizon volume* demarcating observable objects from which light has travelled during the 14 billion years since the big bang and those even more distant objects unobservable now in principle.

In contrast to most contemporary cosmologists who hold that there must be one basic, unified theory of physical laws that applies to all universes in the multiverse but gives rise to different local by-laws due to different outcomes of symmetry breaking, Whitehead thinks that not only do the laws of nature change from epoch to epoch but the more ultimate laws change as well. If he is right about his fundamental principle, that reality is process, even the more general laws in the wider geometrical society are subject to change but the change is so miniscule that the laws at this level appear to be permanent and eternal.

Scientific Status Defended

One of the most serious objections to multiverse theory is that it is metaphysical speculation rather than science,⁵ as other cosmic epochs or universes are unobservable in principle and the hypotheses advanced untestable. Since, however, Whitehead never embraced a sharp dichotomy between metaphysics and science, the scientific status of the theory of *cosmoi* was not a matter of concern. Science begins in the

general description of observed fact, but the impulse toward speculation is grounded in the unrest with which scientists are confronted. Lack of satisfaction with simple description or even the *general* description of observed fact is the justification of speculative extension. This urge toward an *explanatory* description is the basis for the continuum between science and metaphysics.⁶ The evidence for other cosmic epochs is indirect; it is at best an inference from what is observed in our cosmic epoch. Thus the hierarchy of societies beyond our cosmic epoch must be considered metaphysical in the sense that it is an extension of theory beyond the observable, yet it is clear that our epoch must be set in a larger society that serves as its environment and it must have originated from the disintegration of its predecessor epoch. Whitehead thus argues that the inference is justified by the search for a more complete theory. He described his theory as a ‘conjecture,’ but it appears to be a conjecture that is necessary to achieve the goal of complete unification.

Conclusion

Whitehead’s theory of cosmic epochs might very well appear quaint to the physicist steeped in contemporary string theory or inflationary cosmology. There is no doubt that his theory offers little in terms of detailed science or a fruitful direction for testing multiverse hypotheses. The point, however, is not what Whitehead contributes today, but rather how well he pioneered a general framework of multiverse theory roughly seventy years before such theories began to enter the mainstream of physics.

References

¹ A. N. Whitehead, *Process and Reality: An Essay in Cosmology*. Corrected Edition. Ed. David Ray Griffin and Donald Sherburne. (New York: Free Press, 1978), pp. 89-100.

² L. McHenry, “The Multiverse Conjecture: Whitehead’s Cosmic Epochs and Contemporary Cosmology,” *Process Studies* 40.1 (2011), pp. 5-24.

³ J. Clerk Maxwell, *A Treatise on Electricity and Magnetism*, (Oxford: Clarendon Press, 1873).

⁴ M. Tegmark, “The multiverse hierarchy.” *Universe or Multiverse?* Ed. B. Carr. (Cambridge: Cambridge University Press, 2007), p. 99.

⁵ P. Davies, “Universes Galore: Where Will It All End?” *Universe or Multiverse?* Ed. B. Carr. (Cambridge: Cambridge University Press, 2007), p. 491.

⁶ A. N. Whitehead, *Adventures of Ideas*. (Cambridge: Cambridge University Press, 1933), p. 164.