

LITERATURE REVIEWS

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HOW FINAL IS FINAL?

DREAMS OF A FINAL THEORY. Steven Weinberg. 1992. NY: Pantheon Books. 334 p. Cloth, \$25.00.

Reviewed by Benjamin L. Clausen, Geoscience Research Institute

Steven Weinberg shared the 1979 Nobel Prize for Physics with Sheldon Glashow and Abdus Salam “for their contributions to the theory of the unified weak and electromagnetic interaction between elementary particles.” This book describes the hope of Albert Einstein in his later years, of Weinberg, and of physics in general, to unify all of the forces of nature — gravitational, weak, electromagnetic, and strong — into one final theory (ch 10) that will provide a complete and beautiful (chs 5 and 6) basic understanding of the natural world. Although he states on p 5 that this “is not a book about the Super Collider” (i.e., the Superconducting Super Collider, or SSC), Weinberg devotes the final chapter (12) to the SSC, stating that “without it we may not be able to continue with the great intellectual adventure of discovering the final laws of nature” (p 274). Chapter 8 describes the current lull in the advance of physics that he hoped the SSC would overcome. Considering that Weinberg actively participated in planning the SSC until it was scrapped in 1993, it is not surprising that he takes several opportunities to justify building the multi-billion dollar accelerator.

Chapter 1 notes that “by the 1890s an odd sense of completion had spread to many scientists” (p 13), but this was a misguided perception considering the major revolutions in physics of this century. Lest the author be accused of hoping for that same kind of complete theory, he states that a final theory would “be final in only one sense — it will bring to an end a certain sort of science, the ancient search for those principles that cannot be explained in terms of deeper principles” (p 18).

Some of the physics details of the book are reviewed elsewhere (Wilczek 1993; Smith 1993); here some of the philosophical implications will particularly be addressed. Chapter 2 gives examples from physics, chemistry, biology, and astrophysics of the many scientific “arrows of explanation” that eventually converge to the four basic forces. Combining these four forces into one grand unified theory would provide the one final answer to all questions. Of course in practice, the theory would have the usual limitation for complex systems (such as the weather or living organisms) that slight inaccuracies in knowing the initial conditions result in total loss of predictive power over time. He concludes the chapter by saying:

... our discovery of the connected and convergent pattern of scientific explanations has done the very great service of teaching us that there is no room in nature for astrology or telekinesis or creationism or other superstitions (p 50).

Other authors have suggested that a totally naturalistic world view is insufficient to explain all of the observed data from cosmology, quantum mechanics, complex systems, the conscious mind, and coincidences in the fundamental constants (e.g., Davies 1983; Gribbin & Rees 1989; Squires 1990; Pearcey & Thaxton 1994). However, Weinberg believes that a final theory will need only naturalistic components. Chapter 3 gives “two cheers for reductionism,” argues that there are no fundamentally new laws for complex systems, and decries holism as the “nuttiest extreme” (p 53). Chapter 4 finds no “messages for human life in quantum mechanics that are different in any important way from those of Newtonian physics” (p 78). Probabilistic interpretations do not do away with determinism or make room for human free will and divine intervention. Chapter 9 mentions that the constants of nature presently appear to be well suited for the existence of life only by coincidence, with the dubious anthropic principle as their only explanation: what we can expect to observe must be restricted by the conditions necessary for our presence as observers. However, Weinberg believes that a final theory, perhaps some kind of string theory, would be able to prescribe values for all these constants of nature without any surprising coincidences, although he recognizes that a cosmological constant of exactly zero to 120 decimal places may still require some kind of anthropic principle for explanation. Finally, he says “it is consciousness that presents us with the greatest difficulty,” but even there it “is not

unreasonable to hope that ... we shall be able to recognize something, some physical system for processing information, that corresponds to our experience of consciousness itself” (p 44-45).

Chapter 7 finds no use for philosophy in arriving at the final physical principles, and Chapter 11, entitled “What About God?”, finds no place for theology either. Weinberg says that “the only way that any sort of science can proceed is to assume that there is no divine intervention” (p 247). As such “there is an incompatibility between the naturalistic theory of evolution and religion as generally understood” (p 248). The incompatibility is not one of logic, but of temperament. Religion didn’t arise to answer questions about first causes, “but in the hearts of those who longed for the continual intervention of an interested God” (p 248). If no conflict is seen, “the retreat of religion from the ground occupied by science is nearly complete” (p 250). To try to resolve the conflict by having science treat factual reality, while religion treats human morality doesn’t work. Weinberg goes on to state that religion as defined by the great majority of believers definitely has something to do with factual reality (p 249).

Weinberg would like to believe in a designer, but that designer would also have to be responsible for suffering and evil (p 250). He would like to find evidence in nature of a concerned creator, but finds “sadness in doubting that we will” (p 256). He does not think “that science will ever provide the consolations that have been offered by religion in facing death” (p 260). Religion provides meaning and hope, but for those very reasons it seems “indelibly marked with the stamp of wishful thinking” (p 255).

To respond, science has done well at mechanistically explaining the natural world, with a steadily diminishing need to invoke a god-of-the-gaps until its use has fallen into disrepute. But it has left humanity with a clockwork universe that provides nothing for the human spirit. Woe is the church if it provides no more than science for the basic needs of the human soul, if it provides only rules, creeds, doctrines, and rites, if it doesn’t provide the concern of a friend or of a personal God who cares. The evil in the world can be explained philosophically by a God who made creatures with free will so they could love, but when evil directly affects a person’s life, the only answer comes from a friend who can empathize, or a personal God who understands. A purpose in life requires the personal touch, making a difference in some-

one else's life. Weinberg feels that personal need, but unfortunately does not see the solution in religion.

Finally, Weinberg finds fundamentalists and other religious conservatives in one sense closer in spirit to scientists than religious liberals. Conservatives believe in what they believe because they think it is objectively true, whereas liberals "think that different people can believe in different mutually exclusive things without any of them being wrong, as long as their beliefs work for them" (p 257). However, "it is conservative dogmatic religion that does the harm" with "the long cruel story of crusade and jihad and inquisition and pogrom." Weinberg would like to strike a balance between the contributions of religion and its problems, but in so doing "it is not safe to assume that religious persecution and holy wars are perversions of true religion" (p 258).

These comments should be of concern for any group that feels it has a corner on truth, whether scientific or religious. Even objective truth can be viewed from many different perspectives with each individual attaching different relative significance to different aspects. Thus the fact of objective truth gives no license for one group to force its perception of that truth on others.

Weinberg does a good job of making a case for the beauty and power of naturalistic science. He catches the reader's imagination as he describes the hope for a final theory. Unfortunately, he pictures a totally naturalist theory with no place for God. Arguments are often on his side; the changed life of someone touched by the Person of God is not.

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