

BOOKS

Academic Verities vs Political Realities In the *Enola Gay* Exhibit Dispute

An Exhibit Denied: Lobbying the History of *Enola Gay*

▶ Martin Harwit
Copernicus (Springer-Verlag),
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Reviewed by J. L. Heilbron

On 30 January 1995, I. Michael Heyman, four months into his tenure as secretary of the Smithsonian Institution, canceled an exhibition titled "The Last Act: The Atomic Bomb and the End of World War II," which had been in planning at the institution's National Air and Space Museum for seven years. Heyman acted under strong pressure from the then-new Republican Congress. The NASM's director, Martin Harwit, resigned three months later.

Congress had been mobilized against the exhibit by the American Legion and the Air Force Association. To the Air Force veterans, the flight of the *Enola Gay* symbolized the service and sacrifices of B-29 crews in bringing the war across the Pacific. To the larger number of veterans scheduled to participate in the invasion of the main islands, the *Enola Gay* signaled not death but life, relief from battles that they expected to be as bloody as the fights for Okinawa and Iwo Jima. To Harwit and his staff, the old bomber meant an opportunity to bring dramatically before a large public (the NASM is the most visited of the Smithsonian's museums) the moral, military and political questions raised by historians who have studied the records. In *An Exhibit Denied*, Harwit recounts, with the detail of military history, the battles between the veterans and the NASM over the restoration of the *Enola Gay* and the script for "The Last Act."

When Heyman canceled the exhibition, he said the Smithsonian had "made a basic error in attempting to couple an historical treatment of the use of atomic weapons with the 50th

anniversary commemoration of the end of the war." Harwit condemns this formulation. To him it implies that "a true history of the mission of the *Enola Gay* could not adequately honor the nation's veterans, and that it was more important for America to accept a largely fictitious, comforting story in this commemorative year than to recall a pivotally important twentieth-century event as revealed in trustworthy documents now at hand in the nation's archives."

Many will agree with Harwit that no exhibition commemorating the mission of the *Enola Gay* that omitted the tragic effects of the bombing should be mounted at an institution dedicated by its charter to "the increase and diffusion of knowledge." That does not mean that the revisionists' story would have had a stronger claim to being "true history" than the veterans'. The original script insinuated that, because Japan was defeated militarily and several options for compelling its surrender existed, the use of the atomic bomb was not morally or militarily justified. In an extreme form of this theory, President Truman bombed Hiroshima and Nagasaki to keep the Russians out of Japan and to encourage them to make concessions in Eastern Europe. In any case, he did not enter into the sort of moral calculus presupposed by the revisionist historians: "How can I minimize the total loss of life if one American life equals 100 or 1000 Japanese lives?" Truman's primary purpose was to end a costly war in which American servicemen and women were still dying.

Harwit expected that the exhibition would enable its visitors to draw their own conclusions by displaying the various stories and documents without editorial comment. This was an illusion. The presentation would have skewed the conclusion. In particular, the exhibit's emphasis on the decision to order the flight of the *Enola Gay* would have created the impression that, for Truman and his aides, the atomic bomb presented the same sorts of problems it does for historians.

Heyman's distinction between a commemoration and a historical treatment also is an illusion. However badly a commemoration misrepresents the past, it is a view of history. Political propaganda, electoral campaigns, edu-

cational reforms—most of the important decisions we make—are based on views of history. Professional historians study history but do not own it. When, as in the battle over the *Enola Gay*, history as perceived by former actors differs importantly from history as presented by professional historians and curators, the actors have every right, even a duty, to speak out.

The veterans used tactics not approved for academic warfare. They lobbied politicians to end a head-to-head combat in which they were not trained. But it is not only they who lobbied. Harwit's historians and their advisers also fought for their version of the truth. That is the way in our democracy. Our school history books are battlefields. Parties contend for space for accounts of women, minorities, the military, religions and so on, now advancing, now retreating, as fads in history and pedagogy change and outside lobbies wax and wane.

By the time Heyman canceled the exhibit, Harwit's patient negotiation had produced a revised script that satisfied most of the parties. Thereafter the pressure was merely and meanly partisan. It is a shame that Heyman could not withstand it. The public would have learned much from a presentation of a significant and controversial episode in our history in a form that concerned actors and informed historians had forged together.

Conceptual Developments of 20th Century Field Theories

▶ Tian Yu Cao
Cambridge U. P., New York,
1997. 433 pp. \$59.95 hc
ISBN 0-521-43178-6

Conceptual Developments of 20th Century Field Theories is a work of remarkable scope that integrates physics with the history and philosophy of science without being superficial in any of these diverse disciplines. It surely stands alone as a unique intellectual undertaking. Physicists (including professional theorists as well as students) and historians and philosophers

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of science should all find this a valuable work. The general topic is a unified study of the origins of and the conceptual relations among the research programs of general relativity, quantum field theory and gauge field theory.

As Tian Yu Cao tells us early in this book, his goal is to counter several versions of antirealism that question the ability of scientific knowledge to give us a reliable window into the constituents, ontology and workings of the physical world at a fundamental level. His targets include the social constructivists who claim that the very form and content of science are exclusively determined by sociological factors, those agnostics who emphasize the essential underdetermination of a scientific theory by its empirical base, and those followers of Thomas Kuhn who deny the reality of theoretical entities and any type of progress toward a coherent and possibly unique theoretical ontology.

To this end, the author offers a conceptual history of modern physics featuring the discovery of the ultimate laws and composition of nature. This enterprise is based on a belief in a causal structure of the world, one that is accessible via scientific investigation. It is this commitment that underwrites the search for and the confidence in actually finding a model of causal forces acting among the basic constituents of the physical world—a model that can be taken as a realistic representation of this world. Cao argues that such metaphysical assumptions are necessary if the scientific enterprise is to produce theories with unifying power, and he uses his book to establish that we do, indeed, have access to this metaphysical reality in terms of an integrated picture of the physical world.

As he admits quite candidly at the start, his treatment is highly selective, being dictated by his view of scientific theories. In a sense, then, his undertaking is a bootstrapping one in which commitment to an overarching schema informs the selection of a story line that ultimately supports this encompassing-structure itself. I say this not to imply any vicious circularity of argument but to lay out clearly what Cao's undertaking is about.

After a brief discussion of the rise of classical field theory culminating in Maxwell's formulation of electromagnetism, Cao turns to what he terms the geometrical program for fundamental interactions, the centerpiece here being the general theory of relativity. Although general relativity is often interpreted as a geometrization of gravity, Cao sees this merely as an early phase and takes Einstein's ma-

ture view to be one in which the gravitational field itself takes center stage. It is this conception of general relativity as essentially a field theory that provides a conceptual link with quantum and gauge field theories, so that all of these become part of an overarching field program.

The focus of this study is, of course, quantum and gauge field theories themselves—mainly quantum electrodynamics, the standard model of electroweak interactions and quantum chromodynamics, culminating in an especially perspicacious presentation of the effective field theory program and its relation to the status of renormalization. Here Cao displays a truly impressive understanding of both the history and content of these profound developments. Certainly this extended case study, which occupies the greater part of the book, is likely to become the standard reference on the history and conceptual underpinnings of modern field theory.

The expert on the intricacies of quantum field theory will admire a story well told, the student of this highly technical aspect of modern theoretical physics will appreciate a helpful overview of and insights into the mathematical tools he or she is struggling to master, and the general reader with some scientific background will be enlightened by the understanding it provides of the current conception of nature underwritten by modern physics. Also, the historian and philosopher of science will find here a reliable, authoritative and readable reference to this discipline.

It remains a fact, though, that in spite of Cao's admirable efforts to make the underlying concepts accessible to the general reader, some of parts II and III (on quantum and gauge field theories) will still be pretty heavy going for many. In this regard, a glossary of terms might have been helpful. Finally, even if one grants the author's contention that certain general structural properties survive dramatic theory changes—and this is what provides the basis for his claim of a "structural realism"—one can still ask why this necessarily makes for a reliable ontology. Of course, questions like this will lead to just the type of general discussions that this book is meant to provoke and that should make Cao's study a topic of lively debate in the future. And, even if a reader's predilections do not happen to be this philosophical, that person will still find perusal of this book an informative and rewarding intellectual experience.

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The Very First Light: The True Inside Story of the Scientific Journey Back to the Dawn of the Universe

 John C. Mather
and John Boslough
BasicBooks (HarperCollins),
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ISBN 0-465-01575-1

The Very First Light is the story behind the COBE—Cosmic Background Explorer—satellite mission as told by its chief scientist, John Mather, and science writer John Boslough. The book is clear, briskly paced and fun to read. It follows the evolution of the COBE mission, interspersed with historical asides and clear, nontechnical descriptions of the science. It is a page-turner for those who want to understand how big science is done.

COBE is a milestone in the quest to understand the universe and make cosmology a physical science. The satellite—launched in 1989—made definitive measurements of both the frequency spectrum and the anisotropy of the cosmic microwave background. In the majority of cosmological theories, the CMB is the cooled afterglow of the primordial fireball; the photons detected today have scarcely interacted with anything since last scattering off electrons some 100 000 years after the Big Bang. Encoded in the frequency spectrum is a history of the cosmic energetics. Encoded in the anisotropy are the signatures of the fluctuations in gravitational potential that led to the formation of cosmic structure.

There were three instruments aboard COBE. Mather was the principal investigator for one of these, the Far Infrared Absolute Spectrophotometer. Designing and implementing this instrument was a tour de force by any standards: FIRAS determined that the absolute temperature of the CMB is 2.728 ± 0.004 K (95% confidence limit). In addition, the FIRAS team has identified the anisotropy, at a level of 30 μ K, in the data. This experiment will probably not be duplicated or bettered for decades. George Smoot was the principal investigator of COBE's Differential Microwave Radiometer instrument. Newspaper headlines announced its fantastic discovery of the anisotropy. Though the DMR data are still the best measurement of the anisotropy, the results will soon be improved by ground-based, balloon-borne and satellite missions. Mike Hauser led the team responsible