This contingency is explored most fruitfully through an examination of contemporary histories of relativity written by Einstein and other scientists working on the theory. Staley argues that scientists use narratives of the past to make claims about the present state of their discipline and the meaning of certain theories. Was Einstein's theory an outgrowth of Lorentz's, or something completely novel? Did it emerge from experimental results or from mathematical reasoning? The answers to these questions were not at all clear in the years following Einstein's miracle year, and Staley deftly shows how these disputes were fought out through apparently innocuous historical tales. Einstein's role in the development of relativity, and thus the meaning of the theory itself, stabilized only when a particular historical narrative was widely accepted.

The importance of the past to the future of physics is also an important theme in Staley's close investigation of the famous 1911 Solvay Conference. This meeting is often pointed to as marking the transition from 'classical' to 'modern' physics, but Staley again argues that we must understand what those terms meant to the historical actors themselves. His sensitive reading of the origins of the term 'classical' and its connotations gives us a fresh perceptive on the significance of physicists marking off part of their disciplinary history under that heading. This section of the book is a story about how physicists reinterpreted their past to mean something very particular, and how in some sense historians have been culpable in going along with their narrative. The close ties between understandings of the past and claims about the meaning of physics that Staley uncovers are insightful and useful.

Einstein's Generation succeeds at rethinking the story of relativity's emergence. It carefully unpacks and redisplays the canonical events along the road to Einstein's apotheosis in a valuable way. For that very reason, the book may be difficult for those readers not already familiar with the conventional story. Nevertheless, the case made here for the propagation of relativity as the result of the interests and idiosyncrasies of a community, not just the brilliance of a gifted individual, is very effective. If it takes a village to raise a child, it takes a discipline to raise a theory.

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SILVAN S. SCHWEBER, **Einstein and Oppenheimer: The Meaning of Genius**. London: Harvard University Press, 2008. Pp. xiv + 412. ISBN 978-0-674-02828-9. £19.25 (hardback).
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Do not be misled by this book's for-marketing-purposes subtitle, *The Meaning of Genius*. As Silvan Schweber writes in his preface, labelling anyone a 'genius' makes it impossible to put the work in perspective. He rightly aims to describe his two characters, Albert Einstein and J. Robert Oppenheimer, in context and in interaction with colleagues. Alas, this aim is at best partially achieved. The book is disjointed, as the protagonists, though sharing a common employer for almost a decade at Princeton, in fact had little time for each other. Another problem is the subtle and not-so-subtle bias of the author, who, in keeping with the mid-century physics in which he was trained, overrates Oppenheimer's science. One would never guess from Schweber that Einsteinian realism has made a comeback of late – and that this has consequences for how we tell the history of physics.

At the outset we learn that Schweber intends to examine his two physicists as great men, in Isaiah Berlin's definition of greatness – that is, as makers of an exceptional contribution towards 'satisfying or materially affecting central human interests'. Schweber himself worked as a postdoc in 1949 with a third great physicist, Hans Bethe, and helped establish a strong physics school at Brandeis University (which Einstein had aimed to found as a secular university in Jewish hands, before a profound breakdown in relations with other founders in 1947, examined in the book). In the 1990s, Schweber turned to historical biography of mid-century physicists, writing fine assessments of the pioneers of quantum electrodynamics (1994) and of physicists of the atomic

bomb project (2000). The latter was his first assessment of Oppenheimer, whom he sees as the iconic spokesman of the charismatic collective of physicists who created a new world of perils and hopes, of prospects of Armageddon and bounteous supplies of energy.

Leaving to one side Oppenheimer's undoubted contribution as an organizational leader, most famously at Los Alamos, what is his scientific legacy? His years abroad as a young man produced a useful but hardly groundbreaking contribution to atomic and molecular physics known as the Born–Oppenheimer approximation. His greatest contribution was in general relativity (or so judges Schweber, quoting Freeman Dyson). Certainly two pioneering articles on gravitational collapse of 1939 are considered to provide the mathematical basis of 'black holes'. But his technical solution did not face the fundamental speed-of-light conundrum, and he himself accorded little importance to those studies, leaving others to found and foster schools in relativity and gravitational physics. A pragmatic physicist, he was unconcerned by the multiplicity of field and particle descriptions at small and large scales. Charles Thorpe's description of Oppenheimer as a 'scientific Svengali' in his recent book *Oppenheimer: The Tragic Intellect* (Chicago, 2006; reviewed in *BJHS* (2009), **42**, 127–8) seems apt.

In contrast, Albert Einstein was a passionate seeker after consistency and coherent principles. Though still unsuccessful, his unified field project continues to challenge physicists, while Einsteinian realism (the locality principle) continues to dispute quantum entanglement interpretations. Einstein's model of gravitational collapse (1939) argued that the nothing-faster-than-light principle prevents the formation of black holes, leaving, as noted, a still unresolved contradiction with the 'Oppenheimer–Snyder' unending-collapse model. If Einstein nevertheless still suffers from a bad scientific press, this is partly Oppenheimer's doing. He was noted for David-versus-Goliath assaults on Einstein, first in a sixtieth-birthday radio address in 1939. He was notably absent from the contributors to the seventieth-anniversary Festschrift. His most devastating assault (at least as Oppenheimer viewed it) was the 1965 memorial speech for the tenth anniversary of Einstein's death. Statements on Einstein's work as 'beautiful but full of errors' and his twenty-five years at Princeton as 'a failure' hit the news. Oppenheimer's close associates such as Abraham Pais criticized him for going too far. In the lecture and afterwards, one detects the sourness of a once-promising scientist who had failed to fulfil himself. He was already ill, and died two years later. Yet the speech was influential in turning physicists to dismiss Einstein. Pais's later biographies of Einstein (1982) and Bohr (1991) similarly downgraded Einstein.

After starting at Princeton in 1947, Oppenheimer encouraged scholars to relate their work to social and political events, and in his last phase remade himself as a public intellectual. His 1957 lecture series, dedicated to the American psychologist William James, set out grand views on scientific and cultural progress which prefigure those expressed in his 1965 memorial speech. He argued that quantum complementarity was echoed in oriental philosophy and that it was the key to understanding the post-war world. Schweber sees these ideas as giving scientific and philosophical underpinning to American pragmatism, but does not address Thorpe's contrary view of a 'tragic intellect'.

It is hard not to see Schweber as a partisan historian–physicist, depicting Einstein as a 'loner' rather than as the 'creator and rebel' of the 1972 classic by Banesh Hoffman and Helen Dukas, and bent on boosting the other of his pair. He wrongly describes the Born–Oppenheimer approximation as 'foundational', though not even Oppenheimer thought it so. In a similar vein, he reports uncritically the fanciful applications of quantum complementarity that are used to justify other contradictory combinations. He appears out of touch with modern developments of the Einstein project, in non-quantum optics as well as gravitation, and writes off Einstein's physics post-1930 just as the physics mainstream for decades largely did. Few would agree with him that both men were outstanding as physicists. And what of other criteria for 'greatness'? While Oppenheimer ducked the issue of using the atomic bomb, Einstein joined in challenging it, going

on to help found Pugwash and inspire ideas of world government. Confronting McCarthyism was another difference, though arguably Einstein's high status allowed him to take the stronger, principled stand. As secular Jews, one promoted Jewish intellectualist spirit, while the other dropped Judaism for oriental philosophy. And where Einstein's aphorisms continue to be widely cited, Oppenheimer's contributions as a public intellectual increasingly lack resonance, tied as they are to a past era of American free-world hegemony. The book on Einstein and Oppenheimer for our time remains to be written.

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