

# Henri Poincaré: The Movie

## The Unintended Consequences of Scientific Commemorations

*By Yves Gingras\**

**Philippe Thomine** (Director). *Tout est relatif, Monsieur Poincaré!* Produced by Vidéoscop–Université Nancy 2, Archives Henri Poincaré, UMR 7117, CNRS, 2005.

We have become accustomed to the outbreak of “memory wars” at commemorations of major political events that are perceived as foundations of a national identity (the American Civil War, the French Revolution, etc.). One of the side effects of such commemorations is often to reactivate old debates that had been forgotten or lay dormant. While this is obvious for political commemorations, it is no less true of scientific commemorations; not surprisingly, the UNESCO International Year of Physics in 2005, celebrating Einstein’s *annus mirabilis* of 1905, has revived the specter of Henri Poincaré’s contribution to the “theory of relativity.”<sup>1</sup>

Although specialist journals in history and philosophy of science discussed the question at length following the publication in 1953 of the second volume of E. T. Whittaker’s *A History of the Theories of Aether and Electricity*—in which the British mathematician strongly argued against Einstein’s “paternity” of relativity, which he christened the “Poincaré-Lorentz theory”—the debate did not really hit the newspapers and register with the general public until 2005, when it was suggested that Einstein had in fact “plagiarized” Poincaré.<sup>2</sup> This extreme formulation states the case in its crudest form; I will show, how-

\* Département d’Histoire, Université du Québec à Montréal, C.P. 8888, Suc. Centre-Ville, Montréal, Québec H3T 1M9, Canada.

<sup>1</sup> For papers on commemoration in science see Pnina G. Abir-Am and Clark A. Elliott, eds., *Commemorative Practices in Science: Historical Perspectives on the Politics of Collective Memory*, *Osiris*, N.S., 1999, 14; and Abir-Am, ed., *La mise en mémoire de la science: Pour une ethnographie historique des rites commémoratifs* (Paris: Éditions des Archives Contemporaines, 1998).

<sup>2</sup> E. T. Whittaker, *A History of the Theories of Aether and Electricity*, Vol. 2: *The Modern Theories, 1900–1926* (London: Nelson, 1953). His famous chapter was titled “The Relativity Theory of Poincaré and Lorentz.” See also, e.g., Max Born, rev. of Whittaker, *A History of the Theories of Aether and Electricity*, Vol. 2, *British Journal for the Philosophy of Science*, 1954, 5:261–263; Born, *Physics in My Generation* (New York: Springer, 1969), p. 106; H. M. Schwartz, “A Note on Poincaré’s Contribution to Relativity,” *American Journal of Physics*, 1965, 33:170; and G. H. Keswani, “Origins and Concept of Relativity,” Parts 1 and 2, *Brit. J. Phil. Sci.*, 1965, 15:286–306, 1965, 16:19–32. For a detailed analysis of this period see Yves Gingras, “The Collective Construction of Scientific Memory: The Einstein-Poincaré Connection and Its Discontents, 1905–2005,” *History of Science*, forthcoming.

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ever, that the same thesis is implicit in a more subtle way in a documentary on Poincaré that was also produced in the context of the International Year of Physics, just a year after the 150th anniversary of his birth. We should first note that the roots of this French debate are to be found in another celebration: the 200th anniversary, in 1994, of the *École Polytechnique*, of which Poincaré is a celebrated *Ancien*. After critically analyzing the documentary, I will reflect briefly on the social function of “precursors” in collective memory.

#### L’X ATTACKS: *POLYTECHNICIENS* AND THE PUBLIC IMAGE OF POINCARÉ

In April 1994 the house journal of the fraternity of *Polytechniciens*, *La Jaune et la Rouge*, published a paper by Jules Leveugle, a member of that close-knit group of the *Anciens élèves de l’X*, as the Polytechnique is usually called. In this twenty-page text Leveugle claimed that the theory of relativity—including the famous equation  $E = mc^2$ —had been completely developed in Poincaré’s publications, all of which appeared prior to Einstein’s 1905 papers. For professional historians of physics, there was nothing new in this article, apart from the peculiar interpretation, the strongly nationalist tone, and the insinuations of plagiarism. Denouncing the fact that French historians of science “have ignored the originality and anteriority of Poincaré in the genesis of relativity theory,” Leveugle concluded with a call to arms: “*Agissons*,” he exclaimed in boldface type, “let’s do something so that teachers, textbooks, and media note the originality and anteriority of Poincaré’s ideas, of his contribution to the elaboration of the famous formula  $E = mc^2$ , of the scientific, pedagogic, and moral value of the enduring dialogue between Poincaré and Lorentz, which led to the discovery of relativity theory.”<sup>3</sup> He proposed renaming the principle of relativity the “Poincaré principle,” thus recalling another famous former X, Sadi Carnot, from whom the “Carnot principle” in thermodynamics derives its name. Leveugle also suggested naming the “mythic” equation relating inertia to energy the “Poincaré-Planck equation.” Despite the fact that neither the word “plagiarism” nor any of its cognates appeared in Leveugle’s essay, the idea is implied and the paper has in fact been read as suggesting as much.<sup>4</sup>

In Leveugle’s view it was high time—given the 200th anniversary of the *École Polytechnique*—for a movement to correct the injustice done to Poincaré, the illustrious colleague who discovered relativity before Einstein. However, because it circulated mostly among *Polytechniciens*, his essay does not seem to have had any major public impact until ten years later, when Leveugle republished it as a book-length analysis in the more favorable context of the 150th anniversary of Poincaré’s birth (2004) and, especially, the UNESCO International Year of Physics (2005).

Thus Leveugle’s book and a volume on the same topic by Jean Hladik, more baldly titled *Comment le jeune et ambitieux Einstein s’est approprié la relativité restreinte de Poincaré* [How the Young and Ambitious Einstein Appropriated for Himself Poincaré’s Special Theory of Relativity], hit French newsstands with their provocative thesis.<sup>5</sup> Though most re-

<sup>3</sup> Jules Leveugle, “Poincaré et la relativité,” *La Jaune et la Rouge*, Apr. 1994, pp. 31–51, on pp. 49–50. For a defense of Einstein against this “revisionist” literature see Roger Cerf, “Dismissing Renewed Attempts to Deny Einstein the Discovery of Special Relativity,” *Amer. J. Phys.*, 2006, 74:818–824.

<sup>4</sup> The right-wing French organization “Le club de l’Horloge” writes that “in this groundbreaking article, which quotes Whittaker, Leveugle goes further than the latter by demonstrating for the first time not only Poincaré’s precedence but also that Einstein’s paper could not have been the result of independent discovery and was therefore a plagiarism.” See [http://www.clubdelhorloge.fr/einstein-poincare-hilbert\(eng\).htm](http://www.clubdelhorloge.fr/einstein-poincare-hilbert(eng).htm).

<sup>5</sup> Jules Leveugle, *La relativité, Poincaré et Einstein, Planck, Hilbert: Histoire véridique de la théorie de la relativité* (Paris, L’Harmattan, 2004); and Jean Hladik, *Comment le jeune et ambitieux Einstein s’est approprié la relativité restreinte de Poincaré* (Paris: Ellipses, 2004). For a review that analyzed and criticized the “plot

viewers were skeptical and did not want to give too much visibility to books that demonstrated a restrained but clear hatred of Einstein, newspapers and magazines nonetheless covered the “event” with headlines like “Einstein a Plagiarist?” and “Einstein Relativized.” The assertion of “plagiarism” on the part of Einstein was even taken up in the magazine *L'Express* by Claude Allègre, the controversial former minister of national education, research, and technology and a member of the French Académie des Sciences. But most commentators rejected the “revisionist” stance, opting instead for the middle ground typical of continuist history and insisting that Poincaré, Lorentz, and Einstein all contributed to the theory of relativity. Conscious that such strong allegations of plagiarism could backfire, the director of the Henri Poincaré Archives reminded Allègre that any “exaggeration of the role of Poincaré in the elaboration of the theory of relativity can only jeopardize [their] efforts to promote Poincaré on the national and international scenes.” The sanguine ex-minister responded that he noted “with pleasure the new unanimity recognizing the joint merits of Lorentz, Poincaré, and Einstein, which was the essential message of [his] article.”<sup>6</sup>

#### MOVING THE MEMORY OF RELATIVITY

The context provided by the International Year of Physics gave unprecedented visibility to Einstein as the uncontested embodiment of the discipline in the public imagination. In France, however, it also offered the opportunity to promote “Poincaré the physicist,” mainly through the polemic of the “paternity” of relativity. Given the logic of the contemporary media, where only “scandalous” views and really newsworthy events have any public impact, it is probably only because of the extreme nature of Leveugle’s and Hladik’s assertions that Poincaré’s role became known outside the circle of specialists. As I noted in the introduction, such a high-profile commemoration no doubt served to stimulate those who thought that Poincaré had somehow been unjustly forgotten—if not in the specialized literature, then certainly in the public imagination. This feeling was probably most intense in France, where newspapers hotly debated the question.<sup>7</sup>

In addition to popular books, which can reach a large public, a powerful tool for constructing collective memory is provided by documentary films. It is thus significant that in 2005 a 26-minute documentary on Poincaré was produced, with high schools students as the intended audience. Titled *Tout est relatif, Monsieur Poincaré!* [It’s All Relative, Professor Poincaré!], it is available not only in French but in English, German, and Chinese as well—these latter versions are probably intended to promote French culture abroad and to showcase Poincaré as an important incarnation of it.<sup>8</sup>

Biographies of geniuses are usually synchronized with their protagonists’ birthdates.

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theory” developed in the book see Jean Eisenstaedt, “Einstein ou Poincaré?” *Pour la Science*, 2005, pp. 6–7; Leveugle sued Eisenstaedt for defamation over this book review, and the court ruled in favor of Eisenstaedt. See also Jean-Marc Lévy-Leblond, “Albert, Henri et les autres,” *La Recherche*, May 2005, no. 386, p. 65.

<sup>6</sup> The headlines appeared, respectively, in *Le Nouvel Observateur*, 5 Aug. 2004, no. 2074, p. 51; and *Le Monde*, 15 Apr. 2005, p. 8. Claude Allègre’s assertion appeared in *L'Express*, 8 Nov. 2004, no. 2784, p. 102. Gerhard Heinzmann, director of the Henri Poincaré Archives, responded *ibid.*, 6 Dec. 2004, no. 2788, p. 140; Allègre’s rejoinder appeared *ibid.* The term “revisionist” was used by Olivier Darrigol in an interview in *Le Monde*, 8 June 2005, p. 5. For other reactions see *Le Soir*, 9 Oct. 2004; and *L'Express*, 16 Feb. 2004, no. 2746, p. 117.

<sup>7</sup> We should note that many Web sites discuss the “theory” promoted by Jules Leveugle and others concerning Poincaré’s priority. They can be found easily using any search engine. It should also be noted that some of these sites are clearly anti-Semitic in their anti-Einstein platform and use Leveugle’s and Hladik’s books as just “another proof” of the plot against truth about relativity.

<sup>8</sup> The ultimate national icon of France is of course René Descartes. See François Azouvi, *Descartes et la France* (Paris: Fayard, 2002), for a fascinating cultural history of how the philosopher came to stand for France itself.

Though 2004 was in fact an occasion to present a biography celebrating the 150th anniversary of Poincaré's birth, it is intriguing that the film was produced in the context of the 2005 International Year of Physics and that its scenario centered on Einstein, instead of presenting Poincaré's life for its own sake and as an autonomous trajectory. As we will now see, the scenario addresses the priority question in a peculiar rhetorical way.

Following a series of quotations from Poincaré's philosophical books, read (over about a minute and a half) by a masculine voice (representing Poincaré), the title of the film appears and the narrator, a female voice, begins:

Nineteen hundred and five. A man is writing a seventy-page scientific paper on a new mechanics. In many respects, the work resembles a paper that Einstein will publish in a few months, and which will be viewed as the foundation of the special theory of relativity.

You are this man, Professor Poincaré, are you not? Why is it that your name is not also associated with the discovery of relativity? Why is it that you, one of the great scientific geniuses, are known only to experts?

What happened to you, Professor Poincaré? Never mind; we'll let you get on with your work.

This opening scene (which lasts about a minute) fixes the tone: a comparison between Einstein and Poincaré. That frame set, the film then presents a traditional biography that follows Poincaré from his birth in Nancy to his training at the *École Polytechnique* and covers his various scientific researches. His scientific ascension is rapid: he becomes "one of the world's most brilliant mathematicians" and travels across Europe. Though acknowledging his wide recognition as a mathematician, the scenario nonetheless suggests a lack of recognition for his work on "relativity." Unsurprisingly, following the traditional "take" on biographies of scientists, Poincaré is represented as a "solitary seeker, often disorganized," a genius who discovered fundamental results in many fields: mathematics (Fuchsian functions, topology), astronomy (three-body problems), electrodynamics (electromagnetic wave propagation in transmission lines, etc.). His philosophical books on conventionalism are also discussed. This long survey (about 18 minutes) of his various contributions also includes passing references to the social and technological contexts of the times (the Franco-Prussian War, electric light, the Eiffel Tower) and closes with the sentence: "In retrospect, success in turn-of-the-century theoretical physics required not only a grounding in mathematics and physics, but also a bold philosophical outlook."

There follows another series of quotations (read by the masculine voice) on space and time, taken from Poincaré's works, and then the narrator intones:

Well, Professor Poincaré, your scientific and philosophical work seems to form the foundations of the relativity revolution. Not only that, but you show that the Lorentz transformations form a group.

Nonetheless, according to popular history, the relativity revolution would be inspired by someone else, a young man familiar with both your scientific and philosophical work: Albert Einstein. [A photo of the young Einstein then appears.]

You met him once, without really seeing eye to eye. Here you are in Brussels in 1911, engaged with Marie Curie, your back to Einstein.

[Here the well-known photo of the participants at the 1911 Solvay Congress appears.]

After briefly suggesting possible reasons why the two men did not get along (personality clash and the Franco-German rivalry), the female narrator continues:

It is as if you worked out the fundamentals of a relativistic viewpoint, including the philosophical analysis of our concepts of space and time, only to be outdistanced in the final lap by someone half your age.

I suppose it's true, Professor Poincaré: it's all relative; not just in physics, but in the recognition of posterity as well.

You made fundamental contributions to three major theories of twentieth-century physics: special relativity, quantum theory, and chaos theory. Your work changed the face of modern mathematics, and deeply influenced the philosophy of science.

But you haven't found your place in the Pantheon of Scientific Greats like Marie Curie and Albert Einstein. Why is this?

Poincaré does not answer, and the masculine voice speaks again with a last salvo of quotations about pure thought. It concludes—against the background sound of a thunderstorm—“Thought is but a flash in the midst of a long night. Yet this flash is everything.”

I have quoted these long extracts in order to illustrate a striking aspect of the scenario: its interrogatory rhetoric, a series of questions left unanswered. But in rhetoric, the very act of *repeating* or *multiplying* questions without providing answers is meant to suggest an *implicit* answer: it insinuates that something is amiss—here, that Poincaré *should* have been recognized for his work and that, for some unknown reason, *he was not*. The questions also block the possibility that scientists did in fact recognize his contributions in physics but saw something other than “special relativity” in them. It is only in hindsight, now that Einstein has become famous and relativity has been accepted as true, that one can point so readily to Poincaré as a “precursor.” More disturbing is the fact that if one were to bring together sentences that are separated into different sequences in the film's scenario one would get a strong insinuation of plagiarism. Let us see how it works by imagining a lawyer in a court pleading for Poincaré: (1) “In many respects, [Poincaré's] work resembles a paper that Einstein will publish in a few months, and which will be viewed as the foundation of the special theory of relativity”; (2) “Well, Professor Poincaré, your scientific and philosophical work seems to form the foundations of the relativity revolution”; (3) “Nonetheless, according to popular history, the relativity revolution would be inspired by someone else, a young man familiar with both your scientific and philosophical work: Albert Einstein.” The lawyer would then show the jury a photo of the culprit: the young Einstein, a man *familiar* with “*both* [Poincaré's] scientific and philosophical work.” He would not specify exactly which *scientific* work Einstein was familiar with. What is the likely message the jury will gather from this pleading? Already taking the conclusion for granted, the lawyer goes on: Poincaré has not “found [his] place in the Pantheon of Scientific Greats like Marie Curie and Albert Einstein. Why is this?” More subtle than the arguments put forward by Leveugle and Hladik, the film nonetheless implicitly proposes a similar line of reasoning: Poincaré did not get a fair hearing, and justice should be done during this centenary of relativity by recognizing him as one of the founders of that famous theory. Interestingly, by using the metaphor of the “Pantheon of Scientific Greats,” the film echoed the wish expressed by Claude Allègre: that Poincaré should finally enter the real Panthéon, where the ashes of Pierre and Marie Curie were moved in 1995 at the direction of then-president François Mitterand.

As with any film, different viewers of *Tout est relatif, Monsieur Poincaré!* will have different interpretations. Some, critically disarmed by finally seeing one of their scientific heroes in a movie dedicated to the history of science, will focus on the didactic message and applaud the competent presentation to a lay audience of the variety and profundity of Poincaré's contributions to science, particularly in mathematics and celestial mechanics. Others, overcoming the uncomfortable feelings generated by the opening and closing rhetoric of the film, will be glad to observe that the social and technological “contexts”

are presented and will gloss over the fact that these “contexts” are simply juxtaposed to the intellectual narrative, with no effort being made to show how exactly they did or did not have an impact on Poincaré’s thought.<sup>9</sup> To a critical eye, though, the film seems quite traditional, taking no lessons from more than thirty years of research in the social and cultural history of science. Nowhere in this film can one find anything like Peter Galison’s effort to link Poincaré’s cultural context to his philosophical views on conventionalism.<sup>10</sup> Quite the contrary: as I have already noted, Poincaré is presented as a pure mind floating in the world of Platonic numbers, while technology and society pass by as a mere backdrop. It is certainly ironic that, as historians of science have at last learned to go beyond the tradition of presenting Einstein as a lone genius, they are now presented with a story of Poincaré as the lone genius who discovered relativity before Einstein.

It is important to note here that the representatives of the Henri Poincaré Archives who were scientific consultants on this documentary have always insisted that it is absurd to try to diminish Einstein’s fundamental contributions to relativity in order to promote those of Poincaré. But consultants do not always convince film directors, who have their own agendas. Historical complexity is ill-suited for dramatization and for newspapers that thrive on scandals; movies, in order to have any effect, need absolute heroes (winners or losers), not typical (and boring) bourgeois figures. Hence, by its inner cinematographic logic, the film (unwittingly) conveys ambiguities that strongly suggest the interpretation that Poincaré was for unknown reasons deliberately sidelined in favor of Einstein.

In burnishing the image of a genius, the documentary promotes a counternarrative and countermemory to the dominant one centered on Einstein in order to rewrite history and replace what the narrator curiously calls “popular history” with another version in which Poincaré will finally have a place “in the Pantheon of Scientific Greats.”

#### THE SOCIAL FUNCTION OF “PRECURSORS” IN COLLECTIVE MEMORY

Many scientists, philosophers, and historians of science have used the term “precursor” to qualify Poincaré’s role in the genesis of relativity theory. Georges Canguilhem brilliantly argued long ago that the notion of “precursor” is an artifact, “a counterfeit historical object.” It makes sense only by “substituting the logical time of truth relations for the historical time of these relations’ invention,” thus treating “the history of science as though it were a copy of science and its object a copy of the object of science.”<sup>11</sup> While Canguilhem’s epistemological arguments should be sufficient to eliminate the notion of the precursor from the discipline of the history of science, thus effectively blocking useless debates about priority, it is important to realize that the notion does make sense for a scientific community that must construct its own “official history” that accommodates the work of all its members. Precursors serve a social function in the construction of the collective memory of a community by creating links that provide continuity in time and between successive generations of scientists. Being based on a continuist vision of progress, the notion of the precursor is fundamentally ecumenical and minimizes potential

<sup>9</sup> One anonymous reviewer noted that he “had the same feeling when [he] saw [the film], and it made [him] feel uncomfortable.” All my colleagues and students who saw the film with me had the same reaction.

<sup>10</sup> Peter Galison, *Einstein’s Clocks, Poincaré’s Maps* (New York: Norton, 2003). The point here is not to agree or disagree with Galison’s analysis but to give an example of an attempt to take seriously the question of connecting the social and the intellectual, as opposed to simply juxtaposing the two in a text or a film.

<sup>11</sup> François Delaporte, ed., *A Vital Rationalist: Selected Writings from Georges Canguilhem* (New York: Zone, 1994), p. 51.

tensions between the different groups and specialties that form the discipline. It is thus not surprising to see that the term often appears in actors' histories of science.<sup>12</sup> Instead of confronting scientists with each other, it is simpler for the sake of harmonious relations within and between disciplines to construct a global scenario uniting the contributions of everyone in a narrative of continuous progress. More pointedly, Canguilhem's analysis also suggests that most debates about the specific contributions of Einstein and Poincaré are an effect of the confusion of roles, where historians forget their specific method and object, becoming actors in the game of attributing "proper credit" instead of analyzing this practice. From this point of view, popular books and the film reviewed here are weapons in the struggle for the imposition of the legitimate "history" of "relativity theory" and the redistribution of symbolic credit among actors.

As to the probable outcome of that struggle, it is not impossible that future physics textbooks will raise Poincaré to the level of Einstein and—at least in France—relabel what is now known as "relativity theory" the "Einstein-Poincaré theory," or the "Poincaré-Lorentz theory," as Whittaker suggested, or even, in a more ecumenical fashion, the "Lorentz-Poincaré-Einstein theory"—just as textbooks now teach "Boyle's law" or "Boyle-Mariotte's law" and "Snell's law" or "Snell-Descartes's law," according to their national bias. But only time will tell if this recent attempt will succeed in reshaping the collective memory. Whatever the result may be, future historians can then apply their trade to the outcome and explain how it all happened. For, to paraphrase Spinoza, the historian's task should be not to laugh, deplore, or detest, but to understand.

<sup>12</sup> See Loren Graham, Wolf Lepenies, and Peter Weingart, eds., *Functions and Uses of Disciplinary Histories* (Dordrecht: Reidel, 1983), pp. ix–xx.