

Who's a conventionalist? Henri Poincaré's correspondence with physicists

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[Abstract of a talk delivered during the workshop “Mathematics in the physical sciences, 1650–2000,” at the MFO Oberwolfach in December 2005, organized by Niccolò Guicciardini, Tinne Hoff Kjeldsen and David E. Rowe. First published in *Oberwolfach Reports* 2(4), 2005]

Henri Poincaré's engagement with physics was an enduring one, spanning almost the entire length of his scientific career, from his doctoral thesis of 1879 to the end of his life in 1912. This interest in the problems of physics, however, represents a serious challenge for the historian of exact science, for several reasons. First and foremost, there is the hard fact that Poincaré pursued problems of physics in parallel with seemingly-unrelated interests in analysis, topology, geometry, celestial mechanics, electrotechnology, and philosophy of science. Locating the threads tying these disparate disciplines together is only part of the task; attaching them to Poincaré's actual practice of science is another matter altogether. Secondly, the turn of the twentieth century saw the emergence of the sub-discipline of theoretical physics, and a consequential remapping of disciplinary frontiers, a remapping in which Poincaré was an important cartographer, and one whose writings on the interrelations of logic, mathematics, geometry, mechanics, and mathematical and experimental physics exercised a durable influence on scientists throughout the twentieth century.

Historical studies have illustrated Poincaré's innovative approaches to questions of mathematical physics, and his critical, but apparently independent evaluation of leading theories of the day: Maxwellian electrodynamics, kinetic gas theory, Newtonian gravitation, electronic theories of matter, and quantum theory. Likewise, the effectiveness of Poincaré's disciplinary entrepreneurship is better known in part thanks to the opening of the Nobel Archives, which reveal a widespread appreciation of his contributions to physics on the part of the international scientific community.

For its several merits, this historical work has illuminated neither the why nor the how of Poincaré's engagement with physics. These are, of course, topics that Poincaré did not address himself, at least not directly. In his last four years, Poincaré's state of health declined, and he did not find the time to write his memoirs. A good scientific biography has yet to be published, although several lives of Poincaré are in the works. Adding to the difficulty of the biographer's task is the fact that only a small portion of Poincaré's Nachlass has been published. Among the unpublished portion of the Nachlass are two hundred and fifty-seven letters to and from physicists, less than ten percent of which has been exploited to any extent by historians. To obtain an idea of how Poincaré went about doing physics, and why he did so, surely this would be a good place to begin.

What then does Poincaré's correspondence with physicists tell us about his engagement with the problems of physics? One way to approach the question is

by examining the relation between the image of Poincaré's physics drawn from his published works, and that arising from his unpublished correspondence. The image we form is multi-faceted, of course, but let us look briefly at just one facet: the thematic image. Are there themes in Poincaré's published work that are echoed in his correspondence? If so, which ones? What themes find no echo in the correspondence? Inversely, we can if there are themes addressed in the correspondence that are absent in the published œuvre.

First of all, among the problems of physics addressed by Poincaré in print, and which have an epistolary pendant, we find multiple resonance, the Zeeman effect, questions concerning Lorentz's theory of electrons, and the Rowland effect (i.e., the magnetic action of convected charge). Study of the Rowland effect, in particular, generated a significant volume of correspondence in the period 1901-1903 (38 letters), while only two published articles are linked to the topic, one of which is an edition of his letters to the French physicist Alfred Potier. The themes "missing" from Poincaré's correspondence include the foundation of the second Law of Thermodynamics, kinetic theory in general, probability, and quantum theory.

As for the inverse relation, in his correspondence Poincaré takes up, among other topics, what he called "Le Bon" rays, and N rays. The former were also known as "black light", or "lumière noire", in the coinage of their erstwhile producer, friend and editor of Poincaré, Gustave Le Bon. The latter rays were the work of one of France's leading experimental physicists, René Blondlot. The fact that both phenomena were spurious may seem sufficient to explain Poincaré's reticence to publish, but it is not, as demonstrated by his publications on the equally-spurious *absence* of the Rowland effect. Perhaps after close study of these and other cases present in Poincaré's correspondence, historians will be in a better position to understand how and why Poincaré constructed his singular—and phenomenally successful—physical world-view.