IN THE WORKS: *The Lost Report*

There have been many rewarding discoveries of Peirce manuscripts since Max Fisch began the systematized search of public and private archives in the 1950s. The 1968 discovery of Peirce's "Report on Gravity at the Smithsonian, Ann Arbor, Madison, and Cornell" (1889), known today simply as the Lost Report, represents one of the most significant finds to date. Now, nearly 30 years later (and more than a century after its suppression), the Lost Report is being edited for inclusion in Volume 6 of the *Writings*.

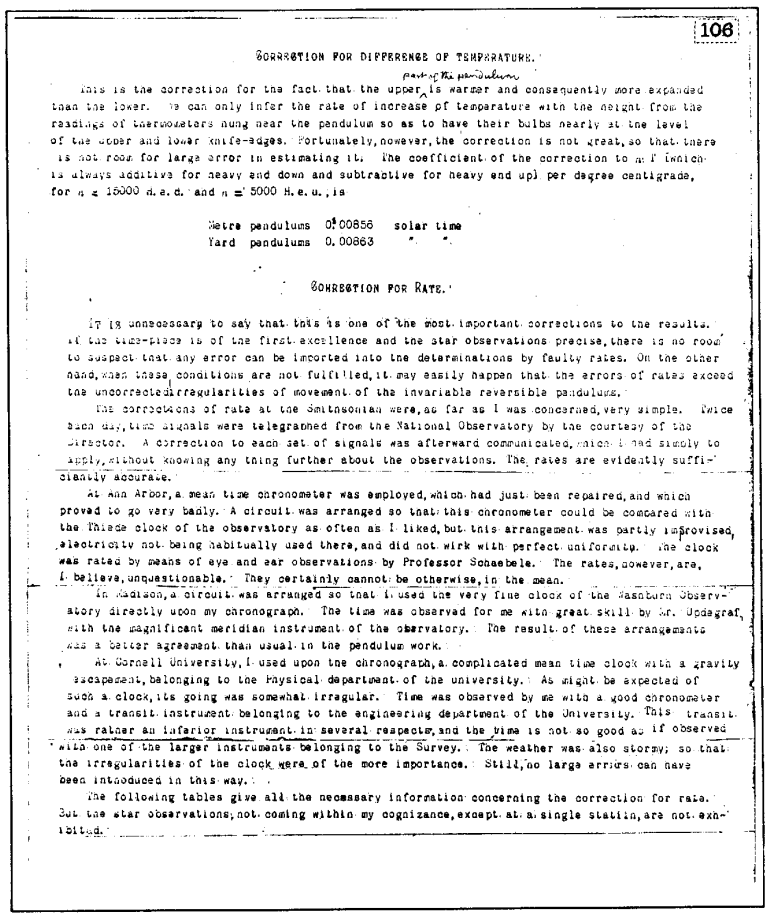
The 140 oversized typescript leaves of the report chronicle Peirce's decade-long attempt to obtain gravity values across North America. His pioneering refinements in the design and use of gravity pendulums—the instrument used to measure gravity since Galileo's time—were essential to the topographic and hydrographic mapping of the continent. Moreover, European geodesists were counting on Peirce to link his field stations with the international effort to establish the true figure of the earth. But Peirce was working without sufficient funding or computational support, and was only able to complete a report for his base station (the Smithsonian) and three field stations approximating an arc along the 43rd parallel.

Thousands of data sheets from these stations (and from stations occupied by Peirce along a vast meridional arc from Montreal to Key West) survive in Peirce's Harvard papers and in the Coast Survey records deposited in the National Archives; these documents, as well as plentiful references to this work in Peirce's official correspondence, led University of California (Berkeley) physicist Victor Lenzen to suspect the existence of the Lost Report and to begin an exhaustive search for it. When investigations resulted in the discovery of the report by Coast Survey archivists, Lenzen became the first twentieth-century scientist to examine the document.[1] Lenzen, best known as a philosopher of science, was not unfamiliar with Peirce's work; as a young graduate student, he had actually moved Peirce's papers from Arisbe to Harvard in 1915. In his analysis of the Lost Report, Lenzen discovered that Peirce presented his procedures and station values for gravity ahead of his data, in much the same way that a modern researcher provides a descriptive abstract as overview to a scientific publication.

As it turned out, Peirce's "results first" approach provided the key to understanding why the Lost Report was suppressed. This form of presentation was not favored in the last century, and Peirce was directed to rewrite the report; he was also ordered to report on his other gravity stations as soon as possible. Peirce was unable or unwilling to comply with either directive. Citing his own misgivings and the negative reports of outside reviewers (Simon Newcomb's proved least informed but most damaging), Survey Superintendent T. C. Mendenhall refused publication and, on the basis of Peirce's lack of publishable production, asked for his resignation from the Survey in 1891. Much of the report data would eventually be used by Peirce's Survey colleagues (without adequate attribution) to prepare more general reports on North American gravity stations; in 1894, Mendenhall would tell a congressional committee that Peirce's gravity determinations were, simply, inadequate.[2]

Peirce accepted his dismissal with uncharacteristic calm—he had known for some years that a break with the Survey was inevitable. He had fought a losing battle against a dwindling budget since 1885, and his refusal to work in Washington stretched his working relationship with successive superintendents to the breaking point. But bureaucracy is rarely the match for genius over the long haul. When Victor Lenzen studied Peirce's final value for gravity as determined in the Lost Report, he found that Peirce's results were as close to computer-age determinations as the best published values presented in Europe or America prior to the twentieth century.[3]

In 1977, the Lost Report was filmed as part of the Complete Published Works microfiche collection (P385, fiche 89–92). Ken Ketner's decision to film this unpublished and unedited text is a fair indication of its continuing importance to Peirce scholars. Today, the Lost Report presents some interesting editing challenges as it is prepared to appear in print for the first time. The document that Peirce turned over to Mendenhall in November 1889 was a 140-page conflation of new and old typescript carbons. It evolved from three earlier forms of the work: reductions of the raw



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CORRECTION FOR DIFFERENCE OF TEMPERATURE.

This is the correction for the fact that the upper part of the pendulum is warmer and consequently more expanded than the lower. We can only infer the rate of increase of temperature with the height from the readings of thermometers hung near the pendulum so as to have their bulbs nearly at the level of the upper and lower knife-edges. Fortunately, however, the correction is not great, so that there is not room for large error in estimating it. The coefficient of the correction to n' (which is always additive for heavy end down and subtractive for heavy end up) per degree centigrade, for n = 15000 d. e. d. and n' = 5000 H. e. u., is

Metre pendulums	0.00856	solar time
Yard pendulums	0.00863	" "

CORRECTION FOR RATE.

It is unnecessary to say that this is one of the most important corrections to the results. If the time-piece is of the first excellence and the star observations precise, there is no room to suspect that any error can be imported into the determinations by faulty rates. On the other hand, when these conditions are not fulfilled, it may easily happen that the errors of rates exceed the uncorrected irregularities of movement of the invariable reversible pendulums.

The corrections of rate at the Smithsonian were, as far as I was concerned, very simple. Twice each day, time signals were telegraphed from the National Observatory by the courtesy of the Director. A correction to each set of signals was afterward communicated, which I had simply to apply, without knowing any thing further about the observations. The rates are evidently sufficiently accurate.

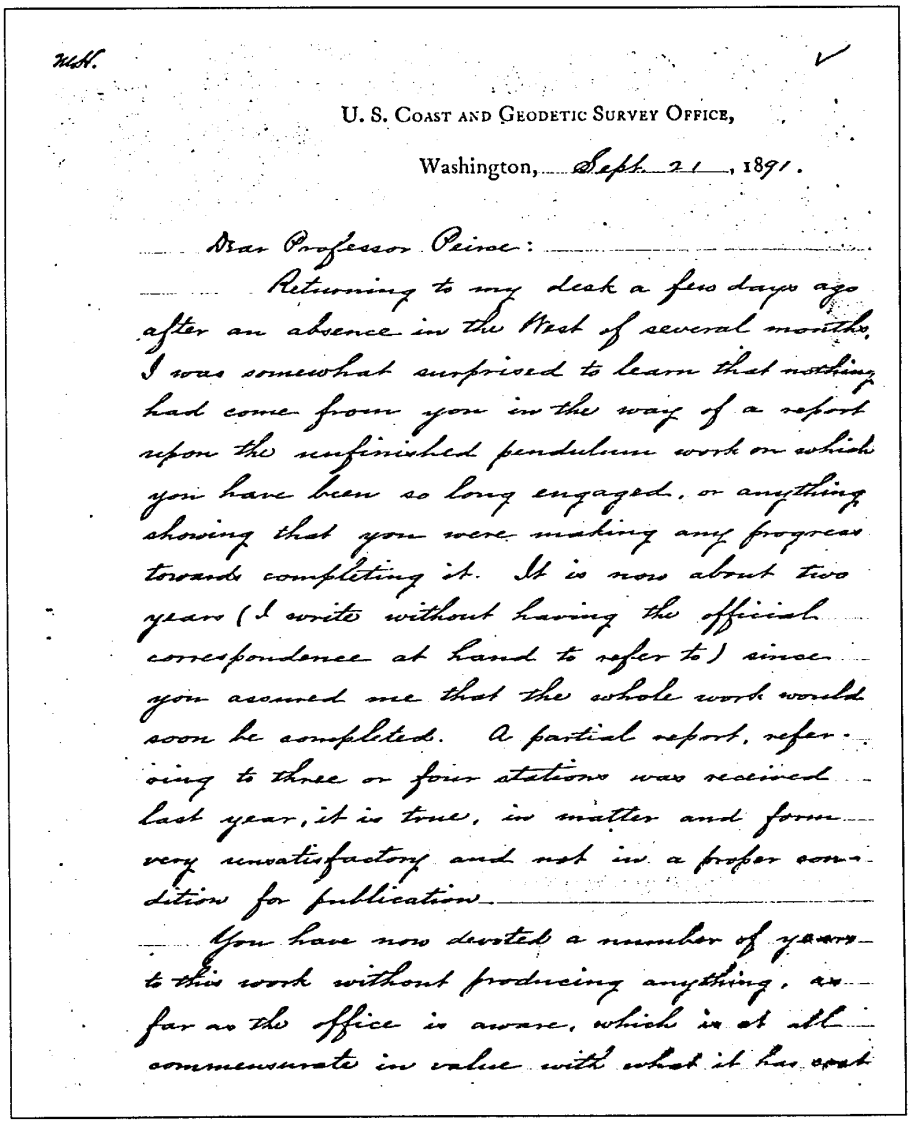
At Ann Arbor, a mean time chronometer was employed, which had just been repaired, and which proved to go very badly. A circuit was arranged so that this chronometer could be compared with the Thiede clock of the observatory as often as I liked, but this arrangement was partly improvised, electricity not being habitually used there, and did not work with perfect uniformity. The clock was rated by means of eye and ear observations by Professor Schaebele. The rates, however, are, I believe, unquestionable. They certainly cannot be otherwise, in the mean.

In Madison, a circuit was arranged so that I used the very fine clock of the Washburn Observatory directly upon my chronograph. The time was observed for me with great skill by Mr. Updegraf, with the magnificent meridian instrument of the observatory. The result of these arrangements was a better agreement than usual in the pendulum work.

At Cornell University, I used upon the chronograph, a complicated mean time clock with a gravity escapement, belonging to the Physical department of the university. As might be expected of such a clock, its going was somewhat irregular. Time was observed by me with a good chronometer and a transit instrument belonging to the engineering department of the University. This transit was rather an inferior instrument in several respects, and the time is not so good as if observed with one of the larger instruments belonging to the Survey. The weather was also stormy; so that the irregularities of the clock were of the more importance. Still, no large errors can have been introduced in this way.

The following tables give all the necessary information concerning the correction for rate. But the star observations, not coming within my cognizance, except at a single station, are not exhibited.

Leaf 106 of the final typescript, assembled by Peirce from four partial leaves of the first typescript, begins the summary of final correction factors for the gravity stations.



MH. ✓

U. S. COAST AND GEODETIC SURVEY OFFICE,

Washington, Sept. 21, 1891.

Dear Professor Peirce:

Returning to my desk a few days ago after an absence in the West of several months, I was somewhat surprised to learn that nothing had come from you in the way of a report upon the unfinished pendulum work on which you have been so long engaged, or anything showing that you were making any progress towards completing it. It is now about two years (I write without having the official correspondence at hand to refer to) since you assured me that the whole work would soon be completed. A partial report, referring to three or four stations was received last year, it is true, in matter and form very unsatisfactory and not in a proper condition for publication.

You have now devoted a number of years to this work without producing anything, as far as the office is aware, which is at all commensurate in value with what it has cost

"You have now devoted a number of years to this work without producing anything." Coast Survey Superintendent T. C. Mendenhall's 21 September 1891 request for Peirce's resignation cited failure to resubmit the 1889 gravity report as grounds for dismissal.