Henri Poincaré's Saint Louis Lecture of 1904: Early Publication and International Dissemination

Hector Giacomini

Institut Denis Poisson. Université d'Orléans — Université de Tours — CNRS.
37200 Tours, France
giacominihector@gmail.com

Abstract

Henri Poincaré's Saint Louis lecture, delivered on 24 September 1904 at the International Congress of Arts and Science, occupies a distinctive place in the prehistory of twentieth-century theoretical physics. In this text, Poincaré formulated the principle of relativity in explicit and general terms, not as a narrow empirical rule limited to electrodynamics, but as one of the major guiding principles of mathematical physics. The lecture also offered a principle-based conception of theory centered on invariance, least action, and general theoretical coherence. Although the conceptual importance of the Saint Louis lecture has long been recognized in the historiography of relativity, far less attention has been devoted to the material conditions under which it entered international circulation. This article examines the editorial, commercial, and institutional pathways through which the lecture was disseminated between late 1904 and early 1905. It reconstructs the three principal early publication channels of the text: its first printed appearance in *La Revue des idées* in November 1904, which inserted it into a commercially organized and interdisciplinary intellectual review; its republication in the *Bulletin des sciences mathématiques* in December 1904, which brought it into a widely distributed specialized mathematical network and later provided the standard reference most often used by historians; and its English translation in *The Monist* in January 1905, which extended its reach into a transatlantic forum devoted to philosophy, science, and the foundations of knowledge. A central part of the article is devoted to *The Monist*, whose intellectual profile is reassessed in detail. Often remembered primarily as a philosophical review, the journal also functioned around 1900 as a transatlantic forum for mathematical physics, geometry, logic, and the philosophical foundations of science. Drawing on library catalogues and accession registers, the article shows that the January 1905 issue of *The Monist*, containing the English translation of Poincaré's lecture, circulated rapidly through a dense network of European research libraries, in some cases reaching institutions within weeks of publication. At the same time, the evidence presented here shows that the later historiographical dominance of the *Bulletin des sciences mathématiques* obscures the lecture's more diverse early circulation, in which *La Revue des idées* also played

a significant role. Through the combined channels of Parisian intellectual publishing, specialized mathematical circulation, and the transatlantic infrastructure of *The Monist*, the Saint Louis lecture entered the reading networks of scientific and learned communities almost immediately after its appearance.

1 Introduction

Henri Poincaré delivered his lecture at the International Congress of Arts and Science in Saint Louis on 24 September 1904. The Congress formed part of the Louisiana Purchase Exposition, the World's Fair organized to commemorate the centennial of the Louisiana Purchase of 1803, through which the United States had acquired vast territories from France and effectively doubled its size. Held in Saint Louis from April to December 1904, the Exposition was one of the largest international exhibitions ever organized, attracting nearly twenty million visitors and bringing together exhibitions from dozens of countries. The fair occupied an enormous site in Forest Park and included extensive industrial, technological, and cultural displays intended to demonstrate the achievements of modern civilization at the dawn of the twentieth century. Alongside these exhibitions, the organizers sought to emphasize the intellectual and scientific accomplishments of contemporary society.

Within this framework, the International Congress of Arts and Science was conceived as the scholarly centerpiece of the Exposition. Organized primarily by the philosopher Hugo Münsterberg of Harvard University, the Congress assembled several hundred leading scholars, principally from Europe and North America. Its ambition was unusually broad. Rather than presenting narrowly specialized research reports, the organizers aimed to produce a synthetic survey of contemporary knowledge across the sciences, humanities, and social sciences. The program was therefore structured as a systematic "map of knowledge," divided into a small number of major disciplinary divisions and more than a hundred specialized sections. Each field was represented by eminent scholars invited to deliver authoritative lectures summarizing the present state and future direction of their discipline.

The Congress thus brought together a remarkable constellation of leading figures in mathematics, physics, chemistry, astronomy, and the philosophy of science. Among the mathematicians invited to present major addresses were Gaston Darboux, C. E. Picard, Paul Appell, and Henri Poincaré from France, together with several prominent representatives of the emerging American mathematical community, including Eliakim Hastings Moore, Maxime Bôcher, Heinrich Maschke, and Edward Kasner.

The physical and chemical sciences were represented by several of the most influential figures of the period, including Ludwig Boltzmann, Wilhelm Ostwald, Albert A. Michelson, Svante Arrhenius, Jacobus H. van 't Hoff, William Ramsay, Ernest Rutherford, Paul

Drude, and Paul Langevin.

As was common in large international meetings of the period, some lectures were delivered in person while others were submitted in written form for publication.

Poincaré delivered his lecture on 24 September 1904. During the same session Ludwig Boltzmann first presented his address, followed by Poincaré's lecture entitled "The Present and Future of Mathematical Physics." The juxtaposition of these two figures, one of the principal architects of statistical mechanics and the other a leading authority in mathematics and physics, illustrates the exceptional intellectual level of the Congress.

More broadly, the Congress assembled an exceptional concentration of scientific authority and was designed as a systematic survey of the structure of knowledge itself. Many of the invited participants were leading architects of the emerging scientific landscape of the early twentieth century. Their contributions did not present new technical discoveries but instead offered synthetic reflections on the foundations, methods, and future development of their disciplines. The Congress functioned as a panoramic intellectual survey of modern science at a moment immediately preceding several major transformations in theoretical physics.

The proceedings were later published in an eight-volume series between 1905 and 1907, which constitutes a large-scale encyclopedic overview of the international state of science around 1904. Poincaré's lecture was included in the first volume of the series, published in December 1905 [19]. Rather than presenting new technical results, the presentation offered a reflective assessment of recent developments in mechanics, thermodynamics, and electrodynamics and examined the conceptual tensions emerging at the foundations of classical physics.

The lecture was subsequently published in several venues. The first printed publication appeared on 15 November 1904 in *La Revue des idées* [16], an influential Parisian intellectual review founded in January 1904 and published until 1913, whose editorial program sought to bring together philosophical, literary, and scientific discussions within a common critical framework. A second printed version was published in December 1904 in the *Bulletin des sciences mathématiques* [15], one of the leading international mathematical journals of the period, widely read across European scientific communities. The text was then translated into English and published in *The Monist* [17] in January 1905. It was later incorporated into the volume *La valeur de la science* [18]. A published advertisement for the book appeared in the July 1905 issue of the *Revue de métaphysique et de morale*, one of the principal French philosophical journals of the period. This suggests that the volume had already appeared by June 1905. The book rapidly became one of the most influential collections of Poincaré's reflections on the philosophy of science.

These successive publications placed Poincaré's reflections within a rapidly expanding international circulation of scientific and intellectual periodicals. The conceptual significance of the Saint Louis lecture has long been recognized in the historiography of

relativity, which has examined its role in the emergence of a principle-based approach to theoretical physics. Much less attention, however, has been devoted to the material conditions under which this formulation entered international scientific circulation.

The present article examines the editorial and institutional conditions that enabled this rapid dissemination. It analyzes in particular the role of *The Monist* as a transatlantic forum for the philosophical foundations of science, and reconstructs the circulation of the January 1905 issue through European research libraries. By situating Poincaré's lecture within this infrastructure of scientific publishing and library networks, the study sheds light on the material pathways through which one of the earliest explicit formulations of the principle of relativity entered international scientific discourse.

1.1 Early Notices in German Mathematical Periodicals

An interesting indication of the early visibility of the St. Louis Congress in the European scientific community is provided by contemporary German periodicals. A particularly significant example is found in the *Jahresbericht der Deutschen Mathematiker-Vereinigung*, the principal journal of the German Mathematical Society and a major organ of professional mathematical communication in the German-speaking world. In the issue of June 1904 (p. 389), the journal published a notice announcing the forthcoming *International Congress of Arts and Science* to be held in St. Louis in September of that year. The notice explicitly mentioned several of the principal lecturers associated with the mathematical sections of the congress, including Henri Poincaré, Ludwig Boltzmann, Émile Picard, Gaston Darboux, Edward Kasner, and Heinrich Maschke. The presence of these names in a German mathematical journal several months before the congress itself demonstrates that the event was already known and recognized within the European mathematical community.

2 The Scientific Content of the Saint Louis Lecture

Poincaré's Saint Louis lecture of 24 September 1904 was conceived as a synthetic and reflective assessment of the state of mathematical physics rather than as a technical research contribution. The lecture offered a broad diagnosis of what Poincaré described as a possible "crisis" in the foundations of physics, touching upon mechanics, thermodynamics, electrodynamics, and the theory of electrons.

A central theme of the lecture was the status of fundamental principles in theoretical physics. Poincaré explicitly enumerated what he regarded as the guiding principles of contemporary theory: the conservation of energy (principle of Mayer), the principle of Carnot (degradation of energy), the equality of action and reaction (principle of Newton), the conservation of mass (principle of Lavoisier), the principle of least action, and, cru-

cially, the principle of relativity. These principles were presented not as consequences of detailed mechanical hypotheses, but as general constraints capable of guiding theoretical construction even when the microscopic mechanisms of nature remained uncertain.

Poincaré contrasted an earlier phase of physics grounded in atomistic models based on central forces with a more recent "physics of principles," in which emphasis shifts from mechanical construction to structural invariance. Principles originally abstracted from experience acquire methodological primacy: they delimit admissible theoretical constructions and provide coherence across otherwise distinct physical domains.

The Principle of Relativity

In explicit and programmatic terms, Poincaré formulated the principle of relativity as follows: the laws of physical phenomena must be the same for an observer at rest and for an observer carried along in uniform translational motion. Consequently, no experiment should allow one to determine whether one is in such uniform motion or not. In the lecture this formulation appears within the canonical list of fundamental principles and is treated on the same conceptual level as energy conservation and the principle of least action.

The relativity principle is not introduced merely as an empirical summary of ether-drift experiments. Rather, Poincaré presents it as a structural requirement increasingly supported by the persistent failure of attempts to detect motion relative to the ether. He discusses in particular the negative results of Michelson-type experiments and emphasizes the remarkable stability of electromagnetic theory under uniform motion. The continued empirical confirmation of null results is interpreted as evidence that the invariance of physical laws under uniform translation may reflect a deep structural property of nature.

Some commentators have pointed out that Poincaré's formulation refers explicitly to observers, whereas later formulations of the relativity principle speak directly of the invariance of the laws of nature. Taken in isolation, the reference to observers might appear to leave open the possibility that the laws themselves possess a simpler form in a privileged frame while appearing differently to moving observers. Yet the broader context of the lecture substantially weakens such a reading. Throughout the discussion Poincaré repeatedly insists that the *laws of phenomena* themselves must be identical for all observers in uniform motion and that the repeated failure of ether-drift experiments suggests that this invariance is not accidental but reflects a general property of nature. The emphasis therefore falls not on perceptual relativity but on the structural invariance of the equations governing physical processes. In this respect, Poincaré's principle of relativity appears as the explicit crystallization of themes already articulated in his writings [11, 12, 13], and made accessible to German-speaking readers through the 1904 translation of *La science et l'hypothèse* [14]. Poincaré further analyzes the theoretical

devices introduced to preserve this invariance. He discusses Lorentz's notion of "local time", obtained by synchronizing clocks through light signals under the assumption of equal light speeds in opposite directions, and notes that observers in uniform motion would naturally adopt such a synchronization without ever detecting any measurable effect that could reveal their uniform motion. He also refers to the hypothesis of length contraction in the direction of motion and to the modifications of dynamical quantities required to maintain agreement with experiment. These elements appear in the lecture as components of an increasingly elaborate theoretical effort to safeguard the relativity principle.

Importantly, Poincaré suggests that the situation may ultimately require a new mechanics in which no velocity could exceed that of light and in which inertia would increase with speed. Such remarks indicate that the principle of relativity is not treated as a peripheral correction within classical mechanics, but as a constraint capable of reshaping its conceptual structure.

Lorentz's 1904 Theory

An important component of the lecture is Poincaré's discussion of Hendrik Antoon Lorentz's recent work. In May 1904 Lorentz had published a major paper [6]. In that work Lorentz presented a refined mathematical formulation of the transformations required to preserve the form of Maxwell's equations in a moving frame.

Poincaré's lecture demonstrates that by September 1904 he was fully aware of the structure and implications of Lorentz's construction. He describes the introduction of local time, the contraction hypothesis—according to which bodies moving through the ether undergo a physical contraction in the direction of motion—and the modification of forces and masses required to reconcile theory with experiment. In Lorentz's framework, this contraction was introduced as an ad hoc dynamical effect intended to account for the null results of ether-drift experiments, most notably the Michelson–Morley experiment. He notes that the growing complexity of these hypotheses reflects the seriousness of the challenge posed by the relativity principle and by the experimental results of Michelson and others.

Although Lorentz maintained the ether as a privileged frame and introduced the transformed time t', which he called "local time" and associated with the readings of electromagnetic clocks in the moving system, Poincaré's interpretation shifts the emphasis. The preservation of the form of Maxwell's equations under transformation is presented not merely as a technical success, but as evidence of an underlying invariance deserving elevation to principled status.

From Technical Devices to Structural Invariance

While recognizing the mathematical ingenuity of Lorentz's theory, Poincaré places the interpretative focus on invariance itself. The invariance of electromagnetic laws under uniform translation is portrayed as a structural feature that theoretical physics must respect. Rather than grounding theory in mechanical models of the ether, he advocates an approach guided by general principles whose empirical resilience suggests deep structural validity.

In this framework the transformations are not merely compensatory devices designed to preserve an ether theory; they signal the possibility that classical mechanics itself may require modification. Poincaré explicitly contemplates a future mechanics characterized by velocity-dependent inertia and by the impossibility of exceeding the speed of light. The lecture thus articulates a conception of physics centered on symmetry, invariance, and coherence between domains, rather than on detailed mechanical modeling.

The rapid publication of this lecture in several venues between November 1904 and January 1905 therefore ensured that these reflections entered the international scientific discussion almost immediately.

3 Historiographical Assessments

A substantial body of scholarship has recognized the importance of Poincaré's Saint Louis lecture, although the precise status attributed to the text has varied from one author to another. At a minimum, historians and philosophers of physics generally agree that the lecture marks a moment of unusual explicitness in Poincaré's treatment of the relativity principle and that it occupies a significant place in the sequence linking late nineteenth-century electrodynamics to the conceptual reconfigurations of the early twentieth century.

Several authors have emphasized the principled character of Poincaré's formulation. Michel Paty [8, 9, 10] stressed that Poincaré did not merely invoke the principle of relativity by name but assigned to it a universal scope and a methodological role in the organization of theoretical physics. In Paty's interpretation, mathematical physics is structured around a limited set of general principles—including the equality of action and reaction, the conservation of mass and energy, the second law of thermodynamics, the principle of least action, and the principle of relativity—which function as guiding constraints in the construction of physical theories. Within this framework, the relativity principle appears not as a hypothesis restricted to electrodynamics but as a foundational requirement governing the mathematical representation of physical laws. Raffaella Toncelli [20] likewise interprets Poincaré's relativity through the architectonic function of general principles, while Roberto Torretti [21] also emphasized the programmatic character of Poincaré's formulation. Elie Zahar [23] reproduced passages from the Saint Louis

lecture in his discussion of the transition from Lorentzian electrodynamics to later theoretical developments.

A second line of interpretation has treated the Saint Louis lecture as a major document for understanding the conceptual state of physics immediately before 1905. In an early study, I. Yu. Kobzarev [5] read the text as a particularly revealing synthesis of the tensions affecting theoretical physics at that moment, including the interpretation of Maxwell's equations, the status of the ether, the statistical interpretation of thermodynamics, and the emerging formulation of the relativity principle. In this perspective, the lecture appears as a concentrated expression of Poincaré's diagnosis of a broader "crisis of principles" within classical physics. Giuliano Giannetto [3] developed this line of analysis in greater detail, interpreting the lecture not merely as a survey of contemporary difficulties, but as a carefully organized diagnosis of the crisis of classical mechanics and of the need for a new theoretical framework.

Olivier Darrigol [1, 2] has likewise situated the Saint Louis lecture within Poincaré's broader analysis of the crisis of fundamental principles in early twentieth-century physics. In his reading, the lecture integrates the most recent developments of Lorentz's 1904 electron theory into a systematic diagnosis of the difficulties affecting the major principles of physics. Carnot's principle appears threatened by the statistical interpretation of irreversibility and by Brownian motion; the principle of reaction is challenged by radiation pressure and electromagnetic momentum; and the principle of relativity itself seems endangered within a theory still based on a stationary ether. At the same time, Darrigol emphasizes that the lecture contains one of Poincaré's clearest early formulations of the relativity principle, defined as the requirement that the laws of physical phenomena be the same for an observer at rest and for an observer carried along in uniform translational motion.

Other historians have focused on more specific conceptual aspects of the lecture. Scott Walter [22] has drawn attention to Poincaré's discussion of clock synchronization and to his analysis of a possible empirical challenge to Lorentz's theory arising from hypothetical signals propagating faster than light. Such signals, Poincaré observed, could in principle reveal discrepancies in the synchronization of clocks adjusted by light signals and thereby disclose the common motion of the clocks, contradicting the relativity principle. Arthur I. Miller [7] likewise noted that in the Saint Louis lecture Poincaré presented Lorentz's theorem of corresponding states as an expression of the relativity principle, emphasizing that the laws of physical phenomena must have the same form for observers in uniform translational motion.

A comparable recognition of the lecture's importance appears in the work of Stanley Goldberg [4]. Goldberg describes Poincaré's address at the Saint Louis Exposition as an intervention in which the principle of relativity was formulated in explicit and general terms. Quoting the lecture, he emphasizes Poincaré's statement that the laws of phys-

ical phenomena must be the same for an observer at rest and for an observer carried along in uniform translational motion. His analysis thus confirms that the Saint Louis lecture has been regarded as an important formulation of the principle of relativity in the years immediately preceding the major theoretical transformations of the early twentieth century.

This historiographical recognition makes the question of circulation all the more significant. If the lecture indeed represented a major moment in the explicit formulation of the relativity principle, then its publication between late 1904 and early 1905 disseminated not a peripheral technical remark but a text situated at the highest level of contemporary theoretical reflection. What has received far less attention, by contrast, is the material dimension of that dissemination: the channels through which this formulation entered the international scientific reading network in the months immediately following the Saint Louis Congress.

Its rapid publication in several venues between late 1904 and early 1905 ensured that these reflections on the relativity principle and on the general form of physical laws entered the international scientific reading network almost immediately.

4 The First Printed Publication: *La Revue des idées* (15 November 1904)

The first printed appearance of Poincaré's Saint Louis lecture occurred not in a specialized scientific journal but in the Parisian intellectual review *La Revue des idées*, in the issue dated 15 November 1904. Founded earlier that same year, the journal was a monthly periodical appearing on the fifteenth of each month and addressed to a cultivated readership interested in philosophy, science, and literature.

Unlike scientific journals issued by learned societies, *La Revue des idées* operated within a commercial publishing framework. A contemporary bibliographical notice in the *Revue de linguistique et de philologie comparée* announced the inaugural issue in explicit terms: "Le n° 1 de la *Revue des Idées* (1 fr. 50, chez tous les libraires) vient de paraître." This statement provides direct evidence that, from the outset, the review was marketed through the general retail book trade in France and was available for individual purchase beyond subscription alone. The same notice is revealing in another respect: it prominently highlighted the scientific contents of the first issue, showing that science formed part of the journal's public identity from the moment of its launch.

Its intellectual profile was explicitly interdisciplinary. Tables of contents from 1904 show the coexistence of contributions in philosophy, mathematics, physics, biology, history, and literary studies, often written by university professors or members of major French scholarly institutions. Within this editorial environment, Poincaré's article

“L’État actuel et l’avenir de la physique mathématique” appeared as part of a broader intellectual discussion rather than as a technical communication restricted to a specialist audience. The publication therefore inserted the principle of relativity into the commercially organized culture of intellectual periodicals characteristic of the Belle Époque.

Evidence from surviving library holdings shows that the review also entered numerous academic collections across Europe and North America. Complete or substantial runs are preserved, for example, at the Bibliothèque de Genève, Bibliothèque universitaire de Genève and the Bibliothèque cantonale et universitaire de Fribourg in Switzerland; the University of Vienna; the Staatsbibliothek zu Berlin; the Universitätsbibliothek Erlangen–Nürnberg; the Koninklijke Bibliotheek in The Hague; the Royal Danish Library in Copenhagen; the Biblioteca Nazionale Centrale di Roma; the British Library in London; the Royal Library of Belgium in Brussels; and several major North American research libraries, including Princeton University, Yale University, Harvard University, the University of Chicago, Stanford University, the University of Illinois Urbana–Champaign, and the Library of Congress.

Evidence of active circulation also appears in contemporary periodical monitoring. The inaugural issue of *La Revue des idées* (15 January 1904) was described in detail in the Brussels weekly *L’Art moderne* of 14 February 1904, less than one month after publication. Further evidence is provided by the Romanian cultural journal *Viața Romînească*, which between 1906 and 1912 repeatedly published analytical recensions of *La Revue des idées* in its survey section “Revista revistelor.” These structured summaries of individual French articles show that the review was not merely present in library collections but was actively monitored in Eastern European intellectual circles within a relatively short time of publication. A complementary indication comes from the Roman review *Nuova Antologia*, whose bibliographical section registers individual deliveries of dated issues of *La Revue des idées*. A similar pattern appears in Spain: the Madrid review *Cultura Española* cited a specific issue—“*Revue des idées*, 15 Mayo 1906”—in a scholarly notice published in August 1906, and subsequent issues integrated the journal into standardized bibliographical references. Further evidence appears in the London weekly *The Athenaeum* of 13 January 1906, which referred to *La Revue des idées* as the original place of publication of a scholarly work and described it as an “enterprising publication.” Because this reference occurs in a substantive archaeological review rather than in a mere bibliographical list, it suggests that the French journal had already become recognizable within British intellectual circles less than two years after its founding.

The available archival documentation indicates that the university and research-library holdings mentioned above were not necessarily acquired at the moment of publication. Several institutional collections were assembled retrospectively through the international book trade. Archival records identify major commercial intermediaries such as the Brussels bookseller Falk, the Viennese firm Carl Gerold & Co., the Turin-based bookseller

Ermanno Loescher, Hubert Welter in Paris, and the New York importer G. E. Stechert & Company as suppliers of European periodicals to research libraries. These firms operated simultaneously as commission agents, subscription managers, and retail bookshops integrated into transnational distribution networks. Their documented role confirms the commercial availability of *La Revue des idées* within international book-trade channels. This publication therefore circulated not only through subscriptions but also through retail sale in French bookshops; the separate rate for the international postal union suggests that comparable retail sale abroad was also likely, even if the surviving documentation does not yet allow this to be demonstrated directly.

4.1 *L'Enseignement mathématique*, Ernst Mach, and an Early Reference to *La Revue des Idées*

Founded in 1899 and edited from Geneva and Paris, *L'Enseignement mathématique*, still published today, was not simply a pedagogical journal. It also functioned as a transnational forum in which broader questions concerning the foundations, meaning, and development of mathematics and mathematical physics could be discussed before an international readership. Its prestige is reflected in the presence, among its contributors during the first decade of the twentieth century, of figures such as Henri Poincaré, Paul Appell, Paul Painlevé, Gaston Darboux, Emile Borel, Felix Klein, Guido Castelnuovo and Adolf Hurwitz.

A curious but historiographically revealing episode appears in this context. In vol. 6 (1904), pp. 425–439, the journal published "Définition physique de la force," a communication presented at the Second International Congress of Philosophy in Geneva in September 1904 by Louis Hartmann, of Paris. In vol. 7 (January 1905), p. 41, the journal first printed a brief letter from Ernst Mach, who found Hartmann's ideas natural and interesting from the standpoint of the historical development of mechanics. The editors then added a remark from an anonymous reader suggesting that Hartmann's communication be compared with Henri Poincaré's Saint Louis lecture on the present state and future of mathematical physics.

The editors did not merely relay this comparison: they immediately supplied the bibliographical information themselves, noting that Poincaré's lecture had been reproduced in *La Revue des Idées* of 15 November 1904. The chronology is striking. Barely a month and a half after the publication of that issue of *La Revue des Idées*, an explicit reference to it was already appearing in *L'Enseignement mathématique*. This editorial gesture shows that Poincaré's lecture had very rapidly become visible enough to be invoked in an ongoing discussion on force, motion, and the principles of mathematical physics.

5 The Monist (1890–1905): Philosophy, Science, and a Transatlantic Forum for the Foundations of Knowledge

Founded in 1890 by Paul Carus, *The Monist* was published continuously by the Open Court Publishing Company until 1936, when the journal ceased appearing. After a twenty-six–year interruption, it resumed publication in 1962 and has appeared without interruption ever since, continuing to the present day under the auspices of the Hegeler Institute and Oxford University Press.

The journal is often retrospectively described as a philosophical periodical devoted to metaphysics, religion, and the unity of knowledge. A systematic examination of its contents between 1890 and 1905, however, reveals a broader intellectual profile. Alongside philosophical discussions, *The Monist* regularly published contributions on mathematical physics, geometry, logic, and probability theory, as well as reflections on the conceptual foundations of the exact sciences. In this respect, it also served as a transatlantic forum in which scientific and philosophical discussions of the foundations of knowledge could intersect.

From its earliest volumes, *The Monist* featured substantial contributions by leading mathematicians and physicists, alongside essays situated at the interface between scientific practice and epistemological reflection. Its pages document debates central to the intellectual environment of the fin de siècle: non-Euclidean geometry, axiomatics, atomism, energetics, the nature of physical space, the concept of infinity, and the relation between experiment and mathematical formalism.

5.1 Major European Figures

Before 1905, *The Monist* published substantial contributions by several major European figures in mathematics, physics, and epistemology.

Henri Poincaré

Two major essays by Poincaré appeared in the journal before 1905:

- H. Poincaré, “On the Foundations of Geometry,” 1898.
- H. Poincaré, “Relations between Experimental and Mathematical Physics,” 1902.

These essays offer systematic analyses of the logical structure of geometry and of the relation between theory and experiment.

Ernst Mach

Between 1891 and 1903, Mach used *The Monist* as a recurrent outlet for his scientifically grounded epistemology. His contributions addressed psycho-physics, energetics, experimental practice, and the analysis of space and geometry. Among the most notable are:

- E. Mach, "Some Questions of Psycho-Physics," 1891.
- E. Mach, "On the Principle of the Conservation of Energy," 1895.
- E. Mach, "On the Part Played by Accident in Invention and Discovery," 1896.
- E. Mach, "On the Stereoscopic Applications of Röntgen's Rays," 1896.
- E. Mach, "On the Sensation of Orientation," 1897.
- E. Mach, "On Physiological, As Distinguished from Geometrical Space," 1901.
- E. Mach, "On the Psychology and Natural Development of Geometry," 1902.
- E. Mach, "Space and Geometry from the Point of View of Physical Inquiry," 1903.

These contributions show that *The Monist* provided a sustained platform for Mach's empirically oriented reflections on the conceptual foundations of science. Before 1905, *The Monist* already formed part of the Mach's own published network of references. In the 1903 edition of his book *The Analysis of Sensations and the Relation of the Physical to the Psychical*, Mach explicitly referred readers both to his own articles in *The Monist* and to at least one related contribution by another author, the american mathematician Arnold Emch. *The Monist* therefore appears as a recognized extension of Mach's own intellectual project.

More broadly, the journal also participated in the circulation of a closely related philosophical milieu. Before 1905, *The Monist* published several contributions explicitly devoted to John Stuart Mill, and it also included a review of Charles Douglas's *The Ethics of John Stuart Mill* (1897) in its Book Reviews section, as well as documentary material such as a book review in *The Monist* of Lucien Lévy-Bruhl's *Lettres inédites de John Stuart Mill à Auguste Comte* (1899). *The Monist* thus contributed not only to the dissemination of Mach's ideas, but also to the continuing discussion of Mill's philosophical legacy.

Ludwig Boltzmann

Two important methodological essays by Boltzmann appeared in 1901:

- L. Boltzmann, "The Recent Development of Methods in Theoretical Physics," 1901.

- L. Boltzmann, "On the Necessity of Atomic Theories in Physics," 1901.

Both engage directly with contemporary debates on atomism and theoretical method, confirming that *The Monist* welcomed substantial interventions in ongoing discussions in theoretical physics.

C. S. Peirce

Although not a European author, C. S. Peirce must be included among the major intellectual presences of *The Monist* before 1905. He was one of the journal's most remarkable and versatile contributors, publishing on logic, mathematics, cosmology, scientific method, evolution, and the role of chance in nature. His famous series of essays beginning with "The Architecture of Theories" (Vol. 1, 1891), followed by "The Doctrine of Necessity Examined" (Vol. 2, 1892), and culminating in "Evolutionary Love" (Vol. 3, 1893), gave sustained expression to an original philosophical vision in which scientific inquiry, indeterminism, and evolutionary development were closely linked. Peirce's defense of real chance and his opposition to strict necessitarianism placed him close, on important points, to Boltzmann's broader anti-dogmatic orientation.

Göttingen's Mathematical Program

The journal also gave clear visibility to the mathematical program associated with Göttingen:

- F. Klein, "The Present State of Mathematics," 1893.
- O. Veblen, "Hilbert's Foundations of Geometry," 1903.
- D. Hilbert, "On the Foundations of Logic and Arithmetic," 1905.

Veblen's article deserves particular attention. Written while he was still a very young mathematician, it is one of the earliest English-language discussions of Hilbert's axiomatic reformulation of geometry. Veblen himself would soon become a leading figure in twentieth-century American mathematics, notably through his work on geometry, topology, and the development of the Princeton mathematical school.

5.2 Sustained Mathematical Density

Beyond these well-known figures, the journal maintained a steady stream of mathematically oriented contributions on geometry, logic, and the foundations of arithmetic.

Among them were articles by George Bruce Halsted on non-Euclidean geometry, Joseph Delboeuf on the dimensionality of physical space, Gino Loria on the historical

development of geometry, and Paul Carus on the philosophical foundations of mathematical reasoning. Other contributions addressed problems in arithmetic and logic, including essays by Hermann Schubert on number, mathematical knowledge, and classical geometric problems, as well as George Abram Miller's discussion of the concept of infinity in the context of Cantorian set theory.

These essays were not technical research papers in the later specialized sense. Even when written by major mathematicians, physicists, or logicians, they were often predominantly conceptual, qualitative, and synthetic in character. They dealt with the foundations, meaning, methods, and philosophical interpretation of scientific knowledge in a form that remained broadly accessible to cultivated non-specialists.

The same volume that carried Hilbert's foundational essay and Poincaré's reflections also included contributions on geometry, combinatorics, and mathematical education by W. S. Andrews, A. L. Baker, and Paul Carus. The coexistence in the same volume of contributions by Hilbert, Poincaré, Peirce, and a range of mathematical authors illustrates how the journal functioned as a transatlantic forum in which foundational reflection, scientific method, and mathematically informed but generally non-technical discussion circulated within a shared intellectual space.

5.3 Book Reviews and the Monitoring of Scientific Literature

Another striking feature of *The Monist* during its first fifteen years is the substantial space devoted in each issue to reviews of recently published books. These review sections, often spanning many pages, formed a regular component of the journal and provided detailed discussions of new works in mathematics, physics, chemistry, logic, and the philosophy of science. In this way, they served as an important mechanism through which the journal monitored and interpreted developments in contemporary scientific literature.

Between 1890 and 1905, the books discussed in these sections included works by some of the most influential European scientists of the period. Among the authors reviewed are J. H. van 't Hoff, Wilhelm Ostwald, Ernst Mach, Hermann von Helmholtz, Ludwig Boltzmann, Pierre Duhem, and A. H. Bucherer in physics and physical chemistry, as well as mathematicians and historians of mathematics such as Felix Klein, Richard Dedekind, Otto Hölder, Jacques Hadamard, Jules Tannery, Moritz Cantor, and Florian Cajori. The review section also engaged with works in logic, methodology, and the philosophy of science by authors such as Louis Couturat, A. De Morgan, Edmund Husserl, and Karl Pearson.

By presenting and discussing recent books in these areas, the journal offered its readership a systematic overview of developments across the exact sciences and their philosophical interpretation. The review sections of *The Monist* functioned as a kind of intellectual observatory, tracking the evolution of contemporary scientific thought and making Eu-

ropean scholarly production visible to an international readership. The scientific profile of *The Monist* was inseparable from its institutional positioning. Published in Chicago but distributed through established European agents—most explicitly in London through Kegan Paul, Trench, Trübner & Co., Ltd.—the journal functioned as a structured relay between continental scientific debates and the American academic environment.

6 Institutional Circulation of *The Monist*, Vol. 15, No. 1 (1905)

Evidence from library catalogues, accession registers and institutional stamps shows that the January 1905 issue of *The Monist*, which contained the English translation of Poincaré's Saint Louis lecture, circulated rapidly within European academic institutions. The surviving record reveals a broad and structured transatlantic distribution linking the United States to major European research libraries.

Institutional holdings of volume 15 are documented across a wide geographical area. In Switzerland, the *Universitätsbibliothek Bern* preserves a continuous run of the journal from its earliest years. In Germany, copies of the 1905 volume are preserved at the Bayerische Staatsbibliothek in Munich, the Staatsbibliothek zu Berlin, the Universitätsbibliothek Leipzig, the Universitätsbibliothek Erlangen–Nürnberg, the SUB Zentralbibliothek Göttingen and Strasbourg, then part of the German Empire. In France, the same volume is held by the Bibliothèque nationale de France and the Bibliothèque interuniversitaire de la Sorbonne. Additional holdings are found at the Biblioteca Nazionale Centrale di Roma, the University of Cambridge, the University of Oxford, and the Library of the Université catholique de Louvain.

The Scandinavian evidence is particularly important. At Uppsala University Library, the fascicle corresponding to the January 1905 issue was formally registered on 3 February 1905, showing that it reached Sweden within only a few weeks of publication. At the National Library of Finland in Helsinki, the issues for 1905 were subsequently bound together in a single volume bearing a 1906 binding stamp, a pattern strongly suggesting regular subscription and progressive receipt of the fascicles during the year. Surviving holdings in Stockholm, Göteborg, and Lund indicate that *The Monist* was part of the regular serial intake of these research libraries. In Denmark, The Monist was also held in Copenhagen, whose collections include the January 1905 issue.

According to archival information provided by the Staatsbibliothek zu Berlin, no. 1 of volume 15 was delivered to the Königliche Bibliothek Berlin on 24 February 1905 by the Harrassowitz book trade in Leipzig. The same source further records regular deliveries for the remaining fascicles of the year: no. 2 on 9 May 1905, no. 3 on 19 July 1905, and no. 4 on 28 October 1905. These dates show that the Berlin holding formed part

of an ongoing and orderly current subscription supplied through an established German intermediary. At the University Library of Göttingen the January 1905 issue of *The Monist* was registered on 10 February 1905.

Further archival evidence from other institutions reinforces this picture of contemporary circulation. At the Bibliothèque interuniversitaire de la Sorbonne, historical periodical registers show that the journal was being received by subscription in 1905. Although these records do not provide precise arrival dates for each fascicle, they establish that the January 1905 number entered the library through the ordinary flow of current serial deliveries rather than through later retrospective acquisition. The Bodleian Library at Oxford preserves a continuous run of *The Monist*, and examination of the fascicles for volume 15 shows that the issues were received and processed at Oxford in the very month of their publication. The Oxford material thus demonstrates a pattern of immediate contemporary receipt.

The long Scandinavian series once held by the Karolinska Institutet Library in Stockholm, with its uninterrupted run from the earliest years of the journal to 1932, likewise points to sustained receipt over several decades.
Although the present study focuses on Europe, *The Monist*, vol. 15, no. 1, had already entered the Library of Congress / Smithsonian circuit by 16 January 1905, as shown by the stamp on the issue itself, that is, just two weeks after publication.

The evidence from Uppsala, Berlin, Göttingen, the Sorbonne, Oxford, and the broader European holdings demonstrates that the January 1905 issue of *The Monist* circulated within a dense network of university and national research libraries extending across Central and Western Europe, Scandinavia, and the British Isles. In most documented cases, the issue appears to have reached these European libraries within a few weeks of publication, indicating not only wide geographical distribution but also a rapid rhythm of transatlantic circulation. Information concerning the reception dates of this issue was obtained through direct email correspondence with library staff who verified stamps, accession data, or other material evidence in the relevant collections.

6.1 Retail Availability of *The Monist* in London and Paris

Evidence from contemporary printed notices shows that *The Monist* was not confined to academic exchange networks, but was commercially offered to the public in major European book markets. In London, the January 1905 issue itself prints both a London commercial relay and a British retail price: “London: Kegan Paul, Trench, Trübner & Company, Limited” and “In England and U. P. U., half a crown; Yearly, 9s. 6d.” This indicates that the fascicle was explicitly prepared for sale on the British market, not merely circulated institutionally.

Paris offers an equally important case. A contemporary French notice for *The Monist*

states: “Bureau à Paris chez Brentano, 17 avenue de l’Opéra. Abonnement annuel : 12 francs. Prix d’un exemplaire, 3 francs.” This provides direct evidence of a Parisian commercial point of sale, with subscription and single-issue prices in francs. These notices show that around 1905 *The Monist* was commercially accessible in London and Paris. Retail availability in other major European book centres was probably possible as well, given the journal’s international distribution structure, but it is not directly attested by the documents presently available.

7 The *Bulletin des sciences mathématiques* as a Specialized Channel of Circulation

Still active today, the *Bulletin des sciences mathématiques* was already, by the beginning of the twentieth century, a long-established and internationally recognized mathematical journal. At that time, mathematicians of high standing from several countries published in its pages, confirming its place within the professional landscape of advanced mathematical research.

The publication of Poincaré’s Saint Louis lecture in this journal in December 1904 opened a third channel of circulation. Founded in 1870 under the title *Bulletin des sciences mathématiques et astronomiques*, the journal was conceived not merely as a venue for original papers but also as an instrument of mathematical information and bibliographical monitoring. It played an important role in the circulation of mathematical knowledge and in informing readers about developments beyond France.

From 1885 onward, the journal continued under the shortened title *Bulletin des sciences mathématiques*. By the beginning of the twentieth century, it was already a well-established professional review, very different in profile from a general intellectual monthly. The appearance of Poincaré’s lecture in this periodical therefore meant that the Saint Louis text entered a specialized mathematical network structured by research libraries, learned societies, and professional subscriptions. It was also through this publication that the lecture was most often cited in later historiography: the *Bulletin des sciences mathématiques* version became the standard reference.

Library catalogues show that runs including the December 1904 issue were preserved in a substantial number of European academic libraries. In Switzerland, holdings include ETH Zurich, the Bibliothèque de Genève, the University Library of Neuchâtel, the Université de Genève, and the Université de Fribourg. In Denmark, the *Bulletin des sciences mathématiques* is preserved both at AU Ny Munkegade in Aarhus, whose holdings cover from 1887 to 2008, and at KU Matematik in Copenhagen, where the journal is held from 1877 to 1997.

The same issue is likewise traceable in major libraries of the German- and English-

speaking academic worlds. In the German-speaking sphere, runs including 1904 are documented at Heidelberg, Nuremberg, the Bayerische Staatsbibliothek in Munich, the Technische Universität München, Berlin, Göttingen, and Strasbourg, then part of the German Empire. In the United Kingdom, holdings including 1904 appear in the catalogues of Oxford, Cambridge, the British Library, and University College London. In Italy, catalogue searches likewise indicate holdings for 1904 at Bologna and at the Biblioteca del Dipartimento di Matematica "G. Castelnuovo" of Sapienza University in Rome.

The ETH Zürich evidence is particularly valuable because information of this kind is rarely preserved or recoverable. The library was able to determine with certainty that the January 1904 issue entered its collections on 12 March 1904. This shows not only that the ETH copy belongs to an original historical run, but also that the *Bulletin des sciences mathématiques* was reaching a major Swiss academic library on a timescale of roughly two months.

Comparable evidence is available in Britain for the December 1904 fascicle containing Poincaré's lecture. The Cambridge copy bears an acquisition stamp dated 24 January 1905, while the Bodleian Library copy at Oxford bears a stamp dated 13 January 1905. These two institutional traces show that the issue had reached two of the major British university libraries within only a few weeks of publication.

These geographically dispersed holdings show that the *Bulletin des sciences mathématiques* belonged to a dense and specialized European infrastructure of mathematical communication. The December 1904 publication of Poincaré's lecture thus entered a professional transnational circuit extending, naturally, from the major university libraries of France to Switzerland, Germany, Britain, and Italy.

8 Conclusion

The Saint Louis lecture of September 1904 occupies a distinctive position in the early history of twentieth-century theoretical physics. Historians have long recognized the conceptual importance of this text as one of the first explicit formulations of the principle of relativity as a general methodological constraint on physical law. What has received much less attention, however, is the material context through which this formulation entered the international circulation of scientific ideas.

The present study has examined the editorial and institutional pathways through which Poincaré's lecture was disseminated in the months following the Saint Louis congress. The text first appeared in print in November 1904 in *La Revue des idées*, an interdisciplinary Parisian intellectual review operating within the commercial networks of the Belle Époque press. It was then published in December 1904 in the *Bulletin des sciences mathématiques*, where it entered a more specialized mathematical and scientific environment. Finally, the English translation published in the January 1905 issue of *The Monist*

inserted the lecture into a well-established transatlantic infrastructure of circulation.

The evidence assembled here shows that these three publications opened distinct and complementary channels of dissemination. *La Revue des idées* brought the lecture into a broader French intellectual sphere; the *Bulletin des sciences mathématiques* integrated it into professional mathematical networks; and *The Monist* ensured a particularly rapid and geographically extensive international circulation.

Evidence drawn from library catalogues, accession registers and provenance marks demonstrates that the January 1905 issue of *The Monist* circulated rapidly through a wide network of European research libraries, including major institutions in Switzerland, Germany, France, Scandinavia, Italy, and the United Kingdom. In several documented cases—most clearly at Uppsala, Berlin, Göttingen and Oxford—the issue reached libraries within weeks of publication. The available evidence for the *Bulletin des sciences mathématiques* also points in the same direction, showing that Poincaré's lecture entered established academic collections on a short timescale.

These findings modify the usual bibliographical picture of the Saint Louis lecture. Later historiography largely treated the *Bulletin des sciences mathématiques* version as the canonical reference, while giving little attention to the parallel publication in *La Revue des idées* and especially to the English version in *The Monist*. The result has been a narrower image of the lecture's circulation than the historical record supports.

Poincaré's programmatic formulation of the relativity principle did not remain confined to congress proceedings or to a limited philosophical readership. Between November 1904 and the first months of 1905, it entered several different reading networks at once: commercial, intellectual, mathematical, and institutional. The Saint Louis lecture was therefore not only an important text in retrospect. It was also a text that circulated early, widely, and through multiple channels in the contemporary scientific world.

Acknowledgments

The author wishes to express his sincere gratitude to the librarians and archivists who provided information on the dates of arrival or institutional reception of issues of *La Revue des idées*, *The Monist*, and the *Bulletin des sciences mathématiques* in their respective institutions. Their generous assistance made possible an important part of the documentary reconstruction presented in this article.

References

[1] Darrigol, Olivier. "Poincaré's Light." *Séminaire Poincaré* **XVI** (2012): 1–43.

[2] Darrigol, Olivier. *Relativity Principles and Theories from Galileo to Einstein*. Oxford: Oxford University Press, 2022.

[3] Giannetto, Enrico. "The Rise of Special Relativity: Henri Poincaré's Works before Einstein." In *Atti del XVIII Congresso di Storia della Fisica e dell'Astronomia*. Bologna: Italian Physical Society, 1998.

[4] Goldberg, Stanley. *Understanding Relativity: Origin and Impact of a Scientific Revolution*. Boston: Birkhäuser, 1984.

[5] Kobzarev, I. Yu. "Henri Poincaré's St. Louis Lecture, and Theoretical Physics on the Eve of the Theory of Relativity." *Uspekhi Fizicheskikh Nauk* **113**, no. 4 (1974): 679–694. English translation: *Sov. Phys. Usp.* **17** (1975): 679–694.

[6] Lorentz, Hendrik Antoon. "Electromagnetic Phenomena in a System Moving with Any Velocity Smaller than that of Light." *Proceedings of the Royal Netherlands Academy of Arts and Sciences* **6** (1904): 809–831.

[7] Miller, Arthur I. *Albert Einstein's Special Theory of Relativity: Emergence and Early Interpretation*. Springer / Birkhäuser, 1998.

[8] Paty, Michel. "Physical Geometry and Special Relativity: Einstein and Poincaré." In L. Boi, D. Flament, and J.-M. Salanski (eds.), *1830–1930: A Century of Geometry. Epistemology, History and Mathematics*, pp. 126–149. Berlin: Springer-Verlag, 1992.

[9] Paty, Michel. "Poincaré et le principe de relativité." In J.-L. Greffe, G. Heinzmann, and K. Lorenz (eds.), *Henri Poincaré: Science et philosophie*, pp. 143–202. Berlin and Paris: Akademie Verlag and Albert Blanchard, 1996.

[10] Paty, Michel. "La place des principes dans la physique mathématique au sens de Poincaré." *Philosophia Scientiae* **3**, no. 2 (1998–1999): 61–74.

[11] Poincaré, Henri. "La théorie de Lorentz et le phénomène de Zeeman." *Éclairage électrique* **19** (1899): 5–15.

[12] Poincaré, Henri. "La théorie de Lorentz et le principe de réaction." In *Recueil des travaux offerts par les auteurs à H. A. Lorentz à l'occasion du 25ème anniversaire de son doctorat le 11 décembre 1900*, published in *Archives néerlandaises des sciences exactes et naturelles*, ser. 2, **5** (1900): 252–278.

[13] Poincaré, Henri. *La science et l'hypothèse*. Paris: Ernest Flammarion, 1902.

[14] Poincaré, Henri. *Wissenschaft und Hypothese*. Autorisierte deutsche Ausgabe mit erläuternden Anmerkungen von F. und L. Lindemann. Leipzig: B. G. Teubner, 1904.

[15] Poincaré, Henri. "L'état actuel et l'avenir de la physique mathématique." *Bulletin des sciences mathématiques* **28** (1904): 302–324.

[16] Poincaré, Henri. "L'État actuel et l'avenir de la physique mathématique." *La Revue des idées: études de critique générale*, no. 11 (15 November 1904): 801–814.

[17] Poincaré, Henri. "The Principles of Mathematical Physics." *The Monist* **15** (1905): 1–24.

[18] Poincaré, Henri. *La Valeur de la science*. Paris: Ernest Flammarion, 1905.

[19] Poincaré, Henri. "The Principles of Mathematical Physics." In *Congress of Arts and Science: Universal Exposition, St. Louis, 1904*, vol. 1, *Philosophy and Mathematics*, 604–622. Boston and New York: Houghton Mifflin, 1905.

[20] Toncelli, Raffaella. *Le rôle des principes dans la construction des théories relativistes de Poincaré et Einstein*. Paris: Connaissances et savoirs, 2013.

[21] Torretti, Roberto. *Relativity and Geometry*. Oxford: Pergamon Press, 1983.

[22] Walter, Scott. "Poincaré on Clocks in Motion." *Studies in History and Philosophy of Modern Physics* **48** (2014): 131–141.

[23] Zahar, Elie. *Einstein's Revolution: A Study in Heuristic*. La Salle, IL: Open Court, 1989.