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Henri Poincaré:
The Love for Truth and the Relations Between Ethics and Science

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Abstract:
In the years 1903-1910, Poincaré developed thoughts about the relationship between ethics and science. This essay gives a historical or genetic framework for these thoughts and analyzes their content. Around 1895, Ferdinand Brunetière claimed that science was bankrupt, and Marcelin Berthelot responded in the name of science. Poincaré came to affirm an ideal of science that shows its moral value, centered on the disinterested cult of truth, independence of spirit, criticism and vigilance towards prejudices, a skepticism that prevents presenting as science what is only half-science. At the same time, Poincaré, who attributed the driving force of moral actions to feelings, insisted on the impossibility/disadvantage of reducing morality to science. Attentive to the antinomies that arise in the confrontation and interaction of human things, he showed himself attentive to the contemporary debates associated with the emergence of Durkheimian sociology and the possibility of a "science des mœurs".

Keywords: Bankruptcy of science; Berthelot; Ethics and science; Love of truth; Poincaré

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Introduction

At the turn of the century, Henri Poincaré was publicly known as one of France's most distinguished scientists (Darboux 1913, VIII, 26). Poincaré had gradually become involved in French intellectual and public life. After the death of chemist Marcelin Berthelot in 1907, Poincaré was commonly perceived as the greatest living French *savant*. He was elected to the Académie Française in 1908. Unlike Berthelot (who was a senator and minister), Poincaré never assumed political responsibilities; but his personal, family (he was Raymond Poincaré's first cousin), and institutional connections made him an important intellectual voice of the Third Republic. He considerably contributed to France's cultural *rayonnement* in the world.

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Under the French democratic regime, science played a key role in the ideological debate that pitted Catholic conservatives against secular republicans. The latter supported free thought and advocated the separation of church and state, enacted as a law in 1905. The Dreyfus Affair (1894-1906) was another fractious issue and a decisive moment in the affirmation of intellectuals in the public defense of democracy. Several scientists took Dreyfus's side, including Paul Painlevé, Paul Appel, and other distinguished mathematicians. Their friend Poincaré made a decisive contribution to restoring the truth by showing the falsity of the probabilistic reasoning used by the prosecution in the conviction of Captain Alfred Dreyfus.[2]

The remarkable, immediate, and lasting success of Poincaré's books aimed at a broad educated audience (*Science and Hypothesis* in 1902, *The Value of Science* in 1905, *Science and Method* in 1908, and the posthumous *Last Thoughts* in 1913) may be explained not only by their philosophical relevance but also by their ethical significance. As early as 1899, the philosopher and believer Édouard Le Roy used Poincaré's conventionalism to support Bergson's intuitionism and anti-intellectualism, as well as the fideist position in the science-religion debate, i.e. the thesis of a non-incompatibility between religion and science (Cerejeira 1930, 17-18).

When the American translation of *Science and Hypothesis* appeared, the philosopher Josiah Royce, a former student of Hermann Lotze and a notable moral philosopher, authored the preface. He related Poincaré's "unverifiable hypotheses" – which Royce considers to be "large theoretical constructions" made by those "special workers […] who have been driven to the freedom of philosophy by the oppression of experience" (In Poincaré 1913, 14) –, with Kantian regulative principles (Poincaré 1913, 16), noting that Poincaré's epistemology corresponds in some way to an *assouplissement*, to a less a priori and dogmatic, and more plastic perspective of the structure of knowledge that Kant formulated. There is a deliberative element in the exercise of this freedom – conventions are the result of a convenient and not arbitrary deliberation – and Royce uses a political analogy to illustrate this: "The organization of science, so far as this organization is due to hypotheses of the kind in question, thus resembles that of a constitutional government – neither absolutely necessary, nor yet determined apart from the will of the subjects, nor yet accidental – free, yet not a capricious establishment of good order, in conformity with empirical needs" (In Poincaré 1913, 17).

Royce here points to conditions for the proper functioning of collective reason and intersubjective consensus, a relevant ethical aspect. Royce also notes that Poincaré's reflections on the logic of science, formulated within the framework of physics, are of the greatest interest to the sciences of the organic world and the historical-social sciences, which have more obvious links with ethical questioning.

In what follows, we will focus on those texts by Poincaré in which he explicitly deals with the relationship between ethics and science. We will begin by recalling the debate on the bankruptcy of science triggered by Ferdinand Brunetière, highlighting Berthelot's philosophical position on science and ethics. We will move on to Poincaré's texts, where, alongside a high ideal of science and the affirmation of the impossibility of reducing ethics to science, we will find subtle considerations regarding the antinomies that arise in human interactions, and a correlative attention to the emergence of Durkheimian sociology and to the possibility of a *science des mœurs* (science of morals).

[2] Dreyfus, of Jewish origin, was accused of espionage on behalf of Germany, on the basis of evidence established 'scientifically' by official experts, after which the case was reviewed and Dreyfus was finally found innocent (on the Dreyfus Affair and the Dreyfusard scientists, cf. Duclert 1999, 71, 74-75, 82).

The Bankruptcy of Science and Berthelot's Position

A reverence for science characterizes the Third Republic: there is a belief in the superiority of scientific methods over the world of mysteries, revealed truths, and dogmas. Science is believed to be the way forward for humanity, both materially and morally; the moral value of science is affirmed by many secular thinkers (such as Ernest Renan) against traditionalist Catholicism, which was in favor of restoring the monarchy. In the country of Descartes and Pascal, several of the defenders of the value of science – such as Berthelot or Poincaré – do not affirm a triumph of scientific universality over subjectivity, nor do they advocate the confluence of science and technology, which is partly understandable given the contemporary criticism of the living conditions of workers subjected to machinery (Michelet, Hugo, etc.).

The historian and literary critic Ferdinand Brunetière (1849-1906), after meeting Pope Leo XIII in Rome, published an account of this visit in January 1895 in the *Revue des Deux-Mondes*, an article that sparked a harsh polemic. Brunetière argues that science is not capable of providing the foundations of ethics, a function he believes is properly entrusted to the Church, and speaks of "faillites de la science", an expression that he would later replace by "La banqueroute de la science" and which became a *leitmotif* in some circles.[3]

Several scientists responded to Brunetière, among whom the most influential politically was Marcelin Berthelot. He elaborated his position in the text "La science et la morale", published in the *Revue de Paris* in February 1895, and expanded in book form in 1897. As Minister of Public Instruction (1886-1887), he insisted on the separation between state and religion: public education should not be religious, so teachers should be secular. Berthelot's scientism has several peculiarities. One is that he is clearly Kantian, and close to the labor philosophy of the neo-Kantian criticist Charles Renouvier (Darlu 1904): the future society is one based on the dignity of the human personality and will be the time of "equality and fraternity of all before the holy law of labor". For Berthelot it is "only science that possesses the moral force to found" this future time, because the scientific law cultivated by the savants, has far-reaching consequences: "[The scientific law] metamorphoses humanity by improving the material condition of individuals […] and by developing their intelligence; by destroying the transitory economic organizations that oppress them […] and finally and above all by imprinting on all consciences the moral conviction of universal solidarity, founded on the feeling of our true interests and on the imperative duty of justice" (Berthelot 1897, xi, xiii, cf. Paul 1968, 312).[4]

Berthelot is at the antipodes of the social Darwinism of the German biologist and monist thinker Ernst Haeckel (Gautier 1880, 5-6, 8). For Berthelot, if knowledge "is acquired by a single method, the observation of facts", it springs from "two distinct sources, one internal, the other external"; while sensations perceive the external world, the internal world is that of conscience, spirit and feeling, our subjective world; it is from the depths of conscience that the distinction between good and evil and the idea and feeling of duty come, in other words "the categorical imperative of which Kant speaks" (Berthelot 1897, 22-24). In the same vein, the philosopher Alfred Fouillée, known for his notion of *idée-force* and for his conciliatory method, valuing philosophy that aims (Hegelianly) at the whole, the integration of the acquisitions of the sciences and specialized knowledge: "Will science have the moral

[3] The contours of the controversy are well described in Paul 1968; The more general European context of discrediting the value of science in Belle Époque Europe, where questions linked to the meaning of human life stand out, is analyzed in Rasmussen 1996.
[4] At the end of 1895, Berthelot joined the cabinet led by Léon Bourgeois, author of "Solidarité", as the Minister for Foreign Affairs.

hegemony of humanity? Purely objective science, no; science that is both objective and subjective, with the indispensable crowning touch of philosophy, yes" (Fouillée 1896a, 15).[5]

Later in his text, Berthelot says – in the line of Alfred Espinas, the author of *Des Sociétés Animales* (1877) and Peter Kropotkin – that among sociable species there is the feeling of family and the individual's dedication to the community; that there is continuity between the behavior of these species and that of human races that have remained savages and that social instincts can be perfected by heredity (Berthelot 1897, 25-26). In the development of civilizations, these social instincts, which are translated into duties and which have a scientific character since they have proven to be useful to the community, were disturbed by the "arbitrary prescriptions of theocracy", whose unscientific justification invoked the power of the gods (Berthelot 1897, 26). This harmful disturbance resulted from the confusion of the two orders, the objective and the subjective, since the moral order imposed by the theocracy results from objectification, by attributing what is immanent in conscience to a divinity outside it (Berthelot 1897, 27); a corollary of this is the affirmation of the inferiority of Christian charity to the ideal of human solidarity (Berthelot 1897, 28). In the dynamics of societies, there is an intimate connection between the evolution of ethics and the sciences that concern the comprehension of humans:

> [The conception of modern morality] is more or less elevated, depending on the intelligence of the individual; its practice is more or less delicate, according to the variously developed feelings of peoples and individuals. But, in the final analysis, it responds today, as it always has, to the state of knowledge, that is to say of science unequally advanced according to time, place and person. [...] It is gradually being modified by the ongoing discoveries of the physiological, psychological and sociological sciences. (Berthelot 1897, 30)

But in both science and ethics, the positive, concrete and current aspect must be distinguished from the ideal aspect: "Just as there exists alongside positive science an ideal science [...] so there exists alongside it an ideal morality, which announces and precedes the evolution of future morality" (Berthelot 1897, 30), for example Socratic ethics.

Berthelot's position is clear to the following extent: he asserts and secularizes a subjective order of conscience. This order postulates the categorical imperative, with a distinction between what is *de facto* in the external world, and what is *de jure* in the free deliberation of a mind assuming ideals of humanity and solidarity. But his scientific foundation of morality, which is repeatedly affirmed, is articulated in a philosophically confused way, as noted for example by the Bishop of Chartres François Lagrange (Paul 1968, 314) or by the philosopher Alfred Fouillée.[6] At any rate, Berthelot was acclaimed as a defender of republican values, secularism and the value of science, and a large banquet was organized in his honor on April 4, 1895. Among the 859 attendees, there were many notables from French political, cultural and scientific life including Auguste Rodin, Émile Zola, Georges Clemenceau, Camille Flammarion, Raymond Poincaré – and Henri Poincaré who would later take up the issue in his own way, subscribing to some of Berthelot's theses but insisting on the separation between ethics and science.[7]

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[5] On the specificity of philosophy, cf. Poincaré 1910b, 28, 38.

[6] Referring to the debate on the bankruptcy of science, Fouillée wrote: "Science, for its trouble, was defended by scientists. One of the most illustrious recalled that we owe him the telegraph, the railways, "coloring matters!" M. Berthelot adds that he "adheres to the morality of duty and honest people"; but he does not show us how this morality is justified" (Fouillée 1896a, 4).

[7] Cf. Lalouette 1998, 840. In *Savants et Écrivains*, Poincaré included a eulogy of Berthelot, in which he values his work as a historian of science and philosopher and notes his conception of a disinterested

The Speeches Addressed to Paris Students in 1903

On January 25, 1903, Poincaré presided over the general session of the Association Amicale des Anciens Élèves l'École Polytechnique. In his speech, he considers the past, present, future, and spirit of the school, and he argues that a high ideal of science must be preserved. This ideal best serves republican France, with its cosmopolitan values opposed to German nationalism.

Among the previous presidents and the former students of the school, Poincaré easily identifies numerous great figures of French science, engineering and public administration. The school's success is based on a non-utilitarian and collective spirit, on the "force of the idea": students learn to fight for the Fatherland and for Truth. If success in the physical sciences is due to the "influence of the high mathematical culture they have received", success in mathematics is the result of a taste for applications, in particular mathematical physics and mechanics (Poincaré 1910b, 268, 272-273). Commenting on the debate on the "faillite de la science", he ironically compares the detractors of science to spoiled children who have been given too many presents, concluding: "In the struggle of life, we need two things: weapons and courage. Science promised us weapons; she gave them to us. If we do not have the courage to use them, it is not she who goes bankrupt, it is us" (Poincaré 1910b, 274-275).

Thinking about the future of the school, Poincaré says that it will only be assured if it preserves "that which can form and strengthen the minds, that which teaches us to learn, to think, to understand." It is necessary to always cultivate "the disinterested way of thinking which itself is liberating" and not to let oneself be "seduced by the sophisms of intransigent practitioners." In other words, "the alliance of theory and practice must not be broken; it must not be mutilated, without which it would remain a vain name" (Poincaré 1910b, 278-279).[8] These reflections are in harmony with his defense of free inquiry, the disinterested pursuit of science and truth, which he will constantly affirm in his speeches in favor of the value of science.

On May 11, 1903, Poincaré presided over and gave a speech at the annual banquet of the Association Générale des Étudiants de Paris (AGEP). Created in 1884, the AGEP brings together associations from the main institutions of higher education in Paris. In 1896, the AGEP has started to publish the monthly bulletin *L'Université de Paris*. Following democratic principles of inclusion, giving voice to reflections from various democratic quarters, and benefitting from excellent facilities in the Rue des Écoles, it regularly organizes festivities, banquets, and sessions in honour of great figures. Its proximity to the secular values of the Republic will provoke criticism from sectors of the Right.

Léon Delamarche, a law graduate who would teach at the École Coloniale from 1906, presided over the AGEP from 1903 to 1905 and invited Henri Poincaré to preside over the 1903 annual banquet. The AGEP's cultural activity was then intense. At the session of May 14, 1903, the poet Sully Prudhomme was invited to chair a session in honor of the historian Gaston Paris (Prudhomme's chair, number 24, at the Académie Française would be occupied by Poincaré in 1908) (Poincaré 1910b, 12, 41); he declined due to ill health, and Louis Havet took over the chairmanship. As usual, to the 19th AGEP banquet were invited great personalities

cult of science, his belief in its beauty and goodness, his "faith in science" which he associates with Renan's friendship and inspiration (Poincaré 1910b, 169-170).

[8] Bruno Belhoste, in his 2003 work, talks about the hegemony of the school and the formation of French technocracy, noting that from 1870 onwards, it ceased to be a "nursery of scientists" (Poincaré being the exception); as for the central values and ideas that characterize the spiritual power exercised by this school, namely over the ramifications of Saint-Simonism, Belhoste is not very clear (Belhoste 2003, 413-419).

from intellectual and academic life, such as the economist Charles Gide and the mathematician Paul Appell. Poincaré's speech, in which he reaffirmed his ideal of science and his concern about the German threat (remember the annexation of several regions of France in 1870 and the future war of 1914-1918) and made a distinction between the realms of ethics and science, was widely applauded and published in the AGEP bulletin. Delamarche said a few words after Poincaré, indicating that Poincaré's public recognition owes a lot to the recent publication of *La Science et l'Hypothèse*:

> Forgive me, Mr. President [Henri Poincaré], for doing violence to your modesty and for not saying here what is being said everywhere else. No one is more authorized than you to praise science. We all know that science owes a great deal to you, and that you have not only made a major contribution to the progress of mathematics and physics in their special fields, but have also masterfully addressed questions of method, thus enriching the philosophical spirit of your generation, which is first and foremost respectful of scientific knowledge […]. Underneath the serenity of your speech, one senses that the dangers to truth and to the spirit that must govern its pursuit have been clearly seen and strongly felt by you. (In Poincaré 1903, 65)

Poincaré places the search for truth at the top of the hierarchy of values, and praises youth for its natural sincerity and love of truth. But this search is difficult and indefinite and can disappoint those who commit themselves to it: "We know that truth is sometimes disappointing, that it is a phantom that shows itself to us for a moment only to flee from us unceasingly, that we must pursue it further and further, without ever being able to reach it" (Poincaré 1903, 60). The search for truth requires independence of spirit (akin to individualism), freedom from prejudice and passion in order to achieve "absolute sincerity" (Poincaré 1903, 61). Poincaré distinguishes between scientific truth "which is demonstrated" and moral truth "which is felt" (Poincaré 1903, 61) and takes up the Kantian distinction between means and ends to affirm that science and ethics have their own domains:

> If we shouldn't be afraid of moral truth, all the more so shouldn't we fear scientific truth. First of all, scientific truth cannot be in conflict with ethics. Ethics and science have their own domains, which touch but do not penetrate. The former shows us what we should aim for, while the latter, given the goal, shows us the means to achieve it. They can therefore never contradict each other, since they cannot meet. There can be no immoral science, any more than there can be scientific ethics. (Poincaré 1903, 64)

But the attitude needed to find either of these two types of truth is the same, and differs from the simple utilitarian attitude, which shuns or fears truth because it follows the logic of interest, that is, interest in consequences (in an obvious criticism of one of the pillars of pragmatism): "I bring the two truths together, because the same reasons make us love them, and the same reasons make us fear them" (p. 61).

Poincaré believes that in many situations there is a conflict or antinomy between the search for truth, which is always an unfinished process, and the need for concrete and collective action in the present time, and he illustrates this antinomy with the situation of France, which was invaded in 1870 by Prussia, having lost Alsace and Lorraine, Poincaré's birthplace, and which was then intensely experiencing the Dreyfus Affair. France, with its values linked to the Revolution and the Universal Declaration of Human Rights, had to be strong among nations; the anti-Dreyfusards invoked nationalism, reason of state and the defense of military prestige to silence the investigation of the truth; Poincaré, who defended Dreyfus in the name of the truth, called for peace between the two sides: "On both sides, the majority were animated by noble intentions; on both sides, an ideal worthy of respect was being defended, and there were serious reasons to believe it was under threat. But it was

precisely for this reason that everyone judged their adversaries to be criminals; so much hatred and so many insults! If ever a new conflict of the same kind breaks out, let's hope we'll be fairer to each other" (Poincaré 1903, 61).

In this "applied" part of his moral reflections, Poincaré praises a French ideal of the cosmopolitan cult of ideas, of a tradition of the confrontation of ideas, of hospitality towards differences, noting that this is not how things are in Germany and that this is why the younger generations should take care of military mobilization;[9] because France, conceived as a homeland of ideas and not of interests, needs to be prepared for war:

> The day when France no longer has soldiers, but only reasoners, William II will be the master of Europe. Do you believe that William II has the same aspirations as you? Do you expect him to use his power to defend your ideals? Or do you place your trust in the peoples of Europe, and hope that they will one day share the same ideal? That was also the hope in 1869. Don't imagine that what the Germans call right, or freedom is the same thing as what we call by the same names. And even if all peoples were to march towards the same ideal, that wouldn't exempt us from being strong. If that's true, and if that ideal is ours, we're the ones in the lead. (Poincaré 1903, 63)

Léon Delamarche summed up Poincaré's thinking well when he said the following words after his speech: "You've brought us right to the root of error, pointing out the fault we commit when, for love of truth, we forget the realities and necessities of practical life, as well as when, to these realities, we sacrifice intangible truth" (In Poincaré 1903, 65).

The Value of Truth is the Highest Value of Science: *La valeur de la Science* (1905)

In December 1903, Pope Pius X placed on the Index and banned five works by the Catholic priest and theologian Alfred Loisy (1857-1940). His book, *The Gospel and the Church* (1902), showed that the Bible's conceptions about the birth and development of the world were naive and incompatible with the profundity of the Eternal (Ginoux and Gerini 2014, 99-109). Subsequently, the case of Galileo was invoked in the written press – condemned for having stated that the Earth revolves around the Sun – and a controversy was sparked around the question: "Does the Earth really rotate?" referring to Chapter VII of *La Science et l'Hypothèse*, in which one can read: "These two propositions, 'the earth rotates', and, 'it is more convenient to suppose that the earth rotates', have one and the same meaning. There is nothing more in one than in the other" (Poincaré 1913, 111). Already in early 1904, the reactionary Édouard Drumont, in the newspaper *La Libre Parole*, used that passage to affirm that science did not produce those certainties that made the biblical genesis obsolete (although Poincaré was talking about the diurnal rotation of the Earth). Poincaré was forced to write an open letter to Camille Flammarion (May 1904), where he affirmed that "the rotation of the Earth is certain to the same degree as the existence of external objects. I think that this gives sufficient assurance to those who might have been frightened by unusual words" (In Ginoux and Gerini 2014, 105).

Poincaré's statements, when used in the ideological debate surrounding the bankruptcy of science and in the context of the Dreyfus affair, acquired a moral and political value. This is why Poincaré gave his second book on the philosophy of science the significant title *La Valeur de la Science* (1905). The Introduction to this book begins with a literal copy of what he said to the Parisian students in 1903 about the notion of truth and the distinction

[9] On this French cosmopolitanism and humanism see the eulogy to S. Prudhomme, Poincaré 1910b, 25.

and relationship between scientific truth and moral truth.[10] Here appears a spiritual and pessimistic note of Schopenhauerian nature that does not appear in 1903: "Not to suffer is a negative ideal and one that would be more surely achieved by the annihilation of the world. If we want to free man more and more from material worries, it is so that he can use his regained freedom to study and contemplate the truth" (Poincaré 1908 [1905], 1). This is in line with the previous statement that truth does not necessarily lead to happiness. It is probably the same pessimism, with a cosmological hue, that transpires from the final sentence of *La Valeur de la Science*: "Thought is only a flash of lightning in the midst of a long night. But it is this flash of lighting which is everything" (Poincaré 1908 [1905], 276).[11]

After repeating what he said in 1903, Poincaré considers another antinomy, which opposes the ideal of unity that allows us to speak of *la science* in the singular and the concrete disparity and variety of the savants' intelligences. He thereby reaffirms the advantages of epistemological pluralism, one of the salient features of his philosophy of science. Amidst the sections of 1903, Poincaré subtly introduces a phrase that goes in the direction of his response to this antinomy: "And yet we must not be afraid of the truth because it alone is beautiful" (Poincaré 1908 [1905], 2). The march of science reveals an unexpected harmony,[12] and yet this march is a collective work: "The truth that is not the same for all; is it the truth? But by looking at things more closely, we see how these very different workers collaborate in a common task that could not be completed without their help. And that already reassures us" (Poincaré 1908 [1905], 5-6). This isolated passage will be clarified in the final pages of the first chapter of *Science and Method* (1908), where Poincaré speaks of the savant's search for that intellectual beauty which is the beauty of the harmony of the world, noting, against Tolstoï and completing Mach: "And we see that the concern for the beautiful leads us to the same choices as that of the useful. And it is also thus that this economy of thought, this economy of effort, which is according to Mach the constant tendency of science, is a source of beauty as well as a practical advantage" (Poincaré 1920 [1908], 16).

On the Necessity and Conditions of Free Inquiry, and on Truth: *Le Libre Examen* (1909) and *Savants et Écrivains* (1910)

As part of the celebrations of the 75th anniversary of the Université Libre de Bruxelles, the afternoon session of November 21, 1909 was dedicated to conferences by three members of the Université de Paris: Poincaré, Félix Le Dantec and Gustave Lanson (Mawhin 2012, 9). Poincaré lectured on "Le Libre Examen en Matière Scientifique", as suggested by the rector of the university. Once again, Poincaré takes the opportunity to speak about his notion of science: the development of the *savant*'s disinterested attitude needs external (legal and institutional conditions that allow and encourage the freedom to investigate) and internal conditions (self-criticism that corrects prejudice and passion, sincerity, love of truth).

The topic of intellectual freedom has its roots in the Enlightenment and points to one of the greatest values of the French Republic. Poincaré will reflect about it from the

[10] The first six paragraphs of *La Valeur de la Science*'s Introduction coincide with part of the 3rd paragraph on p. 60, 3rd to 5th of p. 61, 3rd and 4th on p. 64 of Poincaré's 1903 speech. Rollet in his thesis did not consider this (Rollet 1999, 404). Maintaining the high level of debate, Poincaré will dedicate the final chapters of the work to his philosophical response to Édouard LeRoy.

[11] "La pensée n'est qu'un éclair au milieu d'une longue nuit. Mais c'est cet éclair qui est tout". On the significance of the image of thought as a flash of lightning, see my Preface to the recent Portuguese translation of *Science and Hypothesis* (Príncipe 2024, 26-27).

[12] This is an aspect that Boutroux highlighted in his eulogy (cf. Boutroux 1913a, 695; Príncipe 2024, 35-36). Brunschvicg described Poincaré's attitude as bringing it closer to Kant's Third Critique, thus somewhat following the spirit in which Jules Lachelier wrote his *De l'Induction* (Brunschvicg 1913, 602, 612).

perspective of science. The text begins with a major concern: the danger of replacing true science with a half-science (demi-science) that is a false science. This is related to an asymptotic and holistic ideal of knowledge, which implies an attitude of humility. The danger might come from an applied social science intervening in the domain of (pure moral) consciousness, or from the interference in science of the interests of other applied interests, namely technological, just as Poincaré had alluded in 1903 when he warned against an "applied drift" at the École Polytechnique. For Poincaré, disinterested research spontaneously brings fruits to humanity and the order of knowledge must not be subverted under the pressure of applications subject to often immoral interests. Accordingly, he begins his speech in Brussels as follows:

> Freedom is for science what air is for the animal; deprived of freedom, it dies of asphyxiation like a bird deprived of oxygen. And this freedom must be without limits, because, if one wanted to impose limits, one would have only half-science, and half-science is no longer science, since a half-science is necessarily a false science. Thought must never submit, be it to a dogma, to a party, to a passion, to an interest, to a preconceived idea, or to anything whatsoever if not to the facts themselves, because to submit would be to cease to be. (Poincaré 2002 [1909], 139)

Firstly, we need to lift the external or legal constraints that limit free inquiry, be they the religious ones that had their zenith in the Inquisition, or the more modern ones that threaten those who dare to "open their eyes […] and say what they have saw". In addition, scientists must be self-critical of prejudices assumed in good faith and received from their justly venerated masters. As knowledge of facts is always imperfect, various interpretations of them are possible, and prejudices narrow this variety. Poincaré is attentive to the multiplicity of professional psychologies and, to illustrate it, gives an unflattering picture of the mentality of lawyers: "They are satisfied when they have not been silenced; their business is not to seek the truth, but to make people believe that they possess it" (Poincaré 2002 [1909], 140).

In a typically nuanced manner, Poincaré recalls the conflict between catholics and secularists, noting that he is not targeting the scientific activities of the believers. Pasteur was a good catholic but educated in the spirit of free inquiry by his masters and comrades at the École Normale Supérieure (Poincaré 2002 [1909], 141). Conversely, "certain positivist schools" that incense science, are dogmatic, being nothing more than "a Catholicism without God". In a probable allusion to Alfred Loisy, he notes that the history of religions is "a science that must be treated as a science", and that it must be practiced not by a fervent and dogmatic believer but by someone who has sympathy for religious matters and therefore can understand "the phenomena that he must study" (Poincaré 2002 [1909], 141).

As for those who invoke social interest to proscribe certain types of research because they can generate dangerous theories, Poincaré states that lies are never a remedy as they can never avert danger: only those who can behold the truth in its beauty and serene splendor can avoid dangerous temptation (Poincaré 2002 [1909], 142). However, those who erect lofty, general theories need to remain critically vigilant; while those who distrust theories, sheltering themselves in the affirmation of facts, fall into serious error. Poincaré takes the opportunity to summarize his epistemology:

> Isolated facts are devoid of interest, because it is their comparison that reveals to us their harmony, the source of their beauty, and because analogy alone allows for prediction without which there is no possible practical application. All classification is a disguised theory, and yet it is only by classifying facts that one can move through the maze without getting lost. Those who ignore this truth will only walk gropingly, constantly retracing their steps, taking the same path a hundred times. They will lack a

> convenient economy of thoughts. They should remember that the task is long and that life is short (I do not mean only that of man, but that of humanity), and they must not expose themselves to losing precious time. (Poincaré 2002 [1909], 142)

Poincaré then addresses the question of miracles and paranormal effects, such as those attributed to mediums, exceptional phenomena allowing occasional violations of laws and scientific determinism. Now, the idea of law, of regularity of phenomena, is a postulate and, therefore, those phenomena are not invalidated a priori by physics; but knowledge of psychology and history attests to the non-truth of such exceptional situations (Poincaré 2002 [1909], 144).

Toward the end of his address, Poincaré notes that having dealt with the question of what freedom could do for science, he should also say some words on what science can do for freedom. He then makes the eulogy of tolerance and ecumenism between all who love the truth:

> What we must ask of science is not to discover truths as disagreeable as possible for our political adversaries, but to create free minds; when it has given us many of them, it will have paid its debt to freedom.
>
> Look at Pasteur, his faith was deep, and he certainly did not believe he was working against Catholicism. However, he trained students who were imbued with his methods, his rigorous criticism, his habits as a conscientious experimenter. He thus presented free minds to mankind, and all lovers of freedom must be grateful to him for that. Among these students, there are perhaps some who share his religious ideas; but they will work freely like their master; in their turn, they will engender free minds and thereby they will work in our interest; whatever they may think, these believers are one of us [the free minds]; if there were only such believers, we could live with them. (Poincaré 2002 [1909], 145)

The love of truth goes hand in hand with a subtle conception of truth as an ethical value, which is far from the notion of truth as a correspondence between statements and facts. In Chapter IX of *Science and Hypothesis*, Poincaré warned the reader about the danger of unconscious hypotheses (Poincaré 1913, 129). In this 1909 speech, Poincaré notes that the study of phenomena often starts from prejudices that favor certain interpretations, excluding other possible ones. In many areas of knowledge what we obtain is practical certainty, not mathematical certainty – prejudices can lead to overestimating practical certainty and be an obstacle to the improvement of knowledge. It is our duty to reject a unifying structure that appears artificial in the eyes of a free investigator (the word "artificial" reminds us of his answer to Le Roy, see chapter X of *The Value of Science*). The choice between interpretations is often based on likelihood (*vraisemblance*): "Unfortunately, the assessment of likelihood is a delicate, fleeting, eminently subjective thing, on which all good minds cannot always agree" (Poincaré 2002 [1909], 140).

In the introduction to *Savants and Écrivains*, a book of essays and eulogies published in the context of his entry into the Académie Française, Poincaré lists an ideal set of virtues of the savants: be hard-working, love truth and Science with a faith that gives courage and perseverance, have a critical mind, be modest and optimistic (because "passion gives frequent joys"), remain young at heart, have the virtue of disinterestedness and be indifferent to glory (Poincaré 1910b, iv, v, viii-xii). But he notes that the faith of the scientist does not have a precise object, it "has no other object than a vague and indeterminate ideal" (Poincaré 1910b, vi); to illustrate this point, Poincaré offers a comparison:

> There are two kinds of religious needs, there is the need for certainty, and there is the need of mystical love. [...] The first need makes the orthodox, the second makes the

> heretic. The faith of the *savant* does not resemble that of the orthodox. [...] The love of truth should not be confused with the love of certainty. Far from it, in our relative world all certainty is a lie. No, the faith of the *savant* rather resembles the restless faith of the heretic, who is always searching and never satisfied. (Poincaré 1910b, vii)

To summarize, the love of truth implies a systematic critical attitude, the habit of truthfulness, a dynamism that produces constant revision and the recognition that on the frontier of knowledge, which is constantly expanding, the savant faces mystery. The search for truth is a continuous effort of conquest, where aesthetic values and a sense of heresy, similar to the attitude of mystics, are fundamental.

The Relations Between Ethics and Science: *La Morale et la Science* (1910)

On 17 March 1910, Poincaré took part in the Conférences de Foi et Vie, organized by the Protestant pastor Paul Doumergue, who had been running the Protestant evangelization magazine *Foi et Vie* since 1898. Émile Boutroux (who published the book *Science et Religion dans la Philosophie Contemporaine* in 1908) and Henri Bergson also took part in this event. The text of Poincaré's lecture was published in no. 11 of the magazine on June 5, with the title glossing over Berthelot's, but reversing the order of the terms, which corresponds to Poincaré's fundamental thesis: "There can be no scientific ethics; but there can be no immoral science either" (Poincaré 1917 [1913], 225). Faithful to what he had said in 1903, science and ethics are distinct domains, although they are related.[13]

The text has a clear argumentative structure: it deals with the relationship between ethics and science, assuming that both have their own characteristics that give them identity and autonomy. Poincaré begins by recalling the debate on the bankruptcy of science. He then sets out his own position: he explains the logic of moral action, invoking Aristotle's practical syllogisms and finding the driving force behind action in a moral sentiment and not in abstractly stated principles. He presents two possible modes of interaction between science and ethics, compatible with his point of view. For each of these modes, he detects an antinomy that he does not resolve; in each mode, a positive side is opposed by a negative side.[14] In the first mode, science, with its love of truth, arouses new feelings: it indirectly helps to create a moral attitude. In the second mode, science can reinforce natural moral sentiments by articulating them in a more concrete way. Poincaré here alludes to a contemporary debate on Lucien Lévy-Bruhl's system of morals (1903). The text ends with a reflection on the antinomy of freedom and determinism.

[13] With Berthelot dead, Poincaré is the heir to his status – his candidacy for the Académie Française is a sign of this.

[14] The open-ended nature of antinomies has a long tradition in French thought. Pascal opposed the truths of reason to the truths of the heart. The Proudhonian notion of antinomy, which gives a more real and dynamic meaning to the Kantian conception, is complex and rich in nuances; but it can shed light on Poincaré's (even if there is no genetic relationship): a) thinking from antinomies means paying attention to the diversity that only experience can capture; b) the antinomy captures the essential antagonism that lies at the heart of an idea or a real situation, capturing its double face – the good and the bad are side by side like the poles of an electric battery and this co-habitation generates the movement; c) in the affairs of society and the human spirit, an abyss separates the two antinomic positions when they are first posed; d) the balance or equilibrium between the negative and positive aspects is not guaranteed a priori, contrary to a Hegelian conception; e) the search for this balance – a dynamic process that requires constant attention and action – responds to the Kantian question "what ought I to do?"

Poincaré disagrees with the two extreme views of the relationship between science and ethics that faced each other at the end of the 19th century: the positivist view according to which "science would place moral truths above all dispute, as it did with the theorems of mathematics and the laws enunciated by physicists" (Poincaré 1917 [1913], 223), and the anti-scientist view of a Brunetière, according to which positivism is a principle of immorality. For Poincaré, moral and scientific facts belong to two different orders, as grammar wisely recognizes. Scientific statements are in the indicative mode, and their syllogistic combination cannot lead to a statement in the imperative, "Do this or don't do that." Poincaré begins with what Aristotle, in his *Nicomachean Ethics*, called a practical syllogism, that is, a syllogism whose conclusion refers to an action and whose major premise is an injunction in the imperative mode (this kind of syllogism corresponds to the logic of the action and not to the explanation of the action [Schiller 1917, 652]). Aristotle introduced it when talking about *akrasia* or weakness of will, namely, a situation in which the agent goes against his better judgment about the action to be performed.[15] In order to illustrate the impotence of metaphysical-moral deductions, Poincaré gives examples of *akrasia*: "Metaphysics urges us to conform to the general law of being that it claims to have discovered. I prefer, one might contend, to obey my particular law. I don't know what she will reply, but I can assure you that she will not have the last word" (Poincaré 1917 [1913], 226). This is because moral action is triggered by the strength of a moral, generous feeling: "All dogmatic ethics, all demonstrative ethics is therefore doomed in advance to failure; it is like a machine where there would only be transmissions of movement and no driving power. The moral motor, the one that can set in motion the whole apparatus of connecting rods and gears, can only be a feeling" (Poincaré 1917 [1913], 227).

With regard to the first mode of indirect action of science on morality, which gives rise to new feelings linked to the particular affective psychology of the scientific profession, Poincaré reaffirms what he had already said about his ideal of science. Science, properly understood, enables us to glimpse the "splendid harmony of natural laws", to love an ideal greater than ourselves, to develop a love for truth, to acquire the habit of disinterestedness, to seek absolute sincerity and thus to fight lies. What is more, science is a collective work: "It therefore gives us the feeling of the necessary cooperation, of the solidarity of our efforts and those of our contemporaries, and even of those of our predecessors and successors [...] We feel that we are working for humanity, and humanity becomes dearer to us (Poincaré 1917 [1913], 232-233).[16]

At the same time, Poincaré, denounces the dangers of an exclusive passion for science:

> The love of truth is undoubtedly a great thing; but what a bargain if, in pursuit of it, we sacrifice infinitely more precious objects like kindness, pity and love of neighbor. At the news of some catastrophe, of an earthquake, we will forget the suffering of the victims to think only of the direction and amplitude of the tremors; we will almost see it as

[15] It is unlikely that Poincaré drew inspiration from Kant. Kant in the *Critique of Practical Reason* makes a comparison of the structure of the analytic of pure practical reason with a practical syllogism (Kant 1996, 5: 90). Of the few authors explicitly mentioned in this text, Aristotle is one of them, but in relation to the notion of science as a search for the general (Poincaré 1917 [1913], 231); the other is Alfred Fouillée in relation to freedom as an idea-force (Poincaré 1917 [1913], 246). Poincaré does not appear to adhere to the Kantian ethics he describes as "an inflexible ethics, the somewhat dry ethics of a Protestant catechism" (Poincaré 1910b, 39).

[16] One can see how these words inspired in the post-war period the defenders of the value of reason who founded L'Union Rationaliste (Henri Roger, Paul Langevin, Albert Bayet, Jean Perrin, etc.) and how the Belgian Jean Pelseneer, historian of science, in his review of Bayet's book *La Morale de la Science* (1931) criticizes Bayet for not citing Poincaré (Pelseneer 1933, 242, 244).

> good fortune, if it has brought to light some unknown law of seismology. (Poincaré 1917 [1913], 233-234)

Considering the experiments carried out on animals Poincaré states that they should be treated with mercy. Recognizing the variety of individual human paths, Poincaré concludes, in a Pascalian tone of moderation:

> Science, widely understood, taught by teachers who understand it and love it, can play a very useful and very important role in moral education. But it would be a mistake to want to give it an exclusive role. It can give rise to beneficial feelings, which can serve as a moral driving force; but other disciplines can do so as well; it would be foolish to deprive ourselves of any help; we do not have too many of all their combined forces. There are people who do not have the intelligence of scientific things; it is a fact of vulgar observation that there are in all classes students who are "strong" in literature, and who are not "strong" in science. What an illusion to believe that if science does not speak to their intelligence, it will be able to speak to their heart! (Poincaré 1917 [1913], 235-236)

Regarding the second mode of action of science on morality, Poincaré returns to the paradigm of the practical syllogism: "Fais ceci, or quand on ne fait pas cela, on ne peut pas faire ceci, donc fais cela" (Do A; but A cannot be done without doing B; therefore, do B) (Poincaré 1917 [1913], 236). In this mode, science has a practical relationship with morality by providing the means (B) for the ends (A) to which ancestral moral sentiment points in a more or less vague way. An antinomy results from the interaction between those ancestral feelings and science, when the concrete articulation of those ends conducing to purposeful action occurs. Considering the positive side of the antinomy, Poincaré notes that moral actions are inspired by a variety of feelings (greater sensitivity to pity and compassion, the search for social harmony, love of country, the inner search for perfection, the construction of an inner citadel for the Stoics, etc.). Now science, and here Poincaré again appeals to his scientific ideal of harmony and unity, can show that these various tendencies or feelings are not in conflict: "If science shows us that this conflict is not to be feared, if it proves that one of these goals cannot be achieved without aiming at the other (and this is within its competence), it will have done a useful work, it will have brought valuable help to moralists" (Poincaré 1917 [1913], 237-238).

However, considering the negative side of antinomy, Poincaré notes that science can produce a disenchanted vision of human ideals – understood as chimeras – and a loss of confidence in moral values. For example, given the complexity of our psychology, the scientific destruction of prejudices can have unpredictable effects on weaker souls (this reminds us of La Rochefoucauld: "It is not always by virtue of valor and chastity that men are valiant and women are chaste"). Therefore, maintaining the autonomy of morality with respect to science is preferable.

While thinking about the application of the scientific method to the study of morality, Poincaré invokes the emergence of (Durkheimian) sociology and the debate that intensified with the publication of Lucien Lévy-Bruhl's (1857-1939) book *La Morale et la Science des Mœurs* (1903). This historian of philosophy, who went on to devote himself to sociology and anthropology, attacked the "theoretical morals" that sought a metaphysical foundation for morality, forgetting the concrete and positive investigation of moral facts, which should be constituted as *science des mœurs* (science of morals). For Lévy-Bruhl, moral facts are both social facts and facts of individual conscience, and the spiritualist conception of two irreducible orders (moral conscience not being of a natural order) is false. His comparative method gives precedence to moral sentiments (one of the chapters of the book is entitled "Le sentiment moral"), that is, to the affective foundations of action and ideational

representation, insisting on the permanence of sentiments throughout history, despite variations in their symbolic representation (Keck 2009, § 6). In a way, Lévy-Bruhl, and with him Poincaré, took up the Schopenhauerian dichotomy between representation and will (feeling) and defended the primacy of the latter.[17]

Lévy-Bruhl believed that from the *science des mœurs* an *art moral rationnel* could be generated with a vocation for application, an aspect that was particularly attacked.[18] The long preface to the third edition (1907), in which Lévy-Bruhl responds to the criticism, contains epistemological reflections that are in line with Poincaré's ideal of science. For Lévy-Bruhl, moral facts are felt in consciousness as if they were irreducible, but their origin is social. Science cannot be confused with its applications because it aims to satisfy our need for knowledge. Its project is to constitute an "objective and disinterested science of moral reality", which, in its development, will lead to discoveries that will present reality in a light that cannot be predicted beforehand. This does not mean that science cannot be applied, but application depends on further reflection on the ends that are sought, implying the establishment of a scale of values. Lévy-Bruhl values the metaphysical effort to ground morality, but warns of its risks, noting that by focusing on the highest and most universal ends, it ignores the concrete social reality where less general ends are established because they are considered reasonable according to the development of the available means, by perceiving what is possible in each situation. This ends up generating a variety of ends in probable correspondence with the variety of social types. Of course, there are universal and instinctive ends (humans want to live and live as well as possible) which give moral facts their proper character. Despite its disinterested character, the "science of morals" can produce judgments of value by showing, for example, the harmful character, for a given society, of an extant rule (Lévy-Bruhl 1971 [1907], iii, v, xi, xiii, xiv, xv).

Reflecting on the criticism of Fouillée, who sees in the new comparative science the danger of the dissolution of good morals and moral skepticism, Lévy-Bruhl quotes Guyau's "Reflection dissolves instinct". Like Poincaré, he does not believe that scientific knowledge has the power to change deep moral feelings and convictions that are not purely individual but social (Lévy-Bruhl 1971 [1907], xvii, xxiv; cf. Poincaré, 1917 [1913], 247). Also, the existence of metaphysical theories that aim to found morality is, in itself, of little social effect because purely theoretical knowledge cannot counterbalance the strength of moral sentiment (Lévy-Bruhl 1971 [1907], xx). Lévy-Bruhl does not believe, as Fouillée does, that the immediate character of states of conscience attests to the autonomy or primacy of conscience: the moral fact is not reduced to conscious duty, since this feeling of obligation has a social origin. He observes that in contemporary France morality and religion are closely linked: Morality is conceived as a secular religion, where Duty plays the role of God, a consideration that is historically very pertinent since the Third Republic needed to replace the clergy in many educational functions and favored Kantian ethics (Lévy-Bruhl 1971 [1907], p. xxi-xxii).

The fact that Poincaré was aware of this debate is probably linked to his connection to Xavier Léon's circle.[19] At Léon's salon, receptions and lunches constituted for decades a true philosophical forum, favoring free conversation against the disciplinary cantonment typical

[17] For the author of *Die Grundlage der moral* (1840) it was compassion that founded moral behavior. Schopenhauer's saw in the *Rig-Veda* maxim "tat twan asi" the basic intuition of that feeling (oceanic in Romain Rolland's words) that unites us to others and to nature.

[18] Two of the regular contributors to *Revue de Métaphysique et de Morale* (which reviewed Lévy-Bruhl's book unfavorably) interested in "applied ethics" and critical of Kant's foundational perspective, published relevant texts in 1903: Frédéric Rauh published the book *L'Expérience Morale* and Gustave Belot began a series of reflections on moral topics (truthfulness, justice, charity, etc.) that would be included in the 1907 book *Études de Morale Positive*. Both of them, and Fouillée, were among Lévy-Bruhl's critics.

[19] X. Léon and L. Brunschvicg are among the founders of the *Revue de Métaphysique et de Morale.*

of academic institutions. Léon thus favored the creation of bonds of friendship between thinkers with different positions, maintaining an ideal of sociability that characterized the Belle Époque and would disappear with it. These meetings were attended by figures such as Lachelier, Espinas, Darlu, Durkheim, Lévy-Bruhl, Le Roy, Painlevé, Meyerson, philosophy professors from the Parisian *lycées* and from the Sorbonne, and several collaborators to the *Revue de métaphysique et de morale* (Soulié 2009, 180-185). Furthermore, Poincaré attended several sessions of the Société Française de Philosophie, founded in 1901, and closely linked to this journal and its founder Léon. Poincaré, as a good listener, kept himself abreast of philosophical debates.

Let us return to *La Morale et la Science*. Poincaré seems to sympathize with the possibility of scientific knowledge of morals becoming effective, without this affecting the moral basis:

> If we were to demonstrate scientifically that this or that custom, which we considered indispensable to the very existence of human societies, did not in fact have the importance we attributed to it, and only deluded us by its venerable antiquity, if we were to demonstrate this, assuming that such a demonstration were possible, would the moral life of humanity be shaken? Either this custom is useful, and a reasonable science cannot demonstrate that it is not; or it is useless, and should not be regretted. From the moment we place at the base of our syllogisms one of those generous sentiments that engender morality, it is still this sentiment, and consequently, it is still morality, that we must find at the end of our whole chain of reasoning, provided this reasoning it has been conducted in accordance with the rules of logic. What is in danger of succumbing is what is not essential and was only an accident in our moral life. The only thing that matters cannot not be found in the conclusions, since it is in the premises. (Poincaré 1917 [1913], p. 239-240)

The reader familiar with Poincaré's epistemological reflections will not fail to notice the parallel between this reasoning (which distinguishes between generous sentiments, the true basis of morality, and concrete customs or rituals, which concretize them) and the relationship between the *rapports vrais* (true relations) and the theoretical ontologies that dress them and disappear with the evolution of scientific ideas.[20]

This is followed by a reflection on the dangers of misunderstood science, and a distinction between "true science" and "demi-science". Here, the negative side of the antinomy seems linked to a dysfunction of science (science playing the role of auxiliary to ancestral moral sentiments). The probable origin of the concept of demi-science is Fouillée's 1896 article on the hegemony of science and philosophy. For Fouillée, a Plato scholar and organicist philosopher who asserts a panpsychism according to which the general process of evolution affirms a "will to consciousness", science has a social dimension: science, by becoming known to all and becoming consensual in the conflictive process of collective reason (Proudhon), will socialize truth – social intelligence will integrate the universal truths acquired (Fouillée 1896a, 7). However, this process of acquiring the truth is slow and, in many cases, partial – that implies vigilance: "science implies a society of consciousnesses which are exercised reciprocally and towards exterior things; it is a triple harmony with each and with

[20] See *Science and Hypothesis*: Introduction; beginning of chap. X; chapter XII, section "Maxwell's theory" (Poincaré 1913: 29, 140-141, 175). For example, Fresnel's optical theory, which was replaced by Maxwell's, left intact the system of differential equations, the mechanical models of the ether (images that ontologically cover this system) being abandoned, which illustrates the (evolutionary) principle of stripping away "rapports vrais": "The true relations between these real objects are the only reality we can attain, and the sole condition is that the same relations shall exist between these objects as between the images we are forced to put in their place" (Poincaré 1913, 140-141).

the whole" (Fouillée 1896a, 8; 1986b, 146). Fouillée believes that philosophical reflection, in which speculation – for which analogical reasoning is fundamental – is not strictly subject to what is acquired by partial science, is essential for a good understanding of moral things. In this line, given the contemporary belief scientist in mechanistic reductionism, only an analogical panpsychism allows us to see in others the dignity that we attribute to ourselves due to the fact that we have a conscience, to whose states we have immediate access:

> But as regards men and even animals, we are indeed obliged to assume the existence of the psychic behind mechanical appearances. If I looked on men as machines which did not feel, neither morality nor society would be any longer possible. The necessity of reasoning by analogy is here practically obligatory, and it receives its justification theoretically in the fact that all takes place just as if other men felt and willed like ourselves. (Fouillée 1896a, 12; 1896b, 150)

Fouillée thus argues that well-understood science will always have a double face – objective and subjective. That is, it recognizes and starts from the primacy of our states of consciousness, which are our only immediate reality; which implies that any science that discards psychism is destined not to be a science of the whole. The reader may be here reminded of Berthelot's similar views, earlier discussed in this essay.

One of Fouillée's theses is that action is driven by belief (*croyance*) often unsupported by scientific knowledge (Fouillée 1896a, 18). Feelings often play a role, as a result of unconscious and hereditary social knowledge: "We believe, indeed, not solely with our intellect, but with our sentiments and our innate or acquired impulses. It is incontrovertible that our sentiments and our impulses, the result as they are of a social action prolonged through centuries, contain a hereditary store of truth, though a truth mingled with much error" (Fouillée 1896a, 17; 1896b, 154).

This ancestral knowledge contained in feelings corresponds to a spontaneous intelligence of a synthetic nature that must be distinguished from analytical and reflected intelligence: "The so-called conflict of the intellect against the heart is in reality the conflict of one form of intelligence against another, of the reflective against the spontaneous" (Fouillée 1896a, 18). Fouillée calls this spontaneous form of intelligence demi-science, considering that it is an important moment in evolution, but one that involves risks. He generalizes to the current state of science: in view of the understanding of the whole, human science is just a demi-science, whence we may infer the legitimacy of feeling and belief:

> The reason demi-science is often more dangerous than ignorance, is because it is an unconscious and half-way analysis, which nevertheless thinks that it is complete and assumes to rule our action. […] Nevertheless, demi-science, with all its disadvantages, is a necessary moment, a stadium in evolution. The misfortune is that our human science is always demi-science; and hence, the very legitimate role of sentiment and of belief. (Fouillée 1896a, 18; 1896b, 157)

Poincaré, for his part, notes that half-science is formed from prejudices and superstitions, from new ideas that have become fashionable, from hasty generalizations and deductions made without a true experimental spirit. These errances are illustrated in sociology by the crude comparison between society and organism, and by ignorance of or contempt for history (Poincaré 1917 [1913], 241). Poincaré, when he speaks of half-science, also refers to science that intends to intervene directly in human affairs without considering psychological complexity (a kind of social engineering with a mechanistic perspective). In the following section, however, he will favorably consider a more descriptive and comparative approach, to which he gives Lévy-Bruhl's name *science des mœurs,* with a suggestive analogy: *science des mœurs* is to morality what a treatise on the physiology of digestion is to a good

dinner (Poincaré 1917 [1913], 243). This science seems a good idea to him, without fearing that it could turn out to be dangerous because (like metaphysics) owing to its abstract character it will have little capacity to affect passions.

Poincaré ends the lecture by returning to the topic of the antinomy between determinism and freedom, the subject of several doctoral theses in France in the 1870s (including those of Fouillée, Lachelier, and Boutroux), written under the influence of Félix Ravaisson. In the wake of Friedrich Schelling's emergentism Ravaisson invoked Kant's Third Critique, which gave great importance to finalism. The proposed conciliations of freedom and determinism, which looks for a spiritualist and evolutionary foundation mattered as it concerned one of the greatest values of the French Revolution. It went along with the intention to give to the Third Republic a Kantian ethics based on the idea of autonomy, and not on the catholic value of charity. Well aware of the importance of these debates, Poincaré asserts that the difficulty arises when scientific determinism is extended to consciousness. Whatever the ultimate metaphysical truth on this matter, its knowledge will have little effect on humans who move largely by instinctive, unconscious processes. In his conclusion, Poincaré reaffirms what he stated at the beginning: "There is not, and there never will be, scientific ethics in the proper sense of the word" (Poincaré 1917 [1913], 247). Well-understood science can indirectly help morality, but it will never be enough because it only sees a part of man, or only sees it according to a certain perspective. The hegemony of a half-science would be disastrous.

Conclusion

Poincaré's subtle thoughts on ethics are anchored in the Western tradition of Plato, Aristotle, Pascal, Kant and Schopenhauer. To him the virtue of truthfulness is obviously related to the notion of truth and in this way his ethical reflection is related to his epistemological reflection, in which dynamical architectural aspects prevail over certitude. Poincaré intervened in events that were ethically relevant to the Third Republic. Others diverted his epistemology for ideological purposes, and thus provoked his reaction as an *intellectuel* who needed to defend *La Valeur de la Science*.

In general, Poincare's philosophical thought owes much to the informal activities provided by the philosophical circles of Émile Boutroux and Xavier Léon. These circles were part of the rich French intellectual milieu of their time, with a rare balance between specialized knowledge and polymathic attitude. The French intellectual elites of the Belle Époque shared a cultural ideal in which philosophical conversation still played a dominant role.

Poincaré was a kind of universal sage, a democrat concerned with moderation and conciliation, tinged with a shade of pessimism. He defended a pluralism driven by antinomies in the relationship between science and ethics. He distrusted scientific generalizations about human affairs, although he understood that science could help human progress if well understood. He advocated critical vigilance in order to prevents us from taking the part for the whole, to respect history and the complexity of human affairs, and to maintain a Pascalian respect for the truths of the heart. His views had an evolutionary flavor, as they valued the ancestry of the generous feelings that are the moral basis for our actions.

In our times, Poincaré's ethical thinking may inspire us to once again place the value of veracity, the love of truth, as a *sine qua non* condition for moral success (and survival) of our species, to reject the naturalization of the technical-scientific complex and to beware of any existentialist fatalism that turns us into puppets devoid of ethical freedom. It may indeed be good to return to the ancient sources of spirituality and rationality that teach us to value the contemplative path over the technical/practical path. If you believe Poincaré, the great human concern should be to live wisely in the *Polis*.

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