
THE EPISTEMOLOGICAL REVOLUTION OF ANDRÉ-MARIE AMPÈRE

For my dear departed friend and comrade in arms, Gene Schenk (1954-2019)

By Pierre Beaudry, 7/15/2019

INTRODUCTION

“Electrical currents are like human minds; they attract each other when they move in the same direction and they repel each other when they move in opposite directions.”

Dehors Debonneheure on the subject of André-Marie Ampère's discovery and Xi Jinping's win-win policy.

In addition to being a first class scientist André-Marie Ampère was also a first class philosopher, and especially an epistemologist of exceptional talent. Although he became famous for his groundbreaking work in electromagnetism,¹ he has today remained virtually unknown as a philosopher. I will focus, here, on his less known work in epistemology²; that is, on the revolutionary method of investigating his classification of human knowledge, a method which he called “cautious probing” (*tâtonnement*) aimed at harmonizing *interacting relationships*

¹ André-Marie Ampère, [*Theorie des phénomènes électrodynamiques, uniquement déduite de l'expérience*](#), Mequignon-Marvis, Paris, 1826.

² André-Marie Ampère, [*Essai sur la philosophie des sciences, ou, Exposition analytique d'une classification naturelle de toutes les connaissances humaines*](#), Mallet-Bachelier, Libraire-Éditeur, Première Partie, Paris, 1856 : [IRIS](#); Seconde Partie, Paris, 1843 : [IRIS](#).

between opposites, something similar to the *coincidence of opposites* in Nicholas of Cusa or the change of voice register in Bel Canto singing.

Ampère's epistemology is naturally and conceptually tied to four human conditions: faith, reason, doubt, and the willful determination to improve human knowledge. Above all, his central question was how to unify faith and reason. That may be the reason for his choice of "*cautious probing*" whereby his Catholic faith provided his mind with the compass of directionality that he required, and the Leibnizian principle of sufficient reason gave him the light he needed to deal with the doubts he was consumed by.

The key conflicting singularity within Ampère's process of improvement of the human condition was the musical Lydian-like interconnection among his reason, faith, and will power in spite of a constant state of doubt which he considered his worse form of suffering. He once confessed to his son that "doubt is the most distressing state of the human mind because God wants man to suffer when he deviates from the truth, just like when he deviates from his duty."³

His duty was to be passionately committed to improve the knowledge of mankind, as he said: "To improve myself and mankind, that's the idea that I always have before me and which is anchored in my mind. I don't want to work, feel, or compose anything which is not oriented to that purpose."⁴ This mission was unshakable as was his quest for the unity of principle between his faith and reason. Ampère was totally in agreement with Leibniz's definition of the role of reason as the proverbial light guiding his faith out of his doubt-ridden Platonic Cave. Leibniz established his principle of discovery as follows:

"I assume that two truths cannot contradict each other; that the object of faith is the truth that God has revealed in an extraordinary way, and that reason is the linking together of truths, but especially (when it is compared with faith) of those whereto the human mind can attain naturally without being aided by the lights of faith. [...] It is in the same sense that sometimes reason is contrasted with experience. Because reason consists in the linking

³ Joseph Janin, [La vie passionnée d'André-Marie Ampère](#). Bulletin de la Sabix, 2004, Section 41. Translated by PB.

⁴ Joseph Janin, *Op. Cit.*, section 44. See Leibniz on *Felicity*: [LEIBNIZ ON FELICITY](#).

together of truths, it is entitled to connect also those links which experience has furnished it, in order thence to draw mixed conclusions; but reason pure and simple, as being distinct from experience, only has to do with truths independent of the senses.”⁵

Moreover, Ampère’s epistemological classification of human knowledge is based essentially on how his mind can relate harmonically to two opposite domains: mind and matter, which he divided into the sciences of the mind or “noology” and the sciences of matter or “cosmology.” It is that *interacting relationship* which is fundamental to understand as Ampère’s primary discovery. That *interacting relationship*, however, cannot be understood without unifying faith and reason because there are considerable imponderables between the two. It is important to harmonize the relationship between faith and reason especially because *belief alone* is an excuse to evade the need to think, while *reason alone* is the pretention of being able to evade the imponderable intervention of the Creator.

As Leibniz demonstrated, if your faith makes you believe truthfully in something that is revealed to you, and your reason makes the willful connections within that revelation, even without the lights of faith, then, your mind will be able to make discoveries by itself:

“Success entire and infallible belongs only to the consequent will, as it is called. This it is which is complete; and in regard to it this rule obtains, that one never fails to do what one wills, when one has the power. Now this consequent will, final and decisive, results from the conflict of all the antecedent wills, of those which tend towards good, even as of those which repel evil; and from the concurrence of all these particular wills comes the total will. So in mechanics compound movement results from all the tendencies that concur in one and the same moving body, and satisfies each one equally, in so far as it is possible to do all at one time. It is as if the moving body took equal account of these tendencies, as I once showed in one of the Paris Journals (7 Sept. 1693), when giving the general law of the

⁵ G. W. Leibniz, [*Theodicy: Essays on the Goodness of Go, The Freedom of Man, and the Origin of Evil*](#), *The Project Gutenberg*, p. 73.

compositions of movement. In this sense also it may be said that the antecedent will is efficacious in a sense and even effective with success.”⁶

For Leibniz as well as for Ampère, this distinction between will and reason is a fundamental distinction which differentiates man from the beast. For a human being reason precedes willfulness, because human actions must depend on prior reflections; for an animal action, perception, and willfulness simply coincide.

Thus, the founding principle of all of Ampère's endeavors, which can be understood as the triply-connected interacting relation between reason and power, is the foundation of what became known as Ampère's law; that is, what is identified in physics, today, by the right-hand rule. However, that ordering has to be given direction in accordance with God's Plan. The whole question therefore resides in finding out what that Plan is.

THE DIRECT SYNTHESIS METHOD OF 'CAUTIOUS PROBING'

“Whereas so many beings exist on Earth in the blissful ignorance of their own existence and follow the unreflective impulsions to which they have always assumed their actions, why is it that I am always tormented by the desire to know the nature of my own intelligence and of my will, by the desire to go back to the origins of the knowledge that I have or that I believe I have, seeking to discover the principle behind the determinations of my actions? Should I attempt to stifle that desire, in the fear that I might not be able to bear any fruit from efforts directed toward a goal which man is not given the ability to attain? Or, being certain that the Author of my being would not have given me such a tendency towards the truth, which dominates me so imperiously, unless He had provided me, at

⁶ G. W. Leibniz, Op. Cit., p. 137. Here Leibniz leads us to understand the unity of harmony between reason and power. He concluded: “Thus it is that there is no absolute predestination to damnation; and one may say of physical evil, that God wills it often as a penalty owing to guilt, and often also as a means to an end, that is, to prevent greater evils or to obtain greater good.” (p. 136-137) Ampère used a similar opposition between understanding and will power: “The two systems of will and understanding continuously react on each other and can only develop through such a mutual interaction. How could our actions multiply themselves if they were not enlightened by the light of our intelligence? And what would be our intelligence if it could not act?” Barthelemy Saint-Hilaire, Op. Cit., p. 168.

the same time, with the necessary faculties to help me walk with assurance in the pathways which leads to it, would I sacrifice my entire existence to such a noble destination?" Jean-Marie Ampère⁷

According to Ampère, the *direct synthesis* method of *cautious probing* is able to solve problems that *analysis* is incapable of solving because this method is the only one capable of “explaining the facts by going back to their causes and their laws.” As he told his son Jean-Jacques:

“Never was it possible that *direct analysis* could have been used to discover the simple and general law whereby celestial bodies attract each other through the inverse square of their distances; it is only through formulating hypotheses that such a great truth was discovered.”⁸

On the one hand, according to his son, “the exclusion of a hypothesis is by its very nature more certain than the admission of that hypothesis; because a fact which is contrary to it proves its falsehood.”⁹ (135) However, this exclusion does not validate what a true hypothesis is; it merely shows how a false hypothesis can be rejected.

On the other hand, the way to seek the truth of a hypothesis is through understanding the role that the connectivity of “*interacting relationships*” (“*rappports*”) plays between two or more thoughts in the history of human thinking. A universal idea, for example, is not an idea which isolates the common aspect of similar perceptions. The idea of red is not derived from the totality of red objects one has perceived. As Ampère said: “The idea of red is very different from the many images of red.” Here, there is a “one of the Many” that sense perception cannot form from a multiplicity of perceived images.

⁷ Barthelemy Saint-Hilaire, [*Philosophie de deux Ampères*](#), Didier et Cie, Paris, 1866, p.1.

⁸ Barthelemy Saint-Hilaire, [*Philosophie de deux Ampères*](#), Didier et Cie, Paris, 1866, p. 135. Introduction by Jean-Jacques Ampère.

⁹ Barthelemy Saint-Hilaire, Op. Cit., p. 135.

Ampère makes a fundamental distinction between the so-called “universal” of Aristotle and the mental creation of an idea of connection between sensations. Aristotle wrongly thought that a universal was what was common between many things. Ampère considered that the universal is not “what was common between many things but rather the special intellectual relation that the mind discovers among similar things; and such a general idea is the footprint that this intellectual action made on the soul.”¹⁰ In other words, a sensation is not an idea and can never become an idea: “To feel is to feel and nothing else; it is not to know.”¹¹ Knowledge only comes to the moral individual who makes the difference between good and evil, between what tears apart the heart of the wicked and makes the just happy.

Then, Ampère makes an amazing jump which he calls “*transportation*” from the mental dimension to the physical dimension of the external world. He assumes that the *interacting relationships* which our minds create among our sensations also exist in the outside world: “We assume that the relationships which exist among perceived phenomena also exist among substances.”¹² And, said Ampère, our role is to *transport* them from the domain of the phenomenon to the domain of the noumenon. However, what sorts of *interacting relationships* are necessary to establish the certainty of such a hypothesis? Is this “*transportation*” legitimate or is it simply a mental concoction? Ampère’s answer to this question is very simple: The only certainty we can have resides in the *transportation of interacting relationships* between phenomena and noumena, between our perceptions and the things in themselves.

For example, in physics, causality is an *interacting relationship* between cause and effect, time is an *interacting relationship* of succession, space is an *interacting relationship* of extension, motion is an *interacting relationship* between two successive situations, etc. One can change the nature of objects being studied without changing the nature of the *interacting relationships*. Ampère gives the example of the command to love thy neighbor: “It is sublime only because it

¹⁰ Barthelemy Saint-Hilaire, Op. Cit., p. 142.

¹¹ Barthelemy Saint-Hilaire, Op. Cit., p. 149.

¹² Barthelemy Saint-Hilaire, Op. Cit., p. 143.

embraces an infinite number of terms, that is, of human beings, for whom that constant universal relation exists.”¹³ Like the relation of duty between father and son or between the citizen and his country, regardless of whether the father is good or bad, and whether the nation is evil or just, such *interacting relationships* are independent of the nature of the terms they relate to and they are the only ones which can relate phenomena to substances. The difficulty, here, arises when the *interacting relationship* encounters a contradiction or a paradox.

THE PARADOX OF ‘CHANGE AND NO-CHANGE’

“When our knowledge of nature changes willfully and coherently, nature itself changes accordingly.”

Dehors Debonneheure

In the second part of his *Essay on Philosophy of Sciences*, Ampère developed a method of exploratory experimentation (*synthesis and analysis*) which is crucial for understanding how to deal with axiomatic changes in the human mind and how such changes apply to physical nature as well. This new way of understanding the idea of an axiomatic change in science can be highlighted by what Ampère developed as a performative method of changing the world by means of a higher degree of human consciousness through a method of harmonizing *interacting relationships* between two opposites. He was a master of changing the way the mind thinks by practicing it. The way to access truth, therefore, was not by finding a coincidence between a thing and an idea; it was to discover the agreement between the *relations between things* and the *relations between the conceptions* we have of them.

Ampère’s method of exploratory experimentation in both physical nature and the human mind was initially used to investigate the relationship between faith and reason. His method was a subjective and transformative method of intervention into the universe as a whole, a method of performative change which could give direction to the future of the universe based on truth and not on romantic fantasies. Thus, the world of nature could no longer simply be considered

¹³ Barthelemy Saint-Hilaire, Op. Cit., p. 155.

as a mechanical domain of fixed, stable, and unchanging discrete objects, simply understood as a world based on clocks, balances, and levers. Universal genius was the world's objective.

For Ampère, a handful of poets and scientists discovered that the complexities of the universe had to include the human mind and human emotions as integral parts of scientific and technological progress. As French philosopher, Joseph-Ernest Renan, once said of Ampère: "The perfect man should be at the same time a poet, a philosopher, a scientist, and a virtuous man."¹⁴ There had to be a similar quadratic relationship between matter and mind which interacted like electricity, magnetism, heat, and light do, but this had nothing to do with the utopian fantasy of mind over matter that some romantic historians¹⁵ have imagined had taken place in France at the turn of the nineteenth century.

The mistakes that such so-called historians made comes from the assumption of a one on one correspondence between the physical and the spiritual world as if there was a "*mi-lieu*", a sort of halfway zone of in-betweenness, a sort of common ether or medium between mind and matter. There exists no such thing as a "*mi-lieu*" like the Balzac fictitious character, Balthazaar Claes exemplified in the *Quest for the Absolute*. Of course, this nonsense leads to fallacies of mesmerism, magic, and mysticism, as Balzac demonstrated.

The issue that both Balzac and Ampère were developing, in artistic composition as well as in science, is the matter of human control over the forces of nature, not for the purpose of manipulating and controlling human beings like cattle, but for the purpose of giving mankind the ability to free the human will from want, to eliminate poverty in the world, and to improve mankind's chance to fully embrace its extraterrestrial imperative. In that sense, artistic composition is the basis for government and for statecraft generally.¹⁶

¹⁴ Joseph Janin, *Op. Cit.*, section 49.

¹⁵ See, for example, John Tresch, [*The Romantic Machine: Utopian Science and Technology after Napoleon*](#), The University of Chicago Press, Chicago, 1992.

¹⁶ Lyndon LaRouche advocated such a phase-change in the July 5, 2019 EIR reprint of his November 5, 1997 report titled, [*1997 Is Not 1929: A Lesson from Carl Gauss*](#), in which he wrote: "Classical art is the basis for statecraft: to study the mind of people. What is statecraft supposed to do? It provides the circumstances under which the people

The epistemological problem that Ampère had to solve was that of the *opposition between mind and matter* in all axiomatic aspects of human mentation; and that required a complete anti-Cartesian and anti-Newtonian approach. It is the *coincidence of opposites* between the two internal and external worlds which had to be resolved. The apparent antagonistic nature of the two worlds emerged in its formal opposition, in both philosophy and science as a fallacy of composition which was interpreted as an opposition between Romanticism and Mechanism. The conflict was presented in the following series of fictitious oppositions by American historian, John Tresch:

“ROMANTICISM

“emotion, will, passion
“spirit
“sensation, color, feeling
“moral, personalized nature
“freedom
“wholes (synthesis)
“Retrograde, nostalgic
“organisms

MECHANISM

reason
matter
mass, motion, number
amoral, impersonal nature
determination
parts (analysis)
progressive, forward looking
machines”¹⁷

Such oppositions between *Geisteswissenschaft* and *Naturwissenschaft* are fallacious and wrong categories unless their couplings imply a search for the unity of their conflicting polarity; that is, unless the intention is to solve this false dichotomy of human thinking. Ampère’s task consisted in resolving these axiomatic conflicts along such disassociated and contrary fault lines among different human cultures.

can achieve their common goals. It is supposed to make sure education exists, to make sure infrastructure is developed, to make sure medical care is provided; to ensure that society is self-organized in such a way as to meet the needs of the individual, and the society as a whole; to satisfy the aspirations of previous generations; to maintain the present generation; and, to lay the foundations for a betterment of future generations. And, that is what art is conceived to do: to train the mind, to train and educate the passions in such a way, as to produce a better, more moral individual.”

¹⁷ See John Tresch, Op. Cit., p. 3.

These oppositions are like the *change/no-change* paradox that Lyndon LaRouche had established in the *freedom/necessity* paradox. And, in order to succeed in solving it, one must understand that these oppositions are metaphorical effects of physical processes and poetic images of the mental powers which the mind requires to change the universe. Thus, all expressions of mechanical, rational, and algorithmic thinking must not be considered literally, but as poetical expressions of scientific processes of discovery in the cultural circumstances of their time.

At the end of the eighteenth century, the French education system had reached an axiomatic moment of transformation which was reflected in the overall social reordering of the nation-state; that is, inside of governments, in the education system, in the sciences and in the arts more generally. Pierre-Simon marquis de Laplace's "*Celestial Mechanics*" (1799) had become the glorification of the Newtonian world view that Napoleon Bonaparte had adopted, officially, as the basis for the administration of his Empire. Laplace became known as the Newton of France after he was nominated count of the Empire in 1806 and elevated marquis in 1817.

It was within such a French imperial and oligarchical setting that the fight for the inclusion of the human mind began to be shaped in earnest into science under the republican banner of the Monge-Carnot Ecole Polytechnique, especially under François Arago. The central issue of contention was the Laplace Newtonian view of separation among the quadratic imponderable fluids: electricity, magnetism, heat, and light. The Laplace-Newton assumption was that these four fluids were independent of each other, had no way of affecting one another; and the forces they exerted in the physical world were rectilinear as if they were based on the mechanical devices of clock, balance, and lever. Therefore, the singularity of the interaction that Ampère identified between electricity and magnetism was a moment of truth because no such devices were adequate to explain what was happening.

As Ampère discovered in 1819, following the deflection by electricity of a compass needle by the Danish physicist, Hans Christian Oersted, whenever two

electrical currents move in the same direction, they attract each other; when they move in opposite directions, they repel each other. Thus, magnetism can be generated by electrical currents alone, as human minds do. Now, observe how one can apply the same underlying principle to the domain of epistemology; that is, when two minds move in the same direction, they attract each other and when they move in opposite directions, they repel each other; ultimately, one leading to alliances in peace and the other to conflicts leading to war.

Such an experiment of attraction and repulsion led Ampère to make a profound discovery of principle which applies to both the physical universe and the human mind.

When on September 9, 1820, Francois Arago reported publically the accidental discovery by Oersted whereby a compass needle had rotated at a 90 degree angle to the motion of an electrical current inside of a wire, Ampère had already demonstrated that electricity and magnetism could not exist separately; and he began to establish the fundamental principles of attraction and repulsion to the new science of electrodynamics. Ampère knew that the principle underlying electricity and magnetism could act as an epistemological bridge between matter and mind. However, electromagnetism and mind are not to be identified with one another, even though the power of electromagnetism is to nature what the power of epistemology is to the domain of mind.

After Ampère had presented his findings to Arago and Fresnel, it became clear to the anti-Newtonians and anti-Cartesians of France that electricity, magnetism, heat, and light were all wave phenomena that interacted among each other as a quadratic “cosmic substance” that most resembled the wave patterns of communications between human minds of different cultures, and especially like Lydian quadratic singularities that J. S. Bach had discovered in Bel Canto singing. There was no magic to this, but lesser minds could not grasp the epistemological validity of the discovery, so they stubbornly looked for ways to turn Ampère’s new epistemological discovery into a romantic fallacy of mystical character.

Laplace, Poisson, and Biot joined the Newtonians to denounce the new discovery as mystical, because the new discovery did not agree with their

mechanistic view of the universe. When Laplace was made a marquis by Napoleon, he took charge of the Society of Arcueil where linear mathematics became the hegemonic ruler of scientific knowledge. One more time, the standard mechanical view of the world became dominated by the Newtonian law of attraction at a distance and motion in straight lines. From that moment on, until today, science followed the mathematical model of Coulomb whereby electricity, magnetism, heat, and light became discrete forces acting separately and in linear ways. The monster of linear action at a distance had restored its imperialist power once again. However, the singularity which had to be grasped in that moment was calling for a complete axiomatic transformation of human society as a whole.

The singularity was like the Soprano voice change of register through the F# passing tone in Bel Canto singing. It was the passing singularity between the Fourth $4/3$ and the Fifth $3/2$, within the octave of C-256 and C-512, the Gauss arithmetic/geometric mean interval of action which located the point of transformation that took place in Ampère's discovery of electromagnetism as a bridge between mind and matter.

The Ampère discovery was similar to the passing discontinuity from F to G, as was the "devil's interval" that Leonardo da Vinci had discovered in the well-tempered musical system; that is, the poetic singularity taking place in the Soprano and Tenor voices when their voices pass over from the chest register to the head register. Once this process of transformation is understood metaphorically by the scientist, who must also be a musician, the paradox of *change/no-change* can become resolved. Lyndon LaRouche rediscovered and revived the Bach Lydian resolution a century later as the axiomatic means of transforming society in an anti-entropic manner.¹⁸

If one applies the quadratic and biquadratic dynamic of the Lydian voice modulation as Marian Anderson does, for example, in her interpretation of the "[*They Crucified my Lord*](#)", one will begin to understand what sort of dynamics are required among the quadratic composition of electricity, magnetism, heat, and

¹⁸ Musical Manual.

light; this musical example shows how the *unity of opposites* between science and art can be best illustrated.

THE SCIENCE OF ‘PUBLIC FELICITY:’ AMPÈRE’S METHOD OF “CAUTIOUS PROBING” WITH INTERCONNECTIVITY

The new and decisive idea that emerged during the 1820’s and 30’s was a new conception of connectivity of human relationship to nature through the invention of technologies related to electricity and magnetism. The time had come to eliminate the simplistic mechanistic view of Newton and of Descartes about the universe and to replace it with a changing view of how humanity can alter nature through the interconnectedness of artistic and technological progress and spread this new conception throughout the world. This advance required a new epistemological understanding of mankind’s knowledge of itself. The method of “*cautious probing*” with interconnectivity among the different peoples of the world was the crucial new epistemological contribution that Ampère had brought to the new scientific discoveries of that period.

Thus, with his complete classification of human sciences, Ampère contributed to the formation of a new and specific *Zeitgeist* or *episteme* of human relationship to itself and to nature, a sort of social accompaniment to Alexander von Humboldt’s *episteme* of the Cosmos as a whole.

The social epistemology of this period was not characterized, as some historians have claimed, by the opposition of rational, unemotional detachment, and a mechanical ‘clockwork universe’ on the one side and a mystical, romantic, and irrational liberalization on the other side. The deeper epistemological quest was based on the search for a solution to the Cusa paradox of the *coincidence of opposites*, which is the true *science of felicity*. This paradox began to be understood and resolved politically by the Leibniz influenced Monge-Carnot Ecole Polytechnique, which posed the anomaly of paradoxical thinking as the solution to the alternative between internal force and external force; that is, the application of the Leibnizian *vis viva* (living force), as an internal motive force which had the power of correlating the creative activity of the human mind and the potential of the energy-flux-density expressed by the interaction of electricity and magnetism.

Ampère's epistemology is based on what he called an *indirect synthesis* method of “cautious probing” (*tâtonnement*) between attraction and repulsion; because, like Arago and Humboldt, Ampère's intention was to turn the principle of electricity and magnetism into instruments of economic transformation which were to modify the very force they transmitted; that is, by performatively implicating themselves in changing the way people think around them. In other words, the revolutionary method was a performance of transformation of both mankind and the universe we live in. As Schiller put it: “*What doth promise the one, surely the other fulfils.*”¹⁹

Ampère uses four different axiomatic reasoning processes to study the human mind's ability to deal with scientific experimentation: *direct synthesis*, *indirect synthesis*, *direct analysis*, and *indirect analysis*. This quadratic reasoning format is the simplest way to validate scientific knowledge from the standpoint of epistemology and not simply by deductive logic. The “*synthetic*” and “*analytical*” forms correspond to what Lyn had identified as the mental processes of discovery “from the top down” and “from the bottom up,” respectively.

According to Ampère, Newton had discovered his so-called law of gravitation by means of a “*direct analysis*” because he started from simple experimental effects of gravitation and induced his gravitation law from the bottom up; that is what became known as the apple effect. Ampère's method reflected the opposite form of reasoning, that of an *indirect synthesis* of probing, because he started with the hypothesis of interconnectedness from which he derived complicated observations as being adduced from the top down.

Unlike the imperialists Newton and Laplace, whose cold mathematical reasonings were detached from the reality they were studying, Ampère and his associates, were subjectively involved in the outcome of the creative process they were investigating. This new scientific method was for Ampère a barometer of the political climate in France during that period of intense social turmoil (Revolution, Empire, Restoration, and Republic) as it expressed the axiomatic differences

¹⁹ Friedrich Schiller, *Poet of Freedom*, Schiller Institute, New Benjamin Franklin House, New York, 1985, p. 317.

between the mechanical NO-CHANGE tendencies of oligarchical imperialism as opposed to the dynamical CHANGE tendencies of republicanism. Ampère's genius was to establish a road-map of how a human government, concerned with the improvement of mankind as a whole, had the duty to make its people happy; that is, prosperous by focussing on the idea of the general welfare.

If that early period of the nineteenth century represented a renewed attempt at establishing the age of reason by putting at the center of the equation the subjective role of such a transformative form of human consciousness, as an integral part of the scientific experiment, this example of Ampère demonstrates for us today that humanity is finally ready and willing to internalize such an axiomatic change for the benefit of the whole of mankind, as an echo of the American System and an early precursor to Roosevelt's Bretton Woods and to LaRouche's New Bretton Woods. The geopolitics of two British instigated World Wars prevented humanity from accomplishing such a purpose during the entirety of the twentieth century, and in so doing, they have brought the world to the brink of a Third World in the Twenty-first century. However, mankind is now finally ready to make a successful attempt at a time when it is confronted with a similar technological potential that LaRouche proposed with his economics of the World Land-Bridge with his Four Laws applied to the Four Powers of a new Renaissance.

The condition for such a project to be successful is reflected in how to consider the internal connectivity of Africa as a whole. If that new Bretton Woods policy can become reality today under the condition of exoneration of Lyndon LaRouche in the United States, it can only be realized as well, and for the same reason, under the condition of developing Africa as the moral pivot of world development. As David Cherry and Ramasimong Tsokolibane demonstrated in EIR, interconnectivity of the whole of Africa with high speed railroads will set the pace for the required infrastructure throughout the entire continent and the rest of the world. They reported:

“Railroad planners, specialists and government officials met in Kenya, April 10-11, 2019 under the aegis of the African Union Development Agency (AUDA, formerly NEPAD) to chart the way forward for

construction of the African Integrated High-Speed Railway Network, a system to connect all 54 national capitals and all major economic centers on the African continent. This objective is meant to be achieved by 2063.

“A modern, integrated Africa-wide system is visionary. But the plan approved by the African Union (AU) transport ministers in Malabo, Equatorial Guinea in 2014 goes even further. It specifies a *high-speed* rail system – the ‘HSR’ in AIHSRN. ‘High-speed’ is defined by the AU as a design speed (maximum speed) of at least 240 kilometers per hour (150 mph). Most trains in Africa today run on tracks of one of the old colonial narrow gauges, and most can only travel at 50km/h (31 mph), or even less. This proposed jump from today into tomorrow is what China calls technological ‘leap-frogging,’ and the AU has adopted the concept. Perhaps the last shall be among the first.”²⁰



²⁰ David Cherry and Ramasimong Tsokolibane, [African High-Speed Rail Finance Requires LaRouche Four-Power Pact](#), EIR, June 28, 2019.

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“Al Boraq,” in Morocco, inaugurated in November 2018, can travel at 320 km per hour (200 mph) and is the only high-speed train in Africa.

Similarly, Ampère’s theory of internal connectivity of *interacting relationships* among human beings was for him as concrete and real as the physical fluid substances he was experimenting with in his laboratory. His approach was so bold that he constantly invented new concepts and new words to express them. For instance, he attempted to develop a Leibnizian science of *public felicity*²¹ which Ampère called *Coenobology*; that is, the science of the common good: “from the Greek *κοινός*, common, and *όλβος*, happiness; the two together, *κοινολβια*, meaning public felicity.”²² In other words, a science of the prosperity of a population starts with global connectivity within itself, including the understanding of “Life, Liberty, and the Pursuit of Happiness.” Ampère summarized his new concept as follows:

“The comparison which the preceding science [*Coenobology*, PB], which is derived from the social state of the various nations, leads us to recognize among the circumstances in which they can be found, those which contribute to the prosperity of each and those which harm it. Then, one can search for the causes that led to these circumstances, which have, for example, made the inhabitants of one country more active or those of another country more lazy, or made them educated or ignorant, and thinking or not about their future and that of their children, or what made them stop working as soon as they had enough to live for a few days, and that they

²¹ The original French text of Leibniz’s « *Felicity* » was published in G. W. Leibniz, *Textes inédits*, d’après les Manuscrits de la Bibliothèque provinciale de Hanovre, publiés et annotés par Gaston Grua, Tome II, Presses Universitaires de France, 1948, pp. 579- 584. Leibniz wrote: « **FELICITY is a durable state of pleasure and satisfaction: joy.** However, several pleasures, especially the more sensual, cause pains that are much greater and last much longer in their wake, or block greater and longer lasting pleasures. The role of wisdom is to provide us with the true means and the necessary precautions and distinctions to acquire Felicity. We must distinguish between joy and pleasure: one can have joy in the midst of pains; we must also consider that joy is always accompanied with contentment, but it says something more. That is why our joy and our pleasure must not have unpleasant aftermaths and must not plunge us in a greater and longer sadness afterwards. It is that selection of joys and pleasures, and of the means of acquiring them, by avoiding sadness, which represents the science of Felicity. Several pleasures, mainly the more sensual, cause much greater and much longer pains or block access to greater and more durable pleasures. This is why moderation must be advocated. On the other hand, there are pains, which are extremely useful and instructive. Thus, it is in such choices and in the means of obtaining or avoiding them that lies the science of Felicity.” (Translated by PB.)

²² André-Marie Ampère, Op. Cit, p. 126.

returned to work only as the needs of the moment reminded them, that made them realize they had duties to fulfill, or only motivated them to satisfy their inclinations.

“This is how slavery, or a state which differs little from it, was established. These are the circumstances which are conducive to more or less freedom, which are more or less in keeping with the dignity of humanity and more or less favorable to its happiness.

“Finally, what are the causes which have brought the immense fortunes of some families, and the misery of the greatest number? These are the subjects to be studied by that science to which I gave the name of *Coenolbogenic*, which not only justifies what has been observed in statistics and which is explained by *chrematology*, and is studied comparatively and is reduced to its principles in comparative *coenolbology*, but which also helps you discover by which means it is possible to gradually improve the social state and eliminate all the causes which maintain the nations in a state of weakness and misery.”²³

This is what Ampère called *political economy*, or *social economy* and this is where he was best able to apply his *cautious probing* principle of attraction and repulsion. However, the power was not given to him to give advice on how to apply such science to improve mankind. Discovering the knowledge of mankind is not only discovering the instrument of research within the work itself; it is also discovering the cause within its effects, the relationships of the human mind to other minds and to the universe as a whole, and the conformity with the causal action of its Creator. It is up to the wise statesman to implement such a policy.

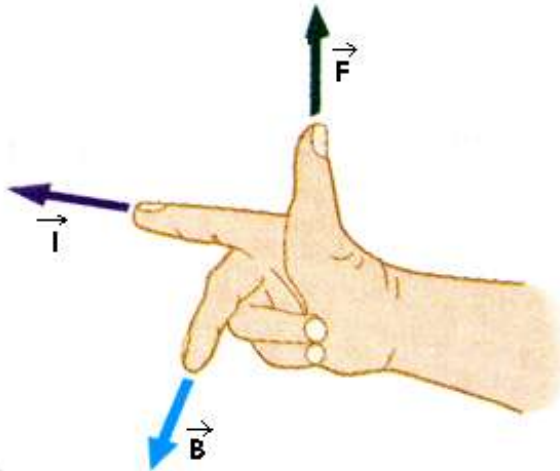
What most physicists of his day missed in that original experiment of Oersted, and what only the genius of Ampère could discover and make you discover, is that the circular motion of the magnetic needle acting at right angle to the electrical current was ironically similar to the Newtonian assumptions that gravitation was acting as straight line action between two bodies. The UK Royal Society belatedly accepted the idea of electro-magnetism in 1828, when they nominated Ampère as an honorary member of their association. All of Ampère's gyrating motions of electro-magnetism in the solar system were made to appear

²³ André-Marie Ampère, Op. Cit, p. 126-127. Deuxieme livre [IRIS](#).

coherent with Newton's idea of straight-line action at a distance, except for the fact that they were providing an axiomatically superior epistemological approach to the British understanding of gravitation.²⁴

THE EPISTEMOLOGICAL SIGNIFICANCE OF THE RIGHT-HAND RULE

Imagine yourself holding an electrical wire in your right hand with your thumb pointing upward. Separate the thumb and first two fingers of your right hand in such a manner that all three fingers form right angles among each other: your middle finger indicates the direction of the magnetic field, the index finger marks the direction of electrical field, and the thumb represents the direction of the moving current. The idea can be illustrated graphically by constructing two inverted cones of light and of shadow. Look at the Carlos de Hoyos video of [Ventanas al cielo](#) with the right-hand rule in mind. The image can be found at 12:46/40:20.



In the illustration of [Ventansa al cielo](#), de Hoyos captured the beautiful geometry of a double inverted cone in alignment with the light and shadow of the wall and with the whole building at the base of the window overlooking the courtyard; that is, by connecting their inversion singularity at a right angle (90 degrees) to that alignment in much the same way that changes occur in the polarization of light, in electrodynamics

more generally, and in the homopolar transformation processes of galactic jets generated through interstellar space.

²⁴ Magnetism and gravitation are two different forces. The gravity between two objects is reduced by a factor of four when the distance is double. In the case of magnetism, the difference in reduction is a factor of sixteen.



Double-cone of light and shadow from [Ventanas al cielo](#)



Artist illustration of galaxy with jets. <https://www.spacetelescope.org/images/heic1511a/>

The principle which unites faith and reason or shadow and light, is much like the Ampère principle of the transverse electromagnetic wave where axiomatic changes of light waves are generated at right angle to each other through the singularity of an inversion between attraction and repulsion. The point is that this is how an axiomatic transformation of the human mind also takes place by inversion and at right angle. That's what happened with the coming together of the inverted cones of light and shadow at the corner's edge of the window level of the building in the courtyard of [VENTANAS AL CIELO](#).

THE ACQUISITION OF HUMAN KNOWLEDGE AS A QUADRATIC PROCESS

Ampère's epistemology can be found in his study of a classification of the different arts and sciences and their applications to a well-organized national or international educational system; it is the underlying principle of such an ordering which is important to understand, for my purpose here, because it defines a principle of good governance centered on the mature role of human society in the universe we live in.

Aside from establishing a classification for the different aspects of sciences, Ampère developed an important method for studying the pathway by means of which one can learn to discipline the human mind as an interconnected social being; it is that last aspect of his epistemology that is essential for statesmanship and for peace in the world today. In the first part of his Essay, Ampère made the following autobiographical point:

“During the spring of 1830, I completed a classification similar to the one I am presently publishing for the sciences that I call “cosmological;” that is, relating to all existing beings in the universe. It was only a short time later, during the same year, that I thought of classifying the sciences relative to the study of the mind and of human societies, which I designated in that work by the name of *noological* sciences. [...]

“I therefore adopted the division of all of our knowledge into two domains: the one including all of the truths relating to the physical universe; the other everything relating to the domain of the thinking process.”²⁵

In other words, what Ampère is saying is that during the same year, 1830, he was investigating the common principles relating to both the physical universe and the mental domain from the vantage point of causality through which human reason is able to arrive at a *unity of opposites* as in the case of an experiment in electromagnetism. And then he added: “...but I needed intermediary subdivisions in order to see how I could form, in each domain, a natural series which displayed the more or less intimate relationships which existed between them.”²⁶

Ampère was always sitting on Leibniz's shoulders looking beyond for an unspoken *coincidence of opposite* underlying his method. The general classification he ultimately chose was made up of three main categories of knowledge: 1. *Pedagogy*, relating to education of human populations; 2. *Technesthetics*, relating to the knowledge of nations; and 3. *Nomology*, which deals with *political economy* or what he also termed *social economy*.

In all of Ampère's works, there is something which is perplexing and exciting at the same time, because he always makes you look into your own mind after making you first look into his, where he invites you to discover the existence of a permanent relationship between four levels of human thinking: a discovery which he compared to four periods of education of a child growing up in accordance with the following progression:

“And with regard to the four epochs and the four subordinate points of view, is it not equally obvious that the period when the child knows only

²⁵ André-Marie Ampère, [*Essai sur la philosophie des sciences, ou, Exposition analytique d'une classification naturelle de toutes les connaissances humaines*](#), Mallet-Bachelier, Paris, 1856 Première Partie, p. XII. [IRIS](#). In that sense, Ampère is a precursor to Vernadsky in establishing the power of the noosphere.

²⁶ André-Marie Ampère, Op. Cit., p. XV. Translations by P. B. Ampère's son, Jean-Jacques, wrote the following about his father's classification of human knowledge: “It contains all of the sciences of human thinking, everything which pertains to the intelligence of a human being, to his actions and to the products of that intelligence. It completes the encyclopedic circle that a steady hand has traced with such an infallible compass that it demonstrated how the great geometer and the immortal physicist had set his sight everywhere all human meditation could reach, in such a manner that nothing from the totality of human knowledge had been left out of this mind whose embrace had dominated everything.” (Seconde Partie, p. V-VI.) [IRIS](#).

what *appears* to him, either outside or inside of him, corresponds to the point of view in which we are concerned only with what is presented to the immediate observation, whether internal or external, of the *world* and of the *mental process*; that the next epoch, where he discovers the existence of bodies and that of thoughts in beings different from himself, corresponds to the point of view of the sciences whose purpose is to discover what is hidden behind these same objects; that the third epoch, when the child, through the labor which he devotes himself to understanding the language of those around him, is led to compare, to classify objects, to observe his thought internally, and, as his reason develops, to deduce from the truths which it knows from other truths which do not necessarily follow as a consequence, represents an analogy very easy to perceive within the sciences, where one also deals with comparisons and classifications; that, lastly, the last epoch corresponds in the same way to the fourth point of view, since the means employed in it, both to ascertain the truth of the *facts* and to explain them, are also founded through the chain of causes and effects.

"This analogy is the result of the very nature of our intelligence; for the scientist necessarily does, and can only do with the study of the physical or intellectual object to which he is devoted, what all men do through the successive acquisition of their knowledge.

"But, as I have already said, the classification of faculties and of intellectual facts is something completely different from the classification of knowledge itself, and that is why one would construct the most erroneous idea of what I have just said, if one were to imagine that I intended to relate the different groups of sciences, as defined in this work, to the different epochs of which I have just spoken [that of a child's education, PB].

"It is obvious that no science can exist for a child before the acquisition of language, and it is, therefore, only during the last two steps that he is capable of dealing with a science or of any art. Generally speaking, the child is only capable of acquiring such knowledge, when the four kinds

of conceptions indicated in the note at the end of this preface are united together. So, the situation is such that the consideration of the steps to which the various kinds of conceptions which compose human knowledge must not be included in any way into the studies relating to the classification of this knowledge.”²⁷

The reason why those two sets of different quadratics are not connected is because each of the four levels of the child's development is a transfinite level relative to the previous level, while the classification of faculties and of ordinary intellectual facts are not of a transfinite character. That is the axiomatic difference between the two domains, and that is why they cannot be compared. The analogy, however, can only be considered from the standpoint of an incommensurable proportionality between the evolution of the mind and the noetic character of human knowledge, but not with the classification of such knowledge.

There are two types of classifications, one is artificial and the other is natural. The natural one is better because it is based on the nature of the objects to be classified rather than on the human intelligence capable of assimilating them. It is that natural classification which is the more complete process, even though it has to be modified every time a new element is introduced. Ampère associated this principle of classification to a science which he called *mathesiology*, which is a first attempt at creating a science that LaRouche had identified as a transfinite ordering. Ampère's ordering of the quadratic classification was as follows:

“Whatever the object of his studies, man must first assemble the facts, whether physical, intellectual, or moral and it is then necessary for him to seek what is in a way hidden under these facts. It is only after these two kinds of investigations, which correspond to the two subordinate points of view included in the first principal point of view, that one is able to compare the results obtained up to that time, and deduce from them the general laws; that is, the comparisons and the laws which belong also to the third subordinate point of view. Then, the investigator can go back to the causes of those facts which he observed under the first, which were analyzed under

²⁷ André-Marie Ampère, Op. Cit., pp. XXIV-XXV. [IRIS](#).

the second, and compared, classified, and reduced to general laws in the third: this search for the causes of what he has learned in the first three points of view, and that of the effects which must result from known causes, constitutes the fourth subordinate point of view, and thus completes all that is possible to know about the object we are studying.»²⁸

At this fourth level, which he identified with the level of *mathesiology*, Ampère discovered that the transfinite progress of human thinking corresponded to the degrees of development of the mind of every human child. Thus, Ampère had reached that higher transfinite hypothesis by relating the physical domain to the mental domain through his crucial discovery of electrodynamics, which represented the hypothesis of the *unity of principle between mind and matter*. A few pages later, he referred to the following autobiographical circumstance in which he had made the crucial discovery of the dynamic unity between electricity and magnetism:

“From 1819 to 1820, I was commissioned to give a philosophy class at the Faculté des Lettres de Paris, in which I developed my ideas on the general classification of intellectual facts. I had already written up the main results of my work on this subject in a *psychological chart*, which I had printed and distributed copies of to a small number of friends, reserving the right to discuss these higher matters at a later date in a special report. But then, Oersted’s discovery of the action exerted on a magnet by a wire where an electric current is introduced (which led me to discover the reciprocity of action that two of these wires exert on each other), forced me to abandon the psychological work of which I have just spoken, in order to dedicate myself entirely to the experiments and calculations that I have published on this reciprocal action. I hope I can one day resume this interrupted work; but I thought it my duty to present, in what I have just said, an outline which may perhaps serve to show more clearly to what extent the classification of the

²⁸ André-Marie Ampère, Op. Cit., 1834, p. XIX. : [IRIS](#).

sciences and of the arts, which I am about to consider, is based on the nature of our intelligence.”²⁹

Then, Ampère added the following quadratic classification for human society as a whole:

“The first division into two domains is obviously acceptable to everyone. As for the subdivision of the whole domain of knowledge into four sub-domains, it will require some further justification, because as a whole they relate to the four great orientations of an educated society: 1) Ecole Polytechnique and applications; 2) Natural Sciences and applications (agriculture) with Medical Sciences (veterinary); 3) Philosophy and Arts and applications; and 4) Historical Sciences and applications (Justice, Military, and Government).”³⁰

Ampère followed such a quadratic *power of two* form of division throughout his entire work as if he were creating a musical composition based on the quadratic Lydian divisions of the musical octave as J. S. Bach had discovered in the well-tempered system. No doubt, such a musical quadratic division is reflective of this process and the most important construction of music that a child can learn at a very early age. Such a process can only remind us of how a student makes a discovery along the lines of the Monge Brigade pedagogical principle.

Finally, the reader may wish to consider that for a human action of axiomatic change to be recognized as being completed (that is, not to be considered mentally quadriplegic), the four following steps are required to complete its transformation process:

- 1) The first is to have the will to execute a definite change for mankind;
- 2) The second is to be conscious of that willful action;
- 3) The third is to design the pathway for execution of the change;
- 4) The fourth is to execute that triple action into completeness.

²⁹ André-Marie Ampère, Op. Cit., pp. XXV-XXVI. <https://iris.univ-lille.fr/handle/1908/911>.

³⁰ André-Marie Ampère, Op. Cit., pp. 239-240.

This quadratic process, however complex it may be for completing the passing from one manifold to another manifold, is considered as a fundamental individual human right.

CONCLUSION

For Ampère the singularity of the relationship between electricity and magnetism was such that if the Earth was able to orient the magnetic needle to the North Pole, so was electricity. Here, the difference in outlook with European imperialism was such that it demonstrated how discoveries of principle were made from the top down and never from the bottom up; that is, from the end purpose of intent. This is how Ampère explained the principle of his own discovery:

“The days when several phenomena previously considered separately as being generated from different causes, were almost always associated with the discovery of new facts, because a new way of understanding causality suggested a multitude of experiments and explanations to be verified. This is how the identity between galvanism and electricity, demonstrated by Volta, was accompanied with the construction of the battery and was followed by all sorts of other discoveries that such an admirable instrument had generated.”³¹

Once Ampère realized that an electrical current, that is, electricity in motion, was able to move the magnetic needle, it became obvious to him that the same “attraction” had to take place between two electrical currents because this is how the mind works. The question is: “Why didn’t Oersted see that?” The answer is simple: “He was not looking for it.” Friedrich Schiller asked the same question about Christopher Columbus; and Columbus found it because he was looking for it, and so it was for Ampère:

*Steer, courageous sailor! Although the wag may deride thee,
And the skipper at th’ helm lower his indolent hand.
Ever and ever to th’ West! There must the coastline be,
Lies it yet clearly and lies shimm’ring before thine own ken.
Trust in the pilot God and follow the silent ocean!*

³¹ André-Marie Ampère, [*Theorie des phénomènes électrodynamiques, uniquement déduite de l’expérience*](#), Mequignon-Marvis, Paris, 1826, p. 131.

*Were it still not, 't would climb now from the torrents aloft.
Genius stands with Nature in everlasting union:
What doth promise the one, surely the other fulfils.³²*

IN MEMORY OF MY FRIEND GENE SCHENK

Gene Schenk had four impulses that resonated like Lydian intervals,
First, he willed something for the benefit of others;
Second, he made that benefit accessible for anyone who wished to hear;
Third, he drew the difficult path that led to the execution of that benefit; and
Fourth, he executed it without saying a “mumbelin word.”

FIN

³² Friedrich Schiller, *Poet of Freedom*, Schiller Institute, New Benjamin Franklin House, New York, 1985, p. 317.