Pierre Menard, author of the Principia

Based on *Pierre Menard, author of Don Quixote* by Jorge Luis Borges

The visible work left by this scientist is easily and briefly enumerated. Unpardonable, therefore, are the omissions and additions perpetrated by Prof.Henri Bachelier in a fallacious catalogue which a certain daily, whose Quantum tendency is no secret, has had the inconsideration to inflict upon its deplorable readers—though these be few and Mechanistic, if not Newtonian and Aristotelian. The true friends of Menard have viewed this catalogue with alarm and even with a certain melancholy. One might say that only yesterday we gathered before his final monument, amidst the lugubrious cypresses, and already Error tries to tarnish his Memory… Decidedly, a brief rectification is unavoidable.

I am aware that it is quite easy to challenge my slight authority. I hope, however, that I shall not be prohibited from mentioning two eminent testimonies. The Herr Doktor Professor Bacourt (at whose unforgettable seminars I had the honor of meeting the lamented scientist) has seen fit to approve the pages which follow. The Professor de Bagnoregio, one of the most delicate spirits of the Principality of Monaco (and now of Pittsburgh, Pennsylvania, following her recent employment to the international philanthropic Simon Kautzsch Centre, which has been so inconsiderately slandered, alas! by the victims of its disinterested maneuvers) has sacrificed "to veracity and to death" (such were her words) the stately reserve which is her distinction, and, in an open letter published in the magazine Sciencus, concedes me her approval as well. These authorizations, I think, are not entirely insufficient.

I have said that Menard's visible work can be easily enumerated. Having examined with care his science notebooks, I find that they contain the following items:

a) A doctoral thesis which appeared twice (with corrections) in the Physical Review Letters (issues of March and October 1959).

b) A monograph on the possibility of constructing magnetic monopoles within quantum solids "rather as ideal objects created according to convention and essentially designed to satisfy scientific needs" (Nîmes, 1961).

c) A paper on "certain connections or affinities" between the thought of Descartes, Leibniz and Erwin Scroedinger (Nîmes, 1963).

d) A paper on the quantum significance of Radio Observations of Interstellar Hydroxyl Radicals (Nîmes 1964).

e) A technical article on the possibility of improving the game of chess, eliminating one of the rook's pawns. Menard proposes, recommends, discusses and finally rejects this innovation.

f) A monograph on Richard Feynman's Path Integral formulation of Quantum Mechanics (Nîmes, 1968).

g) A translation, with prologue and notes, of Ruy López de Segura's Libro de la invención liberal y sciencia (Paris, 1969).

h) The work sheets of a monograph on George Boole's symbolic logic.

i) An examination of the essential metric system of French science, illustrated with examples taken from Saint-Simon (Revue des sciences Romanes, Montpellier, October 1971).

j) A reply to Stephen Durtan (who had denied the importance of the metric system), illustrated with examples from Stephen Durtan (Revue des sciences Romanes, Montpellier, December 1971).

k) A translation of Kosmos by Alexander von Humboldt.

l) A preface to the Cambridge Atlas of Astronomy (Cambridge, 1976).

m) The work Les problèmes d'un problème (Paris, 1979), which discusses, in chronological order, the different solutions given to the illustrious problem of Achilles and the tortoise. Two editions of this book have appeared so far; the second bears as an epigraph Leibniz's recommendation "Ne craignez point, monsieur, la tortue" and revises the chapters dedicated to Russell and Descartes.

n) A determined analysis of the "scientific customs" of Erwin Schrodinger. Menard—I recall—declared that censure and praise are sentimental operations which have nothing to do with science.

o) A paper on circulant states with positive partial transpose (N. R. F., January 1980).

p) An invective against the theory of Electronic States and Band-Spectrum Structure in Diatomic Molecules (This invective, we might say parenthetically, is the exact opposite of the accepted opinion of Prof. Bacourt . The latter understood it as such and their old friendship was not endangered.)

q) A "definition" of Prof. de Bagnoregio, in the "victorious volume"—the locution is Gabriele d' Annunzio's, another of its collaborators—published annually by this lady to rectify the inevitable falsifications of students and peers and to present "to the world and to Italy" an authentic image of her person, so often exposed (by very reason of her beauty and her activities) to erroneous or hasty interpretations.

r) A cycle of articles along with Professor Bacourt (1986).

s) A manuscript list of verses which owe their efficacy to their punctuation.[1]

This, then, is the visible work of Menard, in chronological order (with no omission other than a few vague articles of circumstance written for the hospitable, or avid, physics journal edited by Prof. Henri Bachelier). I turn now to his other work: the subterranean, the interminably heroic, the peerless. And—such are the capacities of man!—the unfinished. This work, perhaps the most significant of our time, consists of two chapters of the first book of Philosophia Naturalis Principia Mathematica and a fragment of chapter twenty-two. I know such an affirmation seems an absurdity; to justify this "absurdity" is the primordial object of this note.2

Two texts of unequal value inspired this undertaking. One is that philological fragment by Novalis—the one numbered 2005 in the Dresden edition—which outlines the theme of a *total* identification with a given scientist. The other is one of those parasitic books which situate Christ on a boulevard, Hamlet on La Cannebière or Don Quixote on Wall Street. Like all men of good taste, Menard abhorred these useless carnivals, fit only— as he would say—to produce the plebeian pleasure of anachronism or (what is worse) to enthrall us with the elementary idea that all epochs are the same or are different. Those who have insinuated that Menard dedicated his life to writing a contemporary *Principia* calumniate his illustrious memory.

He did not want to create another Principia —which is easy— but *the Principia itself*. Needless to say, he never contemplated a mechanical transcription of the original; he did not propose to copy it. His admirable intention was to produce a few pages which would coincide—lemma for lemma and theorem for theorem—with those of Isaac Newton.

"My intent is no more than astonishing," he wrote me on the 30th of September, 1986, from Bayonne. "The final term in a scientific demonstration—the objective world, God, causality, the forms of the Universe—is no less previous and common than my famed treatise. The only difference is that scientists publish the intermediary stages of their labor in pleasant volumes and articles and I have resolved to do away with those stages." In truth, not one worksheet remains to bear witness to his years of effort.

The first method he conceived was relatively simple. Know Latin well, recover his faith in geometry, fight the plague, forget the history of science between the years 1687 and 1990, be Isaac Newton. Pierre Menard studied this procedure (I know he attained a fairly accurate command of seventeenth-century Latin) but discarded it as too easy. Rather as impossible my reader will

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[1] Professor Bachelier also lists a literal translation of Quevedo's literal translation of the *Introduction à la vie dévote* of St. Francis of Sales. There are no traces of such a work in Menard's library. It must have been a jest of our friend, misunderstood by the eminent scientist.

[2] I also had the secondary intention of sketching a personal portrait of Pierre Menard. But how could I dare to compete with the golden pages which, I am told, Herr Doktor Professor Bacourt is preparing or with the delicate and punctual pencil of Carolus Hourcade?

say. Granted, but the undertaking was impossible from the very beginning and of all the impossible ways of carrying it out, this was the least interesting. To be, in the twentieth century, a distinguished scientist of the seventeenth seemed to him a diminution. To be, in some way, Newton and reach the *Principia* seemed less arduous to him—and, consequently, less interesting—than to go on being Pierre Menard and reach the *Principia* through the experiences of Pierre Menard. (This conviction, we might say in passing, made him omit the personal prologue to Book III of *the Principia* . To include that prologue would have been to create a character—Newton—but it would also have meant presenting the *Principa* in terms of that character and not of Menard. The latter, naturally, declined that facility.) "My undertaking is not difficult, essentially," I read in another part of his letter. "I should only have to be immortal to carry it out." Shall I confess that I often imagine he did finish it and that I read the Principia —all of it—as if Menard had conceived it? Some nights past, while leafing through chapter XXVI—never essayed by him—I recognized our friend's thought and something of his logic in this exceptional phrase: *"Trianguli specie et magnitudine dati tres angulos ad rectas totidem positione datas, quae non sunt omnes parallelae, singulos ad singulas ponere."* This happy conjunction of a spiritual and a physical brought to my mind a verse by Shakespeare which we discussed one afternoon:

Where a malignant and a turbaned Turk…

But why precisely the *Principia*? our reader will ask. Such a preference, in an Englishman, would not have been inexplicable; but it is, no doubt, in a scientist from Nîmes, essentially a devoté of Schroedinger, who engendered Bohr, who engendered Heisenberg, who engendered Pauli, who engendered P.A.M. Dirac. The aforementioned letter illuminates this point. "*The Principia*," clarifies Menard, "interests me deeply, but it does not seem— how shall I say it?—inevitable. I cannot imagine the universe without *De revolutionibus orbium coelestium* or without Maxwell's Equations or the Theory of Relativity, but I am quite capable of imagining it without the Principia. (I speak, naturally, of my personal capacity and not of those works' historical resonance.) The *Principia* is a contingent book; the *Principia* is unnecessary. I can premeditate writing it, I can write it, without falling into a tautology. When I was twenty or twenty two years old, I read it, perhaps in its entirety. Later, I have reread closely certain chapters, those which I shall not attempt for the time being. I have also gone through the alchemical papers, the theological papers, Opticks, the writings at the mint . . . My general recollection of the Principia, simplified by forgetfulness and indifference, can well equal the imprecise and prior image of a book not yet written. Once that image (which no one can legitimately deny me) is postulated, it is certain that my problem is a good bit more difficult than Newton's was. My obliging predecessor did not refuse the collaboration of chance: he composed his immortal work somewhat *à la diable*, carried along by the inertias of geometry and invention. I have taken on the mysterious duty of reconstructing literally his spontaneous work. My solitary game is governed by two polar laws. The first permits me to essay variations of a formal or psychological type; the second obliges me to sacrifice these variations to the "original" text and reason out this annihilation in an irrefutable manner . . . To these artificial hindrances, another—of a congenital kind—must be added. To compose the *Principia* at the end of the seventeenth century was a reasonable

undertaking, necessary and perhaps even unavoidable; at the end of the twentieth, it is almost impossible. It is not in vain that three hundred years have gone by, filled with exceedingly complex events. Amongst them, to mention only one, is the *Principia* itself."

In spite of these three obstacles, Menard's fragmentary *Principia* is more versatile than Newton's. The latter, in a clumsy fashion, opposes to the use of geometrical proofs in the the tawdry provincial reality of his era; Menard selects as his "tool" the geometrical proof during the century of differential geometry, Lie algebras and tensor calculus. What a series of *tremors* that selection would have suggested to Robert Hooke! or John Flamsteed! Menard eludes them with complete naturalness. In his work there are no algebraic flourishes or partial differential equations or spinors or manifolds or Lie derivative*s*. He neglects or eliminates algebraic topological spaces. This disdain points to a new conception of the scientific treatise.

It is no less astounding to consider isolated theorems and propositions. For example, let us examine the proof of proposition XXXI, which deals with finding the position of a body moving at an ellipse at a given time. It is well known that based on the uncertainty principle this decides the debate against position and velocity in favor of the position. Newton was a classicist: his verdict is understandable. But that Pierre Menard's Principia—a contemporary of Heisenberg and Paul Fayerabend—should fall prey to such nebulous sophistries! Professor Bachelier has seen here an admirable and untypical insubordination on the part of the author to the paradigm of his era; others (not at all perspicaciously), a *transcription* of the *Principia*; the Professor Bacourt, the influence of string theory. To this third interpretation (which I judge to be irrefutable) I am not sure I dare to add a fourth, which concords very well with the almost divine modesty of Pierre Menard: his resigned or ironical habit of propagating ideas which were the strict reverse of those he preferred. Newtons' text and Menard's are verbally identical, but the second is almost infinitely richer. (More ambiguous, his detractors will say, but ambiguity is richness.)

It is a revelation to compare Menard's *Principia* with Newton's. The latter, for example, wrote (part one, chapter nine):

Casus Corollarii sextii obtinet in corporibus coelesstibus, (ut seorsum collegerunt etiam nostrates Wrennus, Hookius et Halleius) et propterea quae spectant ad vim centripetamdecrescentem in duplicate ratione distantarium a centris, decrevi fusius in sequentibus exponere.

Written in the seventeenth century, written by the "genius" Newton, this enumeration is a mere rhetorical praise of the inverse square law. Menard, on the other hand, writes:

Casus Corollarii sextii obtinet in corporibus coelesstibus, (ut seorsum collegerunt etiam nostrates Wrennus, Hookius et Halleius) et propterea quae spectant ad vim centripetamdecrescentem in duplicate ratione distantarium a centris, decrevi fusius in sequentibus exponere.

The inverse square law, the *mother* of truth: the idea is astounding. Menard, a contemporary of Thomas Kuhn, does not define the inverse square law as an inquiry into reality but as its origin. Scientific truth, for him, is not what has been proven; it is what we judge to be true. The phrase is brazenly pragmatic.

The contrast in style and method is also vivid. The archaic style of Menard—quite foreign, after all—suffers from a certain affectation. Not so that of his forerunner, who handles with ease the current Latin and geometry of his time.

There is no exercise of the intellect which is not, in the final analysis, useless. A philosophical doctrine begins as a plausible description of the universe; with the passage of the years it becomes a mere chapter—if not a paragraph or a name—in the history of science. (In literature, this eventual caducity is even more notorious). The *Principia* —Menard told me—was, above all, an entertaining book; now it is the occasion for patriotic toasts, geometrical insolence and obscene de luxe editions. Fame is a form of incomprehension, perhaps the worst.

There is nothing new in these nihilistic verifications; what is singular is the determination Menard derived from them. He decided to anticipate the vanity awaiting all man's efforts; he set himself to an undertaking which was exceedingly complex and, from the very beginning, futile. He dedicated his scruples and his sleepless nights to repeating an already extant treatise in an alien tongue. He multiplied draft upon draft, revised tenaciously and tore up thousands of manuscript pages.[3] He did not let anyone examine these drafts and took care they should not survive him. In vain have I tried to reconstruct them.

I have reflected that it is permissible to see in this "final" *Principia* a kind of palimpsest, through which the traces—tenuous but not indecipherable—of our friend's "previous" scientific work should be translucently visible. Unfortunately, only a second Pierre Menard, inverting the other's work, would be able to exhume and revive those lost Troys…

"Thinking, analyzing, inventing (he also wrote me) are not anomalous acts; they are the normal respiration of the intelligence. To glorify the occasional performance of that function, to hoard ancient and alien thoughts, to recall with incredulous stupor the *doctor universalis* thought, is to confess our laziness or our barbarity. Every man should be capable of all ideas and I understand that in the future this will be the case."

Menard (perhaps without wanting to) has enriched, by means of a new technique, the halting and rudimentary art of science: this new technique is that of the deliberate anachronism and the erroneous attribution. This technique, whose applications are infinite, prompts us to go through the Theory of Relativity as if it were posterior to the Treatise on Electricity and Magnetosm. This technique fills the most placid works with adventure. To

[3] I remember his quadricular notebooks, his black crossed-out passages, his peculiar typographical symbols and his insect-like handwriting. In the afternoons he liked to go out for a walk around the outskirts of Nîmes; he would take a notebook with him and make a merry bonfire.

attribute Galileo's Dialogues to Niels Bohr or to Lev Landau, is this not a sufficient renovation of its tenuous spiritual indications?

Endonote

The famous story by Borges *Pierre Menard, Author of the Quixote* deals with a writer that wishes to re-create in the 20th century - word for word - the exact text of Don Quixote. In *Pierre Menard, Author of the Principia* turning Menard into a scientist of the twentieth century that wishes to re-create lemma for lemma Newton's Principia has certainly removed an aura of the magical and the unreal from the original story but has raised the plausibility of such an undertaking close to the definite.

But why precisely the Principia? one may ask. The reason is simple. In some sense the original Pierre Menard's phrasing matches exactly how I feel about the Principia:

> "The Quixote ," clarifies Menard, "interests me deeply, but it does not seem– how shall I say it?–inevitable. I cannot imagine the universe without Edgar Allan Poe's exclamation: Ah, bear in mind this garden was enchanted! or without the Bateau ivre or the Ancient Mariner , but I am quite capable of imagining it without the Quixote . (I speak, naturally, of my personal capacity and not of those works' historical resonance.) The Quixote is a contingent book; the Quixote is unnecessary. I can premeditate writing it, I can write it, without falling into a tautology.

(This contingency in a sense applies to the actual story of Pierre Menard itself so in a sense this re-writing can be viewed as quite ironic.).

The questions raised by Pierre Menard author of the Quixote, have to do with the impossibility of translation, the relativity of thoughts and ideas throughout the human history and the - also relative - deconstructions performed by literary criticism on a certain piece of work. Menard, the scientist, - I want to think -deals with the essential substratum of the history of science in a rather unusual manner. Living in the 20th century and trying to re-live (or re-invent) the scientific revolution of the 17th century strikes not as exactly as something impossible any more, but as a hindsight intellectual activity that may even approach the trivial or meaningless. However there are many interpretations to this Gedankenexperiment so there is certainly room for discussion here, both for the scientific thought as such and the scientific thought compared to other intellectual activities like literature. It is certainly up to the reader to decide the importance and influence of… Menard's work.

I have chosen to keep the original Borges text intact and change just the logic appropriately trying to be as delicate to the handling of the original text as possible. For this I have used the James E. Irby translation and not the Spanish

original, although I must admit that re-working it in Spanish would have been much more interesting.

Dr. Basileios Drolias

basileios@drolias.com

http://ficciones.wordpress.com