



Science *and* Literature:
Imagination,
Medicine *and* Space

Edited by
Kostas Tampakis, George N. Vlahakis

Language editing and formatting
Evangelia Chordaki

DIGITAL PUBLICATIONS 07

ΙΝΣΤΙΤΟΥΤΟ ΙΣΤΟΡΙΚΩΝ ΕΡΕΥΝΩΝ | ΕΘΝΙΚΟ ΙΔΡΥΜΑ ΕΡΕΥΝΩΝ
INSTITUTE OF HISTORICAL RESEARCH | NATIONAL HELLENIC RESEARCH FOUNDATION

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INTRODUCTION ON ANSWERS AND QUESTIONS

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“For an answer which cannot be expressed, the question too cannot be expressed.” Thus urges us Ludwig Wittgenstein, in the famous 6.5 proposition of *Tractatus Logico-philosophicus*, first published in 1921, but translated in English in 1922. Far be it from us to try and explicate the meaning of this proposition in all its glory. A more modest use for the purposes of this introduction, however, would be to ponder a specific answer which cannot be easily expressed, and its accompanying, equally difficult, question: When can we say that an academic field is flourishing? And more specifically, how can we express in objective and unquestionable terms, the belief of the editors of the volume that the field of Science and Literature is flourishing?

Perhaps we should follow the later Wittgenstein and base our belief not in word but in action (Wittgenstein 1969). And indeed, it is hard to ignore how the field of Science and Literature has bloomed if one looks at the thriving journals, such as *Configurations* and the *Journal of Science and Literature*, the conferences from the British Society for Literature and Science, the Society for Literature, Science, and the Arts and the Commission on Science and Literature of DHST/IUHPST and the many outstanding, and too numerous to mention, books that have been produced on the subject. Alternatively, we could focus on the various book series devoted on the subject by publishers and universities alike.

Or perhaps, we could narrow our focus even more, and look at the collection of papers in this volume “Science and Literature: Imagination, Medicine and Space” and in its sister volume, “Science and Literature: Poetry and Prose”. Collectively, these essays represent a range of scholars working in periods from the 18th century to the 20th, in spaces as far apart as Greece, Uruguay, Australia and Trinidad and in topics ranging from quantum physics to the plague. To do so, they bring to bear an equally varied set of methodologies and theoretical apparatus from literary studies, epistemology, philosophy of technology, history of science and psychoanalysis. If we were to use an admittedly biased and situated viewpoint based solely on these two volumes, we would have to conclude that Science and Literature is a vibrant, diverse field where scholars from different disciplines converge. This was certainly true for the first three International

Science and Literature Conferences of the Commission on Science and Literature of DHST/IUHPST, from 2014 onwards, which acted as the springboard for this collection. We expect it will also be true in the future.

Each of the two volumes has been structured around specific themes that we believe link its papers. This was not a conscious decision made from the start, but rather the recognition of leitmotifs that we identified when the articles were placed side by side. For the first volume, the themes are “Imagination, Medicine and Space”. The fourteen papers have been thus grouped in three sections, each corresponding to one of the themes. The first, *Imagination*, is understood not only as an analytical category on its own right, but also as a way forward for the field as a whole. In a way that Wittgenstein himself would probably approve, the articles contained in the section seem to describe possible contours and directions of future research, rather than delineate a strict academic field. A telling example is the first paper by Pauline Choay-Lescar, which discusses exploration and its use in the scientific enterprise and the narratives offered by literary theory. Dustin Hellberg continues the border-straddling tone by examining how the thought of Pierce can bring science and literature to an epistemic concilience. The essay by Charalampos Kokkinos tackles the multifaceted concept of the technological artifact, and how it straddles narratives and fields. Tefkros Michaelides moves from imagination to inspiration, through his analysis of Gödel’s theorem as a source for literary production. The sixth and final paper of the *Imagination* section is by Marion Simonin, who appropriately examines intuition and imagination in the poetry of the Franco-Uruguayan poet Jules Supervielle (1884 - 1960), who was nominated for the Nobel Prize in Literature three times. A nominal opponent of automatic writing and surrealist poetry, Supervielle nevertheless adopted and contributed to much of the panoplia of modernist poetry.

Medicine is a tragically relevant topic in these pandemic times. That it would become such a notorious subject would have surprised us greatly four years ago, when the first papers under the homonymous second section were presented. Life imitates art, it is said, so perhaps Science and Literature can also appear prophetic. Lena Arampatzidou breaks new ground by promoting and delineating the term Medical Humanities, as a way that Medicine and Literature can ‘treat each other’. Aureo Lustosa Guerios discusses the archetypical plague, cholera, in the works of Poe and Pushkin. Denise Pereira examines Luís Cebola’s 1955 *Patografia De Antero De Quental* for a way that poetry can act as a source for psychiatric diagnosis, but also science can add to literary theory. Eleonora Ravizza carefully analyses V. S. Naipaul’s *A Way In The World* to bring to the fore the hybridity of medical and literary discourse, while the final sixth paper of the section by Cristina Vidruțiu and Radu Cucuteanu goes in the other temporal direction and examines how Audoin-Rouzeau, writing under the pseudonym Fred Vargas writes of the plague.

The third and concluding section is *Space*, appearing not only as a geographical denomination, but also as an imaginary *topos* and as the site of a specific activity. Polyxeni Giannakopoulou discusses Science and Literature in 19th century public space, a novel way of approaching their interaction. Panagiotis Lazos and George Vlahakis examine the Greek Philological Association of Constantinople as another site where scientific materiality, in the form of instruments, and public science interacted. The contributions of Rosemary Lucadou-Wells & John F. Bourke discuss the mystery drama film “Picnic at Hanging Rock” (1975) and interprets it as a literary text to discuss the interaction of science and literature. Finally Marion Roussel examines Cyberspace, perhaps the most literary and postmodern of spaces, to shed new light on what happens when “technology grabs cyberpunk”.

The range of essays collected here also presents a host of narrative styles and modes of academic expression. As editors, we made a conscious decision to include and welcome submissions of any length and style, from the most rigorously academic to the more experimental. The contributors to these two volumes hail not only from academia, but are also artists, independent scholars and passionate enthusiasts of local history and art. We believe that one of the strengths of the field of Science and Literature is its interdisciplinarity and multidisciplinary, or even, it’s a-disciplinary. In the future, it may be the case that it has acquired its own formal language and mode of expression. In the present tense, we feel its diversity should be celebrated.

If the reader, after perusing the two sister volumes of “Science and Literature”, identifies topics and themes that remain unexplored or only partially discussed, then this collection of essays has fulfilled one of its goals. Like some of our earlier attempts in navigating the Science and Literature scholarship, these essays are meant to act as a snapshot of the fruitfulness of the field and as a call to action for its still further development (Vlahakis, Skordoulis, Tampakis 2014). Or to go back to Wittgenstein: “Whereof one can speak, thereof one should not be silent”. Does that not entail that, if something is missing in the Science and Literature scholarship, we should strive to speak of it?

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EXPLORATION AS A LINK BETWEEN SCIENCE AND LITERATURE

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The notion of exploration seems to me to be one of the major links between science and literature and therefore an important tool in order to study their mutual influences. The term “exploration” being broad, I have chosen to stick to the definition given by Littré in his Dictionary: “to explore is at the same time to roam and examine the world—or some of its elements—while having discovery as a goal”.

Roaming, examining, discovering the world: those words of course point to all the journeys of exploration that have taken place throughout history from the Renaissance onwards (and long before) and which led to major scientific discoveries. By journeys of exploration, I mean sea journeys, (like those of Cook, Bougainville or La Pérouse at the end of the 18th century, beginning of the 19th), but also land journeys (like that of Lewis and Clark in 1804), or even archaeological expeditions, such as Schlieman’s around the 1870s.

The aims of these explorers—apart from the purely political or economical ones—were to discover and map new lands and spaces, to find new species and open new roads, in brief, to take ownership of the world scientifically. But of course, roaming the outer world is only one side of the coin, because the world is also a property of the mind and directly linked to the power of the imagination. So this huge appropriation of the sea, of the earth, and also of space by science also has its counterpart in literature.

My purpose here is to examine how science and literature act and react with one another on the front of exploration, or how, if science offered the literary mind a huge field of investigation, literature in its turn offered science an impulse and a vision.

I will first show the influence of science on literature. Or how science can be a source of inspiration, and also a metaphor, a tool or a method according to the different literary genres.

Then I will show that if literature has been inspired by science, science and scientific explorations have also been very much influenced by fiction and imagination.

And finally, I will consider the common goal of science and literature which is the conceptual creation of the world/word.

Last thing: I will essentially concentrate on the 19th century—a time of great scientific discoveries, the period of the industrial revolution and an intersecting period between the rationalism of the Enlightenment and the passion of romanticism.

Many romantic French, English and American writers were inspired by scientific feats particularly through the glory and poetry of exploratory journeys. Chateaubriand for instance, shows how the sight and testimony of the great explorers coming back to Europe was for him a huge source of imagination and inspiration. As he writes in his *Mémoires d'Outre-Tombe (Memoirs from beyond the Grave)*:

When the Comte de Boisteilleul drove me to Mr Hector's, I would listen to young and old sailors tell about their sea journeys and talk about the countries they had explored: this one had just arrived from India, the other from America; that other one was about to leave for a voyage around the earth (...). My Uncle showed me La Pérouse in the crowd, the new Cook whose death is the secret of storms. I would listen and watch without uttering a single word; but the following night, no more sleep; I would spend it waging imaginary wars or discovering unknown lands..."¹ (Chateaubriand 1989-1998, t. 1, l. 2, ch. 8, 189-90).

Same for Samuel Coleridge also who, after having listened to his father's stories of planets and stars transformed these stories into poetry. For him indeed, poetry, as in *The Rhyme of the Ancient Mariner*, appears as an exploratory journey on unknown and unmapped seas. We could also mention Walt Whitman who grew up with the idea of exploration and progress and who ended up transforming the technological advances of his time into poetry. Whitman uses science as a source of inspiration and a metaphor. The metaphorical road which haunts the pages of *Leaves of Grass* is indeed the road leading to the discovery of the universe, but it is also the interior road guiding us towards the knowledge of the self. Like Thoreau who in *Walden* exhorts the reader to be "a Columbus to whole new continents and worlds within you, opening new channels, not of trade, but of thought" (Thoreau 1967, 522), Whitman also yields to the temptation of the interior journey, of the exploration of the "limitless small continent" (Whitman 1973, s. 1, v. 8, 382) which constitutes his being. Whatever the road, 'secret paths' 'highways' or 'oceans', it is always a passage, a transition which allows the reader to reach a higher level of knowledge, a place also where space and time meet as in the case of the numerous literal or metaphorical bridges permitting the poet to reach the future.

In a poem like "Passage to India", and also in other poems like "By Blue Ontario's Shore" or "Song of the Exposition", Whitman celebrates the great achievements of the science and technology of his time, the Suez canal, the railroads spanning the new world, the cable across the Atlantic...("the earth to be spann'd, connected by network, /(...)/ The oceans to be cross'd, the distant brought near, /The lands to be welded together...") (Whitman 1973, s. 2, l. 32-35, 412). The whole poem is about spanning, linking, crossing and gradually we understand that all these images eventually lead to the link between the outer universe and the inner self. So, we start from "engineers, explorers, voyagers",

1. My translation.

i.e. science, to finally reach “more than India”, namely the soul. Science, which is able to link the parts of the world together serves here as a model and a metaphor. To the scientific feats of Whitman’s time, we could also add the recently elaborated science of geology, which was fundamental to the poet (he adhered to Lyell’s evolutionist theories about the earth) and which he also used as a metaphor. As he says: “The science of language has large and close analogies in geological science, with its ceaseless evolution, its fossils and its numberless submerged layers and hidden strata, the infinite go-before of the present” (Whitman 1872, vol. II, 577). Whitman transforms his reader into a geologist who, through the act of digging, into his book /palimpsest, will eventually be led to discover the various strata of his evolution and what the poet has wished to keep hidden on the one hand, while at the same time longing for these intruders, his readers, to attain the “folded removes and far recesses” of his thoughts.

If science is a metaphor, it is also a tool that allows literature to reach an unmapped territory which implies the crossing of a threshold. It is beyond that threshold that lie the scientific utopias, parodies and the various works of ‘science-fiction’ of the 19th century (although the trend started at least two centuries before). Science here is both a way to reach another world through various means of transportation, and a way to transform, interpret or criticize reality. And the evolution of society—since many writers of the 19th century, although fascinated by science (which eventually was going to reveal the secrets of the natural world), distrusted man’s ability to use it for honorable purposes (see for instance Mary Shelley’s *Frankenstein* (1818), built as a pseudo-scientific narrative, but very critical of the dangers of the pursuit of science for the good of humanity). Many utopias of the period are presented as exploratory journeys into unknown lands, allowing the narrator to investigate, criticize or satirize the questions raised by the scientific controversial issues of the time. Such is the case for instance in Samuel Butler’s *Erewhon* (1872)² which takes place in an unknown colony surrounded by an important range of mountains through which the narrator—as the explorers—tries to find a pass in order to discover and explore what lies beyond. The description of the country “beyond the range” allows him to discuss the most famous scientific issues of the second half of the 19th century, namely evolution and natural selection. Indeed, in one of the chapters entitled “The Machine Book” he develops a theory similar to that of Darwin but which he applies to men and machines, showing that man is a machinate mammal whose limbs lie about in detached pieces all over the world, thus creating a dependence which might lead to a degeneracy of the human species. Butler was one of many writers whose works were directly inspired by Darwin’s *Origin of Species* (1859),

2. Samuel Butler was one of the most interesting and representative of the literary men of that period. In a series of essays published in 1909 under the title *Darwin and modern Science*, one of the authors, Professor Bateson, quotes Butler’s scientific books several times and says: “he is the most brilliant and by far the most interesting of Darwin’s opponents.”, (Seward 1909, 88).

the new Bible according to some, that they would often turn into ridicule. These works were so numerous that we can even speak of a flood of evolutionary utopias³.

These scientific utopias are in a way linked to an older tradition of parody and satire which can be found for instance more than a century earlier in Jonathan Swift's parody of a traveler's tale, *Gulliver's Travels* (1721), which denounces with great humor the folly resulting from the blind pursuit of science. These parodies may also be associated to another literary genre, namely the hoax at once similar and different. For if parody implies a critical distance to science, the hoax on the contrary marks an appropriation of science by literature through an attempt to deceive the audience. One of the most famous hoaxes of the period is Poe's *The Balloon Hoax* which appeared in the *New York Sun* in 1844 and which was so full of accurate scientific details, especially about the lighter than air balloon propulsion, that everybody believed it to be true, namely that "the air, as well as the earth and the ocean, have been subdued by science" (Poe 1983, 71).

Indeed, if many of these imaginary worlds could be reached through exploratory journeys on foot—or by sea—many others, and especially those which take place in space required tools to leave the earth, that ranged from time-machines as in H.G. Wells to space ships, to balloons or cannons as in J. Verne's *From the Earth to the Moon*, thus allowing humans to invade space as they had invaded—or were still in the process of invading—the earth.

But science was not only a source of inspiration, a metaphor and a tool for literature: gradually, the scientific method itself also invested the literary field.

The spirit of scientific explorations radically changed around the middle of the 18th century. Under the influence of learned societies (headed by people like Buffon or Charles de Brosses), the idea emerged not only that governments should finance and organize exploratory expeditions but also that scientists should be part of those expeditions. Bougainville first, but mostly Cook and La Pérouse were the first 'modern' travelers who took aboard their ships many renown scientists covering a great range of disciplines (naturalists and botanists such as Joseph Banks and Daniel Solander, astronomers such as Joseph Billings, hydrographers such as Beautemps-Beaupré...). The narratives of these journeys were systematically published⁴, thus enabling a large public

3. Such is the case for instance for Thomas Love-Peacock who, in *Gryll Grange* (1860) mocked the recent development of science and the sudden interest people had taken in conferences and courses. We could also mention Bulwer Lytton – Lord Lytton – whose *Coming Race* (1870) showed many similarities with *Erewhon*, if only because it shared the same preoccupations: the theory of evolution forms the basis of the book in which the "Vrilias", thanks to the struggle for life and to that new scientific discovery due to Faraday—electricity—have become a superior race possessing control over nature. But the common ancestor, instead of being a monkey is a gigantic frog.

4. Louis-Antoine, de Bougainville. 1771. *Voyage autour du monde par la Frégate du Roi La Bouteuse et la Flûte l'Etoile en 1766, 1767, 1768, & 1769*. Paris: Saillant et Nyon. James, Cook, *A Voyage to the Pacific Ocean: undertaken by the command of his Majesty for making discoveries in the Northern Hemisphere*. London: W&A Straham. *Voyage de La Pérouse autour du Monde. 1797*. Publié conformément au décret du 2 avril 1791 et rédigé par M.L.A. Milet-Mureau. Paris: Imprimerie de la République.

to have access to scientific discoveries. During this period, scientific knowledge really started invading the public domain.

Literature took hold not only of science and scientific discoveries but also of the scientific method (observation, experiment, testing of hypotheses) to explore the universe and its laws in order to express with extreme precision and rigor the infinite and the unknown. In a way, for some writers at least, imagination and inspiration gave way to objectivity, methodology, empirical ideas. Thus, Wordsworth—who, with Coleridge revolutionized the world of poetry with the publication of *Lyrical Ballads* in 1798—depicts his poems as ‘experiments’ and writes further that “they were written chiefly with a view to ascertain how far the language of conversation in the middle and lower classes of society is adapted to the purpose of poetic pleasure”, (Wordsworth, Coleridge 1969, 3). Poetry here appears as a sort of experimental mathematical equation between metrical arrangement and powerful feelings. Even though *Lyrical Ballads* was not directly linked to exploratory journeys, it was nevertheless influenced by the scientific spirit of discovery which had invaded the century and which was largely the consequence of those travels around the world.

Edgar Allan Poe, whom Paul Valéry called ‘the literary engineer’, was also very much under the influence of this scientific spirit of discovery as he attempted to explore the inexpressible, through a poetry which, according to his own terms is both a ‘construction’ and an ‘operation’. In an essay entitled *The Philosophy of Composition*, written in 1846, Poe explores the mechanism behind the writing of a poem, taking the example of “The Raven”. In a way, as he says, he allows the reader to take a peep behind the scenes, something most writers would rather avoid doing since most of them would prefer the world to think that they compose in a sort of ecstatic intuition. Instead, Poe proceeds to detail step by step the process by which a composition attains its ultimate point of completion, with “the precision and rigid consequence of a mathematical problem” (Poe 1846, 163). He starts with what he calls “the intention”, demonstrating, to use his own terms, how the extent of the poem should be extremely brief: “the poem must be made to bear mathematical relation to its merit. The brevity must be in direct ratio of the intensity of the intended effect” (164), concluding that the poem should be 108 lines long exactly.

The scientific method in literature also greatly influenced French writers such as Emile Zola for instance who founded the naturalist school and whose model was Claude Bernard’s work on experimental medicine (*Introduction à l’étude de la médecine expérimentale*, (*Introduction to the Study of Experimental Medicine*)) published in 1865. For Zola, who rejected the romantic taste for fancy and imagination, the purpose of literature was to examine, as a scientist (a physiologist) would, the social relationships between people and the laws of heredity and environment that determined them. His starting point was, as he said, to “study the temperament and the deep modifications of the (human) organism under the pressure of the environment and the circumstances”⁵ (Zola

5. My translation.

1971, 7-11). Using the methods of positive science, his aim was to reproduce reality in all its aspects, with as much objectivity as possible. Talking about scientific analysis, he further claimed that he would use “the modern method, the universal instrument of inquiry which this age uses with such ardor to herald the future. (...) I have simply done on two living bodies the analytical work which surgeons perform on corpses”. Obsessed with the medical model of Claude Bernard and with the misery created by the impact of the industrial revolution in cities, Zola invented a new sort of novel in which the writer is a scientist and the text the image of an ailing body.

Now, if literature was inspired by science, on the other hand, science was also very much influenced by fiction and imagination, whether it be under the form of poetry, mythology or tall tales linked to the exploration of the world, thereby showing the circularity of their relationship. To quote William Blake in *The Marriage of Heaven and Hell*: “What is now proved was once only imagined” (Blake 1981, 184).

We could argue that just as poetry and literature in general took hold of the scientific method to explore the meanings of the words and of the world, conversely science also used the artifices of poetry to convey its message, disseminate and popularize its ideas—at least before the middle/end of the 19th century, a time when science became so specialized and technical that only scholars could have access to scientific works.

As Matthew Arnold said, talking about science and poetry: “interpretations of science do not give us this intimate sense of objects as the interpretation of poetry gives it: they appeal to a limited faculty and not to a whole man. It is not a Linneus or Cavendish or Cuvier who give us the true sense of animals or water or plants, who seize their secrets for us, who make us participate in their life; it is Shakespeare with his daffodils:

That come before the swallow dares
And take the wind of march with beauty (Arnold 1962, 13).

And indeed, such was the case for instance for Erasmus Darwin, writer, poet and naturalist at the same time (much influenced by Lucretius, Ovid and Virgil, but also by Milton and Pope) who, through the use of didactic poetry, managed to convey brilliant new ideas which he was able to transmit thanks to a classical rhetorical framework, familiar to his readers and therefore reassuring. Far from containing only “bare” or “crude” science, the use of didactic poetry implied a wide cultural heritage (which all the cultivated readers of the time possessed), therefore the possibility for the writer to allude to more than its apparent meaning while retaining the possibility to treat science in a social, moral or religious context, thus shaping the attitude of the readers regarding new scientific data. Talking about *The Economy of Vegetation*, Adrienne List in her interesting thesis on *Erasmus Darwin and the Poetry of Science*, argues that Erasmus Darwin uses Lucretius “to encapsulate both the latest discoveries of contemporary science and a sense of the significance of natural knowledge for humanity in a single poetic work” (List 2010, 67). Scientific poetry is both an allusion or a reference to the past and a lesson

opening the gates of the future. But it is also something more. As Erasmus Darwin says: “the poet writes principally to the eye”, therefore creating visual trains of thoughts and triggering new ideas. The mere beauty of the verse, the metaphors, similes, heroic couplets—the whole paraphernalia of classical poetry—helps the reader understand and penetrate the scientific facts, but it also helps him see beyond. See for instance his poem *The Loves of the Plants* (1789) which allows him through the personification of plants not only to deal with the Linnean sexual system of classification among plants but also to treat of human sexuality:

First the tall CANNA lifts his curled brow
 Erect to heaven, and plights his nuptial vow;
 The virtuous pair, in milder regions born,
 Dread the rude blast of Autumn’s icy morn;
 Round the chill fair he folds his Crimson vest,
 And clasps the timourous beauty to his breast (l.39-44. 3-4)

Weak with nice sense the chaste MIMOSA stands,
 From each rude touch withdraws her timid hands;
 Oft as light clouds o’erpass the Summer -glade,
 Alarm’d she trembles at the moving shade;
 And feels, alive through all her tender form,
 The whisper’d murmurs of the gathering storm;
 Shuts her sweet eye-lids to approaching night,
 And hails with freshen’d charms the rising light.
 Veil’d, with gay decency and modest pride,
 Slow to the mosque she moves, an eastern bride
 There her soft vows unceasing vows record,
 Queen of the Bright seraglio of her Lord.-
 So sinks or rises with the changeful hour
 The liquid silver in its glassy tower.
 So turns the needle to the pole it loves
 With fine librations quivering, as it moves. (List 2010, l. 247-262. 25-26, 58)

Moreover, using poetry is also a way to divert the reader’s attention to new and potentially dangerous ideas. Instead of analyzing the scientific content, readers tend to focus on the style and the verse.

Yet, poetry is not only instrumental in helping scientists convey a message and triggering their reader’s imagination: its content—and especially its mythical content—has often been a great source of inspiration for the scientific mind.

As Erasmus Darwin who was inspired and influenced by Milton’s poetry which he used as a model in many poems, so his grandchild Charles also never left his copy of

Paradise Lost while traveling on The Beagle and gathering the elements for his own versions of the origins that would revolutionize the world.⁶

Whether biblical myths of the origins or Greek myths, many a journey of exploration thus stemmed from the desire to confront mythology: we can go as far as to say that scientific truth was—and still is to a certain degree – often obtained through the detour of literature and that going back to the myth can allow the scientist to understand its origin. Hence for instance Schlieman who believed the stories his father had told him about Helen of Troy and who, with his team started digging on the site of Troy, certain that Homer’s poem was describing history. *The Iliad* and also *The Odyssey* have been an endless source of inspiration for novelists, philosophers and scientists alike⁷, so has the myth of Atlantis – invented by Plato to describe what he considered as the model city and used as an example of the degradation of a society – which inspired numerous scientists (mostly geologists, cartographers and various explorers) who set out to discover the lost continent. So, Homeric myths leading to scientific discoveries or Platonic myths sparking endless desires of discoveries, all have had an impact on scientific matters.

Generally speaking, the marvelous—whether mythology or superstition—has always fascinated the public, the explorers and the scientists. The latter often used its literary power as part of their arguments. In *Letters on Natural Magic addressed to Sir Walter Scott (1832)* for example, the physicist and “father of modern experimental optic” David Brewster tried to excite the curiosity of his readers by “detailing the marvelous results of some of the laws of nature” such as specter ships and ghostly effects, which he then proceeded to analyse scientifically. Hence, once again, it is through words, through the mere beauty of the descriptions that scientists can lure the readers into being instructed. As a critic of the time said about the book: “the magic of nature bears a spell in the mere sounds of the words, calculated to captivate those who are most reluctant to enter the temple of science” (London Monthly Review 1832, 23). The ‘temple of science’ seems therefore to be more easily penetrated and explored by those possessing the right tools namely those who are able to manipulate words so as to trigger the imagination of their readers.

And indeed, there is a long tradition of extravagant and fantastical travel narratives going back to antiquity, through the Renaissance and into the 19th century, which precisely fulfill that function. These narratives were extremely popular and despite their being fictional, often served as reference to future explorers who therefore, instead

6. Gillian Beer in her brilliant book *Darwin's Plots : Evolutionary Narrative in Darwin, George Eliot and 19th century fiction*, shows how Victorian novelists and particularly Dickens influenced Darwin's *Origin of Species*, and how conversely he influenced writers such as Thomas Hardy or George Eliot.

7. Plutarch for instance interpreted the 20th book of *The Odyssey* (Ulysses's homecoming) as a metaphorical description of a total solar eclipse, considering the seer Theoclymenus's prophecy about the unlucky darkness invading the world as announcing the phenomenon. The eclipse hypothesis has been studied extensively since that time and especially by the scientists Marcelo O. Magnasco and Constantino Baikouzis (June 24, 2008).

of looking for facts were looking at fiction. Hence again the cyclical detour through fiction. Explorers believed and saw what they chose to see. See for instance the *Travels of Sir John Mandeville* (1371), one of the most popular books of the late Middle Ages, and which, despite its unreliability and fantasy became a work of reference for many famous explorers such as Christopher Columbus or Ponce de Leon.⁸ It relates the travels of an English knight, a fictional pilgrim, through different countries (Egypt, Ethiopia, India among many others), at times showing great accuracy in the geographical data, but most of the time exhibiting an extraordinary talent for fantasy and invention such as when he tells of islands where inhabitants have bodies of humans and heads of dogs.⁹ Similarly, incredible tales of monsters and strange people were published in Portugal throughout the 19th century.

Reading these accounts is often like reading novels of the most imaginative kind and this is particularly true in the case of Arctic expeditions, always surrounded by a halo of mystery. Indeed at the end of the 18th century, beginning of the 19th there was a huge attraction towards polar expeditions—for economic and scientific reasons. England wanted to be the first to discover the famous northwest passage of the North Pole between the Pacific and the Atlantic which would have allowed ships to reach China directly and also the North Pole itself which remained a scientific enigma. At the time, and mostly because of those fantastical narratives, many thought that the pole stood in the middle of a warm sea, free of ice, that would be reached through a path or duct in the ice surrounding it. Some even believed in a hypothetical hyperboreal paradise despite many testimonies to the contrary. The huge popular literature which developed around arctic expeditions served to a certain extent as a lure to entice people into supporting new ventures and had therefore to be colorful and fantastic. This literature can be read as a huge pre-text (or proto text) behind which the final goal disappears. Suffice it to read John Barrow's *Chronological History of Voyages into the Arctic Regions* (1818) to understand the point. Fantastic tales of courage and heroism form the core of his narrative, together with the description of strange creatures such as that depicted by Henry Hudson, sea explorer and navigator, who, while looking for the Northwest passage, discovered the Hudson Bay. He tells of a mermaid that his men saw swimming alongside their ship:

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8. In his introduction to John Mandeville's *Book of Marvels and Travels*, Anthony Bale writes that Christopher Columbus was very disappointed not to see the creatures described by Mandeville on his reaching the New World: "Those undertaking the famous voyages of discovery to the New World could only have expected to meet the marvelous peoples they had read so much about and with whose doing they had become so familiar" (p. XXVII). He further writes that the Spanish explorer Ponce de Leon was looking for Mandeville's fountain of youth, while the conquistador Hernan Cortés was in search of people with dog heads.
9. Many writers were influenced by Mandeville's fanciful travelogue among whom Shakespeare (in *The Tempest*) and Jonathan Swift.

This morning, one of our company looking over boord saw a mermaid, and by that time shee was come close to the ship's side, looking earnestly on the men (...) From the navill upwards her backe and breasts were like a woman's, (...), her body as big as one of us; her skin was very white; and long haire hanging downe behind, of colour blacke; in her going downe, they saw her tayle, which was like the tayle of a porposse and speckled like a macrell... (Barrow 1818, 184).

David Brewster, to quote him again, also reports and shows drawings of strange phenomena, for instance those seen by “Captain Scoresby when navigating with the ship Baffin the icy sea in the immediate neighborhood of West Greenland” (Brewster 1856, 141). He describes extensively what he calls “the enchanted coast”, not an icy empty coast, but on the contrary, a marvelous city with domes and towers.¹⁰ But Brewster's aim is not to lure people into believing in the marvelous but on the contrary to reestablish the truth by analyzing such events from a scientific point of view; in this particular case, he shows that this vision is due to the particular refraction of the light resulting from extreme variations in the temperature of the air.

As Jessica Richard (2003) argued in a remarkable article, the journeys to the pole—which were mostly failures—were inspired not by facts but by desire and imagination. She further proceeds to analyse the relationship between those failed attempts and romance, taking the example of Mary Shelley's *Frankenstein*, whose narration is situated in the 1790s after the failure of four voyages. Stating that in romance “the quest is forever postponed” as in the case of the empiricists for whom “the failure of expeditions proved nothing but that further expeditions were necessary”, she proceeds to demonstrate that the polar narrative which frames Frankenstein's story in Mary Shelley's eponymous novel, is not built on descriptive or positive science—contrary to what Walton the scientist would have liked us to believe—but on an illusion. As she explains:

Polar explorers devoted themselves to this ever elusive quest despite centuries of failed attempts to reach the pole by ship, because they believed in the literature of these attempts, a romance that disregarded the testimony of failed voyages and the odds against the possibility of an open polar sea. (...) The cumulative accounts of these voyages form a narrative of improbable yet perpetual desire, a romance of polar exploration, no less an enterprise of creation than Walton's beloved poetry (Richards 2003, 296).

Furthermore, instead of finding science as was initially the desire of Walton who had set out to discover “the secret of the magnet” among others (“I may there discover the wondrous power which attracts the needle and may regulate a thousand celestial

10. “The general telescopic appearance of the coast was that of an extensive ancient city abounding with the ruins of castles, obelisks, churches and monuments, with other large and conspicuous buildings.” (Brewster 1856, 142).

observations that require only this voyage to render their seeming eccentricities consistent forever” (Shelley 1985, 59) he eventually finds a tale (“the strangest tale that ever imagination formed” (Ibid., 249) and a monster.

Hence we can say that the structure of the novel itself illustrates the circular relationship between science and literature.

Walton, the scientific explorer admits that he has gone to sea because of his reading travel stories and also and mostly Coleridge:

I am going to unexplored regions, to “the land of mist and snow” but I shall kill no albatross;(…) I will disclose a secret. I have often attributed my attachment to, my passionate enthusiasm for, the dangerous mysteries of ocean to that production of the most imaginative of modern poets. (...) There is a love for the marvelous, a belief in the marvelous, intertwined in all my projects, which hurries me out of the common pathways of men, even to the wild seas and unvisited regions I am about to explore (Shelley 1985, 65).

Walton, the scientist, as many scientists of his time was therefore influenced by tales and stories, and the end of his quest is but an echo of Coleridge’s *Rime of the Ancient Mariner*, namely another ancient mariner telling his story of woe. This cyclical process (almost solipsistic) finds endless echoes in the text itself which is like a huge labyrinth of mirrors, in which all the characters are reflections of one another. All of them are trapped in a circular dream (in this case, the polar circle) from which there is no escape, just as the reader is trapped in a work of fiction disguised as a scientific narration.

So, if the image of the circle seems adequate to describe the relationship between science and literature, we can also say that both disciplines share the same purposes and particularly with regard to naming the world.

The appropriation of space during all the centuries of exploration is linked to more or less realistic illustrations, and descriptions whose subjectivity decreases as scientific accuracy increases. Naming was of course an important problem, but birds and plants had different names all over the world, which made them difficult to identify.

Carolus Linnaeus revolutionized the world first with his *Systema Naturae* (1735) where he developed a system to classify plants and then more importantly with his *Species Plantarum* (1753) in which he introduced the Latin binomial nomenclature where every living organism is identified by genus and species. Names were thus stabilized and for the first time, humanity was offered a common language.

Linnaeus was repeatedly dubbed the “second Adam”, a reference to Adam in the garden who, in Genesis was to name “all the beasts in the field and fowls in the air”. As Adam indeed, he transformed the world into words, in order for us to possess it. This vast scientific enterprise can in a way be compared to the poetical experience of naming, especially to the poetic recreation of the world which can be found in works of writers such as Emerson, Thoreau or Whitman, famous for their catalogs and lists of words.

Whitman particularly, set out to catalog all the elements of the universe in order to recreate or create it, since what has no name has no existence.

The catalog is therefore a sort of open guide which, thanks to an extremely constraining rhetorical framework essentially constituted of repetitive structures such as anaphors and epiphors or parallelisms forces us to consider all the possibilities that have not been exploited or mentioned while offering us a feeling of order and security. A famous example of catalog can be found in Whitman's poem "A Song of the Rolling Earth":

The song is to the singer, and comes back most to him
 The teaching is to the teacher and comes back most to him,
 The murder is to the murderer, and comes back most to him, The theft is to the
 thief and comes back most to him, The love is to the lover and comes back most
 to him,
 The gift is to the giver, and comes back most to him (...) (Whitman 1973, 223).

So, thanks to a reassuring repetitive framework where each item can be substituted to another (as in Linneus' nomenclature, it is a one-to-one mapping but the same framework for every item), we can reach a global approach of the world. To a certain extent, the poet invites the reader to a huge game where he can explore the paradigm in order to reach a global approach of the universe, eventually culminating in unity and fusion.

The second point I would like to stress is the common language given to humanity. If thanks to Linnaeus the various species had the same Latin system of name worldwide, we can say that Whitman—and Emerson—were also looking for some sort of language not only that had the same roots but also that would be understood by all. In their cases though, they were looking for some kind of original language where the sounds of the words would perfectly match their description, or, in other words where there would be no contradiction—or rather a total adequation—between the signifier and the signified. This age old debate goes back to Plato, but it is interesting to note that it reemerged among the transcendentalist poets through Rousseau, who himself was influenced by the myth of the "good savage" due partly to the exploration of North America by Jacques Cartier. During his travels Cartier discovered what he called "a young humanity" (what Montaigne was to call the "child world") and proceeded to demonstrate in his *Voyages au Canada* that the savage was not a barbarian, but a natural, innocent creature. Similarly, two centuries later, in the narration of his circumnavigation in 1771 aboard *La Boudeuse et L'Etoile*, Louis-Antoine de Bougainville wrote about the Polynesian paradise (Tahiti had been discovered a few years earlier), a society where innocent natural men were entirely devoted to pleasure seeking. The link between the 'good innocent savage', discovered by explorers and scientists, and the 'good language' pure and accessible to all was developed by Rousseau who, in his *Discours sur l'origine et les fondements de l'inégalité*, shows that only the "natural man", roaming in the forests "without industry, without a

house, without war, without connexions, without kins” (Rousseau 1964, t. III, 159), i.e. the original man, stripped bare of civilization, is capable of speaking this ‘pure’ language where words corresponded to things. The romantic hypothesis of an ideal primitive language was also developed by Emerson in the fourth chapter of his book *Nature* entitled “Language”. As Rousseau, he shows that as we go back in the history of humanity, language becomes purer, more poetical until we reach its infancy where each spiritual fact corresponds to a natural symbol. The corruption of language results from the corruption of man, and the corrupted words no longer have any relationship with their referents. If the theory was developed by Rousseau and Emerson, Whitman applied it to his poetry, thus trying to recapture the essence of the world through sounds. Hence the importance in Whitman’s poetry of primitive cries (“lull, hum, groan, howl, hush, blow”) which correspond to what he considers as the infancy of language. In “Starting from Paumanok”, to take another example, Whitman enumerates the names of Indian cities:

Okonee, Koosa, Ottawa, Monongahela, Sauk, Natchez, Chatta-
hooche, Kaqueta, Oronoco,
Wabash, Miami, Saginaw, Chippewa, Oshkosh, Walla-Walla (...) (s. 16, v. 243-4, p. 26.)

Through the music of this new American map, Whitman wants the whole world to hear the original voice of nature “a word/world primal again” which we can no longer perceive.

“Speech is the twin of my vision” says Whitman again, who tries to recreate America with words. Scientists and poets alike are similar to Gods who, with the performative power of their language—the equivalent of the divine *fiat*—create a sort of parallel intellectual reality.

And indeed, what the explorers and scientists saw was transformed into maps. Through the science of cartography, reality was modeled for spatial purposes and eventually given names. Hence we pass on from a vision to the creation of a model (i.e. to a new form of reality) and eventually to a word. This process is similar to the poetic process where it is the transformation of a vision into words which constitutes the creation itself. In Coleridge’s *Rime of the Ancient Mariner* for example, it is the journey through the “rime” which constitutes the “rhyme”, thus showing that the expedition itself is the work of art.

We can go even further than that: as they mapped and created the world as we know it, scientists and explorers alike often gave their own names to the objects of the world. So, toponymy, here transformed into anthroponymy, appears not only as a creation but also as a gigantic appropriation of the world so as to control and order it, a transformation of nature into culture. Everybody knows how the German cartographer Martin Waldseemuller gave the name of Amerigo Vespucci to the continent he was drawing according to Vespucci’s travelogues. But there are thousands of other cases, as for instance,

that of d'Entrecasteaux sent to look for the lost La Pérouse (1791). His name and those of the scientists who accompanied him are still linked today to the places they have discovered. Famous botanists also gave their names to plants such as the scientist and writer Aldebert von Chamisso (whose name serves as genus—*Chamissonia*—for a great variety of species) or his friend, the entomologist, naturalist, botanist and zoologist von Eschscholtz—one of the most important scientists in the exploration of the Pacific, Alaska and California—who gave his name to the famous *Eschscholzia California* (the California poppy) as to many other plants. The world has become theirs (or the reverse, they have become the world) thus allowing them to acquire a form of immortality.

Once again, we can draw a parallelism with Whitman who begins “Song of Myself” with his own name, in a section called “Inscription” thus forever engraving his own name within the construction of America, as the explorers and scientists of the past have woven theirs into the fabric of the world.

Although science and literature are two very distinct domains which in many ways vie against each other, as the real and the imaginary or the concept and the metaphor, yet their relationship on the front of exploration is so intricate and so intertwined that it is difficult at times to separate them: so much so that the image of the circle seems to be the best paradigm of their correlation. Indeed, the threshold crossed by means of various technical or literary instruments in order to explore the world is to a certain degree a permeable two-way path and the objects that constitute the universe of the marvelous can serve as models for future scientific realizations, just as science can fuel the imaginative mind. Moreover, far from having distinct goals, science and literature share a common vision which is the transformation of the world into words, figures, measures or rules. Indeed, both poets and scientists would have the layman believe that their word – similar to that of God – is able to act on the world so as to master and control it – i.e. to organize and structure chaos. Both languages, whether scientific or literary can take the shape of the divine performative word, transforming the act of writing into an orderly creation of the world.

Yet, that complementary relationship which unites science to literature precisely by being circular, also conveys the idea of confinement, of repetition, and even of curse. This is illustrated in various novels which all share the same cyclical structure and in which the reader is trapped in the recurring experience of reading just as the various characters are trapped in the circles of their desires and curiosity. In Mary Shelley's *Frankenstein*, Coleridge's *Rhyme* or Poe's *A descent into the Maelstrom*, science merges into poetry, rationality into the irrational and reason becomes nature's superb chaos. Instead of having a pattern of oppositions or confrontations, we are confronted to a circular structure where opposites melt and merge into one another. And we can wonder finally if this circular structure in which the narrator takes us by the hand and guides us as Virgil guided Dante in the Inferno, is not simply the image of curiosity, the temptation of knowledge or the desire for transgression.

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SCIENCE, LITERATURE AND PEIRCE: TOWARD CONSILIENCE

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The view of consilience championed by E. O. Wilson in his book named, aptly, *Consilience*,¹ calls for nothing less than a totalizing synthesis of human knowledge no longer compartmentalized by discipline, wherein all fields of research may begin to incorporate their findings and theories into a broader and, paradoxically, more accurate depiction of the human species according to an overlapping set of natural laws.² His book was published in 1998, and at the time I write this, there have been too many advances in too many fields that speak to the idea of consilience, but the humanities and literary studies continue to ignore and reject much of the natural sciences' findings and thus reject the promise of consilience.³ Wilson says of his idea that:

Trust in consilience is the foundation of the natural sciences. For the material world at least, the momentum is overwhelmingly toward conceptual unity. Disciplinary boundaries within the natural sciences are disappearing, to be replaced by shifting hybrid dominions in which consilience is implicit. These

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1. Here, see also Gottschall 2008, 19-41 and Nordlund 2010.
 2. Here at the beginning, I fully realize that what I might be doing in this paper is swapping out one metaphoric overlay of literature for another, like a kind of bait and switch. I merely suggest that by using Peirce, who took science very seriously, it adds a particular ethos missing from the modern literary theoretical trend. I also do not want to make the bland mistake of confusing facts for assertions of facts. A literary fact is not the same as a scientific one. This kind of equivocation is noted and yet must be moved slightly out of the foreground or else the entire project will stall there and only there. I take evolution as a fact, and I assert that such evolutionary facts that influence human behavior will necessarily show up in artistic works, let alone that evolutionary theories are far more predictive and explanatory about the universals of culture, art and language. I do not believe in evolution in the same way that I believe Cormac McCarthy to be a great author. This last bit is an admitted assertion, though it speaks of facts. "For us, as for most people, a 'fact' is a situation in the external world that exists irrespective of the knowledge we have (or don't have) of it—in particular, irrespective of any consensus or interpretation" (Sokal and Bricmont 1998, 102). This definition of fact versus assertion fits Peirce's categories well enough: a fact in its secondness may be unknown and becomes a third as it is known. The knowledge of a fact does nothing to change its constituent being.
 3. The book *Biopoetics* (Cooke and Turner 1999) does an admirable job of trying to extend a sociobiological understanding into literature, though such projects seem to have stalled out in recent years for any number of reasons. I have quoted liberally from it in this article.

domains reach across many levels of complexity, from chemical physics and physical chemistry to molecular genetics, chemical ecology, and ecological genetics ... There has never been a better time for collaboration between scientists and philosophers, especially where they meet in the borderlands between biology, the social sciences, and the humanities (1998, 11-12).

Yet, these borderlands are notoriously hard to map. Even the previous sentence cannot escape fully the tendency for language to climb on itself metaphorically, and thus it would seem that the language problem is insurmountable and that the empirical and the linguistic may remain incommensurable. This is a quality of language that for many (in the Humanities) remains the stopping point beyond which there can be no discussion. It would seem that Wilson, here, would disagree. That this might well seem a type of appeal to common sense should in no way diminish that claim. A philosophical rejection of common sense works well enough, but it is not the daily comport of the human species, and even in the natural sciences it has broad application. As Quine says, "Science is not a substitute for common sense, but an extension of it" (2004, 194). It might seem absurd on its face to want a common sense theory in regards to literary studies or to desire a co-reading of the natural sciences and literature. All faults or misappropriations or category swaps between the disciplines⁴ is purely my fault, though the pushing forth into strange climes seems both necessary to rescue the humanities and to provide a new interpretational lifeway between the disciplines. I believe that Peirce might be the key. Though not directly referencing literary theory, Peirce described the conflict between a scientific attitude and the literary attitude, saying:

Among dilettanti it is not rare to find those who have perverted thought to the purposes of pleasure that it seems to vex them to think that the questions upon which they delight to exercise it may ever get finally settled; and a positive discovery which takes a favorite subject out of the area of literary debate is met with ill-concealed dislike. This disposition is the very debauchery of thought. (*Collected Peirce* 1974, 5.396)

That science posits distinct human traits and universals is something met with an almost heretical attitude in many literary and cultural circles today that enjoy space at

4. I have used the quotation many times, and while it is a long one, it seems rather continually important and relevant. Schrödinger says, "The very name given to the highest institutions of learning reminds us, that from antiquity and throughout many centuries the universal aspect has been the only one to be given full credit. But the spread, both in width and depth, of the multifarious branches of knowledge during the last hundred odd years has confronted us with a queer dilemma. We feel clearly that we are only now beginning to acquire reliable material for welding together the sum total of all that is known into a whole; but, on the other hand, it has become next to impossible for a single mind fully to command more than a small specialized portion of it. I see no other escape from this dilemma (lest our true aim be lost forever) than that some of us should venture to embark on a synthesis of fact and theories, albeit with second-hand and incomplete knowledge of some of them -and at the risking of making fools of ourselves. "

academic conferences. Peirce, writing nearly a hundred years ago, seems to have noticed the same problem between the scientific and literary fields.

Is it then any wonder, when looking back to 1957, in famed literary critic Northrop Frye's *Anatomy of Criticism*, that he called for something like consilience in literary studies, a decade before post-modernism, post-structuralism and the other 'Theories' came along and attempted to 'democratize' language and meaning with a strict adherence to irony, paradox and 'the linguistic turn'? Frye says:

It occurs to me that literary criticism is now in such a state of naïve induction as we find in a primitive science. Its materials, the masterpieces of literature, are not yet regarded as phenomena to be explained in terms of a conceptual framework which criticism alone possesses ... I suggest that it is time for criticism to leap to a new ground from which it can discover what the organizing or containing forms of its conceptual framework are" (1957, 15-16).

Since my discussion here is about literature, and since literature is a formulation of words, and words are themselves at least partially metaphoric, then, again, there would seem no chance to get out of the language problem. Much like in Zeno's paradoxes, common sense might simply implore us to take a step to catch the tortoise, though Theory seems content to ask, 'Whose tortoise and according to what discourse of power do you have the right to want to catch it?' This view, put bluntly, is hostile to science. The logical conclusion to nearly every form of current cultural and literary theory ends with non-empirical attitudes toward concepts and the world. Yet I do feel that literature and science may be brought into concert by augmenting the definition of literature as an aesthetic normative science which may yield positive (testable) results. This comes directly from Peirce and his essay, "The Three Normative Sciences" wherein he outlines the normative sciences as ethics, aesthetics and logic. For Peirce, thinking and reasoning are related to ethical considerations because they form a teleological relationship to some end, thus they are bound in action toward some end.

For normative science in general being the science of the laws of conformity of things to ends, esthetics considers those things whose ends are to embody qualities of feeling, ethics those things whose ends lie in action, and logic those things whose end is to represent something" (*Essential Peirce* 1992, 2:200).

Right away what should be obvious is that for Peirce aesthetics and appreciation are not simply arbitrary or linguistically oriented 'texts' lacking a mooring to some referent in the real world. They are purposive and have, at least in general, some goal, though that goal itself lies out in the future toward which honest inquiry must direct itself.

The corollary of course arises that science, by its proscribed methodology, requires proof, and must bear the weight of empirical evidence. What evidence a work of art may provide in a strictly scientific sense would be little better than a kind of identity

proof: the book is a book, or the text is a text. Word count seems relatively empirical, but that will not tell you what a text means. Delving any further while armed with a strict scientific toolkit will not yield much. Literature is by its nature a falsified medium and cannot yield to a scientific yardstick except in excruciatingly limited ranges, nor can literature be expected to yield up scientific results unless one is looking specifically at it through a discipline like corpus linguistics. Haack says in relating a naturalized philosophy to literature that

though writers engage in inquiry, ‘literature’ picks out the writing, not the inquiry. And, though chemists, astrophysicists, etc., engage in writing, ‘science’ picks out the inquiry, not the writing. As does ‘philosophy’ (1998, 59).

In this strict sense, there is no possible way to actually read literature directly through science, and there shouldn’t be any need to, since the point of this study, as with the sociobiological bend toward consilience isn’t to replace cultural or literary ‘Theory’ with some deterministic system but rather to undergird theoretical practice with a more sound methodology. Peirce says, “[science] does not consist so much in knowing, nor even in ‘organized knowledge’, as it does in diligent inquiry into truth for truth’s sake, without any sort of axe to grind, nor for the sake of the delight of contemplating it, but from an impulse to penetrate into the reason of things” (*Collected Peirce* 1974, 1:44) Any charges of reductionism or scientism may be safely and politely rebuked. What I propose here is far less deterministic than any current Theory which espouses that ‘all texts are political, all texts are texts, all textual meaning is merely evanescent’. What are some empirical things that we may look for in literary works, then? It seems highly unlikely if not absurd that evolutionary forces do not play some part in artistic creation. This idea has been pushed to the periphery by mainstream Humanities and Theory since its inception 20 years ago. One of its founders, literary scholar Joseph Carroll says,

In the move to post-theory, one grants the general validity of evolution ... but also then declares that it is irrelevant, ... that it alters not one jot the way we would read this or that text or describe this or that historical cultural moment ... In reality then, ‘post-theory’ is just the latest incarnation of cultural constructivism (*Reading Human Nature* 2011, 68).

There is simply no way for the human species to not be a species, and thus bear some stamp of an evolutionary heritage. This study simply seeks a way of making this ingress into literature. Part of the problem might be, as evolutionary critic Ellen Dissayanake notes (“Making Special” 1999, 28), that many see art as apart from anything natural because of its rarified status in Western culture, making it something far less utilitarian on its face, thus less in league with the evolutionary forces that shaped modern homo sapiens as much as the species shaped the arts. She says, “Western modernity might view the arts as ‘useless’, but biologists, using the evolutionarily salient criteria of universality,

energy – investment, and pleasure, would have to concede that engaging in the arts–like eating, sleeping, sex, socializing, and parenting – is a fundamental and essential part of human nature” (1999, 29).

What is needed is a set of principles, like a taxonomy or syntax, that stem from a philosophical tradition which takes science qua science seriously while still allowing flexibility of interpretation and range of reading. Yet, such an attempt – doubly bound in the two kinds of language systems of literature and the natural sciences – must proceed very carefully in how it handles its language and language use to maintain a range of possibility (thus keeping open interpretational range) and something which won’t spin entropically out into mere word play. For example, the notion of ‘plasticity’ has been used in the past decade or so as a partial correspondence between science and philosophy, but here the problem is the baldly simplistic metaphoric quality of the word as it is held in ‘continental limbo’. A recent champion of the ‘plastic’ notion has been Catherine Malabou⁵. Many an instance of the far too plastic definition and handling of ‘plasticity’ can be found in her book, *What Should We Do With Our Brains?* While she appears to take the scientific aspects of neuroscience seriously, one comes across passages that appear at once to deal with science in a traditional sense and then quickly steer themselves back into the forms of linguistic obscurantism now associated with the general ethos of continental and cultural Theory⁶. She says, “Let us return to the problem of the transition from the neuronal to the mental. The dialectical nature of identity is rooted in the very nature of identity, that is to say in its biological foundation” (2008, 72). So far so good in treating science as science. She then continues in the very next sentence, saying, “Indeed, in adopting the thesis of a neuronal self, I would postulate that it, too – indeed, it above all – is structured by the dialectical play of the emergence and annihilation of form, that the historico-cultural fashioning of the self is possible only by virtue of this primary and natural economy of contradiction” (2008, 72). While it is clear what Malabou is saying, it is quite unclear how it is scientific, despite the prevailing terminology or proposed compatibility. Thus, such lines of thinking–while important for drawing in the socio-political–are incommensurate with a line of thinking like sociobiology, and thus for the aims of this study. This is not meant to be pure polemic, simply. It is a call for some clearer delineation and use of scientific vocabulary as part of the interpretive toolbox for the Humanities, and literature specifically. This is the great advantage in

5. I would like to mention here that Dr. Malabou had been a potential part of my dissertation committee as an advisor, but was not able to participate. I mention this in case of a conflict of interest in my use of her work, and to state that despite my (partial) intellectual disagreements with Dr. Malabou in general, I hold her work in high regard for attempting to take science seriously rather than harangue it away, as much Theory does, as just another type of “discourse”.

6. Perhaps a general rule may be postulated here that the more a theorist relies on splitting etymology to prove an ethical, philosophical or intellectual hypothesis, the less that theorist should be taken seriously. This is overtly polemical, and is a personal conviction only.

Peirce, when one takes in the full sweep of this thinking and not merely his more popularly known semiotic model. Put simply, Peirce's philosophy takes the real world very seriously, and though this world may be only approximated by language and thus can only be approximately known, its allowance for 'reality' permits a realist view, crucial for the inclusion of science into a literary debate, to take place. Sheriff notes that "[a]ccording to Peirce's theory of signs, we at least have some justification for the sense of certainty we have about our existential experience. Unlike the dyadic sign in which the world is lost in the crack, gap, abyss of nothingness, or whatever, the triadic sign gives us faith that we do indeed come to the world through signs" (1989, 116). Since a literary theory necessarily requires that language be treated preferentially, and since a socio-biological reading of literature requires that facts or 'reality' be taken seriously, then it is only with Peirce that one can proceed toward consilience between these two disciplines. That this might not bear fruit in relation to other disciplines and their relation to a sociobiologically consilient viewpoint is beyond the scope at present.

Charles Peirce is probably best well known as the creator of the very misunderstood philosophy of Pragmatism (which he later renamed Pragmaticism to differentiate it from James' and Dewey's recalibrations)⁷ and for his semiotic system which he created around the same time as – and quite independently from – the Swiss linguist Ferdinand de Saussure. Peirce eventually came to organize his philosophy according to what he called The Categories. He says, "The three categories furnish an artificial classification of all possible systems of metaphysics which is certainly not without its utility" (*Essential Peirce* 1992, 2:164).

It would require a whole other article to define his views in detail or to argue for/against a metaphysical system, so only a very brief and broad summary will be possible here. Peirce basically saw his Categories as a system with which to order any possible system into Firsts, Seconds and Thirds. For my purposes, only Peirce's Categories will be explained in their relation to the Icon/Index/Symbol complex and the Rheme/Decisign/Argument complex and their relation to science and literature as a reflexive language that will hopefully bind them all together⁸. His Qualisign/Sinsign/Legisign designations will be treated only briefly. Peirce says of the categories that:

Category the First is the idea of that which is such as it is regardless of anything else. That is to say, it is the *Quality* of Feeling. Category the Second is the Idea of that which is such as it is as being Second to some First, regardless of anything else and in particular regardless of any *law*, although it may conform to a law. That

7. Neo-pragmatism and its followers (cf. Richard Rorty) have little to do with Peirce's original formulations. Any of Susan Haack's books makes this painfully clear.

8. For the sake of relative brevity, I am leaving out discussion on biosemiotics, which uses Peirce to categorize natural and cultural meaning-making through semiotics. Hoffmeyer (2008) and Wheeler (2006) being the two best examples of this line of research.

is to say, it is *Reaction* as an element of the Phenomenon. Category the Third is the idea of that which is such as it is being a Third, or Medium, between a Second and its first. That is to say, it is *Representation* as an element of the Phenomenon. (EP1992, 2:160)

Put it simply for the purposes of this study, firstness is a kind of presence, secondness is a reaction of some sort to that presence, and thirdness is the interpretation of the interplay between the first and the second⁹. The writing and rendering of a literary work would thus be composed of firsts (sort of bare concepts and proto-thoughts) which are then mediated in the author's mind as seconds, and then come to full thirdness during the act of writing and editing. For the reader, this process is similar. The literary text itself is a first, and becomes a second upon reading which almost immediately becomes a third when actively meditated upon in literal or critical understanding in the mind, either during the reading or reflection upon reading. This process, for Peirce, is indefatigable and constant. The reader's initial interpretation as a third becomes a first in the subsequent thought and the process goes on and on. Peirce's system, thus, evolves, and allows for patterns and variation on patterns. This is not to suggest some conflation of evolution by natural selection to Peirce's 'evolving sign', but the processes are, however, much like Frederick Turner's notion of evolution as a generative feedback loop. Turner says:

Variation, selection, and heredity constitute a cycle, which when repeated over and over again produces out of this very simple algorithm the most extraordinarily complex and beautiful life forms. Variation is the novelty generator; selection is a set of alterable survival rules to choose certain products out of the novelty generator. Heredity, the conservative ratchet, preserves what is gained. ("Ecopoetics" 1999, 128)

What Peirce's system of the categories and signs gives us is a unified format by which the evolutionary processes of variation, selection and heredity can be codified and paralleled to symbolic representation in literature. Again, this is not totalizing, but is a synthetic model which seeks to undergird literary studies. Anyone familiar with Peirce through his semiotics will note the similarity here to the semeiosis process whereby the

9. To make this clearer, see *Collected Peirce* 8:343 (1974) in which he discusses the immediate versus dynamic object. One way to think of it is by analogy to a mirage. If one is in the desert and sees what appears to be an oasis in the distance, this is an immediate object. Its actual reality – as a dynamic object – cannot be known except through inquiry, and the actual reality of the dynamic object might never be known if, say, one dies getting there. For Peirce, all inquiry is held out in the future, and the larger the question being asked, the further out the 'Truth' is. Thus, the views of astronomy, cosmology, geology, biology, physics, evolution, molecular biology and even literature are all types of immediate objects in their ends, or, their ability to interpret the world. Their systems are all different, but under the aegis of consilience they can be brought to bear on the same dynamic object, nonetheless. What is readily apparent is that the predictive abilities between something like evolution and literary theory are radically different.

interpretant (the conventionalized sense or understanding of a sign) has a relation to its object (that thing, real or imagined, being represented) through the representamens (the form a sign may take such as a sound, word or drawing), in which interpretation or meaning is never 'done' because the representamens becomes a subsequent interpretant and the cycle goes around again.¹⁰

Peirce does not take the (accepted or given¹¹) Saussurean view, common to many cultural and literary theories, that language is a binary relationship of negatives: a word or idea is necessarily catalogued in relation to what it is not and therefore language and representation are arbitrary and thus there are no real fixed entities or ideas like 'truth' or 'chromosomal sex'. It is quite clear that this view of language necessarily keeps the empirical sciences far from the Humanities For Peirce, in negatory, binary formulations of this kind the dyadic/binary always give way to a third (an interpretation), especially when placed into propositions¹² about the world as per their semantic content. The propositions also do not have to be about the world, and here is the connection to literary texts and the imagination. Claims that literary moments aren't real in the same sense that an atom or a gene are real rely heavily on a type of reductive linguistic paradox: that what a literary text names has no ground in reality except its own linguistic ground as a text and thus cannot be true in any real or (especially) scientific way. It is a kind of Liar's Paradox. Peirce says:

Consider the proposition, 'This proposition is not true'. This is certainly a proposition. Hence by the definition of a proposition it is either true or not. But supposed it involve no falsity. Then it will follow that it is not true and does involve falsity, thus reducing that hypothesis to absurdity. But all that it explicitly

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10. Peirce's system may at once resemble Hegel's though Peirce is adamant about their dissimilarity as a categorical overlay between the phenomenal and the metaphysical. Peirce says, necessarily at length, "Hegel is possessed with the idea that the Absolute is One. Three absolutes [i.e. Peirce's three categories as distinguishable entities, my note] he would regard as a ludicrous contradiction *in adjectio*. Consequently, he wishes to make out that the three categories have not their several independent and irrefutable standings in thought. Firstness and Secondness must somehow be *aufgehoben*. But it is not true. ... Let the Universe be an evolution of Pure Reason if you will. Yet if while you are walking in the street reflecting upon how everything is the pure distillate of Reason, a man carrying a heavy pole suddenly pokes you in the small of the back, you think there is something in the Universe that Pure Reason fails to account for; and when you have to look at the color red and ask yourself how Pure Reason could make red to have that utterly inexpressible and irrational positive quality it has, you will be perhaps disposed to think that Quality and Reaction have their independent standings in the Universe" (*EP*1992, 2:177-178). Peirce here clearly marks his idea as distinct from Hegel's in its attention to reality and a kind of common sense, as well as to its foundational interrelation of firsts, seconds and thirds as something which begins in some kind of physical/mental quality, is reacted to and then yields understanding, no matter if that understanding be partial or a guess at something which the future of inquiry will yield up. This needn't be merely a human trait either, since most animals have some type of communication system. Peirce would hold that the human form of thirdness/interpretation is simply the most complex form of these.
11. I have argued elsewhere that much current interpretation and understanding of Saussure has been considerably altered by postmodern/poststructural/post-theory/Theory. Rehabilitating his ideas would require considerable effort and space, both of which are unavailable here.
12. Peirce here is talking about logical propositions, and I am (consciously) stretching the term to fit semantic content of the sentence. I do not see this maneuver to be too out of line considering what I am trying to do.

asserts is that it is not true. There is certainly no contradiction in saying that it is not true: it is the very conclusion we have come to. Consequently, the only way in which it can involve contradiction is by expressing at the same time the assertion that it is true. We must therefore conclude that every proposition, in the very propositional form itself, expresses the assertion of its own truth. (*Essential Peirce* 1992, 2:166-167)

What Peirce does quite handily here is resolve, at least linguistically, the problem that someone might raise that a work of literature is not 'real' and has no relation to a scientific principle that would seek to interpret it. What Peirce also resolves is the adherence of Theory to irony, paradox and confusion as primary methods of interpretation. When a literary work (and here the subject of poetry becomes too tricky to address directly) uses propositions to discuss a character or world or set of behaviors, it need not matter that that world is not 'true'. Peirce suggests here that a kind of eristic word-play is not needed, and in the case of applying the natural sciences to literature, it is in fact possible to sidestep the linguistic or paradoxical challenges issuing from current literary theories. Paradox and irony are of course indelible parts of literature, but they are parts, not wholes, and the delicate balance of tensions that literature achieves plays with this tension and doesn't merely wallow in it, as much Theory does. Literary works very much do contain fantasy and word play and non-existent things, but for science to have anything to say to or about literature we might begin by echoing Peirce that the sentences of a literary work express the assertion of tendencies of writers to express aspects of the real world in tandem with fantastical or fictional elements. In this sense, there is no need for the natural sciences or sociobiology to rewrite literary theory en masse, but only to examine those tendencies in literary works that have approachably biological and evolutionary origins (and I will address this issue further on). This is hardly revolutionary, given the ever-growing body of research mentioned by Wilson in the opening paragraph. Indeed, Joseph Carroll says:

(W)e must firmly grasp the principle that all subjects of study have their own specific forms of organization, and that the study of literature will thus have its own categories and structures embedded within the larger general principles of biology and social science. (Even the social sciences must find mid-level principles that resist premature reduction to elemental biological principles of fitness maximization). ("Theory" 1999, 147)

Only Peirce offers a robust enough methodological system which both treats of symbols and of the natural sciences, and with his ideas, consilience seems within reach. All disciplines' findings could then be brought to bear on one another, generating more accurate depictions of 'the human' without the reductive linguistic convolutions and rhetorics often associated with literary theories. It will begin to become more and more consilient the more the disciplines find ways to communicate.

Going back to propositions and definitions and the arbitrary nature of language, it would be quite impossible –except in an abstract way– to determine what anything was or is simply by analogue to its inexistent/non-existent form of being. As if someone would think while reading a book that ‘What I am reading is a book because it is not a horse, is not a goalie at the 2014 World Cup, is not a goalie at the 2010 World Cup, is not a bowl of warm soup being eaten by a goalie at the 2014 World Cup’, etc., makes no sense.¹³ While words are sounds arbitrarily associated with certain things or ideas and these sounds might indeed be random, like Saussure suggests (Peirce would agree with this partially), the meanings of these words are not arbitrary. If the meaning of a word or, to extend the idea, a proposition about the world is located in some contextual and tacit agreement about those words and definitions, then notions espoused by much of the literary theory community are wrong on their face. Gaskin says:

Of course, an utterance or inscription may mean anything at all even to a suitably grounded recipient –that is, it may be taken to mean anything at all by such a recipient- ... But ‘what a person meant’ cannot override what his or her words meant, in context, to a suitably grounded recipient who does bring that grounding to bear in an appropriate way. (2013, 223-224)

This re-rendering of the ‘authorial fallacy’ correctly reverses the linguistic relativism of so-called ‘reader response theory’ and of the hermeneutic circle propounded by much current Theory. Peirce, by grounding meaning and interpretation as thirds based on the fact of words/texts as real firsts in relation to the readers as seconds, keeps the whole ordeal from spinning into shibboleth. Peirce’s advantage here is that he takes both the world and word¹⁴ seriously. This is perhaps the only philosophical manner by which to connect science and literature. Science, it needs to be said, uses language as objectively as it can, despite being based in language. As W.v.O. Quine says,

Science, though it seeks traits of reality independent of language, can neither get on without language nor aspire to linguistic neutrality. To some degree, nevertheless, the scientist can enhance objectivity and diminish the interference of language, by his very choice of language” (2004, 199)

Science gets along quite well by tempering inference and interference, as Quine notes. Literature does not require quite so objective a vocabulary set (except for definitions of things like an amphibrach, sonnet, etc.). Its backing philosophy is hermeneutics, and here is the core split between the disciplines of art and the natural sciences: cultural and literary Theory speaks of cognitive relativism and aesthetic relativism and

13. As an American, it might seem strange to reference the sport of soccer, but I am merely trying to appeal to a broader audience (pretty much the rest of the world). I acknowledge this is a terrible joke, if a joke it be.

14. And please pardon the easy, punning relationship here.

says that both are formulated in language and thus have the same ends¹⁵. Because I am able to come up with any wild notion about a thing or a text, it follows that these notions are justified. The resistance of recent Theory to institutional dogma and foundationalism (rightly so) have led to the radical conclusion that anything goes in interpretation. Very few authors are able to wield such extreme ideology without their works becoming bludgeons. To restate this view in a perhaps too simplistic way, anyone is entirely welcome to maintain that Frost's 'Stopping by the Woods' is a poem about Santa Claus. The fact that someone may hold, or is permitted to hold, this interpretation is not in dispute. But to claim that the poem is about Santa Claus does not make the poem about him or Christmas or Coca-Cola. The prevailing ethos of Theory of late seems to be, 'Don't force people to think in any way except in the way that we've proscribed as correct'. While this is a vulgar reduction, to be certain, it is not too far off the mark.

A parallel might be found in Sokal's analysis of Anyon regarding the Zuni creation accounts. Anyon holds that "Science is just one of many ways of knowing the world ... [The Zuni's world view is] just as valid as the archeological viewpoint of what prehistory is" (Sokal 2010, 108-109). The belief versus knowing distinction here is quite clear and has direct bearing upon the literature/natural science divide. Belief is distinct from knowledge, and one cannot simply cry 'privilege' or 'discourse' any time the terms are used in proximity to one another. If human beings (an animal species) evolved to have certain traits and behaviors which conferred upon them and their descendants certain survival and reproductive benefits, then these are simply part of (emphasis here on 'part of') the way that humans interact in the world. If literature is a kind of interaction between people, no matter its 'language' aspects, then it shouldn't be too surprising that some elements of the shared evolutionary heritage shows up in literature as it is a broad repository of human interests, fears, desires and tendencies and survival strategies that took the species to its current place. To wish the science out of human agency or action is exactly that, a wish. Humans are very complex individual members of a larger community, and we have evolved¹⁶ to be both self-conscious and incredibly dependent

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15. This subject is discussed in Sokal (*Beyond the Hoax* 2010, 106) as a prime reason for the ostensible split between these competing forms of meaning and assignation. He outlines the primary three as cognitive relativism, ethical/moral relativism and aesthetic relativism, and he makes clear that these should be kept separate. I agree with Sokal and yet in the case that the natural sciences be brought into a literary debate, there must be some overlap here between the three. I believe that using Peirce provides this necessary link.
 16. And one should always be very careful using language like this regarding evolution. Evolution didn't 'choose' to create humans, as if we are the teleological end of some grand process. We are, put simply, very lucky (or unlucky, as it were) to be the only species known to be able to understand our place in the cosmos, and our place in the range of life on this planet from early bacteria to the present day over the course of 3.8+ billion years. Evolution doesn't necessarily work toward complexity, though complexity as an evolutionary selection unit has been perhaps the most successful adaptation. For a complete account of complexity in relation to Darwin and evolution by natural selection, see David Christian on the subject (2005, 39-56, 117-125, 94-104, 139-144), especially his use of Chaisson and 'energy flows' as a means of understanding the advantages of energy control and use in the continuum from stars to human societies (2005, 81). Christian, much like Wilson, is pushing for a continuum of understanding

on groups for emotional and physical survival. To say otherwise is to ignore or deny the vast (and ever growing) body of evidence. This dodging of science in a kind of hyper-individuated interpretation common to Theory is very similar to an updated Cartesianism, splitting the mind from the body, as in, the human ability to create non-existential symbols as something apart from the evolved qualities of the brain and body. As Gaskin notes, “thus Culler tells us that a re-orientation away from Cartesianism involves ‘the disappearance of the subject’. But it is a mistake to think the self would, by virtue of being a socially or linguistically constructed entity, disappear, and that the only way to rescue it is to hedge it within a charmed circle of Cartesian first-personal authority and privacy” (2013, 225). I would say that any attempt to define or understand the self would require the natural sciences in league with humanities, rather than the tired whipsong of mind/body dualism. Peirce fiercely resisted Cartesianism of all stripes. A view like Culler’s, as quoted, cannot at all square itself with any broadly scientific perspective on action, intention or meaning.

Now that a general view the problem and possible use of Peirce’s categories is in place, his view of the Icon/Index/Symbol and Rheme/Decisign/Argument relations may be further clarified. The icon/index/symbol notions are typically the most familiar parts of Peirce’s semiotic system, though for my purposes, they need to be added to in order to form a taxonomy by which the various disciplines can understand their relation to one another. An icon for Peirce is simply a sign that “represents by similarity” (*Collected Peirce*1974, 2:276)¹⁷ like a Rhexus, hieroglyphic writing or emoticon. As far as his categories go, icons for Peirce are a first (*CP*1974, 2:286), and “[a]nything whatever, be it quality, existent individual, or law, is an icon of anything, in so far as it is like that thing and used as a sign of it” (*Essential Peirce*1992, 2:291). An index, or indexical sign, indicates its relationship to what it represents, and importantly for the purposes of reading natural science in literature, it has a direct physical relationship with its object, not merely a similarity or tangential association. It is a second (*CP*1974, 2:285) and “is a sign which refers to the Object that it denotes by virtue of being really affected by that Object ... and it is not the mere resemblance to its Object, even in these respects, which makes it a sign, but it is the actual modification of it by the Object” (*EP*1992, 2:291-292). This is the most clearly natural of the signs, and because it has a relation to natural propensities it would form the relationship between evolution/natural science and literature. If a characteristic or trait may be noticed in a text in an individual or group that can be correlated to the natural sciences (sex selection or costly displays among individual group members, etc.), these would constitute an indexical sign. Here, I do not mean the lan-

and his notion of ‘Big History’ is very similar in aim to Wilson’s. Christian cites Wilson’s *Consilience* on page 4 in his book.

17. Numbers used in citing Peirce from the *Collected* relate to paragraph number as assigned in that text, versus the numbers used in the *Essential Peirce* which refer to the page.

guage (a symbol) but rather that what the language is describing is an index. If one notes similar behavior in works of literature that correlate to these scientific aspects, then these too are indexical signs. There would exist then a very real (here evolved tendencies in the species, and conversely, potential deviations from what an individual might be expected to do, say, in a work of fiction which then creates a type of indexico-literary irony) connection between the trait/behavior and its manifestation in action, be that action really perceived or represented in a work of literature. It is a way of linking lived experience to literary experience.

Thus a tremendous thunderbolt indicates that something considerable happened, though we may not know precisely what the event was. But it may be expected to connect itself with some other experience (*CP1974*, 2:286).

Hence, the thunderbolt may be given a 'literary' aetiology (Zeus!), or a scientific one (electrostatic discharge!). One explanation is obviously true by way of its accuracy, predictability and evidential weight, but that is not to belittle the role that literary aetiology plays in building means of explanation, exploration or examination. To attach the natural sciences to literature, the indexical sign may thus be either this kind of literary or scientific sign, though it should be made clear that in relation to behavior and action, the scientific has much more explanatory power than the literary. Certain universal behaviors within the human species would thus form this kind of index, and icons, too, may be seen as partially natural in their similarities to their referents. These stand apart (but in relation to) the symbol.

Whereas the icon and index are natural, or may at least be naturally occurring, the symbol for Peirce is a matter of convention, thus is socially, linguistically and culturally bound. The symbol is a third. He says, "Any ordinary word, as 'give', 'bird', 'marriage', is an example of a symbol. It is *applicable to whatever may be found to realize the idea connected with the word*; it does not, in itself, identify those things. It does not show us a bird, nor enact before our eyes a giving or a marriage, but supposes that we are able to imagine those things, and have associated the word with them" (*CP1974*, 2:300). Here the term 'associated' is key and relates to conventional meaning associated with words. Here would be the realm of literary action, as opposed to the indexical. The symbolic value of a literary text, as a third, grants literary works their interpretational freedom while resting on the icon and index as supplementary forms of literary exegesis, and places them all in relation to one another. Since literature doesn't in any way have to pertain to an empirical fact about the world, the symbol for a literary text, will take precedent. This still allows action and intention in the characters to be read as indexical because human beings will have a tendency to act according to natural (genetic) predispositions. This use of the index is, admittedly, open to a range of interpretation because gene expression in humans is variable and only runs along probabilistic lines. Here, the index as I am using it is in danger of becoming a symbol itself.

A Symbol is a sign which refers to the Object that it denotes by virtue of a law, usually an association of general ideas, which operates to cause the Symbol to be interpreted as referring to that Object (*EP*1992, 2:292).

The symbol, it should be noted, would thus form the cultural component of interpretation, the general ideas about literature.¹⁸

Peirce ... [incorporates] context and human lived experience (meaning) into the sign system. Peirce would, of course, agree with Derrida that 'final meanings' are out of the question, but would insist that there is no escaping the human being of the free and necessary choice involved in all sign usage (Sheriff 1989, 97).

If one cannot escape the human, then one cannot escape the dual influence of evolution by natural selection and culture on literary arts, and thus one has, with Peirce, a system capable of giving meaning, order and voice to both.

Next, it is key to outline the schema of Peirce's rheme/dicisign/argument and how these relate to literary texts, literary (or sociological) theories and to scientific theories. A long quote will be necessary to define these final three signs. Peirce says:

A Rheme is a sign which, for its Interpretant, is a sign of qualitative possibility, that is, is understood as representing such and such kind of possible Object ... A Dicent Sign [or dicisign] is a sign which, for its Interpretant, is a sign of actual existence. It cannot therefore be an icon, which affords no ground for an interpretation of it as referring to actual existence ... An Argument is a sign which, for its Interpretant, is a sign of law. Or we may say that a Rheme is a sign which is understood to represent its Object in its characters merely; that a Dicisign is a sign which is understood to represent its Object in respect to actual existence; and that an Argument is a sign which is understood to represent its Object in its character as sign. (*EP*1992, 2:292)

When these two classes of signs (icon/index/symbol & rheme/dicisign/argument) are combined with the first order (qualisign/sinsign/legisign), for Peirce they form a taxonomy or syntax of the kinds of signs available for interpretation.¹⁹ The basic 10 possible configurations (classes) are:²⁰

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18. This paper acknowledges that the application of, for example, Quine's 'underdetermination theory' might seem to upset the entire enterprise, but my prevailing idea is that one must attempt the overlay regardless. Of course one can never prove that a character in a book acted in such a way because of an evolved behavioral trait in the author, but one can at least show that these behaviors bear similarity to observed behaviors/traits and these explanations have much more predictive power than most literary theories which seek destabilization or to 'problematize the text'.
 19. Peirce outlines this in his essay, "Nomenclature and Divisions of Triadic Relations" (*Essential Peirce*1992, 2:289-299).
 20. Sheriff arranges these categories very admirably in relation to literature, and I am inclined to agree with his assessments, except that the application of science to literary studies requires a different calibration than found

1. Qualisign-Icon-Rheme
2. Sinsign-Icon-Rheme
3. Sinsign-Index-Rheme
4. Singisn-Index-Dicisign

Where these first four are non-linguistic types of signs. The following 6 are linguistic:

5. Legisign-Icon-Rheme
6. Legisign-Index-Rheme
7. Legisign-Index-Dicent
8. Legisign-Symbol-Rheme
9. Legisign-Symbol-Dicisign
10. Legisign-Symbol-Argument

For the sake of length, there is no chance to outline these exactly except to focus on classes 8 through 10 and examine how these form a taxonomy by which the natural sciences and literary studies may be put into intellectual conversation with each other based on the triadic categories of the second tier signs (icon/index/symbol).²¹ If the symbol is given precedence for literary works over the index, as it should, when stepping up to the larger and more comprehensive types of signs like classes 8, 9 and 10, literary theory will necessarily have to give way to evolutionary theory and the other hard sciences. While the literary text itself may be a class 8 here, its constituent parts

in Sheriff's book.

21. For the sake of putting this down, I would (fallibly) suggest that the classes align as follows: Class 1 is the unconscious and regulatory functions of the animal brain. Class 2 is the particular manifestations of Class 1 in a single animal. Class 3 would be behavioral traits like instincts or mimesis or isopraxic relations in a general animal group (here to mean something statistically based). Class 4 would be particular non-verbal processes, as a rule, that can be observed by animals (human or non-human). The preceding four classes are all non-verbal and would fit well into any taxonomy of classification for non-human semiotic exchanges, naturalized as internal regulatory functions, or the social communicative functions of non-human animals, though they also then relate to the same functions in humans. The following six classes are now verbal sign relations. Class 5 is a replica or schema of something like a brain, such as a diagram, or this very classification scheme, or something like a book, taxonomy or picture of such. Class 6 is the collection of data pertaining to animal behaviors. Class 7 indicates how groups of animals actually do behave through observable data and probabilities. Class 8 embodies literature, art, religion, language and other social functions of homo sapiens. Class 9 embodies literary theories or social theories, up to an including economics and linguistics. Class 10 as a broader theory would be the 'hard sciences' such as astronomy, physics, evolutionary theory, and would not include those from class 9. This schematic is admittedly rough, and will require change, but it should suit the present aims of the study well enough. It is important to note here the distinctions that Peirce outlines between 'possibles' and 'actuals'. A possible is something that is fallibly understood, which is to say that it is interpretable. Anything in the triadic classification scheme here containing a rheme is a possible. Therefore classes 5, 6, 8 are possibles. Class 9 is still a possible because, as I see it, while Peirce would call this a 'fact', facts must be gathered and to gather all facts is an impossibility, and thus class 9 is a function of probability. Classes 7 and 10 are actuals, as I am interpreting them in relation to literature and the natural sciences in that they pertain to Peirce's definition of 'actual' as "that which is met with in the past, present and future" (*Essential Peirce* 2:435). These are 'reasons' by which reality is to be understood, and thus class 7 relates to literary works, while class 10 relates to the natural sciences.

can thus be divided into intersections of natural signs like the index or conventional signs like the symbol, and mapping where these thus intersect according to the type of signs being used in a literary text which can then be extrapolated into signs in accord with natural sciences. (For an attempt at a classification scheme, see endnote xviii).²²

Sheriff is one of the few to attempt to use Peirce's ideas specifically about literature.²³ Considering the publication date of 1989, his book is quite cavalier for its time, being part of the heyday of post-modern/post-structural ascendancy in the humanities. Sheriff sees a literary work as a class 8 configuration based on its association with the rheme (1989, 120-121), and sees literary criticism as class 9 (1989, 122) while he argues that literary theory is class 10. I agree with Sheriff on the first two classifications, with modification, but would posit that to include the natural sciences into literary discussion, only the natural sciences could count as class 10 (argument), making literary theory (generally) class 9 (decisign), and literary works class 8 (rheme). Sheriff says, "Literary art, criticism, and theory are all symbolic, but their difference in character consists precisely in whether they represent their objects as signs of possibility, fact, or reason" (124). Since Sheriff is discussing literary theory by itself and not attempting to include the natural sciences, his assessment is a fine one, though it does not square perfectly with my aims. If a literary text is a possibility and criticism about that possibility is a fact, how does literary theory not become 'reason'? This is because for Peirce the universe is itself an argument (*EP1992*, 2:194), and "[the meaning of an argument] is its conclusion, while the meaning of a proposition or term is all that that proposition or term could contribute to the conclusion of a demonstrative argument" (*EP1992*, 2:220). Peirce further says that "an argument is a sign of the truth of its conclusion; its conclusion is the rational interpretation of the sign" (*EP1992*, 2:393). Literary texts and criticism/theory cannot become arguments because they do not attend to purposive ends of knowledge, but are propositionally locatable possibles and facts about those possibles. A literary work needn't be about the world as it is or ever was, thus it is a rheme. A literary theory inasmuch as it is about literature has only that limited vantage and data set (e.g. texts refracted through particular world views like Marxism, etc.) by which to make its figurations. It cannot achieve the class 10 status because there is an even broader category by which to frame the entire ability to have literary texts and assessment of them: the natural sciences. Literary works and theories cannot be a 'reason' in the same way as the natural sciences can. They contribute toward an understanding, but cannot by themselves contain the actual functioning of scientific principles, these being arguments or

22. Two of the best and most accessible overviews on Peirce's thought come from Cornelis de Waal (2000 & 2008).

23. Eco, too, has attempted a kind of calculus of semiotic functions in literature, though I will not be using his notions as he discounts the connection of science to literature (*Theory of Semiotics* 1979, 16-17), seeing them as only culturally related from inference to social convention.

'reason'. Indeed, literary theory itself has often sought the same definition as a literary text, so much so that famed literary critic Terry Eagleton says,

Some of these figures [Bakhtin, Derrida, Kristeva, de Man, Cixous, et al.] are not only eminent critics, but literary artists in their own right. They produce literature in the act of commenting on it (2007, 2).

If this is accurate, then literary theory according to Peirce becomes not a class 9 sign but a class 8, a literary text, and cannot therefore hope to classify itself further. In contrast, Sheriff says, "Peirce is dealing with the human experience of signs... A symbol for Peirce, like Thirdness in general, is a medium; a symbol for Derrida [and Theory, my note], is a substitute" (1989, 131). One could simply say that this is possible because Peirce takes science to have something real to say about reality, no matter the case that this reality may always be what he calls an immediate object, and its dynamic object (the ultimate end of inferential inquiry) might also never be known. This allows for science to have something to say about literary theory, and thus about literature, and to push the disciplines toward consilience. A literary theory like Deconstruction for example, according to Sheriff, could never be more than a class 9 sign since "Deconstruction is not a theory, but a method for deconstructing theory" (1989, 130). If the Theory text is 'about' a work of literature only in a tangential fashion – or worse in a self-referentially linguistic loop – such that the Theory text itself may be deemed a 'work of literature' or merely a text-about-a-text-about-a-text then the thing cannot be said to rise out of a kind of typological relationship to its source material, much like a literary work may 'quote' or reference other works of literature to create allegorical or allusive undertones. Put simply, this is not the aim of Theory as it has labeled itself 'theory', and thus it fails the metric of its moniker. Also, it too fails the benchmark of literature as well, placing it in some nebulous netherrealm. I do not wish to rehabilitate that kind of Theory. It may be safely left wherever it is in the aporeia or trace or void or whatever. Theory's charge that science is merely another discourse is flatly wrong by Peirce's classification, and by common sense. That Peirce calls the universe a sign is not to say that its interpretation is endlessly interpretable. To this Peirce replies:

Nobody can doubt that we know laws upon which we can base predictions to which actual events still in the womb of the future will conform to a marked extent, if not perfectly. To deny reality to such laws is to quibble about words. Many philosophers say they are 'mere symbols.' Take away the word *mere*, and this is true. They are symbols; and symbols being the only things in the universe that have any importance, the word 'mere' is a great impertinence. In short, wherever there is thought there is Thirdness. (*EP*1992, 2:269)

Hence the relationship between Theory as a second and science as a third should be clearly established. "Secondness only is while it actually is" (*EP*1992, 2:268). It cannot have

predictive power over a third because its scope does not reach toward reason or argument or represent reality in the same way that the natural sciences do. Secondness is a method. Thirdness explains the method.

If Wilson's project of consilience is to ever be realized, the various disciplines must be brought into conversation with one another. Seeing literature as a kind of normative science to give it back a purposive end is one way to put it in league with the natural sciences. Such studies as this can only attempt to outline a way that this may be undertaken. Any such inquiries must be capable to taking science seriously, and without being totalizing toward literary studies to avoid the charges of determinism or reductivism or scientism. This breakdown can be attended to, and mended in a way, by looking at literature through a Peircean lens. Literature is a category 8 sign, whereas criticism would be a category 9. Literature looks at the world and the writer's (or speaker's) internal reaction to that world (public or private spaces) and then the poem/book/novel comments on that in the form of a literary work. A critic apprehending a work of literature (in the broad, normal sense) is therefore looking at a representation of the world, and creating not a literary work as defined by a personal reaction to the world, but rather a highly individualized view of a world, thereby placing the critic at a severe remove, unless one takes the banal example of calling a book a 'thing in the world' which is to falsely equate the text's ontological reality (#'s 5-7) with the content of the text. This maneuver is a sly one, but all too common and misleading. Theory in its current form can never be more than a rheme. Theory can never be purely deductive, and given its handling of its source material, it seems barely inductive. I realize I have left more questions unanswered than I prefer, such as, 'Can we relate rheme to deduction, or the dicsign to induction, or an argument to abduction? Or would we require swapping these around to find the logical correlative? Does a rheme=abduction, a dicsign=induction, an argument=deduction? Does it make sense to take the class 3 sign (rheme-index-sinsign) as meaning: Courtship displays between humans which are particular to an individual couple (sinsign) but also bear relation to evolved behaviors (indexical signs in that these are common to the species and have real relations to the behaviors they represent) and lastly have a range of manifestation as thirds (Rhemes) based on cultural practice and local tradition, or that we may thusly see a range of rhemes which are all based on particulars of culture (and thus to relatively broad interpretation) that then bear the behavioral stamp of evolved tendencies through the index? These are interesting directions that further inquiry toward consilience may well endeavor. This proposal by no means desires to 'read' the arts only through science. As Sheriff says,

Our inability to achieve a complete, final, or rational understanding of anything not only shows the impossibility of final interpretations (Peirce places them as always in the future...) but shows the limitations of all rational systems and inquirie" (1989, 96).

This does not mean that science is somehow wrong, or that because it has been incorrect about things in the past that the current scientific consensus is therefore somehow flawed in parallel. Perhaps a complete and rational understanding may come by finally bringing a consilient attitude to bear on human intellectual endeavor. It can be done between the sciences and literature. As Brett Cooke says,

We should not look forward to a single theory of art, but fruitfully, only a common paradigm of perspectives. Life, nature and art are not that simple (1999, 9).

To borrow roughly from Maslow, much current literary theory with its aporeia/trace/discourse talk sees everything, even the natural sciences, like a nail because Theory has but one kind of hammer. If consilience is to be achieved, more analytical devices must be brought to bear on the arts, and for this study literature, in order to deepen the conversation and analysis, but more so to know, if fallibly and incrementally, exactly what it means to be human. Peirce and consilience offer perhaps the most open kind of invitation to explore and examine the universe, with humans as part of the continuum and never apart from it, such that the means by which we seek to know ourselves, be it literature or science, may be said to be parts of the same whole. Peirce's ideas and philosophy allow for this without disappearing down the rabbit-hole of slippery linguistic relativism or some grotesque scientific determinism. In short, Peirce's ideas offer perhaps the best framework and chance for consilience.

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ENGINEERING ARTIFACT MATTERS: THIS IS NOT A *SCIENCE* FICTION STORY ON NEW TECHNOLOGY

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I. Introduction: Why artifact matters?

Insofar as human beings are effectively adaptive, their behavior reflects mostly features of the outer environment (in view of human goals) and reveals only a few restrictive qualities of the “inner environment”, i.e. the natural mechanism that makes a person capable of thought. The “adaptation” of thoughts to the model of environmental problems is restricted by only a few “inherent” qualities of thinking human beings. Everything else in the thinking and problem-solving behavior is artificial: it can be learnt and enhanced through the invention of better plans and their storage in memory (Simon [1981] 1999). Thus, the world of objects should be considered as a decisive component of human continuity and the formation of the human view of life as a whole. Surely, the material product is right there in front of us. It combines, on the one hand, the current view formed by the common taste and the genuine or false needs of the social dynamic, and, on the other hand, it gives an outlet to the concentrated desire of human beings to contribute to their condition-to-be-formed, by expressing still amorphous ideas and hypotheses about it. Furthermore, it enables human beings to ‘converse’ with social reality, even if they cannot participate in a dialogue with all their fellow humans. The human creator, through his or her tangible constructions, makes sure to stop the eternal flow of time, to underline decisive moments of his or her existence and to transmit to the future generations elements that must not be forgotten.

Among all social scientists, anthropologists were the first to discern the material components of the whole cultural unity and to talk about material culture, especially since the 1930s (the earlier archaeological interest was mainly focused on the discovery and the symbolic dimension of artifacts, which also led to the documentation of historical categorizations and views). Their interest lied mostly in an ‘anthropology of techniques’ (not all techniques, though, just the material ones, thus excluding the mental ones – e.g., the techniques of mathematics and philosophy – and others, such as the techniques of state governance) and their research activity took place in the context of the sociological description and analysis of the different forms of elaboration of the natural world

(Lemonnier 1993). The “social life of things” (Appadurai [1986] 1999, Kingery 1996, Lubar and Kingery 1993) emerges through an examination of the material component of every historical period and it suggests the social relations developed through the influence of simple objects and complex constructions in the production and evolution of the various social forms. Even the production of simple commodity products is not just a part of an economic process, but it is now known to participate in the determination of the social becoming through other forms as well, especially cultural ones (Kopytoff [1986] 1999).

II. The “imprinted experience” and the “external world”

The components of the “external world” are the physical presence and the “imprinted experience” of the members of each society. Reality is never given as such; in other words, reality does not stand in itself, as an independent, pure, given, neutral, indifferent entity, with the human brain as its counterpart, namely as a self-sufficient and self-reliant mechanism, an agent always ready to take advantage of the ‘nakedness’ of reality in order to penetrate it. Reality and the brain, phenomena and the perception of phenomena are always socially formed (Arendt [1958] 1986, Kokkinos 2008, Mindell 2002). Thus, by examining the concept of the artifact, one may see the ‘socialization’ of objects as the process that gives objects a “nature”. Defining this concept is a crucial step in the discussion about the natural and the artificial object, about their differences and their similarities, about their ‘nature’ (insofar as artificial objects do have a “nature”), about their relation with social processes and, more importantly for our purposes, about the interpretation of each and every artifact. So let us see in brief how one could analyze this term.

On the one hand, natural objects are guided by specific laws which apply to all of them with no exception, while on the other hand artificial objects do not share a common “normativity”. Different kinds of artificial objects, categorized mostly on the basis of their functionality, follow different laws which must be revealed through different methods. The first and most important quality of an artifact is its internal form or structure (Losonsky 1990), the source of all its other qualities. The functions fulfilled by an artifact, the way it is used in view of a particular end and all its other unconscious uses, do not depend solely on its users; they also depend on the structure of the artifact as such. The use of an artifact is embedded in its internal form or structure and is doubly determined: by its purposed end and by the way it is used in view of this particular end. Thus, the second feature of an artifact is its purposed end and the third the way it is used. From the original conception of the idea to construct an artifact to the last time (after which it loses its functionality altogether) it was used, in view of a particular end and in a determined way, there is a time-span that seems to give the artifact a certain “nature” as a result of its interaction with its environment. This correlation leads to the conclusion that it is possible to consider that, in a way, an artifact has indeed some inherent qualities, i.e. that in its ‘relation’ with the

social whole it acquires features not originally given to it by its producer. The acquisition of such features is related to the way and the process of “socialization” of an artifact, a point particularly stressed by Winner. Having defined politics as “the arrangements of force and power in human interactions, as well as the functions taking place within such arrangements”, Winner argues that there are two ways in which one can conceive of the fact that artifacts may have political qualities: a) in cases where the invention, the design or the adjustment of a particular technological device or system is turned into a way to solve a problem within a human community, and b) in cases of what one may call ‘inherently’ political technologies, i.e. human-made systems that appear to require, or to be compatible with, particular forms of political relations (Winner [1986] 1989, 22).

At this point, and while the ‘dimensions’ of the concept of the artifact have been already described, it is essential to categorize them, so to speak. To begin with, Dippert defines *instrument* as a subcategory of *tool* and *artifact* as a subcategory of *instrument* (1995); but in doing so, he misses elements that have a leading role elsewhere, concerning the hidden relation of an artifact with human reactions. This is precisely the relation stressed by McDermott, who focuses on the implicit meaning of things (1990). McDermott stresses, in other words, the symbolic dimension of things, which often results in the immediate connection of a material element with memories, facts, and even beloved persons. McDermott refers to artifacts capable to digress even the feeling of solitude itself. Finally, Nicolacopoulos, in his attempt to explain the concept of representation through which he mainly intends to clarify the contribution of theory in the production of knowledge, introduces the term *artifact* and distinguishes three categories of artifacts: the primary artifact, produced in order to be consumed as a means to an end; the secondary artifact, a symbol made into the model of the human activity in which the primary artifact is consumed, i.e. a theoretical tool; and the tertiary artifact, not a tool but a theoretical entity devoid of the production and the use of the artifact, becoming the content of the human act of thinking (Nicolacopoulos 1979). This formal, one might say, three-fold distinction of artifacts offers the possibility to classify different artifacts, since an artifact may be a machine (e.g. a computer) or a monument.

As has been noted, “when people talk about technology today, they usually mean the products of contemporary engineering: computers, powerhouses, cars, nuclear weapons” (Billington 1986, 91). Technology may include all the human-made material artifacts, the function of which depends upon a particular materiality as such. According to the interpretation of such terms, this definition may seem to be somewhat redundant. Artifacts may be considered by definition as human inventions. But the redundancy is useful inasmuch as it cautions from excluding the non-human, animal constructions, sometimes also regarded as artifacts. Besides, the element of materiality may exclude social systems from technological objects in the primary sense, although these systems may rely upon manifestations of technology (Rotenstreich [1972] 1983, Tatum 1995, Winner [1977] 1992; [1986] 1989).

Artifacts have also been manufactured through technology, having played an important part in determining the cultural content of different time-periods. This undisputed statement puts contemporary societies before their present, making them appear as decisive historical forces. At the same time, it engages them, in a certain way, regarding the duration, the evolution and the continuity of their own cultures. This issue does not arise if one examines individual activity, the conduct of each particular citizen of a country, but especially if one looks at collective practices, various forms of global politics, decisions and measures taken on an institutional level, that one ought to implement or oppose.

Technology as the construction and use of artifacts is first and foremost a practice or an activity, and for this reason the relation of technology with ideas is not as evident as the relation of science with ideas. The existence of purely technological ideas and theories is not as self-evident as the existence of scientific theories. When ideas are connected to technology, it often seems that scientific ideas are integrated in a practical framework. Indeed, this analogy has led many scholars to consider contemporary technology as applied science, while technology itself functions at the same time as an obstacle to the development of an independent philosophy of technology. However, as is evident by the technological and engineering sciences, there are indeed distinct technological ideas. The concept of machine, as well as the concepts of efficiency and optimization, and the theories of aerodynamics, information, networks and cybernetics, to give only a few examples, are with no exception inherently technological (Kokkinos 2004, Mitcham [1994] 2005, Niadas 1997).

III. The ‘Science – Technology – Engineering’ distinction through the notion of the artifact

It is true that the critical speculation on the technological phenomenon has not pre-occupied extensively the community of either the philosophers or of engineers and technologists. Substantive indications for the opposite have begun to emerge, primarily in Germany and the US, since the mid-1960s. On the one hand, the majority of philosophers claim that theoretical reflection has no serious reason to engage with technology. When such an engagement does arise, it usually restricts itself to moral and praxeological problems, i.e. to issues related to the various effects of the final products of the technological process and to their impact on society. On the other hand, most of the times the community of ‘technical scientists’ does not have the necessary theoretical background for a well-founded, critical treatment of the technological phenomenon. Therefore, the lack of a broader theoretical orientation leads them to consider the technological systems and their processes as isolated phenomena, which can be analyzed solely in terms of their construction and operating mechanisms they employ.

One of the primary problems that arise in the context of a philosophical treatment of technology is the issue of its epistemological status. The question posed, thus, is whether

technology constitutes an autonomous kind of knowledge or simply an ‘application’ of scientific knowledge (understood as the knowledge brought about by ‘pure’ sciences, such as Physics, Chemistry, Biology, etc.) on practical problems, while this same technology lacks an original cognitive content that is proper to that technology and is produced solely within it (Agassi 1983, Kokkinos 2009, Mitcham [1972] 1983, Niadas 1997). This question is important not only because it sums up the knowledge-theoretical rationale of a Philosophy of Technology, but also because the same question has historically constituted the driving force behind the establishment of this philosophical field, for reasons that are not purely philosophical. The first ones who undertook the task to refute effectively the widespread theorization of technology as an ‘applied science’ were none others than the historians of technology. Irrespective of the motives that lay behind this defense of the particularity of technology, the attempt was philosophically successful: the systematic refutation (from a historical viewpoint) of the theorization of technology as an ‘applied science’ gradually led, in the course of the last 40 years or so, to the emergence of a relatively organized and fertile philosophical debate over technology as an autonomous philosophical issue, despite the fact that the relative weight and length of this field, compared to the related field of the Philosophy of Science, is still extremely limited at the international academic level (Achterhius 2001, Hottois 1989, Ihde 2004, Kateb 1997, Mitcham 1998, Scharff and Dusek 2003).

Thus, both the Philosophy of Technology and the Philosophy of Science are cognitive fields that developed in the 20th century, while the latter is undoubtedly more developed (for example, institution-wise, the Philosophy of Science Association was founded in 1934 while the Society for Philosophy and Technology was only founded in 1983). With respect to the Philosophy of Technology, we should note the distinction that Mitcham makes between Engineering Philosophy of Technology –i.e. the attempt by engineers and technologists to elaborate a technological philosophy– and Humanities Philosophy of Technology –i.e. the attempt by researchers from the humanities, primarily philosophers, to consider technology as a matter that requires profound, disciplined thinking (Mitcham [1994] 2005). The former individuals tend to be more analytical, while the latter more critical and interpretative. But let’s take things from the beginning.

In 1877, the German philosopher Ernst Kap coined the term “Philosophy of Technique” (in his work *Grundlinien einer Philosophie der Technik*) and formally established the field of the Philosophy of Technology. For Kap, (technological) tools are perceived as different kinds of projection of the human organs. For example, he does not hesitate to describe the telegraph as an extension of the nervous system. In the beginning of the 20th century, Dessauer suggests that a fourth critique should be added to the three Kantian critiques (of scientific knowledge, of moral action and of sensible perception): the critique of technological construction. In this way, he wants to highlight the transcendentalist preconditions of technical power and reflect on the moral effects of its application. For Dessauer, the essence of technology is found neither in industrial manufacturing, nor in its products themselves, but rather in the very praxis of technological creation (Mitcham [1994] 2005).

In English, the term ‘Philosophy of Technology’ appeared for the first time in 1966 by Mario Bunge. Bunge claimed that technology can be determined only in connection with the emergence of modern science and the change in the relationship between human and nature, concluding that technology is applied science and that technological knowledge is the outcome of the application of the scientific method to practical problems. For Bunge, Technophilosophy has five possible primary chapters (Bunge [1979] 1982): 1. Technoepistemology (the philosophical study of technical knowledge), 2. Technometaphysics (the philosophical study of the nature of artificial systems, from simple machines up to complex human-artifact systems), 3. Technoevaluation (the philosophical study of evaluations undertaken by engineers and technologists in the course of their professional activities), 4. Technoethics (the branch of ethics that studies issues that arise out of large-scale technological plans, e.g. construction of nuclear power-stations, development of special seeds in agricultural production, etc.) and 5. Technopraxeology (the philosophical study of human action driven by technology). The distinction that Bunge attempts is of decisive importance for many later surveys and essentially introduces the components of the field of reference for the Philosophy of Technology.

Now, in the context of the intellectuals who come from the field of humanities, Mumford attempts a distinction between two main kinds of technology: polytechnics and monotecnics. Polytechnical technology corresponds to polymorphism and the multi-dimensional expression of a democratic society, while monotecnical or absolutist technology is based on quantitative production and economic expansionism. This absolutist form of technology has its origins, according to Mumford, not in the Industrial Revolution but rather in the strict social organization (mega-machine) that led, five thousand years ago, to the creation of impressive monumental works, such as the Pyramids and the Great Wall of China (Mumford 1967-1970).

The first “professional” philosophers, who explicitly pose the question of technology, considering modern science as inherently technological, are José Ortega y Gasset and Martin Heidegger. Ortega’s philosophy of technology involves his general theory of circumstances (Ortega [1930] 1972). Initially, there is the creative invention of a design that a person wishes to realize. Next, there is the material realization of this design – i.e. particular technical demands for each occasion. In the modern era, he stresses, human beings are in a position to know how to realize any design, even before selecting it, since they have technology before a technique. In contrast to the instrumentalist view of technology as an autonomous human medium, Heidegger claims that technology is a kind of truth or revelation (Heidegger [1954] 1977) and that modern technology is a revelation that organizes nature and challenges it to create a stock (Bestand). For Heidegger, technological developments do not create original things, in contrast to traditional techniques. Stock consists of objects without any inherent value, beyond human use. Moreover, technology could perhaps help clarify the fundamental question of Being. For

Heidegger, in other words, technology as a form of truth is a means for the disclosure of Being; albeit, a means that conceals its own essence.

During the same period, Ellul claimed that capital is not the dominant power anymore, having been replaced by technology, which he defines as “the set of rationally selected methods that aim at the achievement of absolute effectiveness in every field of human activity” (Ellul [1954] 1964). This ‘technological determinism’ –according to many– is an outcome of a social bet that has transformed science into a tool of technology. According to Ellul, the prevalence of technology has not led simply and solely to the absolute conquest of nature but also to the replacement of natural environment by technical environment. Ellul proposes a morality of non-power, which will strictly delimit technical practice based on the premise that people shall agree to not do whatever they are capable of doing (Ellul [1983] 1989).

Up to now, we have seen –apart from views and positions that belong to the broader ‘system’ of thought of each thinker– that a critical point of the discussion about technology is the relationship of the latter to science. At this point, it is useful to examine in brief the particular dipole and try to discern its terms.

Science and technology have clear conceptual differences. What is often important for a scientific theory is whether it is true or false, while a given technique is evaluated according to whether it is effective or not, whether and to what extent it “operates”. Scientific theories are valid exclusively for a given period of time, until new theories manage to abolish them completely. On the contrary, technological reality is often in a potentially transitional condition driven by economic, social and political forces, which play the primary role in disregarding a technique (of course, without implying that the particular technique is not applicable anymore) and in establishing another. Moreover, the final outcome of scientific research is the production of knowledge, while ‘knowledge’ originating from technological research is often “tacit”, i.e. it is acquired through practice and cannot be explicitly constituted (Polanyi [1958] 1974). This ‘knowledge’ is embedded in the artifact and know how, without being capable of “translating” clearly in a set of propositions. Apart from the acquisition of scientific knowledge, we also “acquire” knowledge by designing, producing, and using artifacts (Kornwachs 1998, Layton 1974). The prevalence of a theory on technology, which is essentially reflected on its practical establishment, does not depend on its objectivity and rightness. On the contrary, a precondition for its adoption is its ability to successfully solve various problems, problems adjusted to the interests of certain social groups. Therefore, market economy and socio-political factors are the ones that play the critical role for the establishment of a new technique, rather than empirical accumulation and step-by-step approach of universal knowledge. Therefore, the shaping of technology appears as a process that is critically affected by fixed ‘external’ preconditions and needs in the context of the development of a society. Perhaps, then, Thomas Kuhn’s approach lies closer to the interpretation of the technological phenomenon. This can be seen more clearly if one examines, for example, the transition

from analog to digital technology, or even the development of nuclear and ‘smart’ weapons that replaced “conventional’ weapons” (Kokkinos 2004, Kuhn [1962] 1981).

Technology, as a critical component of the cultural life of every society, and especially of the modern one, is characterized by political properties. This discovery is adopted by a series of researchers working in the Philosophy of Technology, who place at the center of their attention the downgrading of culture in the context of modern society, and its conquest by cultural ‘products’ of a technological “nature”. It is not by chance that representatives of this trend (primarily Langdon Winner and Andrew Feenberg) start by exploring elements of the Critical Theory of the Frankfurt School (Feenberg 1999, Kokkinos 2007). The thinkers of this School waged a fierce criticism against modernity (and especially against certain propositions of the Enlightenment, highlighting its internal contradictions), focusing in particular on the relationship of technology with culture and civilization. Culture industry and the mass culture are terms used throughout their work in order to describe aspects of the contemporary social condition. They claim that the “violent” entry of the mechanistic mode of thought has managed to decode and direct human expectations, to offer them incorporated into the product under consumption, presenting art not as a form of ideal reality but rather as a fabricated “beautiful reality”. On the other hand, art, which does not distinguish between groups and social categories, is the field out of which the potential that will overturn the existing situation shall emanate. The same thinkers support the necessity of a culturally reformed landscape and highlight the significance of original creation, as opposed to the industrialized, uniform construction. For them, technology has formed a new social condition that tends all the more rapidly to affect the traditional forces of change.

In this context and in this debate, the notion of ‘artifact’ becomes central. From the first conception of the idea for fabricating an artifact until the last time it was used for a particular purpose and in a particular way (and then its functionality ceased to exist), there is a period of time that seems to add a ‘nature’ to the artifact, as a result of its interaction with the environment. In a sense, artifacts even have inherent properties, i.e. in their “interaction” with the social body they acquire characteristics that were not initially attributed to them by the manufacturer. The acquisition of these characteristics is associated with the manner and the process of ‘socialization’ of the artifacts, as it has been emphasized here. This multiplicity of the seemingly ‘neutral’ material product (which connects the economic praxis to the cognitive, the means to the goals, praxis to genesis and to its end (Nicolacopoulos 1979) explains the fact that the human being is often willing to make drastic changes to his/her way of life in order to be in harmony with technological developments, without however being in a position to recognize the dynamics of the latter.

Thus, it is not surprising that the philosophy of technology has placed the analysis of the concept of artifact at the centre of its concern. This development is directly related to the incorporation of a third term into the debate: “Engineering”. On the other hand, it should be noted that a central question of the philosophy of science is “what

kind of science engineering is” (Poser 1998), the answer to which is based on the primary distinction between basic and applied science. In this context, there are generic references to technological or engineering sciences (such as materials resistance, thermodynamics, fluid mechanics, etc. – fields that are, however, only components of the various branches of engineering; “materials resistance” is part of the branch of civil engineering, ‘fluid mechanics’ is part of chemical engineering, and ‘thermodynamics’ of mechanical and chemical engineering), in order to overcome the difficulty in defining the relationship between Technology and Science, which is evident to those who participate in the ‘field’ of engineering and cannot regard themselves scientists or technologists. One of the main differences between science and engineering stems from the division between ‘science of nature’ and ‘science of artifacts’. This difference follows the ontological substance of the objects that each branch deals with. The fabrication of things and the invention of processes, on the one hand, and the discovery of nature and its law, on the other, are activities that seemed independent of one another, at least up until a few decades ago. However, based on this distinction, it is difficult to answer questions posed to us by our times, such as whether a cloned sheep is an artifact or not – and thus where we should classify a biotechnologist or a geneticist. It is by now obvious that an engineer should not only care about whether the artifact that he will design, and that will later be fabricated, “operates” satisfactorily. Moreover, everything that is associated with the evaluation of technological applications shows us that we can no longer focus on specific separate roles –scientists, technologists and engineers– and study them individually, isolated from broader social developments (Kokkinos 2008a; 2008b; 2009; 2012).

The formal knowledge used by engineers when they design things is not scientific, even if a large part of it stems from science. This knowledge is based on experimental features, as well as on empirical observations of materials and systems (Ferguson 1992). The object of engineering is not the given world, but rather the world created by engineers themselves. And this world does not have the consistency of the plan of a beehive, which remains unchanged throughout countless generations of bees, because human fabrications imply a continuous and rapid development. Not because we like change for the sake of change, but because human interests, resources and ambitions do not remain fixed (Petroski 1985). In the context of the contemporary era, it can be easily concluded that any knowledge that is entailed in the artifacts of technology must come from science. This conclusion ignores the multiple non-scientific, minor and major, decisions that are made by technologists as they design the world we live in. Many of the objects of daily use have been clearly affected by science, but their form, size and appearance were defined by technologists and technicians, engineers and inventors, through the use of non-scientific modes of thought (Ferguson 1992). As an activity, engineering falls fully into the jurisdiction of technical/technological knowledge and is totally enclosed within technical activity in general. In our times, it is the mainstream expression through which human

technical/technological activity manifests itself. Despite the continuous survival of traditional techniques and practices, some of which have a history of several centuries, the greatest part of technological activity is expressed through engineering. Perhaps, then, engineering belongs fully to technical activity, while it nevertheless incorporates essential expressions of the transformed scientific activity.

Engineering has formulated its own terms with which it grasps the special characteristics of the knowledge that it handles, conveys and utilizes. Vincenti identifies the following categories of engineering knowledge: (a) fundamental concepts of design, (b) technical specifications and models, (c) theoretical tools, (d) empirical data, (e) practical factors and (f) technical specifications of design. Here, perhaps, Vincenti's approach is of critical significance, as far as design is concerned, a key component that characterizes engineering activity, representing the purposeful adaptation of the means for the realization of a given target, i.e. the very essence of engineering (Layton 1976).

The fundamental concept of design is thought to be the principle that, due to its earlier experience and long-standing use, is instantly seen as applicable when the design of a new application is resumed, which belongs to a class of technological problems where this principle has become part of the "normal configuration" (Vincenti 1990). Vincenti's conclusion concerning the fundamental principles of design is that "each device has an operating principle; when the device becomes the object of regular, daily use, it also acquires a normal configuration". Furthermore, specifications and models constitute an agreed codification of some specialized criteria, both "internal" (for example, those that promote the technical security of the application), and "external" (for example, those that ensure the security of workers, control of "total quality", etc.). In the case of point (c), it is worth noting that the theoretical tools can be found in the context of basic sciences, with which the engineer is always equipped (during his/her long basic studies), while empirical data and practical factors [points (d) and (e)] always serve different designs, and *ad hoc* developments of particular designs, in order to describe the problems faced by the engineer and his or her team.

Engineering can be divided not only in various branches, according to the fields in which engineers work, but also according to functions defined by the engineers' mode of action, i.e. based on the roles that they perform in the production line. In this context, engineering functions vary, from invention, research and development, via design, production and fabrication, to function, sales, service provision and administration. For some, invention is considered to be different from research and development, while for others, it is thought to be something that includes them. Applied research or research oriented towards specific goals uses scientific and mathematical knowledge and the appropriate experimentation in order to compose new materials, or create new processes of energy production. Development entails the exploitation of these materials, energies and processes in order to design, to produce and to assemble original products, ready to address certain problems or fulfill certain needs. Here, the process of design may partly be understood as development, or as an autonomous activity geared towards fabrication and production. In

certain cases, the initial development of the product may include the formulation of specifications for its production. Production and fabrication constitute two kinds of creation in a limited sense. The former creates artifacts of a non-permanent character (consumer goods), the latter fixed edifices (houses, bridges, buildings). Fabrication and assembly can operate as synonyms of the “act of creation”, in certain occasions.

As an aspect of the engineering activity, the act of inventing, in contrast to scientific discovery, refers probably to the creation of a new thing, rather than to the discovery of a new object that already exists but is ignored. For example, the telephone did not exist before the emergence of Bell’s work, while gravity existed but had to wait for Newton in order to take the form of a scientific law. Invention promotes the birth of things through ideas and forces the world to adapt to thinking. Discovery, borrowing ideas from observation, brings forward the adaptation of thinking to the world. Scientific ideas (laws and theories) are over-determined by observations and require the existence of intellectual creativity and imagination. In contrast to the act of conceiving, or even imagining, what comprises the essence of invention is the particular metamorphosis of materials: the realization of a metamorphosis that is conceived in imagination. Invention can start from conception, but is eventually not realized before the operational control of an artifact and the proof of its ability to perform the work that has been assigned to it. Like conscious action that is born in the human mind and is confirmed by its practical realization, the conception of the invention counters the slow and gradual technical change and constitutes a clearly modern concept. Like scientific discovery, invention can be completed in a short period of time by a single individual, bringing about historical discontinuity, or it can be realized through the gradual evolution achieved by a group of individuals. The invention that advances towards its completion with a slow rhythm and spreads in time through numerous insignificant modifications that preserve historical continuity is in certain cases signified by the term “innovation”. Furthermore, perhaps the act of inventing has its origins not so much in the pursuit of the practical materialization of ideas through material construction, but in a random alteration of the material and the form of artifacts through time, which entails the final recognition of the utility of an object. As such, it almost lacks the act of designing, a visible and distinctive characteristic of contemporary invention and innovation. In contrast to the act of designing, the act of inventing appears as an action that proceeds unconsciously, intuitively, or even randomly. The act of designing implies the act of intentionality, but also the act of programming. The act of inventing is nothing but an act of random design and, as such, presupposes the element of insight as well as one’s ability to discover—perhaps accidentally—what is interesting and valuable, and plays an important role, even in works of design. The act of inventing implies the notion of the uniqueness of creation, while the act of designing takes an invention and adjusts it, for example, to the conditions of mass production. Even though certain inventors were engineers, the engineer generally confines oneself to design that is related to existing materials and processes, given that they are deemed sufficient for the realization of the project, bringing about only differentiations dictated directly by the circumstances.

IV. Coda

The so-called “empirical turn” in the philosophy of technology (Achterhius 2001, Ihde 2000, Scharff and Dusek 2003) clearly prioritizes philosophical thinking based on empirically sufficient descriptions that reflect the wealth and the multiplicity of contemporary reality. The primary concern of this current of thought is the broader elaboration of the activity of technologists, scientists and engineers aimed at the exploration of a more effective metaphysical and ontological understanding of artifacts, as well as the approach of more ‘solid’ knowledge-theoretical analyses of technological practice. Therefore, from now on we must refer to a complex phenomenon that is both scientific technology and technological science – let’s call it *Technoscience* (as Gaston Bachelard, Cornelius Castoriadis, John Agassi, Bruno Latour, Jean-Francois Lyotard, Jacques Derrida, Don Ihde and Raphael Sassower have done) (Agassi 1983, Castoriadis 1990, Ihde 2000, Ihde and Selinger 2003, Sassower 2004) and deal in detail with the division between theory and technical process – bearing engineering in mind. The technoscientist draws on elements from basic scientific disciplines and technological or engineering sciences, and attempts to “solve” a problem by “inventing”, using heuristic methods of trial and error as well, and basing oneself solely on pre-empirical, rationally processed data. The nucleus of this effort is the decoding and clear description of the basic principles and ways from which the engineering process originates, the creation of a self-sufficient model of philosophical explanation of scientific-technical activity that will lead us out of the artifact and into a description of the knowledge that is required for its creation, as well as of the ways in which this distinct activity affects human thought and behavior.

Today, human response vis-à-vis the “presence” of each artifact (and the machine) is unclear, often creating –one could emphatically say– a situation where roles and priorities that are associated with basic stakes of human evolution are mixed up. The most advanced artifacts are those that are called ‘smart’ devices and can control their own function. ‘Smart’ devices depend on what is usually called knowledge engineering. But can knowledge be engineered? What happens to knowledge during this process and what special character does it lend to it? On the other hand, the scope of thinking over the tripole technology-science-engineering does not reach into the holistic theorization of the position of its achievements in the cultural body, neither does it engage with the assessment of these achievements with other criteria, apart perhaps from the criteria of validity and the logic of the various theories that back these achievements. The character and the goals of the components of this tripole do not constitute a problem that is inherent to these components. For their goals and directions, for the meaning of these goals, the circumstances and effects of their development, there is a need to construct a framework of principles, upon which the tripole will be able to evolve in a humane way. This duty belongs to philosophy, perhaps because by raising new moral issues, technology and science and engineering tend to undermine the importance of human action with which Ethics traditionally engage.

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GÖDEL'S THEOREM AS A SOURCE OF INSPIRATION FOR LITERARY PRODUCTION

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Almost a century and a half ago literature sought for the first time inspiration in mathematics. It was 1884, when Edwin Abbot published *Flatland, a Romance of Many Dimensions*. It was a short novel, set in a two-dimensional land where all inhabitants were flat and could not conceive the idea of a third dimension. The novel served a double purpose: on one hand it helped the three-dimensional reader gain some insight to the newly emerging mathematical theory of the fourth dimension and on the other, it gave the author the opportunity to present an acute social criticism on Victorian society, a criticism that would stumble on censorship if it were formulated for three-dimensional beings.

Although *Flatland* is the first genuine “math fiction” literary work, there have been some important precursors. In 1608 Johannes Kepler wrote his *Somnium*, a novel narrating a trip of his fictional hero, the 14-year-old Duracotus, to the Moon. Back in 1593, when studying in Tübingen, Kepler had written a dissertation based on the Copernican heliocentric hypothesis in which his calculations led him to a theoretical description of Earth, as seen from its satellite. The dissertation was rejected by Kepler’s professors, who remained faithful to the Ptolemaic, geocentric system. So, Kepler embedded his mathematical work in a fictional narrative, hoping that it would thus enjoy a more favorable reception. The novel was finally published in 1634, four years after Kepler’s death, by his son.

About a century later, Jonathan Swift dedicated the third of his *Gulliver’s Travels* to a voyage to Laputa, the land of mathematicians. All usual clichés about absent minded mathematicians, already coined by Plato and Plutarch (concerning respectively Thales and Archimedes) are reproduced in this extremely critical satire against scientists partly provoked by Swift’s loathing for Newton and his entourage.

About 25 years later, on the other coast of the English Channel, emerged the *Micromégas* by Voltaire. The book describes a visit to Earth by an inhabitant of Sirius. He is much bigger than the inhabitants of Earth, since he can hold a dozen of them on his nail (a more or less obvious “influence” by Swift). Various arithmetic and geometric properties are involved in the development of the story, as well as direct and indirect references to mathematicians of Voltaire’s age, such as Pascal, Maupertuis and Bovier de Fontenelle.

We should also mention the two books by Charles Lutwidge Dodgson, alias Lewis Carroll, *Alice in Wonderland* and *Through the Looking-Glass*, published just twenty years before *Flatland*. Not one mathematical term is contained in the text, but a mathematical aura as well as mathematical hints, are present everywhere.

Thus, 15 years before the opening of the 20th century, Edwin Abbot initiated a new genre (or sub-genre), to be named math fiction. However, as far as science-oriented fiction is concerned, the 20th century is dominated by Physics and Astronomy. H. G. Wells has led the way in coining all of the three main streams of the science fiction genre: Space Travel and interaction with alien civilizations (as in *The War of the Worlds* - 1898), Time Travel (as in *The Time Machine* - 1895) and finally, use of physics and technology to perform “impossible” tasks (as in *The Invisible Man* - 1897).

Throughout the entire 20th century, the new genre flourished, loading many a bookstore’s cases with hundreds of books, most of them becoming best sellers. By the 1930s, specialized science fiction magazines, such as *Amazing Stories*, *Astounding Science Fiction*, *Esquire* and *New Worlds*, became extremely popular. Occasionally, these magazines offered some space to mathematics-oriented short stories. In 1947, for example, *Esquire* hosted Martin Gardner’s *No sided Professor* and in 1950, *Astounding Science Fiction* did the same for *A Subway Named Mobius* by A. J. Deutsch. However, nor these, nor any of the other examples, in any way guaranteed the advent of a new math fiction genre. And then, near the end of the century, in 1998, came *The Parrot’s Theorem*, by Denis Guedj.

Guedj’s novel was initially published in French and was very soon translated in about 30 other languages. Presented as a crime thriller, it was actually a playful narrative of the history of mathematics, enhanced by various interesting personal stories and even some genuine proofs of theorems! *The Parrot’s Theorem* was followed by an avalanche of books that, in one way or another claimed the label of math fiction. Some bookstores created special thematic bookshelves, universities and literary societies organized conferences on the topic and several theoretical analyses were published. Today, Alex Kasman’s mathematical fiction database contains 1286 works claiming the characterization of math fiction. Most of them were published after 1990. If one takes into consideration that the database contains only books published in English, the total number must be much more significant.

At this point, it would be a good idea to make the distinction between “science fiction” and “math fiction”. This distinction is much deeper than the distinction between “science”, taken to mean “natural science”, and mathematics. The themes of science fiction are always based on a real or hypothetical scientific achievement: rocket science inspires stories about space travel, relativity and quantum physics open the door to fiction involving time travel, and informatics spin narratives involving robots and various other intelligent machines. Science fiction itself is generally divided into “hard sci-fi”, focusing as much as possible on scientific accuracy and “soft sci-fi” which generally ignores scientific reality for the sake of plot enhancement. Math fiction is much wider. The focus is not

necessarily on a scientific achievement. Character studies of mathematicians, stories of famous, elusive problems, quests and crime detection using mathematical methods have given us interesting samples of math fiction.

The mathematics themes chosen by the authors vary: The fourth dimension and non-Euclidean geometries, already favored by the precursors of the math fiction era, claim an important share. Famous problems such as Fermat's last theorem, Goldbach Conjecture, the four colors problem and amicable numbers are also appealing to narrators. Some authors prefer to work on invented "problems" (Schogt 1998, 12) so as to have complete freedom in dealing with the plot. However, I think that authors who deal with a real problem, and build their plot around true facts, deserve more credit, since they have to construct their fiction respecting facts related to historical and scientific truth.

Another rich source of inspiration are the lives of mathematicians. Srinivasa Ramanujan, Alan Turing, Évariste Galois, Georg Cantor, Emmy Noether, John Nash or even the mysterious Egyptian scribe, Ahmes, author of the so called Rhind Mathematical Papyrus, have been the themes of very successful literary works. Great achievements such as the measuring of the Earth's circumference by Eratosthenes or the breaking of the Enigma code at Bletchley Park, during World War II, have also been successfully narrated. The corresponding literary works succeeded in respecting the historical truth and cleverly enhancing it with fictional material. Some of the aforementioned themes have served as the basis of very successful screenplays.

However, surprising though it may seem, the undisputable favorite among mathematics storytellers is Gödel's Incompleteness Theorem. More than twenty works of fiction, novels, short stories, plays, and even a graphic novel, have Gödel's theorem as their main, if not exclusive, theme. In order to understand the reason for this unexpected popularity and be able to classify these works according to the level and type of "Gödel involvement", we should first describe briefly the content of this infamous Incompleteness Theorem.

When Euclid wrote the *Elements*, the oldest surviving mathematics survey built according to the solid axiomatic – deductive format, he chose a set of five postulates (*aetimata*), five "obvious" propositions to serve as the basis of his work. All subsequent propositions – theorems and constructions – were to be proved using the Aristotelian deductive process, based uniquely on the axioms and previously proved propositions. The first four postulates were extremely simple in their formulation and were characterized by an undoubtable, intuitive obviousness. Hence, they created absolutely no logical dilemmas. Nobody doubted for example that it is always possible "*To draw a straight line from any point to any point*" or "*To describe a circle with any centre and distance*"¹ (later the geometric theory based exclusively on the first four Euclidean postulates was named "*absolute*" or "*neutral*" geometry). On the contrary the fifth postulate was far

1. Postulates 1 and 3, respectively, of Euclid's *Elements*, translated by T. L. Heath.

more complicated and far less obvious.² For more than two thousand years, from 300 B.C., when the *Elements* were published, until the first decades of the 19th century, the consensus was that the fifth postulate was not actually a postulate and that a proof could be obtained, based on the four postulates of neutral geometry. Various reformulations and equivalent forms of the postulate were suggested. The most popular one was the so called “parallel postulate”, also called “Playfair’s axiom”. It was initially formulated by Proclus (410 – 485 A.D.) but nowadays it is named after John Playfair who re-stated it in 1795: *In a plane, given a line and a point not on it, at most one line parallel to the given line can be drawn through the point.* However, a solid proof, based on the other four postulates, remained elusive.

Then, on February 1826, a Russian mathematician, Nikolai Lobachevsky, formulated a new geometry by adding to the four postulates of the “neutral” geometry a fifth one, stating that, *In a plane, given a line and a point not on it, infinitely many parallels to the given line can be drawn through the point,* which is of course contradictory to Euclid’s fifth postulate. A Hungarian mathematician, János Bolyai, who had independently formulated a set of axioms equivalent to those of Lobachevsky, published his theory in 1932. This new theory was named *hyperbolic geometry*.

Finally, in 1854, Bernhard Riemann proposed a third type of geometry, later christened as *elliptic geometry*, in which the concept of parallels is inexistent. Some years later all three geometries were proved consistent. Moreover, each of them was shown to illustrate the same aspects of physical reality and to have practical applications.

An immediate consequence of this was that the conception of postulates (axioms) as “obvious” truths was proved inadequate. The criterion of obviousness having collapsed, there was an eminent need for a valid process of selecting and putting together axioms for the creation of a new theory.

Moreover, the fact that a certain proposition may be neither provable nor disprovable within a certain set of axioms coined the term “undecidable”: the addition of the “parallel postulate” to the first four Euclid’s axioms (the axioms of neutral geometry) yields a consistent theory, but so does the addition of the negation of this postulate. Hence the parallel postulate is an undecidable proposition within the context of neutral geometry. Many important mathematicians and logicians, such as Gottlob Frege, Alfred Whitehead, Bertrand Russell and Giuseppe Peano, to name a few, put themselves to the task.

On Wednesday, August 8, 1900 in his lecture at the Second International Conference of Mathematicians, held in Paris, David Hilbert described the new situation:³

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2. That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than the two right angles. [Translation by T. L. Heath].
 3. The excerpts of Hilbert’s lecture are taken from Jeremy J. Gray, *The Hilbert Challenge*, Oxford University Press, 2000.

When we are engaged in investigating the foundations of a science, we must set up a system of axioms which contains an exact and complete description of the relations subsisting between the elementary ideas of that science. The axioms so set up are at the same time the definitions of those elementary ideas; and no statement within the realm of the science whose foundation we are testing is held to be correct unless it can be derived from those axioms by means of a finite number of logical steps.

As we can see there is no claim for an axiom to be “obvious”. The only requirement is that the set of axioms must define the elementary ideas of the theory and describe exactly and completely the relations between these ideas. Next comes the question of redundancy. We require independent axioms which must not be provable from other axioms of the theory.

Upon closer consideration the question arises: *Whether, in any way, certain statements of individual axioms depend upon one another, and whether the axioms may not therefore contain certain parts in common, which must be isolated if one wishes to arrive at a system of axioms that shall be altogether independent of one another.*

Now that the axioms are no more selected from “obvious” propositions, there arises the problem of consistency: the arbitrarily selected propositions must be compatible and therefore not contradictory.

But above all I wish to designate the following as the most important among the numerous questions which can be asked with regard to the axioms: *To prove that they are not contradictory, that is, that a finite number of logical steps based upon them can never lead to contradictory results.*

He then explains how the compatibility of geometric axioms may be proved through the consistency of arithmetic. But...

On the other hand, a direct method is needed for the proof of the compatibility of the arithmetical axioms. The axioms of arithmetic are essentially nothing other than the known rules of calculation [...] I am convinced that it must be possible to find a direct proof for the compatibility of the arithmetical axioms by means of a careful study and suitable modification of the known methods of reasoning [...].

And that is exactly where the problem arises! Thirty years after this seminal lecture, a young Austrian mathematician, named Kurt Gödel, published an article⁴ in which he

4. Kurt Gödel, Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I, in *Monatshefte für Mathematik und Physik*, Volume 38 pp. 173-198 (Leipzig: 1931). English translation, On Formally Un-

proved that Hilbert's claims were impossible. Namely he proved that if a set of axioms expresses elementary arithmetic it cannot be both consistent and complete. That is, if it is consistent, it will necessarily contain undecidable propositions, propositions that can be neither proved, nor disproved. Moreover, the consistency of such an axiomatic system cannot be proved within the system.

This meta-mathematical theorem, generally referred to as Gödel's Incompleteness Theorem, has an extremely technical formulation and proof, rather repulsive to a storyteller. On the contrary, ideas concerning self-referential arguments, vicious circles and logical uncertainties are extremely alluring to creators of fiction. Moreover, the various interpretations and mis-interpretations of the theorem, in laymen's terms, open tremendous possibilities to speculation and therefore to fictional creativity.

The most popular rendering of the theorem is that "there are propositions which are true but not provable". Of course, this statement is itself subject to various interpretations, according to one's philosophical orientation. A Platonist, for example, will interpret this statement as a validation of Plato's theory of ideas: truth resides in the realm of Ideas and is inaccessible to humans. All that humans can achieve is a more or less rough, approximate view of truth. The provable propositions of the incomplete axiomatic theories illustrate exactly these rough approximations. Gödel considered himself a Platonist, although his avowed Platonism has long been a subject of controversy among logicians. Therefore, one might speculate that he would accept the above interpretation as compatible with his general conception of mathematical entities as "objects that exist independently of our constructions" (Gödel, 1944)

On the other hand, to an experimental mathematician, believing that mathematics is invented and not discovered, incompleteness would represent the eternal process of reviewing, improving and enhancing theories that do not explain nature but make it more and more manageable.

In any case, to the layman, as well as the specialist, this distinction between "true" and "provable" may initiate romantic, poetic and eventually metaphysical insights. Other interpretations, such as "arithmetic is and will always be incomplete", "there are more than one arithmetics", "the consistency of mathematics cannot be proven" or even worse "the foundations of mathematics might be rotten" may surround the theorem with an aura encompassing a wide variety of feelings, ranging from playfulness to curiosity, fear and even horror. Of course, any or all of the above are adequate for the creation of fiction.

Moreover, Kurt Gödel had a very interesting – from the narrator's viewpoint – life. Suffering from various phobias since his childhood and experiencing periods of mental instability, he had the typical, cliché characteristics usually attributed to mathemati-

undecidable Propositions of Principia Mathematica and Related Systems I, by B. Meltzer, Dover Publications, New York, 1992.

cians. Strongly attached to his mother, he nevertheless ignored her opposition to his marriage and, after ten years of courtship, he married Adele Pokert, a divorced cabaret dancer, six years his senior. When World War II started he fled to the United States, crossing the entire Soviet Union, then passing to Japan on a boat and finally, on another boat, to the USA. At the Institute of Advanced Studies at Princeton, he became a close friend with Albert Einstein. Their long walks, animated by scientific and philosophical discussions, became a part of the history of IAS. He remained attached to Adele for the rest of his life. During his last years he became completely dependent on her. When she entered the hospital due to a stroke, he refused to eat, since his meals were not prepared by her and he subsequently died of malnutrition. One understands how this self-referential syllogism of “refusing to eat in order to avoid dying from poisoning and hence dying of malnutrition” can be tempting for any type of literary speculation.

Gödel’s turbulent and eventful life was the theme of Yannick Granec’s, *The Goddess of Small Victories*: After Gödel’s death, the administration of the IAS assigns to Anne, one of its employees, the task of convincing Adele to donate her husband’s *Nachlass*⁵ to the Institute. During their meetings, Adele narrates to Anne her life with Kurt and the ways in which his obsession with incompleteness affected them. It is a biographical novel with wonderfully staged scenes, describing the life in pre-war Vienna and in postwar Princeton. The circle of Vienna, the rise of Nazism, the Gödel family feuds, the postwar America and the rise of McCarthyism are thoroughly narrated, interwoven with the philosophical inquiries and perplexities of Gödel and his friends. Albert Einstein, Oscar Morgenstern, John von Neumann, Wolfgang Pauli, Robert Oppenheimer are present as minor characters of the novel and Y. Granec succeeds in placing them in realistic, though fictional settings.

The play *Incompleteness* by Apostolos Doxiades deals with the last days of Gödel at the hospital, when he absolutely refused to eat, causing himself to die by starvation. Gödel’s theory is presented in the play by a rather grotesque Hilbert’s figure, who succeeds in informing the audience about the content, while avoiding the lecture-type presentation. A fictional “theories producing” engine illustrates Hilbert’s demand for a method of validating the consistency of newly created axiomatic theories, a demand that was negatively answered by Gödel’s theorem.

As we mentioned above, a consistent theory can never prove its own consistency. Hence, the consistency of a theory can only be proved by “stepping out” of it and creating a model, satisfying all its axioms. This idea is cleverly introduced in the play by a side story: the hospital’s dietitian, who struggles in vain to make Gödel feed himself, has a daughter who suffers from anorexia. The story of her daughter serves as the necessary

5. A scholar’s *nachlass* is the collection of his manuscripts, notes, correspondence, and other manuscripts left behind after his death. The origin of the term is German.

model, needed to guarantee the consistency of the main story, in a way an analogue to the logical process of validating an axiomatic theory.

The novel *The Goddess of Small Victories* and the play *Incompleteness* are the only works of fiction dealing with Gödel's life. In all the other Gödel – related fiction, the focus is on the theorem. In *Uncle Petros and Goldbach's Conjecture*, Doxiadis tells the story of a mathematician obsessed with solving the Goldbach Conjecture (every even number greater than 2 can be written as the sum of two primes). At a certain moment in his life Uncle Petros hears about the Incompleteness Theorem and is devastated by the suspicion that the proposition he has spent all his life to prove might be undecidable. So Gödel's theorem plays a critical role in a novel whose focus is another mathematical problem.

The two encounters of Doxiadis with Gödel's theorem probably acted as strong incentives in collaborating with Papadimitriou, Papadatos and Di Donna to create *Logicomix*, a graphic novel about the foundation crisis in mathematics. The main figure and the narrator of this work is Bertrand Russell. He recounts the story of the foundations' crisis and naturally, an important part of his narration is reserved for incompleteness and its consequences regarding the way we consider mathematics.

The essence of mathematical truth and its comparison to other types of convictions, such as religious faith or legal proof, is the subject of Gaurav Suri's and Hartosh Singh Bal's, *A Certain Ambiguity*. Ravi, a young Indian mathematician studying in the USA, finds out that during the twenties, his grandfather was imprisoned on the charge of blasphemy. Intrigued by this unexpected information, he goes on to search for the newspapers and legal archives from that period: he discovers that his grandfather, who at the time was a postgraduate student in mathematics, had publicly declared that since there is no proof for God's existence, he refused to believe in it. His discussions with the judge in charge of the case were taken down in detail. They concerned the nature of truth, the validity of axioms and the multiplicity of consistent geometries. Ravi who, unlike his grandfather, is well aware of the Incompleteness Theorem, is able to examine the case under this new light and reach conclusions about ambiguity in mathematics, faith and everyday life.

Gödel's theorem as a challenge to certainty is also the theme of the *Oxford Murders*, a crime fiction novel by the Argentine mathematician, Guillermo Martínez. In this novel, the theorem is used in a much more playful manner, succinctly suggesting that mathematics, adequately employed, may serve to hide the truth instead of discovering it. A young Argentine mathematician arrives in Oxford in order to prepare a thesis on mathematical logic. The murder of his landlady, Mrs. Egleton, is the first of a series of crimes, apparently related to a sequence of mathematical symbols. The murderer seems to be challenging Arthur Seldom, a famous mathematician of Oxford, to discover the next victim. The young student and the old professor join forces in order to assist the police in discovering the culprit and preventing the next crime. However, many things

are not as they seem, and the set of selected axioms may not be consistent... The novel has been successfully adapted to film.

The Hell Book by Carlo Frabetti is an allegory, strongly influenced by Dante and Borges. The hero wakes up at the bottom of Hell, which has the form of a library. In order to escape he must climb the floors of the library, one by one. He can only achieve this by beating his demon guardian in various challenges of wit, most of them having a Gödelian character. “Every sin contains its punishment, or rather, the sin *is* the punishment” is his final statement, when after accomplishing the last labour that will set him free.

Wouldn't it be preferable if the Incompleteness Theorem did not exist? Wouldn't it be better if Hilbert's dream of complete axiomatic systems were true? Wouldn't we be happier if in our axiomatic systems all propositions were decidable – if every correctly formulated proposition could be proven true or false? Wouldn't the a priori certainty that an axiomatic system is consistent guarantee the safety and validity of mathematics, if additionally, this consistency could be proved by the system itself? This is the central dilemma of my own novel, *Pythagorean Crimes*. Two young mathematicians, attending the 1900 Hilbert's conference have contradictory opinions. One of them dreams of satisfying Hilbert's requirements; the other fears that a “consistency checking” algorithm will trivialize mathematics, rendering and restricting them to a purely mechanical process, unworthy of their earlier glamour. One of the two opponents is murdered a few months before the publication of Gödel's article, which definitely answers the problem, putting an end to Hilbert's expectations.

In George Zebrowski's, *Gödel's Doom*, Gödel's theorem is interpreted as the fact that “no machine-like entity that proceeds by clearly defined mechanical steps can complete any system that is rich enough to complete arithmetic”; in other words “make it a consistent system which would not come up with new, true and unprovable propositions”. Therefore, incompleteness is considered to be a proof of the existence of free will, as opposed to a fully mechanical, deterministic universe. This is considered to be a flaw in the construction of mathematics and hence, in the construction of the Universe. The heroes of this short story try to repair the error, assigning a new, very powerful and very fast artificial intelligence machine to “complete mathematics”. As the machine keeps on running (if Gödel's theorem is true it will run forever), they speculate about the impact of their experiment on the whole world. Have they triggered a process of total destruction?

In Greg Egan's *Luminus*, Incompleteness is considered not only a flaw but a serious threat to humanity! Malevolent forces, members of the criminal organization “Industrial Algebra” try to take advantage of this flaw in order to gain power. Bruno and Allison fight back by using the entire mathematical arsenal. The involvement of incompleteness in this short story is far more than nominal: One of the most famous undecidable propositions is the Continuum Hypothesis (CH) stating that “There is no infinite set, bigger than the set of natural numbers and smaller than the set of real numbers”. Kurt

Gödel proved in 1940 that CH is not incompatible with the axioms of set theory (known as Zermelo – Fraenkel set theory, ZFC). That is, if the ZFC theory is consistent then the adjunction of the CH as a new axiom will still give a consistent theory. Then in 1963, Paul Cohen proved that the adjunction of the negation of the continuum hypothesis to ZFC will also give a consistent theory. Therefore, the continuum hypothesis is an undecidable proposition in the framework of ZFC, a proposition of the type predicted by the Incompleteness Theorem. Most mathematics are using ZFC with CH but ZFC with the negation of CH is an absolutely valid theory. And therein lies the fictional use of the topic: Egan’s heroes, Bruno and Alice, discover that in a remote – in space and time – universe this alternative set theory had prevailed and if Industrial Algebra could control this universe, it would gain catastrophic powers. The interaction between scientific truth and fictional speculation is really artful and the result is a really successful piece of hard science fiction.

As we already mentioned, Gödel’s theorem states that the consistency of an axiomatic system supporting elementary arithmetic cannot be proved within the system. Ted Chiang in his *Division by zero*, tells the story of Renee, a brilliant mathematician who discovers, through formal investigation, that arithmetic is actually inconsistent, namely that any number can formally be proved equal to any other number. Her discovery leads to a nervous breakdown, since, “mathematics was inconsistent once it was removed from physical entities, and a formal theory was nothing if not consistent. Math was empirical, no more than that, and it held no interest for her”. Of course, the problem – if there really is a problem – lies in the fact that an axiomatic theory can neither prove its own consistency, nor the hypothetical existence of a contradiction. Gödel’s theorem implies that the consistency of a theory depends on the relation to physical entities, contradiction or no contradiction. However, Chiang’s short story describes accurately the mathematical situation. On the other hand, from a literary point of view it is flawed, as evidenced by the author’s difficulty to write an ending.

Andreas Finding, in *Gödel’s Exit* had an interesting idea of how to illustrate the self-referential model which is essential to Gödel’s theory. He imagines Gödel’s reflection stepping out of the mirror and meeting the original person. The time is adequately chosen: it is 1929, when Gödel is working on his theorem but has not yet proved it. Since in the mirror world things work in reverse order, as Gödel comes from his past, his reflection comes from his future and can therefore reveal to him things that are going to happen. It is a pity that the author does not take advantage of this marvelous inspiration in order to further investigate the logical consequences involved in such a situation and restricts himself to biographical speculations.

I have left Zia Haider Rahman’s *In the Light of What We Know* for the end of this survey. At first glance, the theorem seems to be a secondary detail, added just to emphasize the mathematical identity of the two main characters and to form a parallel with the Gödel – Einstein friendship. On the contrary, I believe that Rahman’s novel is the piece

of fiction in which Gödel's theorem is most deeply implemented. The story is about the friendship of two mathematicians. Zafar is a native of Bangladesh, whose mother had been a victim of rape during the genocide conducted in 1971 by the Pakistan armed forces. His friend, the narrator, is a scion of Pakistani high society. They were both raised in the United Kingdom and they met at the University of Oxford, where they both studied mathematics. In the first chapter, Zafar declares that "Gödel's Incompleteness Theorem was the most beautiful mathematics he had come across". There are about twenty more references to the theorem throughout the book. However, the involvement of the theorem is much more evident in the details of the plot rather than in the direct references to it. At crucial turning points of the story, the heroes encounter various situations comparable to undecidable propositions. Their acceptance or rejection of these propositions based "in the light of what they know", is essential to our understanding of the situation, an understanding that is however easily reversed when the alternative choice becomes more convincing.

We have seen how this arcane, abstract Incompleteness Theorem has been a source of inspiration for different types of fiction. Of course, the key to its use in literature has been in all cases a well-chosen interpretation or mis-interpretation, rather than the use of the theorem itself. This is absolutely acceptable, since fiction's main task is not to provide valid information. This type of use is much less acceptable when adopted by non fiction fields, such as sociology, politics or philosophy. Regrettably we have seen various speculations describing the theorem as being

1. A proof and a refutation of Marxism.
2. A proof and a refutation of the existence of God.
3. A proof that mathematics is discovered AND a proof that it is invented.

As Adele says in *The Goddess of Small Victories*, "The guys talking about this damned theorem make me laugh. I doubt if half of them have understood it. They use it to prove everything and nothing!".

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THE POETRY OF JULES SUPERVIELLE, A WRITING FROM METAPHYSICAL INTUITION TO METAPHYSICAL IMAGINATION

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Poetizing of the conservation of energy

“The Germs” of the perpetuation of life

One of the stakes of the poetry of Supervielle is to join dead and living beings. Because ties cannot go through by body concretism, it will be realized by specific mind connections. To create bridges between the two worlds, he accommodates himself not to “the light/Of the after-death”¹ (Supervielle 1946, 382) but to the death itself thanks to the original figure of the “out-come”², character composed by human body and immaterial at the same time. Moreover, he tries to reach the states preceding death, which could be “this obscure waiting”³ (Supervielle 1996, 473) where the internal night and the blood of the poet can be mixed with the clearness of night and sky, aiming to rejoin the Unity, far from himself on the earth, but visible thanks to his lightness. He translates this will in the following verses:

The shadow is one and circulating,
The sky, the blood only does one.
Since a long time disappeared,
I make out my wake
Hardly starred [...] ⁴ (Supervielle 1946, 382)

Underlined by the hypallage, the passed adjective with adjectival value insists on the union of the efforts to lead to the annihilation of the fight between what is commonly considered as opposite elements, to reach the light.

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1. Personal translation of “la clarté/De l’après-mort”.
 2. Translation of “hors-venu”, who is also the title of a poem of Supervielle, *Le hors-venu*, 1938, 305-306.
 3. Personal translation of “cette obscure attente”.
 4. Personal translation of “L’ombre est une et circulante./Le ciel, le sang ne font qu’un./Depuis longtemps disparu./Je discerne mon sillage/À grand-peine étoilé.”

In this way, Supervielle retains the hypothesis of the perpetual renew of energy of the material, advanced by Svante Arrhenius (1910), Swedish physician of the XXth century. This theory gives a caution to the “desire to deny the irremediable”⁵ (Supervielle 1996, 745), that is the definitive lost. The defended idea is that it stays something that what is not anymore alive on earth, in other forms. This is possible thanks to a combination of night and day, even if the price to pay is a hard fight between the two elements, because it would permit to spread mysterious invisible germs in the new created space generated by the conflict.

According to the philosopher Maurice Merleau-Ponty, “science manipulates things and renounces to live in.” She “conserved the feeling of the world’s opacity.”⁶ (Merleau-Ponty [1964] 2003, 9). Supervielle applies the opposite action, through a poetry voluntarily turned onto happening, without negating its obscure origin. Effectively, Merleau-Ponty wishes that science backs to sensitivity. “This is necessary that the thought of science – thought of cursory glance and object in general – replaces itself into a previous ‘there is’, into the place, on the ground of the sensible and working world as they are in our lives, for our body [...], this current body that I call mine, the sentry who keeps silently under my words and my acts.”⁷ (Merleau-Ponty [1964] 2003, 9).

In the poetry of Supervielle, the germs, “fluids” extracted of the “stucked murmur of the worlds”⁸ (Supervielle 1930, 184), construct the program of a renewal of the world, going until where grows up the rumor of our farest thoughts,

Those of a man thinking about under the listening stars⁹ (Supervielle 1930, 184).

The previous “there is”, this is the union, captured in these two verses, of the sensitive body of the world and man’s body. It concerns the body, the thoughts and the soul of beings and objects assembled, attentive to their common nocturnal penetration.

The “night hit by blindness”¹⁰ (Supervielle 1930, 184), despite its handicap, does not stop to pursuit humans “even through the daylight”¹¹ (Supervielle 1930, 184), so that their thoughts may come out “[...] creating into the sky a violent bramble,/A goat’s kid rounding around himself until turning into a star”¹² (Supervielle 1930, 184). Converted in a wizard, the poet

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5. “Note”, “désir de nier l’irréparable”.
 6. Personal translation of “La science manipule les choses et renonce à les habiter” et “elle gardait le sentiment de l’opacité du monde”.
 7. Personal translation of “Il faut que la pensée de science – pensée de survol, pensée de l’objet en général – se replace dans un ‘il y a’ préalable, dans le site, sur le sol du monde sensible et du monde ouvert tels qu’ils sont dans notre vie, pour notre corps [...], ce corps actuel que j’appelle mien, la sentinelle qui se tient silencieusement sous mes paroles et sous mes actes.”
 8. Personal translation of “fluides [...] /Murmure enlisé des mondes”.
 9. Personal translation of “Jusqu’où s’élève la rumeur de nos plus lointaines pensées, /Celles d’un homme songeant sous les étoiles écouteuses”.
 10. Personal translation of “la nuit frappée de cécité”.
 11. Personal translation of “même à travers le jour”.
 12. Personal translation of “suscitant en plein ciel une ronce violente, /Un chevreau tournant sur soi jusqu’à devenir une étoile”.

is visited and influenced by the germs and consecutively by images nearly prophetic. His thoughts, shot out from his internal night, create sparks of air living into a sky in which they are converted into a celestial body. Thanks to Supervielle's poetry, the earth's world, disappeared into the night, continues to live a secret and brilliant life, opposed to the common sense. Effectively, nobody, except the poet and his elected inner circle,

[...] knows that the germs came around us
Whereas night mends
The tears of the day¹³. (Supervielle 1930, 185)

These germs represent the physical-imaginative proof of the continuity of life on earth and in the same time, they signify that the conservation of energy is something rare and precious, that is not accessible to all people. Access to the view of this perpetuation is reserved to few, and science requires the translation of art, especially the images created by poetry, to project new forms of living.

Celestial projection of the living

At the time where it sinks into the night, the materiality of the earth's world, synonym of unknown, is saved *in extremis* by the nocturnal project. This permits to recreate a sensitive world, palpable, transposed in an unreal space configured by poetry. The "germs" are the catalysts of the transmutation of being living into his new mode of existence, an eternal "mourance" handed over celestial space.

They say the sailor who is going to disperse the storm,
Handing over quickly his soul to the last visible star
Between two rising waves,
And, in a look drown from sea and death,
Doing born at million horrible light years
The green shutters of his house timidly gaping

As if a woman's hand was going to push it from inside¹⁴. (Supervielle 1930, 184-185)

Progressively, Supervielle forges in his writing an original spirituality, founded on opposite elements. The lightness of the new world created is stronger to have been erected on total bareness, "starring in the most profound night"¹⁵(Supervielle 1996, 1012). It is in the

13. Personal translation of "[...] ne sait que les germes viennent d'arriver près de nous/Tandis que la nuit ravaude/Les déchirures du jour".

14. Personal translation of "Ils disent le matelot que va disperser la tempête./Remettant vite son âme au dernier astre aperçu/Entre deux vagues montantes,/Et, dans un regard noyé par la mer et par la mort,/Faisant naître à des millions horribles d'années-lumière/Les volets verts de sa demeure. timidement entrouverts/Comme si la main d'une femme allait les pousser du dedans".

15. "Note".

night only, natural space of the celestial bodies, that new material elements can be found or created from earth's bodies. That is why the poet stays awake, surrounded by nocturnal light and accompanied by objects and nature, always look-out. "Surrounded by candles/ Whose flame is faithful"¹⁶ (Supervielle 1947, 442), the explorers leave for other bodies: "We go to news/In the middle of the night"¹⁷ (Supervielle 1947, 442). In the vacuity of the sleepers night appears the celestial elements, hardly desiring a renewal of their earth existence.

And only the stars
Stick on our windows
As old hopes
Always ready to reborn [...] ¹⁸ (Supervielle 1947, 442)

Under this impetus, "a voice embarks upon" (Supervielle 1947, 442). This voice is the strong power of the found poetic voice, angel "mature fruit of a long silence" (Supervielle 1947, 442) in the night, claiming for more darkness in exchange from day beings he wants to add in his own world.

I give you a star,
Light off this candle,
Give me this owl
For this swallow
Who does the day waking up. (Supervielle 1947, 442)

A moving is edified thanks to the magic of the mysterious voice. Effectively, one has to change his eyes, his look, the light around, to be able to see in the complete dark and accede to a supra-seeing view. The poet detains this power of transformation.

I change your grey eyes
In another light
For that you can be able
To see the entire earth
And judge her better. (Supervielle 1947, 442)

In the collection *Gravitations*, the section untitled "The astrologer heart" contains several poems which mention the aerial existence of the dead. The condition of their visibility for the living is the darkness, and the power of a telescope helping human eyes to perceive undefined distances. Thus, living beings and dead use a spyglass, which gives them the possibility to cross worlds and exceed huge distances like intersidereal ones. The astronomical instrument

16. Personal translation of "Entourés de chandelles/Dont la flamme est fidèle".

17. Personal translation of "Nous allons aux nouvelles/Au milieu de la nuit".

18. Personal translation of "Et seules les étoiles/Collent à nos fenêtres/Comme de vieux espoirs/Toujours prêts à renaître".

is the condition of this reciprocal new view. The “celestial cemetery, celestial speck of dust”¹⁹ (Supervielle 1930, 188) is revealed only through a special way of thinking, definitively the poetical imagination, compared to the opening space of a telescope.

In the mind full of distances which always increase
Like in the bottom of a telescope
The man welcomes the declarations of his spacious thoughts,
Map of the sky where worsen Altair and Betelgeuse²⁰. (Supervielle 1930, 189)

In the inverse direction, the poem becomes the allegory of the materialization of the imperceptible. Inside the place of the poem, dead can see the living, transformed in immaterial to be perceived under the special assisted “no-view” of the dead, which is a look without eyes, perceiving things without possibility of capture them.

And now I am not
Only night in your former street,
But did not you become
The astronomer of another world
Who follows me with his spyglass?²¹ (Supervielle 1930, 186)

In the poetic space of Supervielle, based on an intersection between life and death, both are in a common special imagination, which could be defined as a trans-sensitivity. Indeed, beyond the sensations of the living world, the perception of the dead material is possible, deformed but present. Emphasis and attenuation are the two ways of manifestation of what is not anymore. Between roar and rumor, flashes and glimmer, physical limits of things and unlimited, palpable and impalpable meet and help themselves in a reciprocal movement. Material sensations are converted in a spiritual meeting. In this poetic world, one can perceive

Explosions of unreal in whitening fumes
But no noise for ears:
A roar in the fond of the soul.

Gestures around the table
Go to open sea, reach the high-sky,
Bang their silence together,
From where fall down flakes of infinity.²² (Supervielle 1930, 191)

19. Personal translation of “Cimetière aérien, céleste poussière”.

20. Personal translation of “Dans l’esprit plein de distances qui toujours se développent/Comme au fond d’un télescope/L’homme accueille les aveux de sa pensée spacieuse,/Carte du ciel où s’aggravent Altair et Bételgeuse”.

21. Personal translation of “Et maintenant je ne suis plus/Que nuit dans votre ancienne rue,/Mais n’êtes-vous pas devenue/L’astronome d’un autre monde/Qui me suit de sa longue-vue?”.

22. Personal translation of “Des explosions d’irréel dans une fumée blanchissante/Mais nul bruit pour les oreilles:/

The poetic imagination transposes the earth's world into an aerial space: all is similar, except relations between them.

And we hardly think about Earth
Like through the fog of a millenary tenderness.

The man, the woman, the children,
At the aerial table
Leant on a miracle
Which look after a definition.
There is there an all alone door
Without any wall except the evasive sky,
There is there an all alone window
She has for frame a souvenir
And half-opens
To let out a light breath²³. (Supervielle 1930, 191)

As poetry creates unusual relations between significant and signified, human reality transposed in an "inhuman atmosphere"²⁴ (Supervielle 1930, 190) needs the mediation of poetic images to exist.

A mediatized life for the dead

Starburst

Astral bodies are those who do not have any shelter. They are condemned to wander in the infinity. That is why the comet does not dare to go back, fearing to "sink straight to the bottom in front of the eternity"²⁵ (Sourdél 1984, 214). The moon has the most awful destiny, because she turns invariably around its axe, without the possibility to live or die. She expresses this terrible privation of state in these words:

Far companions of the sky shall you never know
What it is to be dead
Dead from kindness in the sky
And even that turning in the most little flame
Turning without hope

Un fracas au fond de l'âme.//Des gestes autour de la table/Prennent le large, gagnent le haut-ciel./Entrechoquent leurs silences/D'où tombent des flocons d'infini".

23. Personal translation of "Et c'est à peine si l'on pense à la Terre/Comme à travers le brouillard d'une millénaire tendresse.//L'homme, la femme, les enfants,//À la table aérienne/Appuyée sur un miracle/Qui cherche à se définir./ Il est là une porte toute seule/Sans autre mur que le ciel insaisissable,/Il est là une fenêtre toute seule,/Elle a pour chambranle un souvenir/Et s'entrouvre/Pour pousser un léger soupir".
24. Personal translation of "inhumaine atmosphère".
25. Personal translation of "de couler à pic devant l'éternité", unpublished poem.

Like turns in her tomb and turns back
A disconsolate dead²⁶. (Sourdel 1984, 214)

Even if the poetry can mix earth's elements and imaginative ones, she cannot go over the border between the two worlds. These can join just in a new third world. If they want to transgress the limit, they run to their perdition. Indeed, in an unpublished poem, Supervielle pictured the moon wishing to dive in the reflection offered by the nocturnal pond, but her astral condition reminds to herself her cruel destiny. Her ingenuous forgetfulness is punished by the crash of her body in contact with water. Fire and water, irresistibly attracted, cannot mix their body, moreover when the fire concerned is a lunar fire: cold, it does not set alight, but it breaks to the stronger water. The poetic narration is the following:

But her precise ingenuity,
At the fresh touching of the water,
Breaks from delight,

And floats the surprise
Of lunar parts²⁷. (Sourdel 1984, 214)

The poet would like the moon to adopt an earth life, but she just has the possibility to come nearer. Definitively hanged to the night's canvas, she approaches by the means of expression of the poetic image. Supervielle metaphorizes the moon to an animal, distracts her from her ruthless survival lending her a flexible body, but always in a cage: "And the moon is an escaped monkey at a sailor's bundle/Who looks at you through light bars of the night"²⁸ (Supervielle 1925, 141). But in front of their own eternity, astral bodies feel the great anxiety of a no ending agony. That is why the poet warms them, gives them life again, and the astral bodies calm down at this friendly warmth. Each dreamer dreams that he has all powers, including the power of putting strangers in himself, transforming elements in human parts.

But it is during the day I love you
When you doubt about your own life
And take refuge
At the profoundness of myself
Like in another night
Less cold, less inhuman²⁹. (Supervielle 1946, 389-90)

26. Personal translation of "Compagnes lointaines du ciel puissiez-vous ne jamais savoir/Ce que c'est d'être morte/ Morte de douceur dans le ciel/Et de tourner tout de même dans la moindre petite flamme/De tourner sans espoir/ Comme tourne dans sa tombe et se retourne/Une morte inconsolable", unpublished poem.

27. Personal translation of "Mais sa candeur précise,/Au frais toucher de l'eau./De délices se brise,//Et flotte la surprise/Des lunaires morceaux", unpublished poem.

28. Personal translation of "Et la lune est un singe échappé au baluchon d'un marin/Qui vous regarde à travers les barreaux légers de la nuit".

29. Personal translation of "Mais c'est le jour que je t'aime/Quand tu doutes de ta vie/Et que tu te réfugies/Aux profondeurs de moi-même/Comme dans une autre nuit/Moins froide, moins inhumaine".

It is only inside the human body, through the look of a poetic imagination that the lightness of the star takes form and sense. When the real comes again, the consciousness of the distance separating the man from the astral bodies separates each one from the other, and the star “so fix and so resistant/And shiny of duration” does not shine anymore, except concealed, waiting for night, which will give her back far and mysterious brightness in human eyes. It is in these hours that the explorer poet dreams her highly, discovers her, and that she bends him towards her living place. Night devours light, and in the same time deploys its own astral shine.

The look of the astronomist
Affects in the bottom of the night
Under foliage of worlds
A star in her nest
A star discovered
Of whom we see pass the head
At the end of this long ephemeral
Look of a mortal
And who begins to sing
The song of black spaces
Who devours the lights
In the solemn abyss.³⁰ (Supervielle 1930, 203)

The poet collects his memories and gives them the light of inspiration. He lends them the intimacy of his hand and the warmness of his human heart. Dead celestial bodies, stars, reborn to life thanks to a compassionate poetry that reanimates bodies by the volunteer affection put on by the poet. This one, ignorant of himself and over physical laws, gives to feel life again thanks an energy between “Sky and earth”³¹ (Supervielle 1947, 443).

And though I am this prudent and this brother
That we can guess through the nocturnal shrub,

And though I see myself gather up stars
Dead, drinking without thirst in my hands gleams,
I reanimate them with a rest of warm
Which comes to me from so far that my gestures shiver. (Supervielle 1947, 443)

The poet is as disoriented as the stars. The need of protection is mutual. That is why the poet follows the direction indicated by the celestial body. At least, its steps make

30. Personal translation of “Le regard de l’astronome/Émeut au fond de la nuit/Sous le feuillage des mondes/Une étoile dans son nid./Une étoile découverte/Dont on voit passer la tête/Au bout de ce long regard/Éphémère d’un mortel/Et qui se met à chanter/La chanson des noirs espaces/Qui dévorent les lumières/Dans le gouffre solennel”.

31. Personal translation of the title “Ciel et terre”.

sense. In this way, the stars, themselves robbed of the view, illuminate the world of all their matter, make it more beautiful for those who still see it. Grateful of this gift, the poet would like to communicate with her.

Blind star, warm and sweet,
By a wink or some foam
Gone down from a mast in the heavens
Answer me that you understood me³². (Supervielle 1934, 275)

But she will not answer him, because her physical and humanized proximity is only imagined by the poet. Here, the poet hurts himself to the reality of science. Nevertheless, he continues to rely on the star. The consciousness of his dream incites him to change the direction of his purpose. His poetry wins in strength of sense what it loses in illusion.

Star, theft I did
One day, in my strongest sleep,
To the nights eating sun.³³ (Supervielle 1934, 275).

This lucidity leads the poet to the real status of the celestial world. Stars form part of the alternation between day and night, they permit to look over the ordinary possibilities of view, and they show a supernatural world where beings bright eternally, but fixed, uniting the opposites. Stars are replaced at their undefined turning distance, “Fix like the expectancy/And like the despair”³⁴ (Supervielle 1930, 203). Physic and imagination conjoin to create a common brightness. In the turning blaze “Where sunrise cross evening”

A star does archery
Drilling the infinity with her arrows
Then lifts a standard
That an eternal flame laps [.]³⁵ (Supervielle 1930, 195)

In this far aerial world of which the poet feels in accord, the star seems truly alone, and paradoxically, she survives thanks to her own burn. The poetic language offers her a helpful grip by the formulation of her hard condition of subsistence.

32. Personal translation of “Aveugle étoile, chaude et douce./Par un clin d’œil ou quelque mousse/Descendu d’un mât dans les nues/Réponds-moi que tu m’as compris”.

33. Personal translation of “Étoile, larcin que je fis/Un jour, au plus fort du sommeil,/Aux nuits mangeuses de soleil”.

34. Personal translation of “Fixe comme l’espérance/Et comme le désespoir”.

35. Personal translation of “Une étoile tire de l’arc/Perçant l’infini de ses flèches/Puis soulève un étendard/Qu’une éternelle flamme lèche [.]”.

I see that a star grips
 To her own violence
 In the hollow evasive air
 Which vanishes from all parts.³⁶ (Supervielle 1930, 166)

Thus, internal night replaces the external one, deceiving. This fusion is hard to realize, because human belongs to the gravity, while night has light attributes like air, space and warm. But the poet improves the privilege to slip into natural elements. “The man who desires the night does itself night, his body grows and take the shape of stars, the poetic night is an internal night, the inside space orders its rhythm and its images, the immensity becomes a refuge. The body has the fluidity and the porosity of a skin which lets itself crossing”³⁷ (Sourdel 1984, 166). The dissolution of the human body under the influence of external fully night becomes a mode of being. This mixed space is the bright retreat when someone feels that night, with its celestial bodies, “Begins to gravitates,/ To take shape of stars inside us, to find its way”³⁸ (Supervielle 1938, 346).

Half-corporeality by the trace of the letter

The epistolary is another way adopted by Supervielle to realize his poetic will to eliminate the distance separating beings “done with a fabric/Cruelly different”³⁹ (Supervielle 1946, 387) and illustrates the half-success aroused by the poetic of the letter. In a letter addressed to his mentor Jean Paulhan, Supervielle declared that physical distance do not separated human beings from star in poetry, reason why he desired to write in this genre to bring together earth’s body and celestial one. The final aim was to give back a flesh-body to the star thanks to poetic voice. His own theoretic thoughts about this topic are illuminating.

Moreover, I hope to write some “letters” in lines or verses one of which “to a star”, he writes to his friend. We are strucked to note that if we watch a star, nothing except the distance separates us from her. But the distance, we need reflection to remember it, does not stop the watch at all. Nothing corporal intervenes between things and us whereas on earth – even at little distances, so much visible things intervene between things and us. And then the fact of writing to a star, the lost letter side, excessively lost letter, attracts me, has always – or nearly – attracted me.”⁴⁰ (Suervielle 1946, 877)

36. Personal translation of “Je vois que s'accroche une étoile/À sa propre violence/Dans l'air creux insaisissable/Qui s'enfuit de toutes parts”.

37. Personal translation of “L'homme qui désire la nuit se fait nuit, son corps s'espace et s'étoile, la nuit poétique est une nuit intérieure, l'espace du dedans impose son rythme et ses images, l'immensité se fait abri. Le corps a la fluidité et la porosité d'une peau qui se laisse traverser”.

38. Personal translation of “Commence à graviter,/À s'étoiler en nous, à trouver son chemin”.

39. Personal translation of “faits d'une étoffe/Cruellement différente”.

40. Personal translation of “J'espère aussi écrire quelques “lettres” en vers ou versets dont l'une “à une étoile”, écrit-il

The poet, by confessing his joy writing “lost letters”, implicitly expresses the pleasure he feels by looking for an improbable recipient. He is profoundly attracted by the physical distance, the own inaccessibility of the star. This configuration permits him to look for her conception and, first of all, to reach her by his words (Dewulf 2008, 47). He materializes his thought in his “Letter to the star”, asserting to her:

We are not separated
By rivers nor by mountains,
Nor by a piece of country,
Nor by one only grain of wheat.⁴¹ (Supervielle 1946, 386)

In the letter, kind of communication founded on “absence-presence”⁴² (Davaille 2005, 160), an “additional trace of the work”⁴³ (Davaille 2005, 160) is appended. Davaille (2005, 161) underlines that the letter is the support of an enigmatic presence, “feeled but concealed in its materiality”, virtual presence more intense for that she is enriched by multiple possibilities, favored by a poetry of sustained and supposed distance by epistolary form. Supervielle explanation concerning the difference between physical co-presence relation and epistolary relation confirms the precedent analysis. He concentrates his preference entirely to the last one. “To be here, you lose your mystery while your letters, I conserve them a long time to do lasting their unexpected and their possibilities.”⁴⁴ Indeed, in Supervielle poetry, letter indicates a distance which makes things half-reals. Truncated communication, the letter is the material vehicle between two beings in physical co-absence. It is the sign of a half-life. Addressed to the stellar friend, it becomes a simplified letter in which the title only testifies to the choosen relation, because it represents an almost impossible link. The poet begins his text elaborating a speech of suggested proximity, opening the possibility of a comprehension without words. Effectively, he says at the beginning of the poem:

You are of those who can
Read over the shoulder,

à son ami. Il est assez frappant que si nous regardons une étoile, rien, sauf la distance, ne nous sépare d'elle. Or la distance, il y faut de la réflexion pour s'en souvenir, elle n'arrête en rien le regard. Rien de corporel ne s'interpose entre l'étoile et nous alors que sur terre - même à de petites distances, tant de choses visibles s'interposent entre les objets et nous. Et puis le fait d'écrire à une étoile, le côté lettre perdue, lettre excessivement perdue, m'attire, m'a toujours - ou presque - attiré.

41. Personal translation of “Nous ne sommes séparés/Par fleuves ni par montagnes,/Ni par un bout de campagne,/Ni par un seul grain de blé”.
42. Personal translation of “l'absence-présence”. Supervielle is partial to the poetic of the letter, because he says he would appreciate a letter even from a person physically present in front of him, to whom he could claim: “How I would be glad to receive a letter from you, even in this moment in which you are in front of me.”, Supervielle, “Chercher sapensée”, *Le Corps tragique*, 654.
43. Personal translation of “trace supplémentaire de l'œuvre”.
44. Personal translation of “À être là, tu perds de ton mystère alors que tes lettres je les garde longtemps sans les ouvrir pour faire durer leur imprévu et leurs possibilités”, Supervielle, “Chercher sa pensée”, *Le Corps tragique*, 654.

I really do not need
For you, to look for my words⁴⁵ (Supervielle 1946, 386)

In the same time, these words demonstrate implicitly the difficulty of embodiment and the indefatigable pursuit of this action. The voice only seems to assume the existence of beings, supposed alive by her. According to Davaille (2005, 162) “so it is by the ‘presupposition’ of existence applied by the letter addressed to somebody that the absent is half-created.” Consequently, the letter is imperative like the sign of a double presence in Supervielle poetry, presence of the poet and presence of the recipient, whose it presupposes the existence. Finally, the epistolary verb seems to create a postulated figure, but the interlocutor remains uncertain. So the embodiment is imperfect. In Supervielle’s, “the letter [...] proceeds” significantly the “‘unfinished embodiment’” (Davaille, 2005, 165), matrix theme of supervillian work.

This analysis showed that Supervielle creates an oneiric poetry, but always settled in material. The renewal of the matter, from germs to celestial bodies, are, more than traces of continuity of life, the foundation of a metaphysic. Thus, living beings are linked up by the mediation of strong poetic symbols, which are universal ones, treated with originality: by developing a specific relation with stars, the poet manages to elaborate half-embodiments.

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45. Personal translation of “Tu es de celles qui savent/Lire par-dessus l'épaule,/Je n'ai même pas besoin/Pour toi, de chercher mes mots [...]”.

MEDICINE HEALING LITERATURE OR LITERATURE TREATING MEDICINE? AN APPROACH TO MEDICAL HUMANITIES

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Introduction

The venture of Medical Humanities, the interface between Medicine and the Humanities might seem unfamiliar or unproductive in today's scientific practice based on high specialization as it is. The paper engages in dialogue with theories of interdisciplinarity / multidisciplinary in exploring its function and in arguing for the productivity of an approach between divergent disciplines such as Medicine and the Humanities. The above-mentioned dialogue is conducted thorough theories by Plotnitsky, Serres and Snow which address the divide between the Natural / Medical Sciences and the Humanities, a core issue in this paper. In exploring distinctive qualities between medical and humanistic discourse eventually transliterated as medical and literary discourse, the paper encounters functions which can operate as spaces for interaction between Medicine and Literature. Representation, Dialogue, Understanding and Interpretation feature functions offered par excellence for interaction between Literature and Medicine. The functions of dialogue, understanding and interpretation in particular are studied along with Dilthey's theory on understanding and Bakhtin's theory on dialogization both coming from the Humanities in showing a productive way from Literature into Medicine and the potential formation of an interactive literary-medical context.

Interdisciplinarity-Multidisciplinarity

In conceptualizing the unfamiliar encounter of Medicine and the Humanities as the osmosis of two disparate disciplines, the field of Medical Humanities establishes an interdisciplinary identity. This interdisciplinary relation might either be described as a structure that brings together two divergent fields to coincide in the same space or as an interdisciplinary function that has two divergent mentalities confer on the same subject, wrestle with the same theme. Arkady Plotnitsky perceives "interdisciplinarity" in the context of "an engagement of diverse disciplines, fields of inquiry

and human endeavors”. An “invocation of the currently fashionable and risky term ‘interdisciplinarity’ is leading him towards “specific epistemological configurations rigorously shared by different fields where they may have different roles to play rather than certain interactions between such fields themselves for their own sake, be they more or less rigorous be they more or less loose” (Plotnitsky, 22-23).

By adopting a broader cultural perspective which tends towards Bohr’s “dream of great interconnections” Plotnitsky introduces in the conception of “interdisciplinarity” a most interesting suggestion related to Deleuze and Guattari’s horizontal “rhizomatics”. Based on their theory of “rhizome” as a unity combining two heterogeneous entities which interconnect without losing their heterogeneity Plotnitsky understands “interdisciplinarity” as “networks of connections and, sometimes, ruptures, and hence something that can only be seen as partially rhizomatic in Deleuze and Guattari’s sense”. Plotnitsky recognizes parallel interactive horizontal networkings –as opposed to an arboreal (vertical) subordination–of different fields and areas of inquiry which although heterogeneous are also interactive–“heterogeneously interactive and interactively heterogeneous–which is what enables and maximizes productive interdisciplinary practices specifically productive crossings between science and the humanities” (Plotnitsky, 26-27).

A closer look at the formation of the rhizome reveals a spatial relationship:

The orchid deterritorializes by forming an image, a tracing of a wasp; but the wasp reterritorializes on that image. The wasp is nevertheless deterritorialized becoming a piece in the orchid’s reproductive apparatus. But it reterritorializes the orchid by transporting its pollen. Wasp and orchid, as heterogeneous elements, form a rhizome (Deleuze, Guattari, 11).

The key words “deterritorialize” and “reterritorialize” which define key functions of the rhizome are substantially spatial, founded as they are on the thematic base “territory”, a word which is semantically related to the word “space”. The spatial referent proves crucial in guiding this paper’s search while endorsing the concept of “rhizome” in Medical Humanities. The main idea is that both the orchid and the wasp are shifting from their substantial center to its periphery where they engage in interconnections. This ec-centric space, off the center and hard existential core of a disciplinary entity is susceptible to interactions between heterogeneous entities; it is a space in between, also in the sense that it does not affect change in the substance of the interacting entities but instead filters their representation through the image of the other, thus effecting a cross representation which challenges certainties. The important thing to note is that eventually the entities participating in a rhizomatic relationship are not shifting from the centre of their existence but from the centre of their representation which is one thing that an inquiry in the rhizomatic relationship of Medicine and the Humanities might look for.

Medical Humanities is this interactive space in between fields, disciplines, centre and periphery, substance and representation. Representation is therefore a key word in the spatial

approach this paper attempts. The movement from substance to representation presents the disciplines with a motive for self contemplation. While the two disciplinary entities “deterritorialize” from their distinctive space to “reterritorialize” in a heterogeneous space, this ec-centric interconnection results in a breakaway state from tight isolation and methodological imperialism and a dislocation from scientific formalism, a term understood as indifference to other disciplines. In this perspective implementation of the unfamiliar approach inside Medical Humanities means production of the image of one discipline through the reproductive system of the other leading both disciplines to a closer approach to self. This process is likely to lead to a more profound self-understanding but is also a process that challenges certainties. Isn't Medicine by definition humanistic? Is Medicine by definition humanistic? Is Medicine by definition humanitarian? Are the Humanities confined to an imaginary fictional world with no strings attached to the real world? Do the Humanities carry the burden of human fate and are therefore ideal for contributing to the management of humanity by medical agents? Are the Humanities likely to actively engage in a constructive dialogue with Natural Sciences? These are only some questions raised in the field of Medical Humanities destabilizing certainties and fixed identities. These questions seem to reflect the destabilizing “orchid-becoming-wasp” and “wasp-becoming-orchid” process which transliterates cross pollination as cross representation.

This closer reading of interdisciplinarity in Medical Humanities employs two—at the very least—spatial approaches to the field. The first one would visualize Medical Humanities as a space in which heterogeneous surfaces or, to be more precise, heterogeneous textual surfaces, i.e. heterogeneous texts, coincide thus establishing the identity of interdisciplinarity as intertextuality. The second one would visualize interdisciplinarity in Medical Humanities as a rhizomatic process joining heterogeneous intensities in an interactive multiplicity cross pollinating representations, especially if we take into consideration that the Humanities constitute themselves a rhizome constructing various combinations among many fields (Literature, Philosophy, History, History of Art, Anthropology, Fine Arts, Music, to name some of them). In any case Medical Humanities defines a space, a context or a process towards a reconfiguration of the disciplinary self away from complacent self-sufficiency. In this procedure which aims at a constructive exchange between disciplinary identities a fuller understanding of the disciplinary self is pursued through multidisciplinary. A context is being structured which asks of each discipline to revisit its self-representation and transcend its typical space, its text, to go across diverse spaces, diverse texts, in moving forward to a composition. Against this multidisciplinary context specialization might be represented as a vertical well-arranged structure, a tree-like structure, usually juxtaposed to the lateral interactive movements of rhizome which thus gains its representation as a rhizomatic multiplicity, as multidisciplinary.

Though it might be counter argued that specialization is the core value of education today and the strongest asset for the achievement of scientific—specifically medical—advances, exiting its tree-like structure to engage in multiple exchanges with the disciplinary rhizome

the specialized disciplinary self is being strengthened in expanding its range. Communication with the ongoing advances of other disciplinary fields would not damage the indispensable of specialization but would instead promote self-consideration in the disciplines. Combined understanding and acceptance of diverse representations of the self would result in broadening and deepening the disciplinary self and would contribute to the pursuit and attainment of disciplinary consciousness. In this sense we might even trace rhizomatic relations on the side of Medicine and talk in plural about Medical Sciences.

In offering the place for the emergence of new knowledge to integrate in the existing knowledge, multidisciplinary actually offers the place for new disciplinary texts to integrate in the already existing ones accomplishing a cross pollination between new textualities and the disciplinary “canon”, texts so far recognized and accepted as typically defining each discipline. By activating this interface multidisciplinary is generating a dialogue between discourses, and therefore challenging the hegemony of disciplinary discourse either medical or humanistic. If text can be conceptualized as the space in which a discourse is articulated, then conceptualizing Medical Humanities would mean contextualizing Medicine *and* the Humanities. In bringing two diverse textualities together the field of Medical Humanities destabilizes another certainty, the certainty of monophonic discourse, the one voice discourse. As the heterogeneous discourses of Medical Humanities engage in cross pollination, they establish a multi voiced text, a text of many voices which opens up from the representation of a well protected, enclosed and secluded space to an exposed, well informed and challenging one.

To be more specific on the diversity of medical and humanistic texts one would have to recur to medical and humanistic discourse and address basic issues. First a clarification has to be made that the part of the Humanities comprises many disciplines such as Literature, Philology, Philosophy, History, Anthropology, Social Studies, Cultural Studies, Psychology, Theology, Health Geography, Visual Arts, Theater, Film and Arts in general which interface in a more or less rhizomatic sense. At this point however, attention will be focused on Literature in relation to Medicine since Literature is textual by definition, therefore in constant dialogue with concepts like text, discourse, narratives, representation, textuality, discursivity, narrativity, performativity.

Representation

Representation has been addressed earlier in this paper in the context of cross-pollination generating cross-representation. Pollination as a main focus of natural studies—fertilization in the case of medical studies—and representation as a main focus of literary studies join in the theory of Medical Humanities in the aftermath of medical practices. In the framework of today’s advances in biotechnology medical practice indulges in excessive use of cross-fertilization when difficulties arise in the process of human reproduction. The use of heterogene-

ous genetic material in human engineering is sure to question certainties one of them being scientific omnipotence but most importantly the certainty of fatherhood and motherhood. While (medical) science engages in creating humans by introducing heterogeneous nonparental genetic material is in fact cross-fertilizing or cross-pollinating the representation of the figure of the father and the mother. Literature would have to contribute to the discussion that fatherhood was not always taken for granted. Motherhood however was. Motherhood was recognized as a stable, timeless value. A literary example might be taken from August Strindberg's play *The Father* in which Captain, the leading character, is gradually led to insanity wandering in morbid thoughts which destroy and corrupt his judgment, haunted by poisonous suspicions about the paternity of his daughter:

Captain: Did you never see how ridiculous you were as a father? I know nothing so comical as to see a father leading his child about the streets, or to hear a father talk of his children. 'My wife's children', he ought to say. Did you never realize how false your position was? Were you never troubled by doubts, I won't say suspicious, for I assume, as a gentleman, that your wife was above suspicion!

Doctor: No, really, I never was, and, indeed, Captain, a man must take his children on trust as Goethe, I think, says (Strindberg, 58).

Additionally, when Captain states that "a man cannot live without honour", his wife Laura counter argues by asking the question "But a woman?" to be replied by Captain's desperate cry: "Yes, for she has her children, which he has not" (Strindberg, 71).

The excerpt communicates the concept of parenthood as it was traditionally conceived and preserved throughout the centuries. The very same concept recognizes motherhood as an unquestionable value, a solid, steady ground while if a ground is to be shaken or a value to be questioned, this is fatherhood. Evidence from the above excerpt attests to the fact that a woman has children while a man does not, while contemporary medical evidence has reversed these terms in questioning motherhood more so than fatherhood. If Captain Adolph's representation as a father is torn between two identities while his wife's remains intact, up to date medical practices in biotechnology have effected a triple—for that matter—split in the identity and representation of the mother engaging in what is being called the meta-narratives of motherhood. Another medical meta-narrative reduces human to a sum total of genetic material in causing Abby Lipmann's reaction against the "tremendous extent to which 'genetics' is taking precedence over how we see health and social problems", something she calls "geneticization". Her critique is that emphasis is being placed on "scurrying to find genes predisposing us to diseases" (heart attacks, strokes, cancer), not on finding the cure to these diseases first and then announcing the genes responsible for them and certainly not on "reducing our more immediate risks overwork and overload from our paid, unpaid and volunteer jobs" (Miller, doi: <http://www.cwhn.ca/en/node/397080>). Transhumanism is another example to top the activities of

new genetics and biotechnology in embracing the goal of transforming human condition setting a purpose for transition to post-humanism thus offering another meta- (post-) example in medical narratives.

The main idea is that while the Humanities, Literature in particular, is textual by definition Medicine fabricates its own text in fabricating identities, engaging actively in the formation of social relations and social or individual representations. In operating matters of identity and representation of the Human, Medicine produces its own text, a meta-text which calls for a dialogue with the Humanities as Sciences of the Human. Performativity then as a function of defining identities performed by medical text as it expands from the classroom to the waiting room, to the clinic (hospital) all the way to the operating room is also to be called meta-medical since it emerges as a function after the functions typically designated as medical.

In conclusion, sustaining networkings of performing identities Medicine involves largely in parameters such as performativity, textuality, narrativity, discursivity, representation which are distinct in the Humanities, most importantly Literature and its study. The functions defined by these parameters delineate a space which has been traditionally territorialized in the Humanities, specifically literary studies. In reconfiguring Medical Humanities this “humanistic” space is reterritorialized in Medicine—or Medical Sciences in a wider perspective—bringing down the harsh divide between medical and humanistic discourse. Medical discourse has traditionally been read as devoid of these functions lacking the narrative, discursive, textual, representative and performative quality. Medical discourse is traditionally understood as objective, evidence based, minimally or non-discursive talking in chemical formulas, numbers and percentages rather than words and phrases, minimally textual as opposed to the maximally textual, maximally discursive, intuition based, fictional—or nonfictional for that matter—text of literary discourse. Contextually the Humanities might be the catalyst to aid (medical) science in gaining consciousness of its weaknesses along with its potential and attain an accurate self-representation or in any case a more complete view of itself from another angle.

Spaces / Geographies in Medical Humanities

C.P. Snow in his famous Rede lecture (Cambridge 1959) entitled *The Two Cultures* maps out the intellectual divide between Sciences and Humanities in distinguishing two cultures, two polar groups:

Literary intellectuals at one pole—at the other scientists, and as the most representative, the physical scientists. Between the two a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and

dislike, but most of all lack of understanding. They have a curious distorted image of each other. Their attitudes are so different that, even on the level of emotion, they can't find much common ground. [...] The non-scientists have a rooted impression that the scientists are shallowly optimistic, unaware of man's condition. On the other hand, the scientists believe that the literary intellectuals are totally lacking in foresight, peculiarly unconcerned with their brother men, in a deep sense anti-intellectual, anxious to restrict both art and thought to the existential moment (Snow, 4-6).

His idea is that the divide relates basically to attitudes, standards, patterns of behaviour, approaches and assumptions shared by the members of each group. The culture of the scientists as opposed to the 'traditional' culture of the literary intellectuals is stereotypically perceived as "intensive, rigorous and constantly in action", with "a great deal of argument", "almost always at a higher conceptual level than literary persons' arguments—even though the scientists do cheerfully use words in senses which literary persons don't recognize, the senses are exact ones, and when they talk about 'subjective', 'objective', 'philosophy' or 'progressive' they know what they mean, even though it isn't what one is accustomed to expect" (Snow, 13-14).

Snow is very perceptive in noticing that both cultures are illiterate to each other's interests. Each culture is impoverished in a different way. The intellectuals "like to pretend that the traditional culture is the whole of 'culture' as though the natural order didn't exist. As though the exploration of the natural order was of no interest either in its own value or its consequences. As though the scientific edifice of the physical world was not, in its intellectual depth, complexity and articulation, the most beautiful and wonderful collective work of the mind of man" (Snow, 15). On the other side the scientists' culture seems "in many ways an exacting and admirable one. It doesn't contain much art, with the exception, an important exception, of music. Verbal exchange, insistent argument. Long-playing records. Colour-photography. The ear, to some extent the eye. [...] Of books, though, very little. And of the books which to most literary persons are bread and butter, novels, history, poetry, plays, almost nothing at all. As a result their imaginative understanding is less than it could be" (Snow, 13-15).

Understanding is a key word most appropriate in informing the convergence of the two cultures in Medical Humanities. Later in this paper the role of understanding will be highlighted through the theories of Wilhelm Dilthey and Mikhail Bakhtin. To return to Snow's cultural map, it has been argued with, reconsidered, revised but most importantly has raised an ongoing discussion from Snow's contemporary F.R. Leavis and his reservations as far as Plotnitsky and his classical-nonclassical divide in the 1990's. Plotnitsky's theory on interdisciplinarity as a rhizomatic formation is juxtaposed to the bipolar (tree) structure of Snow's theory but in a sense constitutes a continuation of it in the direction of producing creative chances at the clashing point where two (says Snow) or more (says Plotnitsky) subjects, disciplines, cultures—or galaxies—meet (Snow, 17).

In defining the space—the space *between*—rather than the energy of the clash Michel Serres indulges in geography as a metaphor for (inter)disciplinarity which he chooses to call “interface”. A point to note in the following passage is the divide between the “hard” and the so called “human” sciences:

The space *between*—that of conjunctions, the interdisciplinary ground—is still very much unexplored. One must travel quickly when the thing to be thought about is complex. Have you noticed the popularity among scientists of the word interface—which supposes that the junction between two sciences or two concepts is perfectly under control, or seamless, and poses no problems? On the contrary, I believe that these spaces *between* are more complicated than one thinks. This is why I have compared them to the Northwest passage [in *Hermès V. Le passage du Nord-Ouest*], with shores, islands and fractal ice floes. Between the hard sciences and the so-called human sciences the passage resembles a jagged shore, sprinkled with ice, and variable. [...] It is more fractal than truly simple. Less a juncture under control than an adventure to be had. This is an area void of explorers (Serres, Latour, 70).

The spatial perspective offered in a breathtaking view by Serres multiplies its effect, takes new directions and charts the field of social and cultural geographies in a special issue of six papers by researchers at Durham Center for Medical Humanities published online (*Journal of Medical Humanities*, vol 36, issue 1 (March 2015)). In this issue it is originally recognized that history, art, literature and music have identifiable locations while “clinical and applied expression is usually set in real places: hospitals, clinics or homes”. The main idea is the spatial segregation of Medical and Human Studies now integrating in Medical Humanities. The theme of territorialization, deterritorialization and reterritorialization is recurring in different contexts which deterritorialize spaces identifiable in Human Sciences to reterritorialize them in Medical Sciences. The introductory article is reconfiguring spatiality in Medical Humanities in cutting across social, cultural and health geographies and in bringing out the potential role of (Human) Geography in Medical Humanities:

The broad thematic intent was to look more closely at and uncover ongoing work on the potential role for Geography within the wider Medical Humanities and in particular to ‘emplace’ the subject more fully. [...] The pieces pick up the themes of those new directions in medical humanities indicated above in the attention variously given to embodiment, nonclinical spaces and activities for health and well-being and the broader considerations of scale and politics. These general trends in medical humanities are cross-cut with contributions to theoretical debates on energy, space, time, movement and affect (Atkinson, Foley, Parr, 2).

At a closer look the papers in this issue “offer explorations of health, healing or transfiguring wonder that are situated in non-clinical settings and make explicit the connections

of space, place and time". Ronan Foley's paper maps geographies of formal and informal folk medicine in drawing a cultural setting of beliefs and practices around the body in the mid-19th century and by drawing on the methodology of "mining archives for traveler accounts and surveys of folklore and healing practices". Geraldine Perriam's geographies chart the exploration of "specific sites of healing as embedded within the culture and beliefs of particular times and places". In addressing the most interesting concept of therapeutic landscapes introduced by geographer Wil Gesler the paper draws on "the multi-layered relationalities that structure senses of healing, places and the experiences of those inhabiting these" and arrives to a conception of healing "as requiring a (re-) integration of that which has become fragmented, a return to wholeness and unity of body, mind and spirit". Perriam indicates how neglect of the 'spiritual', as broadly conceived, neglects an integral part of both the historical and contemporary encounters with healing space and their flows of energy. "Understanding" as a dimension of what Perriam terms "spirituality" will be addressed later on in this paper. The "importance of the spiritual in contemporary health practices" is the main focus in Chris Philo's paper which "offers a vision of 'energy geographies'" in "drawing on a case study of 'new spiritual practices' of the self" using "first person accounts" which feature "energies and energy flows". The nongeographical involvement with human energy by Martyn Evans who engages in a dialogue with the notion of wonder in its capacity to transfigure the comprehension of the world around us is also geographical in the sense of administering relations between the territories of the mind and body. In the fifth paper "Mike White and Mary Robson offer a reflection on how community-based arts and health projects may be beneficial to those involved through two case studies of lantern parades". Territorializing these parades in time and space relates to the definition of the locality and the people coming together in these spaces. The human geography that the paper maps deals with themes like well being, the energy of light, gift, mutual exchange and ritual related to issues of belonging, safety, inclusion and transfiguration of places and people. In the final paper "Sarah Atkinson and colleagues working across both geography and medical humanities in the Durham Centre engage a debate within the field of medical humanities around the terminology of medicine and health". In writing the geographies of health the paper moves in the space between "areas seen as 'medical' and those captured under 'health'". The divergence perceived at the interface of these areas is challenged by the "critical and cultural geographers of 'health' now revisiting and re-valuing the categories of the 'medical' and of 'health' to redress this false divergence" (Atkinson, Foley, Parr, 2-4).

The present paper's geography is also redressing a divergence, the divergence of literary and medical text in following the transformation of medical into literary text and its performativity in spaces ranging from the nonclinical classroom to the clinical waiting room, hospital ward and operating room. This spatiality alternating its geography between the literary and the medical, to further it to the clinical and nonclinical is gradually introducing an integration which might be termed Medical Literature. Cath-

erine Belling is talking about the Poetics of Medicine in suggesting a relative integration. In this context Edson's focus on language, in clinic and in classroom is shown to demonstrate "how, in the hybrid field of medicine, the old dichotomies between "hard" natural science and "soft" human arts—often understood as between cognition and emotion—begin to collapse when we pay close attention to representation and interpretation (Belling, 482). Dichotomies between the medical and the humanistic are being abolished while the distinction between "hard" and "soft" sciences is recalling a similar distinction by Serres and Snow. Representation and interpretation feature as catalysts for the abolition of these dichotomies.

Understanding and Interpretation

Representation has been examined earlier in this paper as a function bringing out new aspects of understanding. Interpretation on the other hand is a function of understanding highlighted by Wilhelm Dilthey. To get there one would have to revise briefly on the assumed divergence between the medical and humanistic, specifically literary, discourse. Medical discourse is endowed with the privilege of objectivity while humanistic discourse is endowed with literary features such as subjectivity. The strong presence of percentages and analogies in medical discourse would indicate its inclination to dominant majorities and general conclusions while literary and humanistic discourse abstains from numbers and proportions in focusing to its larger extent on individualities. This quality of recognizing and focusing on the exception to the rule would suggest a valuable contribution to medical discourse which mainly aims to form rules, formulate norms and define the "normal". Normal and abnormal constitute the two poles around which medical discourse revolves mostly placing emphasis on the negative pole and the pathology of human condition. On the other hand while the humanistic rhetoric with its emphasis on the individual has often been criticized as subjective—therefore less reliable—it introduces a minority-sensitive discourse which lays the ground for congenial empathy.

The contribution of Wilhelm Dilthey

Understanding and interpretation constitute core notions in Dilthey's theory which focuses on the problem of the scientific knowledge of individuals and the principal forms of singular existence in general. Dilthey suggests that "action everywhere presupposes our understanding of other people; much of our happiness as human beings derives from our re-experiencing of alien states of mind;" (Dilthey, 230). This quality of understanding other people and re-experiencing alien states of mind might work as a stable

basis for the approach of the methods of Medicine and the Humanities. Understanding as a procedure of interpreting the words of the others which is what the Humanities revolve around might lay the foundation for the empathic understanding of the patient's narrative which is one thing Medicine centered on.

Dimitris Angelatos is very perceptive in approaching Dilthey's theory and in recognizing that "the distinction between achieved knowledge and the process of producing knowledge corresponds to the distinction between natural and human sciences founded by Dilthey on the semantic juxtaposition between *exegesis* (of nature) and *understanding* (of inner life) accordingly" (Angelatos, 21). Dilthey stresses the focus of Human Sciences on individuality and the comprehension of individual existence which underpins their methodology even if and when it comes to formulating general laws or reaching objective apprehension. Even in the case of "systematically organized" attempts of the Humanities to "derive more general laws and more inclusive apprehensions from objective apprehension" the attempt concentrates on individuality and engages chiefly in operations of understanding and interpretation as opposed to natural sciences which engage in the apprehension of nature:

And if systematically organized human studies are able to go on to derive more general laws and more inclusive relationships from this objective apprehension of individual life, nonetheless the preliminary operations of understanding and interpretation form the basis. [...] Thus, these disciplines [...] depend for their methodological certainty upon whether or not the understanding of individual existence may be raised to general validity. So, at the threshold of human studies we encounter a problem specific to them alone and quite distinct from anything involved in the apprehension of nature (Dilthey, 230-231).

Dilthey focuses on the operations of understanding and interpretation as distinctive qualities in the Humanities, a basis on which this paper meets with Dilthey's theory in suggesting that the Humanities would communicate to natural—in this case, medical—sciences a focus on individualities through the operations of understanding and interpretation. These qualities are significant for the distinction between Human and Natural Sciences.

Human studies, Dilthey informs us, relate to an inner reality, "a coherence experienced from within" while natural sciences are based on sensory appearance and the reflection of reality within consciousness so as to reach an objective apprehension. Dilthey expounds on the difficulty of reaching objectivity which becomes graver when coming to reconstruct objective knowledge of individualities. He argues that the way in which reality is experienced resists objective apprehension even at the level of individual awareness. He invokes Goethe in pondering that individual awareness as the "most crucial of all our experiences is also one of the most difficult and that our insight into the extent, nature, and limits of our powers remain at best incomplete". If knowing

yourself is difficult, knowing another individual multiplies the difficulty and takes the form of a sense perception based on isolated signs since the existence of other people is given to us “only from the outside, in sensory events, gestures, words and actions”. Therefore, it is only “through a process of reconstruction” that “we complete this sense perception which initially takes the form of isolated signs. We are thus obliged to translate everything—the raw material, the structure, the most individual traits of such a completion—out of our own sense of life” (Dilthey, 231). He concludes by formulating a problem: “how can one quite individually structured consciousness bring an alien individuality of a completely different type to objective knowledge through such reconstruction? What kind of process is this, in appearance so different from the other modes of objective knowledge?” (Dilthey, 231)

Understanding comes as the contextually obvious answer sanctioning its territorialization in Human Sciences whereas “the understanding of nature—interpretatio naturae— is a metaphor”. What Natural—in our case Medical—Sciences look for is an “orderly and systematic procedure” developed through “most attentive concentration” in the direction of reaching “a measurable degree of objectivity”, an “*orderly and systematic understanding of fixed and relatively permanent expressions of life*” termed “*exegesis*”. This is possible where the expression of life has been fixed, so that we can return to it again and again. “*Understanding*” on the other hand is “that process by which we intuit, behind the sign given to our senses, that psychic reality of which it is the expression”. “Even the intuition of our own inner reality can only be loosely termed a form of Understanding”, Dilthey states. The various degrees of understanding he recognizes present us with the conditions of integrating the medical and humanistic narrative on the basis of understanding:

“Yet understanding has various degrees”, he argues.

These are determined first of all by interest. If our interest is limited, so also is our understanding. How impatiently do we listen to many arguments; merely extracting the point that happens to be important to us practically, without any interest in the inner life of the speaker; while at other times we passionately attempt to seize the innermost reality of a speaker through his every expression, his every word (Dilthey, 232).

Transliterated in medical terms this pattern would visualize medical text as a narrative related to the inner life of individuals. Most of all it would visualize medical text as a narrative. The introduction of narrativity textualizes Medicine in visualizing a text woven word for word by the patient. *Understanding the words* of the text relates largely to the very essence of Philology which, according to Dilthey, consists mainly in the “*personal skill and virtuosity in the scrutiny of written memorials*” (Dilthey, 233). Consequently the major significance of Literature in its rhizomatic interconnection with Medical Sciences might be valued in relation to what Dilthey recognizes as “the

immeasurable significance of literature for our understanding of spiritual life and of history, for only in speech does the inner life of man find its fullest and most exhaustive, most objectively comprehensible expression. That is why the art of understanding centres on the exegesis or *interpretation of those residues of human reality preserved in written form*" (Dilthey, 233).

On the one hand there is "an art of interpretation" which "has developed gradually and methodically and slowly" and can be seen to territorialize in Human Sciences and on the other hand there is "the experimental investigation of nature itself" which can be seen to territorialize in Natural Sciences. Towards assessing the particular identity of human studies and consequently their potential to contribute to medical studies Dilthey's clarification should be taken into account that "the analysis of Understanding takes its place beside the analysis of inner experience, and both demonstrate the possibility and the limits of the validity of human studies in general, to the extent that these disciplines are governed by the way psychic facts originally come before us" (Dilthey, 234).

In revisiting Schleiermacher's theory Dilthey perceives understanding "as a re-experiencing or reconstruction in its vital relationship to the process of literary production itself". Following this line of thought it seems rather obvious that "the living apprehension of the creative process by which a literary work comes into being" (Dilthey, 240) simulates the process of "understanding the literary product". In this context

wholly new ideas were applied to the understanding of the literary product. Now, a unified and creative power, unconscious of its own shaping force, is seen as receiving the first impulses towards the creation of the work and as forming them. Receptivity and autonomous shaping are indistinguishable in this force. Such a power is individualized to the very fingertips, to the separate words themselves.

Understanding and Interpretation are thus "instinct and active in life itself, and they reach their fulfillment in the systematic exegesis of vital works interanimated by the spirit of their creator", Dilthey explains (Dilthey, 241).

The above mentioned extracts outline two procedures related to the notion of understanding and driven by individualized powers, the process of interpreting the (literary) text and the process of creating the (literary) text which can both be activated in the process of integrating human and medical sciences. Interpretation interweaves with understanding since understanding the individual in any context, the medical context included, requires the interpretation of a personal narrative. While body, numbers or a chemical formula might be assumed to represent an impersonal, non-discursive medical text, the process of interpretation and understanding attests to the textuality of Medicine and the consequent discursivity of a personalized medical text. It has already been suggested that "the body encodes messages" and in this sense it becomes a text embodying messages. The understanding of body and brain as texts entails the need

for decoding the messages “scripted” in them (Prewitt, 77). Interpreting the (literary) text might be useful for the interpretation of the (embodied) medical narrative which is why the “call from Joanne Trautmann Banks for ‘reading in the fullest sense’ still resonates today” (Blackie, Lamb, 414). Understanding or interpreting the medical narrative might raise expectations of growing empathy as per the suggestion of Rebecca Garden who “offers helpful examples of how she draws from cultural theory when teaching a text certain to challenge our best efforts for engendering empathy in resistant readers” (Blackie, Lamb, 414).

Catherine Belling in promoting a Poetics of Medicine is also arguing for attending more closely to the text and “reading in the fullest sense” but she nevertheless “demonstrates the applicability and value of this approach to texts other than those seen as literary”. She applies the same methodology to a scientific journal article, a clinical case conference, and a dramatic text; the result is “a model for reading that insists on the value of rigorous textual analysis across all healthcare settings”. In bringing out the importance of non-literary or nonfictional texts Belling correctly and broadmindedly identifies “the value of the humanities in medicine and medical education” when she explains that “to begin with feelings rather than texts is to miss out on what may be the humanities’ most valuable potential contribution to health care education—and to begin with texts does not mean sacrificing attention to the feelings that almost all texts (not just literary ones) entail. Text is not feeling but its catalyst” (Belling, 482). In this perspective the focus is less on the text and more on the method as she explicitly argues. In furthering this argument, she discerns a more vital contribution of Literature to Medical Sciences not in eliciting emotions which strengthen self-reflection but in offering methods for reading and interpreting factors in the medical context such as people, discourses and practices. She recognizes this multilayered or manifold medical entity comprising factors of theory and practice as “*a set of texts*” which seems to share common grounds with this paper’s understanding of the medical context as a text that reproduces itself. This text which calls for analysis both at the level of content and at the level of method is actually calling for a process of interpretation:

rather than trusting that exposure to art and literature will elicit improving emotions that provoke self-reflection, we might think of the humanities as offering methods for approaching the particulars of healthcare, in all its complexity, with greater understanding and insight. Such methods center on approaching healthcare—its people, discourses, and practices—as a set of texts that must be closely analysed for their content but also, just as importantly, for their forms. When we ‘begin with a text’, it matters far less what text we choose than the methods we apply in reading it (Belling, 482).

In recognizing an equal textuality to all texts composing the big Medical Text she also deliberates on the concepts of interpretation and representation applied equally to this

broad variety of texts: “all knowledge - scientific, clinical, cultural- is textually transmitted and must be interpreted before it can be understood and deployed. Representation and reading are not limited to the literary or the deliberately emotive” (Belling, 485). The disinvolvement of textual approaches from emotive readings and a counter-balanced involvement with representation and interpretation is in line with Professor Ashford’s instruction to “focus on text before feeling” as a “valuable starting point for developing the contribution of humanities methods and texts to medical education” (Belling, 482). The whole discussion writes a circle leading to the body as text and the text as body and finally boils down to the idea that “rather than focusing on the evocation of feelings by mimicking reality, literary texts can be approached in medical education as objects on which to practice the methods of textual analysis. Such practice need not be dry and unfeeling, any more than dissecting the human body necessarily diminishes the anatomist’s wonder at how it works. Feelings, if they are to matter for teaching, should not simply be felt” (Belling, 484).

This attention to the process of close reading relates to the process of understanding or interpreting the text whereas on the other side of intuition the process of creating the text is attracting equal attention and is valued quite as such or even more in regards with the contribution of Literature to Medical Studies. Jay Baruch adopts this attitude as “he challenges the premium placed on the interpretation of the text in order to argue for including creative writing activities in medical humanities education” (Blackie, Lamb, 414). Johanna Shapiro, Deborah Kasman and Audrey Shafer propose personal, creative writing as a process for reflection on patient care and socialization into medicine (“reflective writing”). Based on the authors’ experiences with a range of writing activities in academic medical settings, they structure

a conceptual model for considering the processes and effects of such writing. [...] Specific pedagogical goals in three arenas-professional development, patient care and practitioner well-being – are linked to the writing/reading/listening process. The intent of presenting this model is to help frame future intellectual inquiry and investigation into this innovative pedagogical modality.

This activity of creative writing consists in phases which combine the process of writing / creating the text with the process of reading / interpreting the text. Both processes of writing the text and interpreting the text are based on word, a significant cell in contextualizing Medicine with Literature. The title of the project “From Words to Wards” charts the way from words to wards, that is from texts to medical settings. The way “from words to wards” is just a variation of the way “from texts to classrooms” shown by Michael Blackie and Erin Lamb focusing on the importance of textuality in medical as well as literary studies. Further down in the present article interpretation as the discovery of a path to seeing (contemplating) and supplementing narratives through creative thinking will be adequately shown in Bakhtin’s theory and the operation of the

word. Based on the crucial role of the word in creative thinking the above-mentioned project shifts the dynamics of Words all the way into the Wards and creative writing. In the framework of this project the potential uses of creative writing as a process for reflection on patient care and socialization into medicine (“reflective writing”) have been explored in educating medical students and residents. This insightful conceptual model for considering the processes and effects of such writing unfolds in phases:

The first phase (writing) is individual and solitary, consisting of personal reflection and creation. Here, introspection and imagination guide learners from loss of certainty to reclaiming a personal voice; identifying the patient’s voice; acknowledging simultaneously valid yet often conflicting perspectives; and recognizing and responding to the range of emotions triggered in patient care. The next phase (small-group reading and discussion) is public and communal, where sharing one’s writing results in acknowledging vulnerability, risk-taking, and self-disclosure. Listening to others’ writing becomes an exercise in mindfulness and presence, including witnessing suffering and confusion experienced by others (Shapiro, Kasman, Shafer, 231).

This interactive process of creative writing, otherwise creative thinking recorded in written works is in line with Dilthey who argues on the importance of textuality, reasoning that it is written works which feature a stable basis for working out the process of Understanding as a process which “stretches throughout” human lives and “is exercised upon every type of speech or writing”. He consequently views “the analysis of Understanding as the groundwork for the codification of exegesis” before he draws his final conclusion that Understanding can be realized “only by analyzing the production of literary works”. His assumption that “the possibility of generally valid interpretation can be derived from the nature of Understanding” provides a steady foundation for the establishment of a “relationship between Understanding and literary productivity” (Dilthey, 242). Given that understanding stretches out throughout human lives it seems vital that it is incorporated in Medical Sciences for the empathic energies it works out. Interpretation as a fundamental action working out understanding poses additionally an incontestable necessity to the structuring of medical education.

The contribution of Mikhail Bakhtin

While the interconnection of understanding with interpretation and its structural role in Medical Humanities appears incontestable so is the structural role of word in both processes. Word is not only important in weaving the text, meta-text or interpretive text but also in defining the type of discourse. Words have been traditionally understood as the components of humanistic discourse while signs have been seen to compose med-

ical discourse. The opposition perceived traditionally between the two discourses is the narrativity of humanistic discourse and the non-narrativity of medical discourse. Signs as the encrypted code for symptoms are taken down by doctors to map a non-discursive narrative of the patient's illness, its consequent diagnosis and prognosis on prescription. Within the context of Medical Humanities signs are deployed in gaining full narrative length and symptoms are mapping a fully discursive medical narrative which functions as a vehicle for understanding. The role of word and understanding is stressed by Mikhail Bakhtin in the framework of the distinction between the "exact" and "human" sciences.

Charting directions "Toward a Methodology of Human Sciences" Bakhtin expounds on the distinction between the "exact" and "human" sciences explaining that

the exact sciences constitute a monologic form of knowledge: the intellect contemplates *a thing* and expounds upon it. There is only one subject here-cognizing (contemplating) and speaking (expounding). In opposition to the subject there is only a *voiceless thing*. Any object of knowledge (including man) can be perceived and cognized as a thing. But a subject as such cannot be perceived and studied as a thing, for as a subject it cannot, while remaining a subject, become voiceless, and, consequently, cognition of it can only be *dialogic* (Bakhtin, 161).

The distinctive difference is that the exact sciences are monologic based on the divide between subject and object while the human sciences are dialogic in abolishing the subject-object divide. In the framework of the exact sciences man is understood as one of the objects of knowledge and therefore "perceived and cognized as a voiceless thing" whereas the human sciences enact a reverse understanding of the object as subject in bringing out his voice. This voice interconnects with the voice of the initial "acknowledged" subject in establishing a dialogic activity. Two types of activity are outlined which describe the function of the exact and human sciences respectively: "The activity of the one who acknowledges a voiceless thing and the activity of one who acknowledges another subject, that is, the *dialogic* activity of the acknowledger".

"Two limits of thought and practice (deed) or two types of relations (thing and personality)" are designated during the juxtaposition of Nature to man. In these two lines of thought and practice, between these two limits, two models of attitude are being adopted "attitudes toward the *thing* and attitudes toward the *personality* (Bakhtin, 168) while two processes are being accomplished: the process of *reification* and the process of *personalization*. The thing and the personality (subject) set the *limits* of cognition between the exact and human sciences. Thing-ness and personality-ness become core qualities which distinguish the exact from human sciences (Bakhtin, 161). According to Bakhtin, "the deeper the personality, the closer to the personality extreme, the less applicable generalizing methods are". His conclusion that "generalization and formalization erase the boundaries between genius and lack of talent" verifies the assumption

that generalization and formalization as methods of the natural–medical–sciences erase individuality, a point which calls for a therapy from the human sciences. The distinction between reification and personification as a fundamental difference between the exact and human sciences should be concluded with the clarification that “personalization is never subjectivization”. “The limit here”, Bakhtin clarifies, “is not *I* but *I* in interrelationship with other personalities, that is, *I* and *other*, *I* and *thou*” (Bakhtin, 167). The clearly dialogic nature of this correlation operates as an introduction to dialogization and to contextual meanings also a vehicle of communication between medical and human sciences.

In dealing with the principles of precision and depth Bakhtin notes that “the limit of precision in the natural sciences is identity ($a = a$). In the human sciences precision is surmounting the otherness of the other without transforming him into purely one’s own (any kind of substitution, modernization, nonrecognition of the other, and so forth)” (Bakhtin, 169). In this sense the emphasis on personality-ness, personalization, personification and its indispensable correlation to otherness suggest main parameters of the dialogic cognition. The potential of dialogic cognition goes all the way to understanding and interpretation and proves a key point in the medical-humanistic approach. The core value of this approach lies in the abolition of the “enclosure of analysis (cognition and understanding) in one given text”. According to Bakhtin, each word (each sign) of the text exceeds its boundaries. This exit marks a transition from text to context through which understanding is being conceived:

Any understanding is a correlation of a given text with other texts”, Bakhtin states. Word as a “part of and at the same time common to all of the human sciences-sciences of the spirit-philological sciences” is driving the correlation of text to other texts in linking “understanding and reinterpretation, in a new context (in my own context, in a contemporary context, and in a future one) (Bakhtin, 161).

Bakhtin’s idea of dialogic contact between the self and the others, between *I* and you, between my word and your word, between my word and the others’ words, between my text and your text, between a text and other texts, establishes the concept of dialogization which visualizes an opening from one voice to many voices, is particularly insightful and has a lot to offer to the conception of understanding and interpretation in the frame of Medical Humanities:

The text lives only by coming into contact with another text (with context). Only at the point of this contact between texts does a light flash, illuminating both the posterior and anterior, joining a given text to a dialogue. We emphasize that this contact is a dialogic contact between texts (utterances) and not a mechanical contact of ‘oppositions’, which is possible only within a single text (and not between a text and context) among abstract elements (signs within a

text), and is necessary only in the first stage of understanding (understanding formal definition, but not contextual meaning). Behind this contact is a contact of personalities and not of things (at the extreme). If we transform dialogue into one continuous text, that is, erase the divisions between voices (changes of speaking subjects), which is possible at the extreme (Hegel's monological dialectic), then the deep-seated (infinite) contextual meaning disappears (we hit the bottom, reach a standstill) (Bakhtin, 162).

Contextual relations as a communication of texts but also as a contact of personalities not things territorialize in the "personalized", "moral" Humanities but are most likely to develop also in "neutral", "technical", "depersonalized" Medical Sciences via the path of Medical Humanities and the stages traced in the "dialogic movement of understanding: the point of departure, the given text; movement backward, past contexts; movement forward, anticipation (and the beginning) of a future context". The strongest argument for the contact of personalities is that "dialectics was born of dialogue so as to return again to dialogue on a higher level (a dialogue of personalities)" (Bakhtin, 161-162). Dialogue as a prerequisite for understanding relies largely on "the others' words" which are processed dialogically into "one's own/others' words" with the help of different "others' words (heard previously) and then in one's own words, so to speak (dropping the quotation marks)" (Bakhtin, 163).

If the others' words are assimilated in the final context then the discourse is monologized and disciplinary (medical) consciousness is dominated by the authoritative word. The interception of humanistic discourse would disrupt the unity of the monologue or the one voice text by bringing out the dialogue or the many voices in the context of Medical Humanities. As the one voice text is substituted by the multi-voiced text and monologue concedes to dialogue, interpretation is conducive to dialogic cognition, to understanding "the others' words". Bakhtin is accurate in defining that "the thing remains a thing and the word, a word; they retain their essences and are only augmented by contextual meaning. [...] everything remains as it was but it acquires a completely different contextual meaning (the semantic transformation of existence). Each word of a text is transformed in a new context" (Bakhtin, 164-165).

Contextual meaning is personalistic;" Bakhtin explains. "It always includes a question, an address, and the anticipation of a response, it always includes two (as a dialogic minimum). This personalism is not psychological, but semantic. There is neither a first nor a last word and there are no limits to the dialogic context

Extratextual influences included (Bakhtin, 169-170). Bakhtin challenges the contextual potential of natural sciences since they have an object system (subjectless) while context is always personalized. What the human sciences would have to contribute to natural sciences would be the inclusion of contextual meanings, the "principle of out-sideness", interpretation and understanding of one's own and another's word.

Medical Humanities would thus operate as a space for demonstrating “the complex interrelations of the understood and the understanding subjects, of the created and understanding, and of the creatively rejuvenating chronotopes”; a space for evincing “the importance of reaching, digging down to the creative nucleus of the personality (in the creative nucleus the personality continues to live, that is, it is immortal)” (Bakhtin, 168). Medical Humanities is crucial in introducing the shift from screening the body to reaching the personality through a process which conceptualizes understanding as “the dismemberment of understanding into individual acts”:

In actual, real concrete understanding these acts merge inseparably into a unified process, but each individual act has its ideal semantic (content-filled) independence and can be singled out from the concrete empirical act

Bakhtin concludes (Bakhtin, 159).

Conclusion

While the natural (medical)/exact/hard sciences have previously been distinguished from the human/moral/soft sciences on the basis of their discourse this divide is being abolished in the field of Medical Humanities. In this framework Medicine is primarily textualized and subsequently contextualized with the Humanities, most importantly Literature, in a perspective which visualizes medical discursivity, narrativity and performativity on and off clinical spaces. Medicine is seen to produce its own text, a text which performs identities while at the same time a medical narrative is being written by the patients and the story of each one of them. In this sense medical text is being recognized as a text which reproduces itself in medical times and spaces and therefore becomes itself a space for sustaining dialogic relations between the I and the you, the self and the others, my words and the others' words. Medical text understood as a textual space is likely to transcend itself so as to communicate with other texts in creating a context or participating in a context. These contextual relations establishing a dialogic cognition or condition are based on the main functions of understanding and interpretation originally practised therefore territorialized in the Humanities eventually adopted therefore reterritorialized in Medicine or Medical Sciences.

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BLUE DEATH: THE MASKING OF CHOLERA AS PLAGUE IN POE AND PUSHKIN

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The first cholera pandemic began in India in 1817 and for seven years it struck Asia, the Middle East and the east coast of Africa. The disease arrived in Astrakhan in Russia in 1823, but its spread was prevented by the rigorous winter of 1824, which effectively protected Europe. The second pandemic, however, began a few years later, probably around 1827, again in India, and spread widely, reaching Orenburg in Russia in 1829. For a year, cholera spread to the Russian countryside and arrived in Moscow in September 1830, where it remained for about 4 months.

The last epidemic that struck the capital was the Moscow plague of 1771, which, having devastated the city only 60 years earlier, was still very much present in the memory of the population. It is natural, therefore, that an unknown infection was interpreted as a recurrence of the plague, resulting in panic and hysteria, which was intensified, moreover, by ignorance regarding its causes, the ineffectiveness of preventions and the non-existence of treatments for cholera. Historian Roderick McGrew comments on the subject:

In the public mind, there was little to distinguish cholera and plague, and the contagiousness of the latter was grafted on the rumoured morbidity of the former. Hysteria followed [...] (McGrew 1965, 75).

At the end of August, just before the illness arrived, Pushkin left the city in the direction of the village of Boldino, about 600km from Moscow in the Russian countryside, where he owned property and had some pending business. The poet had become engaged four months earlier to Natalja Nikolaevna Gončarova and wished to arrange his affairs there quickly and return to Moscow for the upcoming marriage.

However, a few days after his departure cholera arrived in Moscow and several quarantine stations were created around the city in an attempt to isolate the city and prevent further expansion of the disease. Pushkin was then unable to return home and was forced to remain in isolation in Boldino until December when the epidemic finally died out and the quarantine posts were abolished. Pushkin's absence and the chaos caused

by cholera forced the spouses to reschedule the marriage for three months later, in February 1831.

The isolation caused a creative explosion in Pushkin's production. In four months he completed *Eugene Onegin*; wrote the five novellas of *The Tales of the Late Ivan Petrovich Belkin*; composed four theatrical works, the so-called *Small Tragedies* (*Mozart and Salieri*, *A Feast in Time of Plague*, *The Covetous Knight* and *The Stone Guest*); and produced the verse story *The Little House in Kolomna*, the fairy tale in verse *The Tale of the Priest and of His Workman Balda* and some lyrics. This period of intense production is called "the autumn of Boldino" by Russian literary criticism (Kahn 2006, xiii).

During this period, Pushkin also wrote many letters that reveal his emotional state as well as the pieces of informations about the illness that he had at his disposal. In a letter addressed to his friend P. A. Pletnev, dated 9th September, Pushkin declares to be surrounded by cholera and emphasizes the speed and the seriousness of the contagion: "Around me, there is cholera morbus. And do you know what sort of a wild beast that is? Before one can say 'knife' it may come and call on Boldino and bite us all – and hey presto!" (Wolff 1986, 284). Three weeks later, as shown by Netchkina and colleagues (Chevalier et al. 1958, 148-149), the poet writes to his fiancée claiming to be ready to go home, but is afraid of being stopped in the quarantine posts:

I'm almost ready to take the road, although my businesses are not settled yet and I'm discouraged. You are very good to foresee for me only six days of delay in Borogod [a quarantine station near Moskow]. I have just been told that between here and Moscow five quarantine posts have been established and that in each of them I will have to spend two weeks, so calculate, and imagine in what a dog mood I'm in...¹

In mid-November, Pushkin tried to leave Boldino but was forced to turn back due to the quarantine. At the end of the month, he left permanently and, despite the cholera being no longer present in Moscow, he was stopped in Platov, in the outskirts of the capital. From there he wrote to Natalja on December 2nd complaining about the disorder in the post and the impossibility of continuing journey: "If you could imagine one fourth of the disorders happening in these quarantines, you could not understand how difficult it is to find a way to pass".²

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1. The authors translate the original letters from Russian to French. I am translating from French: "*Je suis déjà presque prêt à me mettre en route, bien que mes affaires ne soient pas encore réglées et je suis découragé. Vous êtes bien bonne de prévoir pour moi que six jours d'arrêt à Borogodl. L'on vient de me dire qu'entre ici et Moscou ce sont cinq postes de quarantaines qui ont été établis et que dans chacun d'eux, je devrai passer deux semaines, calculez-donc, et imaginez de quelle humeur de chien je serai...*". The original Russian texts can be found in Pushkin 1949, 817-27.
 2. In Chevalier et al. 1958, 148-149. I am once again translating from French: "*Si vous pouviez vous imaginer le quart seulement des désordres dus à ces quarantaine, vous ne pourriez pas comprendre combien il est difficile de s'y frayer un passage*".

One of the plays on which Pushkin worked during this period, *A Feast in Time of Plague*, is, in reality, the translation and adaptation of a passage from the tragedy *The City of the Plague* published by the Scottish poet John Wilson in 1816. The original text, written in unrhymed iambic pentameters, recounts the tragic death of a young couple in love during the plague of London of 1665.

Pushkin translated only the fourth scene of the first act, a piece of just over ten pages, in which the characters come together to celebrate a banquet in honour of a friend who just died. The friends try to create a festive atmosphere, sing two songs and talk about dancing, but in truth, it is difficult for them to abandon sadness and anxiety. Noticing the banquet, a priest approaches, urges them to pray and fast, reproaches the president of the banquet strongly and resumes his way. The text closes in suspense with the description of the president who remains seated, immersed in thoughts to which we have no access.

In the plot of the tragedy, the scene is of little importance and, if it is suppressed, drastic changes in the text would not occur. For this reason, Pushkin's decision of translating only this passage may surprise at first sight. However, after a more detailed analysis, we realize that it is a sagacious strategy³. First of all, the isolation of the scene is able to accentuate the reference to Boccaccio which is quite limited in *The City of the Plague*. Pushkin's text represents only a banquet attended by men and women, all young and noble, who sing to forget the plague under a president's jury: practically a remake of the Decameron's frame narrative. In addition, the cut is able to emphasize the festive elements of the banquet which are brought to the centre of the action: in Pushkin's text, the characters do nothing else. Furthermore, the isolation of the scene creates an indeterminacy in the text: the characters become generic elements and no longer have a personal story and no longer have a personal story nor take part in an action. In fact, we are offered little more than their names. The spatial specificity disappears, since no reference is made to London, the story could take place anywhere. Even time is universalized, since no reference is made to the plague of 1665, but only to a generic "plague time", which does not necessarily correspond to the past and could still apply to the present.

This passage from the specific to the generic is equally traceable in the title, in which the definite articles (*the* city and *the* plague) are abandoned by the majority of translators in favour of the indeterminatives (*a* feast, plague without *the*)⁴. These effects result

3. Indeed, Donald Loewen shows how the critics applauded the choice. Belinsky, not knowing the original text, hypothesizes: "It may be that Pushkin merely used the idea, reproducing it in his own way, and the result was a wonderful poem, not just a fragment but a complete, finished work". Arsenev, in his turn, considers the translation superior to the original: "Wilson's work, considered as a whole, never rises above the level of mediocrity; but our genius poet took from it only the best scene, having discarded its unsuccessful conclusion".

4. There are no articles in Russian. The role of determinate or indeterminate a noun is transferred to other parts of the speech and often depends on the context. The original title Пир во время чумы, *Pir vo vremya chumy*, literally

from the isolation of the scene. They create an open and universal text that leaves to the reader the responsibility of imagining the geographical and chronological location of the narration, the characteristics of the characters, and even to which “plague” the text is referring, since it does not offer any information beyond the inaccurate name.

It should be noted that the choice of Pushkin in favour of an imprecise and, therefore, multipurpose setting, associated with the inaction that characterizes the plot and the inconclusive ending, creates an effect of indeterminacy, irresolution and presentification that allows us to interpret the “plague” as an equivalent of “cholera”. At the time of writing, it is cholera that devastates Russia and affects the lives of both Pushkin and his readers. Moreover, the poet is aware that, being a new and unknown disease, cholera was represented in the collective imagination as an equivalent of the plague and that the natural inclination of the public to confuse and exchange diseases could consequently favour an ambiguous interpretation. As a matter of fact, given the historical context, the choice to write about the plague is in itself revealing of this ambivalence.

And yet, if there is perfect interchangeability between the two diseases, why did Pushkin not change the title to *A Feast in Time of Cholera*? There are several reasons that could justify the choice. The first is the existence of a literary tradition of plague writing that extends from Thucydides and Homer, on the one hand, and from Boccaccio and Defoe, on the other. If Pushkin had chosen to discuss any other disease specifically the dialogue with these texts would be weakened. Moreover, cholera had just appeared for the first time and, unlike the plague, a familiarity with the disease had not yet developed. Then, the epidemic had not yet demonstrated its historical weight, and, in case it disappeared in the near future, the text could easily become outdated. Finally, the plague is the epidemic disease *par excellence* and, therefore, it can easily assume the generic and universal character that the author wishes to create. In conclusion, in the case of for Pushkin, to represent the plague also means to represent cholera, yet the opposite cannot be said is not true.

In addition to selecting and translating the scene, Pushkin amends the two songs substantially. The first is shortened from sixty-four verses to forty, the stanzas are reorganized by sixteen quatrains in five octaves, the meter is changed from trochei to amphibachi, while the rhymes are maintained. The second song is reduced from one hundred to thirty-six lines, the stanzas are transformed from five stanzas of sixteen verses to six sestines, the chorus is abandoned, the rhymes have changed from *aabb* to *abcabc*.⁵

Besides changing the form, Pushkin also drastically reworks the theme of the songs. In the original text, the first song describes the silence of the Scottish fields after the

means, “Banquet in time of plague”, but it is often translated with the addition of the indefinite article: *A Feast in Time of Plague*.

5. First song: 64 (4 verses x 16 stanzas, *abab*) → 40 (8 x 5, *ababcdcd*). Second song: 100 [(16 + 4) x 5, *aabb*] → 36 (6 x 6, *abcabc*). For further details see Gifford, 1949.

passage of the plague, but in the translation, this theme is presented in the first stanza and is immediately replaced by the laments of a girl in love and the advice she offers to her lover. The addition is entirely created by Pushkin, as duly noted by Henry Gifford (Gifford 1949, 43), who also affirms that in the second song the poet completely abandons the original composition, retaining only a general idea of a hymn to the plague. In English, the text opens with a comparison between the plague and battles in land and sea, then depicts the plague as an Empress, and names several of her followers: Madness, Idiocy, Fever, Consumption. In Russian, instead, the text creates a comparison between illness and winter, considers its destructive force as equivalent to that of natural disasters, and suggests a toast and celebrations in its honour.

I believe that the abandonment of most of the original text is due, among other reasons, to Pushkin's intention to include the subject of contagion in the translation. For example, Jenny considers in her complaint the possibility of dying during the epidemic and, if that happens, she begs her lover to leave the city immediately without approaching her body:

Oh, *come not near* then to your Jenny,
 No last kiss on her pale lips lay,
 Watch, *but watch you from afar* off
 When they bear her corpse away!
 Then *leave behind our stricken village!*
 Find yourself some place *apart*
 Where these torments may be lightened,
 And there ease your weary heart.
 [...]
 When the plague ends — then come visit
 Where my poor dust found its rest; (Anderson 2000, 97, my emphasis)

The president of the banquet, on the other hand, declares he is hiding home from the plague and shut her up like winter:

And as her victims' ranks increase
 Each day, each night her burial spade
Knocks at our windows without cease...
 What can we do? Where look for aid?
 Old Man Winter we've beat back;
 That's how we'll meet the Plague's attack!
 We'll light the fire and fill the cup
 And pass it round — a merry scene! (Anderson 2000, 100, my emphasis)

In this way, both of Pushkin's songs offer to the reader a model of contagion absent in the original text, a model focused on touch (*no last kiss [...] lay*), distancing (*do not come near, from afar, leave behind*) and isolation (*knocks at our windows*). This model was

initially developed and repetitively used to fight the plague and was being used in the moment of writing to control the spread of cholera. The thematic change is therefore yet another strategy for overlapping epidemics.

In addition to these changes, Pushkin shifts the emphasis of the song from the past to the present by reversing the tenses used. In the original text, fifty-six out of sixty-four verses refer to the past and only the last stanza has a verb in the present. In translation, only the first eight verses are in the past and the thirty-two are in the present. The proportion is, therefore, inverse: the past has decreased from 87.5% (56/64 verses) to 20% (8/40) of the text, while the present increases from 12.5% (8/64) to 80% (32/40). In this fashion, Pushkin further emphasizes the presentification suggested by other textual elements and indirectly indicates to the reader that the plague of yesterday is also the plague of today. As proof of the effectiveness of this mechanism of presentification, I quote Henry Gifford, who, ignoring the existence of cholera, asserts in his discussion of the translation: "Pushkin has made the plague contemporary" (Gifford 1949, 42). Therefore, this effect of presentification is visible even to those who are not aware of the presence of the epidemic.

Another text that indirectly discusses cholera is *The Masque of the Red Death* by Edgar Allan Poe. The story was published in Philadelphia in 1842, ten years after the first pandemic. It appeared in the newspaper *Graham's Magazine* of which Poe was the publisher at the time. The text tells the story of a group of a thousand nobles who, commanded by Prince Prospero, isolate themselves in an abbey to escape a new disease that is devastating the country: the Red Death. The nobles spend the days hedonistically in banquets and amusements, but every hour, when the clock of the ballroom sounds, they are invaded by a feeling of anguish and uncontrollable fear, which, however, lasts just an instant. The central theme of the story is, therefore, very similar to that of *A Feast in Time of Plague*: a group of nobles try to escape from an epidemic by isolating themselves and engaging in a life of pleasures, but without succeeding completely.

The disease described by Poe is not the plague, but some of its characteristics induce the reader to think about it. Firstly, its name is the Red Death, a clear reference to the Black Death. Secondly, the reference to the *Decameron* is present not only in the setting of the story (*the isolation, hedonism, dances*), but also in numbers: Poe's one thousand nobles are an echo of Boccaccio's ten. Thirdly, both the name of the main character and the colour of the disease he is afflicted with make reference to Caliban's curse against Prince Prospero in *The Tempest*: "The red plague rid you"⁶. In this way, although Poe did not directly represent the plague⁷, his textual strategy is similar to Pushkin's.

6. *The Tempest*, Act I, Scene II, v. 366-368: "You taught me language, and my profit on't / Is I know how to curse. The red plague rid you / For learning me your language!".

7. Barbara Fass (Fass 1992, 5) discusses further the elements of the story related to the black plague: "though his [Poe's] reading about cholera is often described as his source, he also seems to have drawn and materials related

Nevertheless, if some of the features of the Red Death are linked to the plague, others constitute indirect references to cholera. First of all, given the historical context, any new invented disease appearing in literature will be necessarily in dialogue with cholera, which arrived in the United States for the first time ten years before the publication of the text, in 1832⁸. Cholera had lasted for two years on the East Coast. And in 1848, six years after the publication of *The Mask of the Red Death*, cholera would strike the town again during the third pandemic, in which Poe himself almost perished. He comments the disease in a letter of 1849: “I left New York [...] but was arrested in Philadelphia by the Cholera, from which I barely escaped with life”.⁹

he narrator describes the symptoms of the Red Death at the beginning of the text:

There were *sharp pains*, and *sudden dizziness*, and then *profuse bleeding* at the pores, with *dissolution*. The *scarlet stains* upon the body and especially upon the face of the victim, were the *pest ban* [...]. And the whole seizure, progress and termination of the disease, *were the incidents of half an hour*. (Poe 1842, 3, my emphasis)

It is curious how some of the typical symptoms of the Red Death are the same or similar to those of cholera: both diseases cause acute pain and vertigo (*sharp pains, sudden dizziness*); both change the colouration of the victims, in this case to red instead of blue (*scarlet stains*); both are fulminant, one killing in half an hour, the other normally within six and forty-eight hours (*incidents of half an hour*). Unlike the Red Death, cholera does not cause haemorrhage, although one could interpret the “abundant blood loss with dissolution” as a veiled referred to the numerous bodily discharges characteristic of cholera. A cholera victim can loose up to 20% of its body weight through diarrhoea in a matter of hours.

Equally important is the silence of the text, which does not mention the mode of transmission or prevention of the disease and, in this way, reflects the little knowledge that the medical science had of cholera at the time.

to the Black Death”. According to her, one of these elements is the intertextuality with *The Tempest*, in which, she argues, Caliban is the allegory of the Plague.

8. The story devotes ample space to the description of the rooms of the abbey and, to make the setting more vivid, it mentions Victor Hugo's play, *Hernani*. The drama was first performed in Paris in 1830 so that the text itself directs the reader's attention to the period immediately preceding the arrival of cholera. I quote from Poe: “He [Prospero] had directed, in great part, the movable embellishments of the seven chambers, upon occasion of this great fête; and it was his own guiding taste which had given character to the masqueraders. Be sure they were grotesque. There were much glare and glitter and piquancy and phantasm - much of what has been seen in 'Hernani.' There were arabesque figures with unsuited limbs and appointments. There were delirious fancies such as the madman fashions. There were much of the beautiful, much of the wanton, much of the bizarre, something of the terrible, and not a little of that which might have excited disgust.”
9. Letter to Edward H. N Patterson, 19th July 1849 (LTR-328). Available at <https://www.eapoe.org/works/letters/p4907191.htm> (Last accessed 30 Aug 2020)

Poe also uses the recommendations made by physicians as another way of confusing the diseases. His readers would know, for example, that the grouping of a large number of people in a closed place as a form of prevention is the opposite of what was continually recommended by the medical authorities. Furthermore, several scientists claimed at the time that a life of excess predisposed to cholera and, therefore, as a form of prevention, incited the population to constant moderation: avoid parties, have few sexual relations, eat and drink moderately. Historian Charles Rosenberg declares about this topic:

A few days of moderation could scarcely undo the physical ravages of a lifetime given over to drink and gluttony. Sexual excess as well left its devotees weakened and 'artificially stimulated'[,] their systems defenseless against cholera. (Rosenberg 1987, 41)

Poe's characters, on the other hand, do anything but avoid groupings or live moderately, attitudes that draw the attention of the reader of the time and allow him to foresee the conclusion of the story.

Poe also manipulates another medical recommendation with great effect. A large number of scientists believed that anxiety and fear predisposed to infection and made the symptoms more severe. This is evident in the comment by the physician C. L. Seeger who, in a conference on the prevention of cholera in 1832, states that feelings of fear are more fatal than the disease itself: "the Greater proportional number of deaths in the cholera epidemics are, in my opinion, caused more by fright and presentiment of death than from the fatal tendency ... of the disease."¹⁰ For this reason, it was recommended that the population seek entertainment and not think about the risk of contracting cholera, a advice that is in partial conflict with those discussed previously. The historian Christopher Hamlin hypothesizes this advice to be the origin of the paradoxical existence of the "cholera balls":

The need to deny or distract the mind from incipient cholera may also explain the puzzling phenomenon of cholera balls. Best known is Edgar Allen Poe's "Masque of the Red Death" (1842), often seen as a literary response to the cholera epidemic Poe experienced in Baltimore in 1832. But in Paris too cholera was mocked in balls [...] (Hamlin 2009, 71).

In fact, "the fear and presentiment of death" mentioned by Seeger play a central role in Poe's short story and are described in detail:

[...] and when [...] the hour was to be stricken, there came from the brazen lungs of the clock a sound which was clear and loud and deep and exceedingly musical, but of so peculiar a note and emphasis that, at each lapse of an hour, the musicians of

10. C. L. Seeger, *A Lecture on the Epidemic Cholera ... (Boston, 1832)* mentioned by Rosenberg 1987, 75.

the orchestra were constrained to pause, momentarily, in their performance, to hearken to the sound; and thus the waltzers perforce ceased their evolutions; and *there was a brief disconcert of the whole gay company*; and while the chimes of the clock yet rang, it was observed that *the giddiest grew pale*, and the more aged and sedate *passed their hands over their brows as if in confused reverie or meditation*. But when the echoes had fully ceased, a light laughter at once pervaded the assembly; the musicians looked at each other and smiled *as if at their own nervousness and folly*, and made whispering vows, each to the other, that the next chiming of the clock should produce in them no similar emotion; and then, after the lapse of sixty minutes [...], there came yet another chiming of the clock, and then were the same *disconcert and tremulousness and meditation* as before. But, in spite of these things, it was a gay and magnificent revel. (Poe 1842, 6, my emphasis)

The music and the dancing stop every time the clock strikes. The cheerful company is upset for some moments, part of guests are pale, while others nervously pass their hands over their foreheads. However, as soon as the bell becomes silent, the nobles laugh at their own nervousness and forget the fear for an hour.

The details with which the text describes the sounds of the clock and the reaction of the characters attract the attention of the reader, who, by using his or her medical knowledge, is able to judge the adopted survival strategies as ineffective: the group of nobles is too numerous to be effectively isolated; the life of pleasures predisposes them to illness; the entertainment does not make them forget their fear and anxiety due to the persistent interruptions of the clock. In this way, the reader can predict the conclusion of the narrative and suspect that there will be contagion.

In fact, during a masked ball, while the clock strikes for a whole minute at midnight, the guests perceive the presence of a stranger who breaks the “indefinite decorum” of the costumes and makes them murmur “of horror and of disgust”. The figure has gone too far by dressing as a victim of the Red Plague:¹¹

The figure was tall and gaunt, and shrouded from head to foot in the habiliments of the grave. The mask *which concealed the visage* was made so nearly to resemble *the countenance of a stiffened corpse* that the closest scrutiny must have difficulty in detecting the cheat. And yet all this might have been endured, if not approved,

11. Poe 1842, 7: “And thus too, it happened, that before the last echoes of the last chime had utterly sunk into silence, there were many individuals in the crowd who had found leisure to become aware of the presence of a masked figure which had arrested the attention of no single individual before. And the rumour of this new presence having spread itself whisperingly around, there arose at length from the whole company a buzz, or murmur, of horror, and of disgust. [...] In truth the masquerade license of the night was nearly unlimited; but the figure in question [...] [had] gone beyond the bounds of even the prince’s indefinite decorum. There are chords in the hearts of the most reckless which cannot be touched without emotion. Even with the utterly lost, to whom life and death are equally jests, there are matters of which no jest can be made. The whole company, indeed, seemed now deeply to feel that in the costume and bearing of the stranger neither wit nor propriety existed.”

by the mad revellers around. But the mummer had gone so far as to assume the type of the Red Death. His vesture was dabbled in blood - and his broad brow, *with all the features of his face*, was besprinkled with the scarlet horror. (Poe 1842, 8, my emphasis)

The figure is clearly an invader (referred in the text as a *stranger*¹²) and his mere presence upsets, not necessarily because of the fear of contagion, but because his attire is considered displeasing. The invader is considered indecorous and disgusting and, consequently, must be expelled. The guests apparently do not perceive the ambivalence of his presence, in which a supernatural element is possibly present. The reader, however, will likely consider this possibility given the gothic setting of the story. The stranger may be a healthy individual dressing as the Red Death, or a victim which carries the infection and is not dressed at all, or still the personification of the disease itself coming to claim their lives.

I hypothesize that the first appearance of the stranger and the description that follows are used by Poe within the text as an allusion to cholera. First of all, the stranger appears while the clock is ringing and the nobles are frightened. As previously discussed, part of the medical establishment at the time believed fear and anxiety would predispose patients to infection. Secondly, the feelings of distaste and disgust caused by the invader's costume are in perfect consonance with those caused by the humiliating symptoms of cholera. Cholera is by definition the disease of uncontrolled corporeality, the sickness of disgust, of vomit, of diarrhoea. As noted by Richard Evans (Evans 1987, 229)¹³, these symptoms become taboo and are surrounded by an uncomfortable silence. If an author accepts this taboo, the only possibility that rests is to discuss the disease and its symptoms in an indirect and allusive way. I believe this is what happens in this case. Moreover, the stranger is perceived as an invader, which, just like cholera, comes from outside the boundaries of the quarantine, from "out there". Finally, his appearance is cadaverous, like those of cholera victims, and is especially evident on the face, once

12. Poe 1842, 8: "The whole company, indeed, seemed now deeply to feel that in the costume and bearing of the stranger neither wit nor propriety existed."

13. "In addition, the symptoms of cholera were peculiarly horrifying to nineteenth-century bourgeois sensibility. [...] The blue, 'corrugated' appearance of the skin and the dull, sunken eyes of sufferers transformed their bodies from those of recognizable people, friends, family, relatives, into the living dead within a matter of hours. Worse still, the massive loss of body fluids, the constant vomiting and defecating of vast quantities of excreta, were horrifying and deeply disgusting in an age which, more than any other, sought to conceal bodily functions from itself. Bourgeois society, as we have seen, took increasing pains, as the century wore on, to make private the grosser physical acts of daily living and to pretend that they did not exist. Cholera broke through the precarious barriers erected against physicality in the name of civilization. The mere sight of its symptoms was distressing; the thought that one might oneself suddenly be seized with an uncontrollable, massive attack of diarrhoea in a tram, in a restaurant, or on the street in the presence of scores or hundreds of respectable people, must have seen almost as terrifying as the thought of death itself." (Evans 1987, 229).

again like in cholera patients. As a matter of fact, the text insists several times on this key by employing many synonyms: *visage, countenance, features of the face*.

Besides, the stranger immediately infects Prospero solely by being present. The prince then experiences symptoms that could be those of cholera, since he convulses, filled with distaste and, in an omen of his imminent death, changes colour, blushing with anger:

When the eyes of Prince Prospero fell on this spectral image [...] he was seen to be convulsed, in the first moment with a strong shudder either of terror or distaste; but in the next, his brow reddened with rage. (Poe 1842, 8)

Infuriated, Prospero orders that the stranger be captured. However, before narrating how the guests react to the command, the text goes on to describe the geographical position occupied by the prince within the abbey: “It was in the *eastern or blue chamber* in which stood Prince Prospero as he uttered these words.” (Poe 1842, 9, my emphasis).

Just as the plague in the Middle Ages, Cholera was imagined as a scourge coming from a vaguely defined “Orient”. Thus the explicit reference to the “eastern chamber” is charged with meaning that readers at the time would be quick to grasp. Furthermore, the blue colouring of the room is in perfect alignment with the typical representation of cholera. The disease as frequently called *Blue Cholera* in the medical and popular press, as well as *Indian Cholera*, *Asiatic Cholera* or *Cholera Morbus*. In satires and the caricatures, the epidemic was often personified as a stereotyped blue-coloured Indian or Turk that is about to illegally cross the border. Another proof that the colour of the room is not chosen randomly is that the text emphasizes it a second time by repeating and paraphrasing the same sentence: “It was in the *blue room* where stood the prince, with a group of pale courtiers by his side.” (Poe 1842, 9, my emphasis).

The guests do not have the courage to follow the prince’s orders. Then, the invader passes by him and walks solemnly and unimpededly from the easternmost room (the blue chamber) to the westernmost room (the black room). The text emphasizes the lack of obstruction of the invader’s procession:

[...] *there were found none who put forth a hand to seize him*; so that, *unimpeded*, he passed within a yard of the prince’s person; and [...] *made his way uninterruptedly*, but with the same solemn and measured step which had distinguished him from the first, through the blue chamber to the purple - to the purple to the green - through the green to the orange - through this again to the white - and even thence to the violet, ere a decided movement had been made *to arrest him*.

The detailed description of the invader’s displacement is a clear reference to the itinerary of the second cholera pandemic which has travelled inexorably from east to west, from India to the United States.

The stranger finally enters in the last room, the black chamber, and the prince, now awoken from his paralysed state, rushes after him for an unsuccessful attack. When placed face to face with the invader, he immediately falls to the ground, instantaneously dead. In a matter of seconds, all the other guests share his fate, the last one of them dying with the last ring of the clock. This indicates that only one minute has passed from the appearance of the stranger to the annihilation of all the nobles. The carefully described spacial changes in the text (mysterious appearance in the blue chamber, instantaneous death in the black chamber) could be considered once again the fusion of the representations of cholera and the plague, in other words, a mixing of the *blue* cholera and the *black* death.

Besides these internal elements, there is still another connection between *The Masque of the Red Death* and cholera, a connection that can be found in the sources that have motivated the writing of the text.

In 1832, the German poet Heinrich Heine was in exile in Paris, from where he worked as a journalist for the German periodical *Allgemeine Zeitung*. Heine had been writing for this newspaper a series of essays commenting on different aspects of French society when cholera first arrived in the capital. The poet experienced the cholera outbreak at first hand and described what he witnessed in the essays VI and VII from a total of nine. The following year, 1833, these texts would be published in book format under the title of *Französische Zustände*, the *French Affairs*. Heine narrates the events surrounding the epidemic with great irony. He emphasizes how cholera made its first victims during the festivities of the *Mi-Carême*. According to Heine (and the story is probably apocryphal¹⁴), the disease had not been taken seriously by the population, which, instead of avoiding large groups, had celebrated with special joy in the streets. Some of the revellers would even be masked as a personification of the disease.

Its arrival was officially announced on the 29th of March, and as this was the day of *Mi-Carême*, and there was bright sunshine and beautiful weather, the Parisians hustled and fluttered the more merrily on the Boulevards, where one could even see maskers, who, in caricatures of the livid colour and sickly mien, mocked the fear of the cholera and the disease itself.

That night the balls were more crowded than usual; excessive laughter almost drowned the roar of music; people grew hot in the chahut; a dance of anything but equivocal character; all kinds of ices and cold beverages were in great demand — when all at once the merriest of the harlequins felt that his legs were becoming much too cold, and took off his mask, when, to the amazement of all, a violet-blue face became visible.

14. Other eyewitnesses discuss the party of the *Mi-carême* (Anaïs Bazin in *L'Époque sans nom*, for example) or the inclination of the population to ridicule cholera (Chateaubriand, *Mémoires d'Outre-Tombe*) without mentioning the arrival of the epidemic during the party, something that would have been hardly missed.

It was at once seen that there was no jest in this; the laughter died away, and at once several carriages conveyed men and women from the ball to the Hotel Dieu, the Central Hospital, where they, still arrayed in mask attire, soon died. As in the first shock of terror people believed the cholera was contagious, and as those who were already patients in the hospital raised cruel screams of fear, it is said that these dead were buried so promptly that even their fantastic fools' garments were left on them, so that as they lived they now lie merrily in the grave. (Heine 1893, 167)

The parallels with Poe's story are obvious: the feast in times of epidemics, the overcrowded masked ball, characters dressed as the personification of cholera (*in caricatures of the livid colour and sickly mien*), the dramatic manifestation of the disease, the emphasis on the face as a key place to identify the disease (*a violet-blue face became visible*), the sudden and immediate death of the characters, the timely dissolution of the party, the fact they die and are buried in their costumes. The tones of both texts, however, could not be further apart: while Poe's text is serious and full of Gothic suspense, Heine's is light, ironic and, in some passages, even lyrical.¹⁵

We do not know if Poe had direct contact with Heine's texts, but the writer Nathaniel Parker Willis, a close friend of Poe, certainly read it and even used some of his ideas in a letter he published in the *New York Mirror* in 1832 describing, like Heine, his experiences in Paris during the outbreak. In this text, Parker Willis adopted some elements from Heine and, according to Jane Weiss, "adorned the story in gothic and fashionable tones" (Weiss 2003, 94). This letter was republished, along with others, in book format under the title *Pencillings by the Way* in 1835.

Some of Parker Willis's observations are strikingly similar to descriptions we find in *The Masque of the Red Death*:

I was at a masque ball at the *Theatre des Variétés* a night or two since, at the celebration of the *Mi-carême*. There were some two thousand people, I should think, in fancy dresses; most of them grotesque and satirical; and the ball was kept up till seven in the morning with all the extravagant gaiety and noise and fun with which the French people manage such matters. There was a cholera-waltz and a cholera-gallopade; and one man, immensely tall, dressed as a personification of the cholera, with skeleton armour and blood-shot eyes, and other horrible appurtenances of a walking pestilence. (Parker Willis, 1835, 1-3)

15. Heine's description also influenced Sue, who in 1844, two years after the publication of *The Masque of the Red Death*, included in his *Le Juif Errand* a scene in which a mask dance was interrupted by the arrival of cholera. Sylvie Thorel-Cailleteau says about the topic: "Sue reprend ce motif dans le chapitre intitulé 'La Masquerade du choléra' où Couche-tout-nu, l'un des membres de la famille Rennepont alors agonisant, à force de subir les manipulations des jésuites, est déguisé en 'bonhomme Choléra', 'cadavéreux Géronte' dont le 'masque de carton verdâtre, aux yeux rouges et creux, semblaient grimacer la mort d'une manière des plus réjouissantes'". (Thorel-Cailleteau 2012, 340).

The parallels between Parker Willis's texts and *The Mask of the Red Death* are clear. First of all, the settings are in both cases a crowded masked ball. Then, Willis witnessed a "cholera waltz", while in Poe's story the characters are dancing a waltz when are interrupted by the clock ringing midnight. In addition, in Willis's letter, we read about a man "dressed as the personification of cholera" who is described as "immensely tall" and dressed with the "horrible appurtenances of a walking pestilence". In Poe's text, the invader is "tall and gaunt" and is "shrouded from head to foot in the habiliments of the grave". Furthermore, the reference to red and blood is equally present in both authors: in the letter, the man has "blood-shot eyes", while in the short story the stranger has "vesture [...] dabbled in blood" and a forehead "besprinkled with the scarlet horror".

Thus, the links between *The Masque of the Red Death* and cholera are multiple and exist in many different textual levels. One may wonder, however, why Poe did not simply choose to represent cholera since he points to it in so many ways. Just like in Pushkin's case, there are some probable reasons for the choice. The first one is aesthetic. Poe is interested in creating a horror text, full of gothic suspense, and cholera with its disgusting symptoms may not create the desired effect. An invented disease that shares some of the cholera's symptoms and takes them to the extreme, while at the same time causing abundant bleeding, lends itself more to these goals. Moreover, the supernatural elements of narration are more easily justifiable in a scenario in which the discussed disease has no scientific reality. Another reason may be the fear itself that the text could possibly incite in the public: since Medicine at the time taught that the anxiety and fear predispose to contagion, if cholera was used, Poe could be placing his audience in actual danger. In addition, the text is not particularly interested in creating a specific and concrete setting: the geography is vague with only "the country" and "the abbey" being mentioned; no specific dates are offered to the reader, who wonders if he should imagine the history in the Middle Ages, in the present day or even in the future; there are no other characters besides Prospero and the "guests" and almost no information is provided about them.

In conclusion, Poe seems to seek for the same universality that Pushkin sought by changing Wilson's text. By representing the actual plague and the invented red plague, both authors manage to discuss the real and immediate threat of cholera in a specific way and, at the same time, to explore the scourge of epidemics and its consequences, in a more general way.

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THE *PATOGRAFIA DE ANTERO DE QUENTAL*
[PATHOGRAPHY OF ANTERO DE QUENTAL]
(1955) BY LUÍS CEBOLA: POETRY AND ITS
INTERPRETATION AS A SOURCE FOR
PSYCHIATRIC DIAGNOSIS / SCIENTIFIC
THEORY AS A SIGNIFICANT TOOL IN
LITERARY ANALYSIS.

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Introduction

Luís Cebola (1876-1967) was a Portuguese Psychiatrist and the Clinical Director of Casa de Saúde do Telhal (CST) for thirty-eight years, from 1911 to 1949. CST, built in Sintra, belongs to the religious brotherhood Ordem Hospitaleira de S. João de Deus. It opened as an insane asylum for male patients in 1893 (Lavajo 2003, 70) and is still functioning today. When it opened, there were only two Psychiatric Hospitals functioning in Portugal: Hospital de Rilhafoles in Lisboa and Hospital do Conde de Ferreira in Porto (Fernandes 1894, 249-256).

In addition to his work as a psychiatrist, Cebola was a prolific writer as well, and a lifetime supporter of republican ideology, publishing during his lifetime numerous multifaceted books, twenty-three in total, which are extremely rich documents insofar as they reveal the interconnectedness of medical-scientific themes, as well as literary and socio-political concerns, which altogether, significantly enlighten a critical assessment of the historical awareness with regard to the social and clinical perception of mental illness during the first half of the twentieth century.

It is likely that Luís Cebola was nominated as Clinical Director of CST by the Governo Provisório da República Portuguesa [provisional government of the Portuguese Republic] given the government's need to have someone they could trust, politically speaking, in a leadership position at this religious institution, following the Republican revolt on 5 October 1910 (Cebola 1957, 57-58; Gameiro 2009, 14; Lavajo 2003, 180). On April 1911, a law was published which decreed the separation between Church and State, and, consequently, the entirety of the Catholic Church's patrimony became property of the Government (Ramos 1994, 407). However, owing to the fact that the CST was built inside private property, the government could not claim rights over the asylum (Lavajo 2003, 18).

The *Patografia de Antero de Quental* was published in 1955 as an author's edition when Cebola was seventy-nine years old. As he defined it in the book's preface, a pathography was a scientific work which aimed to investigate and describe the influence that

a congenital psychopathy had on the life of a historical figure, In this volume Cebola focused on explicating the clinical origin underlying the suicide of the highly celebrated Portuguese poet and philosopher Antero de Quental (1842-1891). The psychiatrist indeed stressed at the beginning of this volume that he would ascertain the exact psychiatric diagnosis, thereby elucidating the psychopathological causes leading to the poet's tragic end. Furthermore, he would do so by way of a detailed analysis of Antero's biographies, poems, personal letters, and political writings. He would also explore the ways in which such an illness had directly and indirectly influenced his literary work (Cebola 1955, 9).

It is important to note that during the time Cebola wrote and published the *Patografia*, Portugal was under the rule of a right-wing, catholic, conservative, and nationalist dictatorship – the *Estado Novo* [The New State] – having António de Oliveira Salazar (1889-1970) as Prime Minister. Salazar, who was in power from 1933 to 1968, following the 28 May 1926 coup d'état, opposed communism, socialism, and liberalism (Marques 1995, 627-640; Rosas 1994, 243-244). Unsurprisingly, Cebola, as a republican, atheist and a defender of the need for the modernization of Portuguese politics and society, was very critical of Salazar's political regime.

The connections established between psychiatry and poetry, which Cebola explored in the *Patografia*, were also evident both in his personal and professional life. Like Antero de Quental, Cebola was also a poet, having published six poetry anthologies during his lifetime. His undergraduate thesis as a medical student, entitled, *A Mentalidade dos Epilépticos* [The Epileptics' Mind] consisted in the analysis, in shape and content, of works of art produced by epileptic patients with the aim of finding some psychopathological law common to all of them. Here he stated that the analysis of such art works could allow a better psychological understanding of the patient (Cebola 1906). He also challenged the theory proposed by Cesare Lombroso (1835-1909) in his 1889's book *L'uomo di genio in rapporto alla psichiatria*, which suggested that the creativity of geniuses resulted of “a degenerative psychosis belonging to the family of epileptic affections” (Lombroso 1891, 336). Cebola disagreed, claiming that the acts of creative inspiration were not circumscribed to the prodigies, but were common to all mankind, varying only in degree. He also considered the man of genius as representing progress and not degeneration (Cebola 1906, 163-172). As a clinical director in CST Cebola advised the nurses to collect any writings, drawings or paintings made by the patients (Cebola 1940, 194-195), which would then be displayed in a museum, located in CST, that Cebola referred to as Museum of Madness (Cebola 1925, 113-114).

Aims

In this paper I will analyze the main ideas explored in this work of literary-psychiatric enquiry targeted to the general public, where a clear interconnection between these

two areas of inquiry into human nature can be observed. I will examine in detail how Cebola referred to the relationship between genius and madness; to the application of psychiatric knowledge in order to substantiate literary interpretation; and to his suggestion that the study of a work of art, when founded on a scientific approach, allowed for the elaboration of a more detailed psychiatric diagnosis. The attention will be focused on the ways Cebola explored the relationship to be established between the psychiatric knowledge and literary analysis, and how his suggestion of such connection contributes to the overall rhetoric and purposes of his book.

Discussion

Antero de Quental (1842-1891) was a Portuguese poet, writer and philosopher. He was a diffuser and a strong supporter of socialist and anarchist ideas, being very socio-politically active, and critical of the old fashion mentality of the Portuguese intellectuals and politicians of his time (Catroga 1991, 7-55). Antero was a member of what came to be known as *Geração de 70*, an academic movement of young intellectuals established in Coimbra University that aspired to revolutionize Portuguese politics, literature and society (Machado 1980, 383-396). During his life Antero expressed intense feelings of disappointment for the lack of modernity that characterized his nation, and how he expected Portugal to absorb all the political and ideological changes that were occurring throughout Europe. Frustrated, in part because none of his political activities seemed to be fructiferous, Antero became very depressed, retiring in 1881, to Vila do Conde, in an attempt to distance himself from the evils of human society. There he led a monastic life dedicating himself to metaphysical and religious readings, to the writing of sonnets, and to edit his 1886 book *Sonetos Completos* [The Complete Sonnets]. His depressing thoughts intensified as time went by, and in 1891 he shot himself (Grande Enciclopédia Portuguesa e Brasileira, vol. 23, 917-921).

Sousa Martins (1843-1897), a renowned Portuguese physician well known for his pro-bono clinical examinations to the paupers and his studies on the treatment of tuberculosis (Pais, Sousa 1994, 30-31,58-59), published a book in 1894, where he identified the morbid pathology that had led Antero to commit suicide. This work, *Nosografia de Antero* [Nosography of Antero], was founded on biological determinism, and classified Antero as being a circular neurasthenic (Martins, Sousa [1894] 2002). Neurasthenia was a clinical label first used in the late 1860's by George Miller Beard (1839-1883), an American neurologist, to designate nervous fatigue (Killen 2006, 42-43), and after the First World War this psychiatric diagnosis declined in popularity, since its symptoms became to be classified as being of psychological origins, starting to be referred to as psychoneurosis (Vijselar 2001, 239-256).

In the *Patografia*, Cebola praised Sousa Martins as a doctor and also his *Nosografia* describing it as a major work in Portuguese psychiatry. He considered it as being a detailed and meticulous study, only disagreeing with the suggested psychiatric diagnosis, and justifying Martins' mistake by claiming that during his lifetime, the psychiatric classifications had not yet been firmly based on what Cebola defined as being the major works of Emil Kraepelin (1856-1926), Eugen Bleuler (1857-1939), Ernst Kretschmer (1888-1964), Sigmund Freud (1856-1939) and others. Having Martins' *Nosografia* as a starting point, Cebola qualified himself as being the right man to finally solve the mystery behind Antero's death, sixty-three years after the suicide, since he would be guided by his ample clinical knowledge, and his examinations would be founded on modern psychiatry and positive psychology (Cebola 1955, 7-8).

According to Cebola, Antero was a congenital cyclothimic, and his disease had been characterized by the prevalence of depressive crises marked by pessimistic feelings. The worsening of this hereditary pathology had been the cause of his suicide (Cebola 1955, 75, 107-108, 113). He explained to his readers that the disease was located in the poet's brain since birth, and progressed during his lifetime, especially when the external environment was propitious (Cebola 1955, 15-16). Antero had inherited both his mental illness and his literary talent from his maternal and paternal ancestors, and because some of these ancestors were extremely religious, Antero had also received a morbid mystical personality, which led him to desire his own death as a form of redemption, during his depressive crises (Cebola 1955, 12-21). Cebola also added that Antero, when not afflicted by the altered mental states, was a very rational man, owing to which the poet lived in a permanent conflict between his inherited morbid religiosity and his rational atheism, which instigated great mental exhaustion (Cebola 1955, 79).

The psychiatric designation "cyclothymia" was introduced in 1882 by the German psychiatrist Karl Kahlbaum (1828-1899), for describing a cyclical mood disorder that affected mainly the emotions rather than the intelligence and drive and that would not lead to mental dementia. The revision of the Diagnostic and Statistical Manual of Mental Disorders of 1987 considered cyclothymic disorder, as being a cyclical mental disturbance not severe enough to be designated as major depression (Shorter 2005, 166-168).

In chapter four of his study Cebola examined Antero's publication, *Sonetos Completos*, which he considered to be the poet's masterpiece, in order to determine how his congenital pathology had influenced his writing. Here Cebola suggested that a literary analysis allowed the psychiatrist to assess the aesthetic and intellectual value of Antero's mind, permitting him to evaluate the poet's mental functioning, and therefore could be applied to infer the state of his brain's health.

To begin with, Cebola recognized Antero's capacity for capturing objective reality and reproducing it in his poetry, which was noticeable in his perfect use of colour and light, and in his references to pictorial details. While quoting examples from Antero's

verses, Cebola inferred the poet's aptitude to acquire clear visual impressions and preserving them intact inside the cerebral cortex (Cebola 1955, 54-57).

He also noted the biographical nature of his sonnets, and how they depicted a true portrait of Antero's psyche, becoming valuable in documenting the evolution of his mental states. For instance, the fact that Antero's poems were from time to time immersed in melancholic feelings and expressed profound moral pain, could inform the psychiatrist that the most prevalent facet of his cyclic personality was the depressive one (Cebola 1955, 60-63).

The conflict between his mystical feelings with what Cebola called his "rational atheism" was also present in a significant part of his later sonnets, and Antero's conversion to Buddhism, in the years that preceded his death, could likewise be perceived, in the way he articulated his fascination with the achievement of Nirvana, as a path for redemption (Cebola 1955, 63-75). The psychiatrist concluded that Antero's sombre poetry was premonitory of his fatal suicidal tendencies (Cebola 1955, 73).

Moreover, throughout chapter four, Cebola explores the idea that psychiatric knowledge could substantiate literary interpretation, suggesting that a clinical mind was able to achieve a more profound understanding regarding the author and his writings than the layperson. Cebola justified that affirmation by declaring that the psychiatrists were the experts on brain anatomy and physiology, the place where all thought and creativity originated (Cebola 1955, 53-54). To further develop this premise, he opposed his own literary analysis to the one elaborated by Oliveira Martins (1845-1894) in the preface to the first edition of *Sonetos Completos*. Martins was an historian, sociologist, writer, and politician who had been an intimate friend of Antero (Grande Enciclopédia Portuguesa e Brasileira Vol.19, 408)

Cebola expressed his strong disagreement with Martins when the latter claimed that Antero's poetry was exclusively subjective and psychological; that he was an anti-romantic; and also that he had reconverted to Catholicism prior to his suicide, after several years of religious doubt. In order to refute Martins' literary analysis, Cebola quoted several examples taken from Antero's verses, that were demonstrative of his capacity for objective description; of his occasional choice of romantic themes and motives; and ones that revealed the poet's disbelief in Catholicism and his growing belief in Buddhism. The psychiatrist explained that Antero privileged subjective and metaphysical themes in his poetry as a consequence of his mental pathology, which made him prone to melancholic inquisitions. Moreover, the poet did not oppose romanticism, but only those elements he considered to reflect the excesses of the ultra-romantics (Cebola 1955, 54-75).

The *Patografia* also examined questions concerning the influence of pathology on an author, as well as the relationship to be established between artistic genius and mental illness. Cebola considered that Antero's sonnets were deeply informed by his cyclothymia, since his ideas flowered forth from his cerebral cortex, and were therefore a prod-

uct of his altered mind, particularly the ones emerging during the depressive states of his disease, which comprised most of his sonnets, marked by doleful and bleak themes, as a consequence of the prevalence of the melancholic states that characterized his mental illness. According to Cebola the psychopathology was “*decisiva e fecunda*” [decisive and fecund] for Antero’s poetic inspiration (Cebola 1955, 110-111). Moreover, Cebola considered that the metaphysical concerns expressed in his sonnets were intensified in his unconscious mind through as a result of the extensive philosophical readings that significantly marked his youth, e.g. Kant, Schopenhauer, and Hegel (Cebola 1955, 112).

The psychiatrist then examined the nature of Antero’s poetic gifts. Were they the direct consequence of his disease? Could Antero be described as a degenerate in clinical terms? When referring to Antero’s brain function, Cebola uses the expression “magical chrysalis” (Cebola 1955, 53), which suggests that he considered him to have been a literary genius, one whose talent and disease both evolved throughout his lifetime as a result of inherited traits.

Despite his premise that Antero’s literary work was influenced by his mental illness, Cebola refuted the notion that the poet’s natural talent and artistry with words were a consequence of mental disease. As previously mentioned, Cebola believed that Antero did not only inherit his morbid condition from his family, but also his rhetorical and literary talents, his sophisticated reasoning and his love of poetry in general. The perfect form and harmony of his sonnets seemed to emerge from his rational and logical capacities as well as from his profound sensibility. Only the excessive negative emotions he manifested were pathological in origin. In addition, Cebola claimed that, prior to the full manifestation of his cyclothymia, Antero was perfectly capable of sensing, capturing and recording aspects of reality in his writings, which the psychiatrist exhibited as proof of the normal functioning of his brain, despite the disease that was already developing there. Furthermore, his preference for philosophical, spiritual, and melancholic subjects worsened as his cyclothymia progressed over time.

Conclusion

Although Cebola evidenced in his study the need to establish a relationship between psychiatric knowledge and literary interpretation, he does not suggest or propose any sophisticated explanation to justify his thesis that the doctor’s literary analysis could be more solid and insightful than one achieved by the layperson. Furthermore, his study also lacks references to predecessors in the field of clinical-literary analysis nor does it afford the reader any methodological clues to guide subsequent inquiry in this multidisciplinary approach. His chosen rhetoric strategy was to reiterate throughout his study of Antero his belief that the psychiatrist’s specific expertise permitted him a

greater knowledge of brain function and anatomy, the site of consciousness, thought and mentation in general.

Cebola suggested that the medical expert, informed by materialistic and positivist views, was more in tune with the spirit of modernity than any other member of society. By claiming the verity of his psychiatric diagnosis of Antero and supplanting what he regarded as being an outdated classification proposed by Sousa Martins, or by criticizing the literary analysis of Antero's poetic work proposed by Oliveira Martins, Cebola established an opposition between modernity and tradition as manifested throughout the *Patografia* itself.

I propose here that this book functions in fact as an encomium to reason and scientific endeavour as a whole, premised upon and contributing to these potent symbols and expressions of modernity. Modernity, as portrayed by Cebola in his study of Antero, supplants the pre-positivistic cultural strata of metaphysics and mysticism – two expressions of unquestioned tradition – as the means to reach authentic knowledge (observable and criteria-based) vis-à-vis complexities and conundrums of human nature. According to the Portuguese psychiatrist, Antero's preference for the pre-modern modes of inquiry and mystical feeling, along with his abandonment of reason and objective thought, underlie the exacerbation of the poet's congenital disease. In conclusion the relationship Cebola established between psychiatry and poetry was founded upon a deeply rhetorical strategy whereby the psychiatrist affirmed the superiority of the positivist-scientific endeavour as modernity's supreme cognitive project.

Such praise of modernity and scientific thought in general was also used as an indirect way to establish a criticism of the political regime of the *Estado Novo*, thereby avoiding censorship. Cebola's choice of Antero de Quental as his study's focus was undoubtedly charged with symbolism, as he had dedicated most of his lifetime crusading for progress and modernization of Portuguese society as well as disseminating republican, socialist and anarchist ideas. Cebola identified with many of Antero's socio-political views and aspirations, and admired both his writings and personality, since he characterized him recurrently as being a man of virtue and a literary virtuoso. Antero performs in Cebola's study, therefore, the role of a cautionary and prophetic figure: as a symbol of the need for radical political change, one that would lead to the transformation of Portugal into a truly advanced nation. In fact, Cebola intended to follow the footsteps of Antero, presenting himself as someone who, similarly to the famous poet, had dedicated his life to the moral mission of educating his own nation towards progress.

Lastly, Cebola eschewed a complete break with tradition - whether in medicine or in literature - in order for Portugal to reorganise itself in accord with political, social, and cultural modernity, as could be seen in his praise of Sousa Martins and Antero de Quental. Nonetheless, while honouring the cultural and scientific past of the nation, the author underscored the urgent need to accept the new ideas, fields of inquiry and expertise being developed globally. Significantly he introduced himself in the *Patografia*

as being a bridge that could unite the past and the future, inasmuch as he had been raised in and therefore understood traditional modes of thought and being, but had also been educated in accord with the new spirit of the age expressed as the pursuit of new (scientific) knowledge. Cebola's *Patografia*, in which he diagnosed the poet's psychological processes in light of the products of his literary personality, based on his positivistic reading of Antero's poetic output, permitted the psychiatrist to appraise approvingly Antero's undisputed value as a poet while, simultaneously, repudiating – in a complex critical act of symbolic appropriation and rhetorical negation – the poetry's retrograde ideational content, as clinically defined by Cebola himself. Thus, the psychiatrist enacted a complex reading of the poetry of Antero de Quental. By doing so, Cebola dialectically overcame the established critical canon with respect to the great national poet, as seen in the studies previously published by Sousa Martins and Oliveira Martins, for example, while at the same time presenting himself as the embodiment of a lifetime dedicated to scientific inquiry, i.e. truth in a modern idiom. At the confluence of clinical diagnosis, positivistic perspective, literary analysis and political ideology, the *Patografia* represents an important cultural artefact in the history of Portugal's ideological evolution toward modernity. In the process, Cebola both examines and diagnoses, elucidates and appropriates, reads and invents the poet Antero de Quental as victim of tradition and harbinger of modernity.

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HYBRIDITY AT THE INTERFACE OF
MEDICAL AND LITERARY DISCOURSE:
V. S. NAIPAUL'S *A WAY IN THE WORLD*

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In 1617, after being released from a thirteen years' imprisonment, Sir Walter Raleigh attempted a last, desperate journey to the Americas which, if successful, would have granted him forgiveness for his crimes and freed him from the death sentence still hanging over his head. His claims to know the exact location of the legendary city of El Dorado were soon proved wrong and the enterprise was unsuccessful. Following a series of misfortunes – a failed attack to a Spanish outpost, the death of his own son, mutiny, and sickness – the former favorite of Queen Elizabeth returned to England a defeated man, and his execution could not be averted. The story of Raleigh's doomed expedition to the Orinoco River was picked up by the British-Trinidadian Nobel laureate V. S. Naipaul and included in a multi-layered text concerned with the possibility of constructing narratives about the sense of displacement and uprootedness that centuries of violent colonial encounters had left in their wake. *A Way in The World* (1994) – a hybrid novel, partly autobiographical, which, to some extents rewrites and expands Naipaul's 1969 history book *The Loss of El Dorado* – is a deeply meta-reflexive text. It transcends the borders of the historical facts connected to this early moment of the colonization of the Americas and inscribes them in an interwoven sequence of stories which span centuries and continents in order to come to terms with Naipaul's own experience as a writer living across hybrid cultural spaces. Naipaul raises significant questions about writing as a practice that is never at home, always installed in the impossible unity of reality and representation: how do we both fashion and challenge our knowledge of ourselves and the world we live in through writing? How does literature intersect with science in order to chart our perception of self hood and otherness? How does the issue of alterity always threaten to elude the borders of representation and reappear in the form of what has been repressed and hidden?

By following the path traced by V. S. Naipaul, this contribution to the debate on literature and science will tackle the issue of how literature may absorb, elaborate, and

transform scientific discourses,¹ and do so to (re)define the experience of societies that are getting ever more multicultural and multi-ethnic. An intertextual reading of Naipaul's *A Way in The World* will be the point of departure for a reflection on literary representations of cultural hybridity which heavily draws on scientific imagery, and more specifically on medical imagery. The word "hybridity" – a metaphor drawn from the biological sciences – conveys, on the one hand, the anxiety about the disruption and confusion brought about by the sudden emergence of alterity in the field of identity (disease in the body/ disorder in the social body). On the other hand, it also implies that the border between "self" and "other" may be crossed and renegotiated. By putting Naipaul's text in a tradition of colonial and post-colonial writing, this paper will highlight how the body emerges as the problematic site of semantic renegotiations – at times paralleling colonial concerns about mapping and establishing borders to keep an unknown environment under control, at others, questioning the values in which certain "narratives of disease" have become established. Similarly, it will be shown that the apparently neutral language of medicine and science does not only refer to mere biological facts, but is entangled in a variety of cultural, psychological and social values.

Walter Raleigh, a writer and a poet as well as one of the first explorers of the New World, figures in *A Way in the World* as the subject of an epistemological crisis. The character of the legendary Elizabethan hero appears an aging, feeble reflection of the man he used to be, the embodiment of a growing disillusionment casting its shadow onto a late phase of the Renaissance. Naipaul describes him as a man obsessed with writing and consumed by it. He incarnates both the success and the failures of what Michel de Certeau called *écritureconquérante*, a writing which invades the body of the other and turns it into a white page onto which the desire of the colonizer and the discourse of power may be inscribed. Indeed, Raleigh is a colonizer, a man who twenty years before the facts narrated, was able to make the most of the philosophical, scientific and technological knowledge of his time in order to establish the English Dominion of Virginia in North America. Just like the Amerigo Vespucci in the Van der Straet's allegorical representation which opens Certeau's *The Writing of History*, Raleigh pictures himself as the bearer of the weapons of knowledge who sets himself against a virgin land, a space of alterity ready to be transformed into what Certeau would call "a field of expansion for a system of production" (1988, xxvi). Naipaul mentions that, in an attempt to convince King James to endorse his enterprise, Raleigh promised that the land was fertile and full of gold, that all the Indians of the region had been won over, and that he had gathered enough knowledge about the golden territories from the Spanish conquistadors whom he had captured on a previous raid. Yet the explorer's promises are sharply at odd with the reality of his last voyage of exploration: "And now – in this land which in his mind

1. A valuable reference for the analysis of the intersections of literary and scientific discourses are Locatelli 2007 and Locatelli 2008.

and writings existed as a kind of Arcadia where he could be king of the Indians, ruler of a golden empire – he is a man under siege” (Naipaul 1994, 158). Naipaul describes Raleigh as a man becoming ever more insecure about himself and his mission while the land which he believed to have transformed into an object of knowledge and conquest, progressively turned against him.

In Naipaul’s novel, the chapter about Raleigh is subtitled “An Unwritten Story”, an expression used by the author to refer to some unrealized writing impulses which he had been playing with in his mind for years and which had stayed with him until he was able to include them in a wider, multi-layered, narrative. What is argued here is that the adjective “unwritten” refers, in a much wider sense, to a much deeper process of cultural “unwriting”, i.e., of unveiling the different forms and locations of otherness in discourse. Indeed, Naipaul’s narrative shows how Raleigh’s crisis of representation affects both his colonial project and his body. His certainties are giving in to a hostile environment, as much as his body is giving in to a disease on which he does not have control, and which has already claimed several victims among his crew. The first part of the chapter recounts a dialogue between a sick, declining Walter Raleigh and a ship surgeon coming to his cabin to offer some relief to his weakened body and to his sickened soul. Raleigh is described as “a thin and very old man in Jacobean undress in the captain’s quarters. [...] He is sixty-four. He has been ill for many months; he has only eight months or so to live” (Naipaul 1994, 157). The surgeon, instead, is not described. His role is to bring Raleigh his drugs and to receive his confidences. Raleigh’s conversation with a man of science, a man in charge of bringing him the medicines to heal his body, establishes a link between his struggle for sanity and his struggle for sense. The surgeons, with whom Naipaul seeks confirmation of the stories he has been telling about the New World ideally becomes the looking-glass through which Raleigh is trying to see himself, as the following exchange suggests:

[Surgeon] “That was what you told us almost as soon as we left the Canaries, to give us courage for the crossing, after the trouble we had with the Spaniards there and after that captain deserted with his ship”

[Raleigh] “What scum. All that fighting aboard the ships even before we had left England. When that man deserted, I was half with him, to tell the truth. But there was no place for me to go. I had to stay with the expedition. I had begged for it so long, and when it came it was something with its own life, quite separate from me. Something to which I simply attached myself. And then the sickness – all those men sick and dying in our new ship. All those friends. I haven’t even begun to grieve for them. I am frightened to be left alone with grief now. I feel it will take me over. My own cook, Francis, he died. The gold expert I had, a man who was the best gold refiner in London, Fowler – he too died. They all died. The ship began to stink with sick people who couldn’t move and the corpses I had to bury.”

[Surgeon] “And you kept everybody’s spirits up by talking to them about this paradise on this side of the ocean. Not only water, but fresh water and fresh food, and the friendly beautiful people, waiting for you to be their king.”

[Raleigh] “I was ill, too. Fever. Three shirts a night. All wringing wet. And there were days of calm when we didn’t make above six leagues, and the sun hung above us in the sky and in the afternoon the sea seemed to blaze with the glitter. I wasn’t well. The expedition had its own life. I just surrendered to it and it dragged me through one day after the other. I wasn’t willing anything. I was in no position to do anything like that.” (Naipaul 1994, 161-62).

Raleigh’s confessions to the surgeon reveal that his impossibility of staying on top of things reverberates in the lack of control on his body. The world he has been trying to fetishize in his writing is now turning against him with a vengeance as he is progressively surrendering to a fever. The rhetoric of the man as the center of the universe – the celebration of the individual’s achievements, of the hero who acts as a model of courage in an enterprise which will allow him to write his own history on the blank page of a virgin land – crumbles in front of the realization that alterity – in the form of the mysterious sickness – is stronger than Raleigh’s will. His courage has now turned into a form of abandonment, and his imperialist fantasies are, somehow, reversed: he is not a monolithic self, awesome and formidable, but he is both physically and psychologically vulnerable. Also, he is not a conqueror any more, but he is, somehow, conquered by the unknown, inexplicable disease that has spread onto his ship, a ship significantly called *The Destiny*. By focusing on the protagonist’s giving in to fever and defeat, Naipaul’s “Unwritten Story” about Raleigh, “unwrites” the twinning of medical and colonialist discourse. The crisis that Raleigh is facing is, evidently, not just his individual crisis, but it takes a much larger scope. Out of its commander’s control, *The Destiny*, with its mysterious disease spreading among the crew, figures in the text as a matrix of the potentially disruptive encounter between the old and the new world, as well as between ecosystems that had been kept separate for thousands of years. As Alan Bewell, author of *Romanticism and Colonial Disease* (2003), remarks, “[t]o a degree that historians and literary critics have not adequately recognized, colonial experience was profoundly structured by disease, both as a metaphor and as a reality” (Bewell 2003, 2). The Canadian scholar relates how the global expansion of human travel made it possible for pathogens (viruses and bacteria) to travel from one part of the globe to the other. Diphtheria, typhoid fever, cholera, chicken pox, scarlet fever, syphilis, and several other diseases made their appearance after the process of global expansion which started in the 15th century. Similarly, the epidemic threat that *The Destiny* is facing is strictly linked to the fact that it is sailing in strange seas towards strange countries, and that this new, hostile environment refuses to be contained by Raleigh’s *écriture conquérante*.

While Raleigh the conqueror and writer fails to take control of both his colonialist enterprise and his disease, Naipaul's account of his story also reminds us that both colonialism and medicine are based in discursive practices which are culturally and historically located, and that these practices also determine the way people interact with their natural, social and cultural environment. Raleigh's disease reflects the epidemiological crisis of the so-called "Age of Discovery", whereby the expression "epidemiological crisis" does not only subsume a merely biological phenomenon, but also the beginning of a symbolic, discursive practice whose object is the body itself (Cf. Bewell 2003). To quote the words of the Canadian philosopher David McNally,

[t]o talk meaningfully about the human body is to talk about bodies that are the site of dynamic social processes, bodies that generate open-ended systems of meaning. It is, in other words, to talk about relations of production and reproduction, about languages, images of desire, technologies and diverse forms of sociocultural organization. All these things operate on the site of the body and its history" (McNally 2001, 7).

By the same token, the medical-biological conception of the body that underlies colonial representation of disease cannot be separated from the web of meanings, and cultural practices through which scientific knowledge takes shape, from the values and repercussions which concepts such as "illness", "madness", "deformity" or "death" have on a social and political level (Locatelli 2000). Also, when we think about the intermingling of two or more cultures which had been historically and geographically separated - i.e., of what Mary Louise Pratt called "the contact zones" (Pratt 1992). We must consider that the body is also regimented in social systems determined by relations of unresolved conflicts, violence and radical inequality (Cf. Bewell 2003). The discursive existence of the body is inextricably linked to the forms of cultural organization that also justified the supremacy of certain countries over others, and that even the apparently "neutral" science of medicine is permeable to an implicit, hidden agenda strictly connected with the colonial project and with racist ideologies.

"[T]here is a link between imagining disease and imagining foreignness", writes Susan Sontag. Although this statement appeared in the essay *Aids and its Metaphors*, and is about a contemporary disease unknown in colonial times, it clearly highlights the sort of social stigmatization that illness and ill people had to bear with in the colonial context. Diseases often become, in fact, also a repository for culturally located fears projected upon identifiable others. This surplus of meaning extends to sick individuals, who often must suffer the cultural and political weight associated with the disease itself. Colonial medical discourse funnels discourses ranging from the fear of physical contamination to the concern about a perceived threat to social order. Shalini Khan, author of a study on the medical and literary representations of disease in the West Indies, coined the expression "infectious entanglement" to describe precisely the intersections of medical

discourses with other cultural values, thus claiming that the former are saturated with other meanings, that they are, in fact more, than the sum of their mere biological facts (Khan 2010, 15). The accurate analysis of medical treaties dating from the eighteenth and nineteenth century – among which William Hillary’s *Observations on the Changes of the Air and the Epidemical Diseases in the Island of Barbados* (1766), James Grangier’s *An Essay on the Management and Diseases of Negroes* (1802) and James Lind’s *An Essay on Diseases Incidental to Europeans in Hot Climates With the Method of Preventing Their Fatal Consequences* (1792) - allows Khan to highlight the continuity between medical science and the colonial project. These treaties, in fact, construct narratives of disease which are symptomatic of the anxiety connected to the possibility that a social order based on the separation of races may crumble and fall. What emerges from Khan’s analysis is that boundaries concerning the sick body, both as a product and as an agent of social practice, are somehow linked to the construction of a symbolic geography of disease aimed at isolating the threat posed by alterity. The treatment of disease starts from the identification of the colonial other as a potential site of contagion and contamination. Thus, the tropical weather of the colonies is held responsible for the enfeeblement of the colonizer’s body, for the slackening of his inhibition, and for his falling prey to yellow fever. Also, doctors warn their patients that they should not mix themselves with other races, and the potential evil of miscegenation are equally depicted as a threat to individuals and society. Diseases like syphilis and leprosy, came with a social stigma, the former being treated as the result of detrimental, disorderly sexual contacts with women of non-white backgrounds, the latter being associated with African workers.

The treatment of diseases, as Khan remarks in her study, is functional to the creation of prophylactic practices consisting in the coerced isolation of infected individuals, or even of individuals who may be considered at risk of infection. The concern about the contact with the other, and the need to mark the border between health and sickness, are intertwined with discourses of racial segregation, as well as with the terror that an oppressed race may, through disease and contagion, operate a sort of “colonization in reverse” (Khan 2010, 36), like the one that Raleigh seems to be suffering in the passage quoted above. Indeed, Sontag’s statements about foreignness and disease can be better understood if we think not only that in colonial times the threat of new diseases came from outside, but also that the way diseases were dealt with involved the constructions of actual geographies of disease, of “cordons sanitaires” through which the potential threat of disease could be contained.

The way these “cordons sanitaires” are represented in Western literature as they are functional to the assertion of Western individualism is clearly legible through Gayatri Spivak’s seminal essay’s *Three Women’s Texts and a Critique of Imperialism* (1985), and more specifically in her reading of Charlotte’s Brontë’s *Jane Eyre* (1847). Spivak’s essay, a classic in post-colonial studies, has the merit of highlighting how literature provides us with structures through which the whole experience of being ill may gain cultural

and cognitive significance. Although the story of Jane Eyre's personal growth and social ascension from governess to independent woman and then wife to her former employer, Mr Rochester, has been welcomed by many critics as a "cult text for feminism" (Spivak 185, 244), Spivak remarks that it is complicit with what she calls "the worlding of the Third World" (ibid.), i.e. with the process that attempts to disguise its own workings so as to naturalize and legitimate Western dominance. The medical subtext emerges as a central element of this process. The othering and subsequent riddance of Bertha Mason, Mr Rochester's creole wife whom he keeps hidden in the attic of his manor, is functional to the emergence of the racially "pure" English family made up by the widowed Mr Rochester, Jane, and their legitimate offspring. The medical and national identity of the second Rochester family comes into being through a differential model of disease, in which "disease" is strictly connected with a contamination with the colonial space, and "health" emerges in the form of a safe return to civilization and propriety. With his marriage to Jane Eyre, Mr Rochester is able not only to be redeemed from his past, but also to regain the strength and sight that he had lost in the fire that his former creole wife had caused. The novel, in fact, depicts Bertha's madness as strictly connected to her being born and brought up in the pathogenic space of the Tropics, where (coherently with the medical theories popularized by the medical treaties of Lind or Grangier) both her body and her soul suffered from being exposed to an unfavorable, weakening, torrid climate and to a dangerously promiscuous environment, where different races coexisted and interacted with one another. To Mr Rochester, tricked into a loveless marriage to the already tainted Bertha, Jane represents a healthy, English counterpart, a woman able to heal him from his own personal ghosts. Their legitimate union after Bertha's accidental death project them into wider dialectic of body and soul production which goes even beyond the closed circle of the nuclear family and embraces what Spivak calls "the terrorism of the categorical imperative" of the colonial project (Spivak 1985).

Differently from Charlotte's Brontë's novel, whose ending re-established the legitimate social order that the contact with the colonial space had broken, Naipaul's representation of Raleigh's last journey in *A Way in the World* shows how the latter succumbs to the hostile, infectious world of the newly-discovered Americas. Most significantly Raleigh's failure to draw borders and create symbolic "cordons sanitaires" brings in a crisis of individualism, whose culmination is represented by Raleigh's death. At the end of his story, Raleigh's half-Indian, half-Spanish help, a captive that had been brought to England from South America called Don José, relates how even the last moments of the explorer's life were consumed by his impossible struggle to make sense of his enterprise:

The surgeon looked very serious. He said that the old man would become quite unbalanced if he didn't rest. So the king's officers decided to spend the night where we were. They had the old man's chest brought up to the room. When we were alone I began to unpack what was needed for the night. The old man said, "Paper, Don José, paper." He was standing, in his shirt, and smiling at me. I gave

him the paper he asked for, and he sat at the table and began to write at great speed, as he had written that day in the cabin on *The Destiny*, after the death of the commander in the room above us. From time to time as he wrote he looked at me and smiled. I asked him what he was writing about. He said, "About the gold mines of San Thomé, what else?" (Naipaul 1994, 203)

Raleigh's writings are later symbolically collected by the surgeon, who folds the sheet and puts them in his pocket, right before accompanying him to the gallows. With this gesture, the surgeon symbolically marginalizes the voice of the old explorer, relegating it to a space of oblivion. The question mark with which Raleigh ends this paragraph suggests that there is no closure in his story, no production of body and soul, but rather an obsession consuming what is left of the energies of a dying man. What clearly emerges from the text is that at the end of his journey's account, Raleigh has lost the place of main focalizer of the story. In a way, it is the mixed-race Don José who, by taking over this role, "unwrites" Raleigh's story and becomes himself the narrator of the epistemological crisis brought about by colonization. The encounter with the old man leaves him with a clear perception of the imminence of death ("But I felt at the same time that death was close to us all", Naipaul 1994, 204). Upon his return to the Americas, as he is questioned about his fears of the Ocean and of the unknown, he is able to formulate the following concluding remark: "I think, father, that the difference between us, who are Indian, or half Indians, and people like the Spaniards and the English and the Dutch and the French, people who know how to go where they are going, I think that for them the world is a safer place" (Naipaul 1994, 205). With these words, he thus reaffirms the concept that safety relates to the capacity to build epistemologies, i.e. to make sense of the world, enclose "alterity" within certain borders, and be able to find one's way in the world accordingly. Don José's choice to go back to South America, although he was offered several opportunities to stay in Europe and prosper, reflects his disillusionment and his awareness that safety is a provisional illusion.

Raleigh's "Unwritten Story" is also enriched by new meanings if considered for the way it intersects with the other narratives that Naipaul intertwines in *A Way in the World*. More specifically, the explorer's doomed journey to the Americas is counterbalanced by a narrative of disease which Naipaul constructs around a character whose story only appears in the first chapter. The protagonist of this narrative of disease is Leonard Side, a marginal character who is not mentioned any more in the rest of the novel, but who, despite his marginality becomes a valuable key to interpret the novel as a whole. Neither an historical character or a personal acquaintance of the author, Side is an incorporeal presence who comes into being through the perspective of a teacher who happens to be a friend of Naipaul's. Naipaul reports that the teacher told him that she had appointed Side as a judge in a school flower arrangement competition for two years in a row, but on the third occasion, as he had called in sick, she had decided to visit him at home. The woman related that her uneasiness towards Leonard Side had kept growing on each of

their encounters, until it had reached its climax when she had visited Side at his place and found out that he was lying in bed with an unspecified disease. She confessed to having run away from him because, despite his undeniable skills as a decorator and his kindness, she had been utterly repelled by him. Leonard Side is presented as a hybrid character, a character able to shift through different borders, uncannily charming and horrifying at the same time. His hybridity is not limited to the geographical circumstances of his biography which, to a certain extent are parallel to Naipaul's, as they both are West Indians with an East Indian background. What makes this otherwise rather mild and shy man deeply unsettling is his capacity to cross a variety of borders, which makes his identity unstable and threatening. We are told by the teacher that he is a Muslim, but his house is decorated with a crucifix. He has a feminine appearance and earns his living with a feminine job, connected with aesthetic values. He does not seem to care of the border between life and death: he is a mortician and a cake decorator and his fingers touch with the same skills the corpses of dead people and the sweets that his students will eat after the cake decoration courses he regularly teaches.

Leonard Side's narrative of disease is left deliberately incomplete. We don't know what kind of illness struck him down, and we don't know either whether Leonard Side was ever able to cross again the border between disease and health and recover. Naipaul imagines, nonetheless, that after passing successfully through the experience of illness, Leonard will be able to embrace his identity as a hybrid subject:

This was what I heard, and the teacher could not tell me what had happened to Leonard Side; she had never thought to ask. Perhaps he had joined the great migration to England or the United States. I wondered whether in that other place Leonard Side had come to some understanding of his nature; or whether the thing that had frightened the teacher had, when the time of revelation came, also frightened Leonard Side. (Naipaul 1994, 8)

This passage is remarkable for the way it intersects the idea of disease and the idea of exile, leaving both open for any sort of signification. The result of Side's healing could be both acceptance or horror.

What makes the narrative about Leonard Side so interesting is the fact that it blurs the border between "self" and "other" in a most remarkable way. Later in the text, Naipaul symbolically opens the narration of Leonard Side's exile, until he transfigures it into a more universal story which embraces not only this man's biography, but also a "we" that encompasses the narrator himself, and most probably also the teacher:

I can give you that historical bird's eye view. But I cannot really explain the mystery of Leonard Side's inheritance. Most of us know the parents or grandparents we come from. But we go back and back, forever; we go back all of us to the very beginning; in our blood and bone and brain we carry the memory of thousands of beings. I might say that an ancestor of Leonard Side's came from the dancing

groups of Lucknow, the lewd men who painted their faces and tried to live like women. But that would only be a fragment of the truth. We cannot understand all the traits we have inherited. Sometimes we can be strangers to ourselves (Naipaul 1994, 9)

By implying that if Leonard Side ever made it through his diseases, he would probably become an exile, Naipaul seems to suggest that dealing with illness also means dealing with the stranger within oneself, the stranger that the teacher was able to detect in Leonard Side, and which scared her so much probably because, by watching Leonard Side, she could see herself in a mirror. What is more, in the above quoted passage, Naipaul “unwrites” the geography of the body, which is no more described in terms of binary oppositions (e.g. “sanity” vs. “insanity”, “self” vs. “other”, “inside” vs. “outside”), or as an individual experience, but rather as a shared reality: “in our blood and bone and brain we carry the memory of thousands of being” (ibid.). Leonard Side’s narrative of disease therefore evolves towards a discourse of empathy and relation with the other. This “we” Naipaul is using reminds us that hybridity is not just an individual discourse, but that we are all interconnected parts of a much wider becoming. Therefore, Side becomes the “other” through which Naipaul speaks about himself and his condition of exile, and through which he configures his own autobiographical “I” in its entanglement with other human beings.

Naipaul’s “unwriting” reminds us that, if literary geographies of disease highlight the borders between concepts such as “self” and “other”, “health” and “disease”, they also teach us that these borders are extremely porous and provisional. The semiotics of disease is prone to change with time, scientific discoveries, and empirical experiences. Illness can therefore emerge as a dynamic interstitial space for the negotiation of cultural values in ways that go beyond the rigidity of concepts of race, gender, cultural affiliation or political identity.

In this perspective, the provisional quality of the health/disease border has proven a fertile literary terrain for a number of post-colonial writers, who have engaged with medical discourses in their work. The influence of Aimé Césaire, who is considered a founding figure in Caribbean literature and whose influence on Derek Walcott, Wilson Harris, Edward Kamau Brathwaite, and many other poets from the West Indies cannot be overestimated, explored the idea of the Caribbean as a pathogenic space, suggesting that disease is not innate but it is rather a product of the colonial enterprise, the unwanted and violent encounter with the European other. At the same time, Césaire was the first writer in the Caribbean to explore the potential for transformation that “disease” and “hybridity” both entail. The sick, suffering, “impure” body of the African-Caribbean subjects described in Césaire’s poetry entails the possibility of emerging from a devastating contact with the other by undertaking multiple paths of personal and cultural transformations.

Other post-colonial writers have engaged with the issue of how medical discourses do not only go along the lines of the concept of race, but also with those of gender. A prominent and well-known example is Jean Rhys' re-staging the theatre of illness and mental insanity from the subversive point of view of Bertha Mason in the 1966 novel *Wide Sargasso Sea*. Another, less famous example may be the work of the Canadian-Trinidadian poet Marlene Nourbese Philips, who in her poetry deterritorializes the discourse of science to show how language colonizes and alienates a gendered, racialized body. Also, the novel of the Trinidadian/ Canadian writer Nalo Hopkinson *The Salt Roads* (2003) engages precisely with how language and culture fashion the experiences of disease and death, as well as with literature's potential for providing new ways of thinking about the body. A rich, creolized vernacular narrative which has been categorized as "magical realism", "speculative fiction" and even "science fiction", *The Salt Roads* explores the permeability of the border between health and disease from the marginal perspective of three hybrid subjects, women living in very different epochs and cultural contexts. By elaborating on their personal experiences of maternity, death, disease and healing, they produce a trans-cultural counter-narrative which stands out against the official written accounts of history in which they all occupy a marginalized, silenced position.

What emerges from Naipaul's and other post-colonial writer's engagement with the "unwriting" of the discursive interrelation of science and literature is the fact that literature can be not only a site for reflecting and representing changes in society, but also to promote new ways of thinking and acting upon those changes. In Naipaul's novel, both Walter Raleigh's and Leonard Side's narrative engage with the language of medicine to question how we struggle to make sense of the world. Epistemology and epidemiology emerge as somehow twinned discourses, leading to the undoing of the sixteenth century's conqueror, but to the opening-up of possibilities for the hybrid subject who lives in our time and age. Diseases are not represented just as individual issues, but as potentially disruptive forces that threaten the foundation of society. Yet, by taking inspiration from the observation of these disturbances, the novel also asserts the power of imagination to create new entanglements, to fashion new complex identities and to affirm new continuities. Naipaul's novel, in other words, incites us to look for our own personal "way in the world" by questioning the very borders between sanity and disease, self and other, life and death.

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WRITING THE PLAGUE AT THE CROSSROADS
OF HISTORY AND LITERATURE. THE CASE
OF FRÉDÉRIQUE AUDOIN-ROUZEAU/ FRED
VARGAS

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Frédérique Audoin-Rouzeau (born June 7, 1957, Paris) is a well-known French historian and archaeologist, working at the French National Centre for Research (CNRS) and Pasteur Institute. Her work investigates the relations between man and animal along the history. An important part of her research is focused on the mechanism of plague transmission, and more in particular on the role of fleas and rats in the dynamics of plague. The results of this inquiry are gathered in the volume entitled *The roads of plague: The rat, the flea and the man* (*Les chemins de la peste: le rat, la puce et l'homme*), published in 2003, in France (Audoin-Rouzeau, [2003] 2007).

In 1986, Frédérique Audoin-Rouzeau started writing crime fiction novels (for more, see Hynynen 2013), under the penname of Fred Vargas. So far, the author has written 13 crime novels, and won several literary distinctions. Among these, her most famous novel is *Have mercy on us all* (*Pars vite et reviens tard*), published in 2001, in France (Vargas [2001] 2003), and adapted for the screen in 2007.¹ This writing work was awarded Prix de libraires² and Grand prix des lectrices de Elle.³ Within the core of the story is the plague and the action of the novel is codependent on the dynamics of the contamination (for more, see Vidruțiu 2012).

When talking about her work, Audoin-Rouzeau admits that she finds ironic and absurd that “after years of ‘very rigorous’ work in her day job as an archaeologist specializing in epidemiology, she has become famous for her hobby, writing *romans policiers*” (Kerridge 2013). The motifs behind the success of the crime fiction novels remain unknown for the author, but she confesses that her favorite is inspired by her research regarding the plague vector:

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1. *Pars vite et reviens tard* (Have mercy on us all), directed by Régis Wargnier, Neuilly-sur-Seine, Gaumont, 2007, 116 minute.
 2. See <http://www.prix-des-libraires.fr/laureats-prix-des-libraires.html> (Last accessed 30 Aug 2020)
 3. See <https://www.babelio.com/prix/102/Grand-Prix-des-lectrices-Elle-Policiers> (Last accessed 30 Aug 2020)

I do not know why my detective stories are published in 40 countries. In 2003, after seven years of intensive work trying to find the real vector of the plague, I wrote a book about it. It is my favorite of my books. It sold 1,000 copies. (Kerridge 2013).

May it be in a scientific way or in an artistic way, Frédérique Audouin-Rouzeau remains by definition the storyteller of the plague, and the two complementary narratives she creates are symbiotic and codependent (for more, see, Belkaïd 2012).

As an archeozoologist, Audouin-Rouzeau undertook the mission to write a history of the plague from a multitude of points of view: the first one is the historic perspective which is accompanied by other perspectives: history of the plague, history of sciences, and, of course, the history of the relations between humans and animals.⁴

Her work, *Le chemin de la peste. Le rat, la puce et l'homme* is a captivating study of the Plague. The first pandemic analyzed is the Justinian plague, from the 6th century, and the investigation goes until the 20th century. So, it is not just a book about the Black Death from the 14th century, but it is a study of the disease, from its appearance till the recent days in Europe.

Usually, when we hear about the plague, we tend to think about the fascinating domain of the mentalities, of the pain and suffering of the people, of the way they see the epidemic in their own paradigm. Frédérique Audouin-Rouzeau sets on a different path; her analytical point of view focuses on the scientific discoveries related to the disease. From the multitude of existing theories, she tries to understand the plague and its transmission, in the triptych rat–flea–man.

In order to achieve her goal, Audouin-Rouzeau turns to the medical theories, which she presents in detail. Of course, she is not the first one to do so.⁵ But, after more than a decade since the publishing of the book, *Les Chemins de la peste* remains the most important work on the subject. In presenting the medical theories about the plague, the author relies on the newest historical, medical, biological, and entomological discoveries, to recreate the past, in two stages.

The first stage pertains to the history of science. Audouin-Rouzeau undertakes a critical review of the theories regarding the plague, beginning with the results of Alexandre Yersin, those of Paul-Louis Simond, the great turnover of Ricardo Jorge, and those that followed in the 20th century. The researcher opens the file on the transmission of the plague once again, discussing the experiments made so far and, methodically, debunking them.

4. Actually, this is one of the great interest points for the author. Her previous works concern exactly this subject, the human – animal relations in history. See Audouin-Rouzeau 1993.

5. See, for example, Biraben, Le Goff 1969, with the important bibliography up to that point; for more recent information see Scott, Duncan 2003.

The second stage concerns the cultural importance of the plague. Audouin-Rouzeau shows that, despite the belief, perpetuated in the Middle Ages and modernity, regarding the equality of people in front of death, the plague has in reality a different impact on the different parts of the society. She defines this phenomenon in terms of “familial epidemiology” (Audouin-Rouzeau 2007, 416). Thus, she constructs a theory on the socio-professional determinism in the transmission of the disease. The “social marker”, as it develops from her analysis, has a greater force in the populace than in the rich people – with the exception of certain categories predisposed to contract it, due to the occupational hazards (merchants, furrowers, etc.). In the words of Audouin-Rouzeau, “it is the fabric or the leather that allows the plague to enter a city, and not the man so much” (Audouin-Rouzeau 2007, 414).

One of the most important aspects of this historical and medical investigation is its actuality. Audouin-Rouzeau surveys the latent survival of the plague in different environments – hence the chapters that study the Middle East and the manifest presence of the disease in the 20th century, in Kurdistan, Syria, Iraq, Turkey, Mauritania, Brazil, Nepal, Senegal, Zaire (today Congo) and Senegal. The historical analysis and information along with the alert style of writing, are the reasons for which this book is captivating, as well as worth reading. The book reminds the reader the presence of the plague in contemporary times, and the fact that this is favored by the globalization and mobility that comes with it.

From her work as a scientist, Audouin-Rouzeau turns to literature, using the plague as a central piece in her novel, *Pars vite et reviens tard*, under the name of Fred Vargas. She is not an exception among historians in doing so. The past has always presented an appeal to the public, and this appeal is stronger when it comes to fiction, compared with what the people often envision as the arid field of history. And, of course, the challenge is very inviting for many of academics. In fact, so much so, that there is even a congress dedicated to historians writing fiction, even to the point where some of them decided to leave behind the Academia and pursue this new craft independently⁶. But many authors of fiction preferred to remain within the boundaries of history and from there to produce novels. Such is the case of Gordon Russell, for instance, the author of *La note del gladiatore* (Russell 2005), who, in fact, is the collective penname for two Italian historians, Vanna De Angelis and Dario Battaglia. Together, based on their first-hand knowledge of the past, they recreated a spectacular part of the past. The list of such historians is getting longer and longer today. If, in the 1980s, Umberto Eco and his *Il nome della rosa* (Eco 1980) was seen as an exception, today the situation differs. Ian Mortimer uses the penname James Forrester, while Harry Sidebottom prefers signing his own

6. The meeting, “Historians Writing Fiction: Outside the Academy” took place under the auspices of American Historical Association, in New York, in January 2015. For more information see: <https://aha.confex.com/aha/2015/webprogram/Session12498.html>. (Last accessed 25 July 2020) The panelists were David B. Coe, Andrea Robertson Cremer and Laura Croghan Kamoie.

name both as a historian and as an author, and Giles Milton as well. Alison Weir again uses no penname and writes in the biographical (and historical) genre, and so does Kate Williams.

There is an infinity of possibilities in fiction that the historian is interested in, possibilities that are not available to him in the scientific writing, or in other words, as the author puts it “I did get into crime fiction novels in order to counteract the scientific austerity of the archeologist profession”.⁷

The auctorial option taken by Audoin-Rouzeau was to bring the past into present, instead of writing a fiction work on the past. The form of her novel is that of a mystery, the usual choice for those fictionalizing the history.

Frédérique Audoin-Rouzeau’s work of fiction centered on the image of the plague, *Have mercy on us all*, is in the original entitled *Pars vite et reviens tard*, meaning “Leave fast and return late”. The title is a reference to the phrase in Latin “Cito, longe fugeas et tarde redeas”, a phrase used in the medieval times as advice during plague epidemics: fleeing from the disease was the best remedy known. The synopsis of the novel reduced to a simple form is as follows. In today’s Paris, the town’s crier (the person charged with reading out-loud messages in the square for a small sum of money) receives strange letters. As he reads them, a series of cross markings, resembling plague talismans, begins to appear on doors. Later, crimes do not fail to be committed, as the letters progressively announce the arrival of the plague. Panic and fear paralyze the city. Investigations are started in order to find the murderer and to discover if the victims are contaminated by the plague bacillus. The descendant of a survivor of the Plague of Paris of 1920 believes that he can use infected fleas as part of his revenge. He thinks that he can use the plague as an instrument of punishment for those who wronged his family. In the end, the novel reveals that the fleas used by the descendant were not infected with the plague, and that the killings are orchestrated by the half sister and brother of the presumed killer, in order to get him accused and get his fortune.

The story borrows a lot of elements from the cultural history of plague. The points on which Audoin-Rouzeau elaborates the fictional discourse are well rooted on historical sources, historical plagues, and popular beliefs regarding the disease.⁸ The historical sources used by Frédérique Audoin-Rouzeau in the novel are representative for the plague literature along the history. The fragments read by the town’s crier in the square are diverse and complementary. They are excerpts from: the medical treatise

7. See the interview with Frédérique Audouin-Rouzeau: <http://www.cndp.fr/savoirscdi/societe-de-linformation/le-monde-du-livre-et-de-la-presse/auteurs-et-illustrateurs/larcheologue-se-fache-entretien-avec-fred-vargas.html>, (Last accessed 25 July 2020). The phrase was “J’en suis venue à la littérature policière pour contrer l’austérité scientifique du métier d’archéologue”.

8. In a certain sense, Frédérique Audouin-Rouzeau takes further the work on the cultural history of plague, initiated by another French, the demographer Jean-Noël Biraben, as present in Biraben 1976. For an up-to-date research on this subject see Cooke 2009.

Liber canonis, written by Avicenna, a Persian doctor and a man of science, in the 11th century; from the personal journal of Samuel Pepys, an English naval administrator and Member of Parliament, who witnessed the Great plague of London from 1665; and from several chronicles, like *La peste en Troyes*, which describes the plague in the city from 1517; or *L'arivée du Grand Saint-Antoine*, which describes the arrival of the plague in Marseille, on the 25th of May 1720, through the contaminated silk and cotton cargo from Levant; or *La peste à Châtellerault*, that chronicles the plague from 1920 in France.

The historical plagues mentioned in the novel are well chosen by the author and come from all over the world and from different periods: the Plague of the Middle East (1025), the Plague of Troyes (1517), the Plague of London (1665), the Plague of Marseille (1720), the Third Pandemic (1894), and the Plague of Paris (1920).

The novel comprises several popular beliefs regarding the plague along the history. While the scientific work of Audoin-Rouzeau does not rely on mentality studies, the work of fiction strongly emphasizes them, by putting them at the center of the story. For the historian, the novel becomes the ideal place to develop certain cultural perspectives regarding the disease, acquired in the time, but not included in the scientific study, dedicated strictly to plague vectors. Writing a work of fiction on the plague seems somehow relaxing for Audoin-Rouzeau, who plays with and explores the other facets of the plague. The popular beliefs regarding plague, which the historian integrates in the novel, concentrate on a few aspects: signs of the arrival of the scourge, mobile of the plague, name of the plague, human agents of the plague, and protective measures and advices against the plague.

The first popular belief, regarding the plague and integrated in the novel, is that the disease is preceded by a series of signs of different nature. These have a wide range, and may include earthquakes, comets, air going bad, high mortality of rats, and are considered to be due to a malign astrological conjunction. All of these signs are in fact present in the popular image of the plague. More than that, this is one of the points in which the scientific work of Frédérique Audoin-Rouzeau comes in direct contact with the fiction writing: in *Les Chemins de la peste* she shows, the direct link seen by the popular mind between the death that affects part of the rat population and the plague that manifests itself in the next period.

The second popular belief present in the novel is related to the motif of the plague. Starting from Antiquity, the scourge is considered to be a punishment coming from a god and meant to sanction the humans for their sins. Here again the historical background of the author comes in handy. Almost all the accounts on plague in Antiquity, Middle Ages and modernity tend to associate the plague with some sort of divine anger (Audoin-Rouzeau 2007, 379-382).

The third popular belief from the novel connects the symptoms of the plague and the high mortality due to the disease. In the medieval times the plague is called *Mors atra*, *atra* meaning both terrible and black. Along the time the syntagma is translated

exclusively and erroneously as the *Black Death*, in the light of the symptomatology of the disease, that included sometimes the blackening of buboes.

The fourth popular belief present in the novel is the result of the human impulse to find someone to blame for the epidemic. In the medieval times, the authorities designated scapegoats among the outsiders of the society, which were named “plague-spreaders”, and were killed in order to calm down the mobs. Again, the historiography on the subject is very well-known, and, although the author does not interest herself directly into this subject, her readings cover it (see, for example, Christian 2011).

The fifth popular belief from the novel is born out of the need to find a way of fighting the plague. Various solutions are tested along the time: the diamond worn on the left hand, the symbol of the cross painted on doors, and oiling the body. They are all meant to function as talismans and to protect the person.

The novel resembles a puzzle: various fragments regarding the plague and coming from complementary historical sources are quoted. The text resulted is like a palimpsest, where the words and the ideas coming from different works, and pertaining to different times and places in history, sometimes bear a strong resemblance. The force that keeps the pieces connected is the constant feeling of fear: the human being was, is, and will be afraid of plague. The epidemic outbreaks still haunt our imagination and the postmodern man is still bounded by apocalyptic visions.

As the fragments about the plague are read aloud in the square, the tension in the novel increases, and as soon as these state that the plague has arrived, the first Parisian victim appears. This way the rhythm of life synchronizes to the rhythm of the text on the plague, and the fictional victim from the text turns into a real crime. The crimes from Paris try to imitate plague, to respect its rules. The descendant of plague survivors carefully follows the profile of the plague in trying to reenact the epidemic. First, he marks all the doors with the protective sign of the cross, except those of the victims. Second, he places fleas that he believes are infected in the homes of the victims. Third, the half brother and sister of de descendant, knowing that the fleas are not infected with plague, strangle the victims; and fourth, they soil the body of the victims with charcoal, trying to leave the impression that they have been killed by the Black Death.

There is a very close correspondence between the texts and the killings from a geographical point of view. The texts regarding the plague circumscribe the area of the murder: when the historical sources talk about a victim in Marseille, the crime takes place in there; when the quotes describe the arrival of plague in Troyes, the killing sets in there; and when Paris is mentioned as the new destination of plague, the victim is in that city. History precedes fiction, history dictates the course of events, history makes the rules, and fiction just follows.

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SCIENCE AND LITERATURE IN THE PUBLIC SPACE OF ATHENS, 1850-1900

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The public space of Athens in the second half of the nineteenth century was a place of multiple interactions with intense political controversy and ideological ferment. The scientific issues were discussed among other issues of daily life, involving art, literature, history and politics. This multidimensional activity contributed substantially to the ideological and cultural framework within which the basic ideologies of the era developed, such as romanticism and positivism, the longing for the implementation of the Great Idea, the demoticism movement and the request for the modernization which marked the intellectual, cultural, and political life of the country for many decades.

This article focuses on the spiritual movement and interaction that was developed at public places, like the cafes, lounges, clubs and cultural associations, which often took the lead in organizing lectures. In these places, professional scientists or amateurs interacted with people who held positions in other areas of public life, expressing a new reality that shaped the cultural map of the city and the country.

A historical overview

In the nineteenth century, Greece was a newly-established state struggling to find direction according to European standards. It was founded in 1832 after the Revolution of 1821, which freed the country from the Ottoman Empire. The first king, Otto, who was German, ruled from 1833 to 1862 and tried to organize state institutions, including the educational system, according to the German model. In 1863, after a revolution of the Greek people, George I, of Danish origin, usurped the throne after the intervention of several European countries. Yet, the borders of the country were restricted, and further conflicts with the Ottoman Empire culminated in the 1897 war for the possession of Crete. The Greeks were defeated in this war and placed under international financial

control. However, the country did manage to maintain its borders, and Crete – after the intervention of European countries – became autonomous.¹

As is evident from the historical context, the nineteenth century was an era of political, economic, and social instability in Greece. After 1860, however, the country acquired a European orientation, attempted to modernize its state institutions, and rectify its finances. The influx of expatriates from abroad, the rise of trade, the urbanization of the population, and minor industrial growth contributed to the emergence of a Greek middle class, which served as the elite of the country. This sector of society, the intellectual elite, was educated mostly at the University of Athens, the graduates of which staffed the senior management positions of the state (Bastea 1997, 209–230; Tsoukalas 2006, 251–266, 423–448. See also Tsoukalas 1991, 215–222; Dertilis 2005, 399–400).

When Athens became the capital of Greece, in December 1834, it was a small town of a few thousand inhabitants, restricted around the Acropolis, Plaka, Thisseio and the neighboring areas. By 1855, the population had reached around 30,000 inhabitants, while its port, Piraeus, had 6000 inhabitants. At the same time, the palace was constructed in the place that is known as Syntagma Square². Around the same square, important buildings were also built, such as the Hotel Grande Bretagne, the Arsakeion, one of the most distinguished normal schools of Athens, also the University and the Academy of Athens, the Cathedral, the Observatory, the Eye Clinic (Dakin 1982, 150–151).

All these buildings defined an urban triangle which was the center of the city, around which an interesting mobility of people and ideas developed. Political meeting places, schools, the University, newspaper offices, publishers, bookstores and urban houses, which were built in the area, formed the special character of the city and helped networks among people to be created. Athens - initially a small town - was influenced by Western standards and gradually transformed into the capital of the Greek state and the intellectual center of Hellenism. Thus, a circle of intellectuals that included writers, authors, journalists, scientists and politicians began being created and widening. Among them, a strong and creative interplay of ideas, with a significant effect on the social and political developments was cultivated. This interplay was expressed through the various public spaces where these groups frequented, such as the political and literary cafes, the literary lounges, the clubs and the cultural associations. In this climate, the basic ideologies that determined the historical, political, social and cultural context

1. The area of the country was 47,516 km² in 1833 and its population was 719,000; at the end of the century (1896), the area was 63,606 km² and the population 2,434,000. See Dertilis 2005, 325–329, 299–303, 399; Dakin 1982, 104–123, 140–147, 233–238; Skopetea 1988, 21–29; Petropoulos 1997, 185–190, 307–319; Louvi 2003, 9–26; Mavromoustakou 2003), 27–50.

2. The construction of the palace lasted from 1836 to 1843. See: Dakin 1982, 150.

of the nineteenth century in Greece were developed and cultivated; the Great Idea, the romantic and the modernization movement.³

The central cafes

The political and literary cafes were public places similar to the cafes and pubs in Europe that were offered for social relations, intellectual, ideological and scientific debates. In Greece, the cafes were closely connected with the life of Greeks in the nineteenth century. There, people discussed the issues of their interest in the most direct way and their conversations had a personal, political, social or economic content or they were related to culture. The cafes were the prime public spaces where the social life of all groups was vividly manifested, without presuming equality of social status; these sites played an important role in the evolution of political affairs, ensuring a greater degree of interpersonal communication.

The central cafes of Athens were the meeting places for the entire male population, the military, scholars, students, politicians and journalists, but also for a part of the female population. The frequenters could read the daily press, entertain themselves playing backgammon, dominoes, cards or billiards, and broadcast the most important meeting point for trade agreements and financial transactions (Skaltsa 1983, 149; Papakostas 2007, 33-35).

Most of these cafes were located in the center of the city, mainly around Syntagma Square, where the members of the upper class frequented. Aiolou and Ermou streets were crowded places too; numerous cafes were also located around Omonia and Chafteia that were meeting places of the upper and middle classes. Several people also gathered on Kapnikareas street, St. Mark and Kolokotroni streets. Many students gathered in Dexameni and Neapolis apparently because of their proximity to the University and the Technical University (Skaltsa 1983, 302-305, 313-314).

The most famous cafes of this period were Oraia Hellas (Beautiful Greece), located on Aiolou and Ermou street, a place that was playing a significant role in the development of political conditions in Greece, since all ideas of European revolutionary movements were circulating here, conspiracies were created and revolutionary demonstrations were being organized. From 1839 until its closure in 1879 it was the political and spiritual center of Modern Greeks for forty years. Personalities -well known for their political activity- frequented here, such as: Alexandros Soutsos, who had developed action against Otto, Georgios Gennadios, Anargyros Petrakis (the Mayor of Athens from 1835 to 1837), Alexandros Rizos Ragavis, as well as the circle of romantic poets among whom were

3. On the development of the ideological currents of the era, see: Skopetea 1988; Gellner 1992; Lekkas 1996; Dimaras 1994; Politis 2003.

Achilleas Paraschos, Dimitrios Paparigopoulos and Theodoros Orphanides (Skaltsa 1983, 146-147; Papakostas 2007, 123-142).

There were also the cafes of Giannopoulos and Zaharatos at Syntagma Square, the Haramis' café on Omonia square and many others at various locations of the city center. In these central cafes people of the upper and middle class frequented; however, the presence of women was not excluded. The number of women was indeed quite large, since Omonia and Syntagma squares were predominantly characterized as meeting and walking places (Skaltsa 1983, 305-307, 503). Moreover, there were cafes in the centre of the city, particularly near Agia Eirini, Omonia and Agora, which were the meeting places of the members of the lower classes – laborers, store clerks and merchants frequented there.

Some of the frequenters of these places were known for their political activities, while others were artists, poets, writers or scientists. The presence of people of every social class and education in cafes is declarative of the climate there, the intellectual ferment and controversy, and the interaction of ideas. The presence of scientists also reinforces the view that science was a matter of debate and controversy among other aspects of everyday life in the city.

However, there are limited testimonies as literary figures write mostly about these places, who only insinuate about the attendance of personalities of science. A characteristic example is the existence of a cafe in Neapoli, where University students frequented. Even though we do not have detailed references to it, we can conclude that it was a place where scientific ideas and views were developing among other issues on the agenda.

The literary lounges

Apart from the cafes, though, the meetings of literary scholars or people, who were interested in politics and science at that time, took place in some houses, the architectural design of which was anticipated to serve the gathering of a populous audience. In Europe, the attendance in private places where assemblies were organized, the so-called “lounges”, was a popular male habit that also attracted women of the upper class and constituted a characteristic feature of social life during the seventeenth and eighteenth century.⁴

In Greece, the literary lounges constituted a part of the European tradition, where various issues of the intellectual and political life were discussed. They were not purely literary lounges; they formed -mainly in Athens- a feature of the social life of the upper class, of businessmen and politicians, who had come from abroad to expand their economic activities in Greece. They were also frequented by scholars, writers, artists and scientists.

4. About lounges in the European area, see: Schiebinger 2006, 81-83; Terrall, *Configurations* 3.2, 1995, 214; Terrall, *History of Science*, xxxiii, 1995, 285, 302.

The lounges appeared shortly after the Otto period. The first perhaps literary lounge in Athens was that of the Duchess of Placentia. It was organized according to the French standards; she had an extensive library and many scholars and French writers of this period frequented it (Papakostas 2007, 57).⁵

There are many references to literary lounges during the late nineteenth century in Athens. They were frequented by men and women, but almost always a woman was behind their organization, usually the wife of the host. This information mainly stems from the stories of Greek writers and poets of this period, which give us the climate that prevailed in their discussions and reflect the ideological ferment taking place in these spaces.⁶

For example, in his autobiography, the Greek writer, Gregorios Xenopoulos, referred to these meetings in the lounge of the poet Georgios Souris (Xenopoulos 1958, 265).⁷ The poet Georgios Drosinis referred to Eleni Vlachou, who continued to invite people in her lounge even during the absence of her husband, who was serving as an ambassador in Berlin in the winter of 1888-1889. Miltiades Malakasis, another Greek poet, wrote with respect to Mrs Palama, the wife of the poet Kostis Palamas, who was “agile and laughing, tireless and banter, holding the interest of the speech.”⁸

Among the most famous literary lounges of this period is that of Kallirhoe Parren, the editor of the *Ladies' Newspaper*, and an emblematic figure in the Athenian society of the late nineteenth century. According to Gregorios Xenopoulos, once or twice a week, scholars, artists, scientists and journalists gathered at her house (Xenopoulos 1958, 304). During these gatherings, poems and prose were recited and discussions on burning issues of the time were held, such as the language question or the newly emerging feminist movement (Papakostas 2007, 85-87).

The existing references of people gathering in the lounges that derived from the intellectual, artistic, political and economic life of the city demonstrate the interaction of ideas that was taking place there. On the other hand, references to representatives

5. It is about Sophie de Marboit Lebren (1785-1854), a philhellene, the daughter of a French diplomat and the wife of the Duke of Placentia from a town in Northern Italy, who settled in Greece and contributed financially and socially during and after the end of the struggle for national freedom. See Drandakis' Encyclopedia, entry: “Duchess of Placentia, Sophia – Lebren”.

6. Indicatively see: Xenopoulos 1958, 263-274, 305-312, referring to the lounge of the house of G. Souris and Kallirhoe Parren, the editor of the *Ladies' Newspaper*. Also, Malakasis 1964, 503-508, referring to the lounge of the poet Kostis Palamas, as well as Drosinis 2001, 214-221, that provides us with a picture about things going on at the lounge of Angelos and Eleni Vlachou (Angelos Vlachos was a poet and politician that dealt with journalism and literature; he was the partner of various newspapers of the time). The article by Skouzes is very enlightening: Skouzes 1970, 66-82.

7. About G. Souris' lounge, see also Papakostas 2007, 79-84.

8. See respectively: Drosinis 2001, 214; Malakasis 1964, 503-504. About Angelos and Eleni Vlachou's lounge, as well as the one of Kostis Palamas, see also: Papakostas 2007, 66-78, 89-104 respectively.

of science are epigrammatic and fleeting. However, their presence is rather certain as it was a part of a broader landscape of intellectual exchanges that occurred in these spaces.

The Clubs

The members of the upper and middle classes in nineteenth century Greece created their own literary, artistic or commercial clubs, which helped them to create interactions with similar interests and goals, to feel safe and to promote their interests. The first one that was called Gruner Baum, in mid-nineteenth century, was located in Iera Odos and served as an outdoor cafe; the second one, the Pausilipum, which stood on the place where later the Technical University was built, also functioned as a country pub and cafe. There were many other clubs called Philadelphia, Military club, Student Club, the Club of the Literary Company (Skaltsa 1983, 137-139, 293; *ibid.*, 295, a catalog of the clubs of the time).

Around 1875, along with the storming of expatriates in the country, a new class emerged with significant presence in financial life and required their variation from the middle classes; these people -along with the local upper class- were the pioneers in the founding of the Athenian Club. According to Epaminondas Stasinopoulos, its founding in 1875 was not at all incidental. It coincided with a new era that was beginning to be formed in Greece, Athens in particular. In that year the first presidency of Prime Minister, Harilaos Trikoupis, started, whose reforming work would come to transform the face of Greece and the capital city, in particular. Since then, Athens started to take the form of a modern city; within a twenty-year period its population was multiplied ten times and exceeded 100,000 by the end of the century, whereas the city was socially refined through its planning development (Collective work, *The Athenian Club* 1975, 12; Aigialides 1975).

The Athenian club, located in the center of the city, had a card games room, a billiards room, a restaurant, a rich library with thousands of volumes of books, mostly historical ones, a reading room with Greek and foreign magazines and newspapers, a chat room, known as "Flyaritirio", and later a fencing hall (Collective work, *The Athenian Club* 1975, 18-19; Skaltsa 1983, 293). The Athenian club was also organizing lectures, while the first exhibition of paintings in Greece was held there. There were no women among its members, since the Club never allowed their enrollment (Collective work, *The Athenian Club* 1975, 18; Skouzes 1970, 133).

Many prominent figures of the Athenian society were members of the Athenian Club; presidents of the government, prime ministers, ministers, foreign ambassadors, senior government officials, University professors, academics, scholars and artists, personalities from the financial and industrial world, while the kings of Greece were honorary chairmen (Collective work, *The Athenian Club* 1975, 16).

The Cultural Associations

In the nineteenth century, the cultural associations served as the public spaces which expressed the members of the upper and middle classes, and helped them to promote their interests, through the self-assurance and a sense of security they offered. In such schemes, we mainly find people with similar interests and identical goals, who sought to encourage the artistic, literary, national, charitable pursuits or to promote scientific ideas, training and educational work.⁹

Among a fairly large number of cultural associations of this period, we will see here those with the greatest activity. The Athinaion (1865), the Etairia ton Filon tou Laou (Association of People's Friends) (1865), and mainly the Parnassos Literary Society, which issued the homonymous journal and organized the "Courses for the Ladies", were associated with the lectures and promoted literary and scientific work.

The Athinaion Association was founded in 1865 in Athens, aiming at "communicating humble but useful knowledge intended not to intellectuals but to ordinary people for whom it was originally founded". The introductory text and the founding declaration of the Association were published in *Pandora*, from which we draw sufficient information about the philosophy behind its foundation which aimed at "offering tuitions that were both useful and enjoyable", which would have sequence and continuity (Anonymous article, "Athinaion", *Pandora*, 1 August, 1865, 235).

The idea was conceived long before its implementation, but there was the fear of failure. The conviction, though, that the country's prosperity does not originate solely from political discussions, as well as the example of the Philological Association of Constantinople, whose works proved to be fruitful and of public benefit, gave the incentive to overcome worries. What is asked then is public support for the approval of this teaching idea and its benefits in order to maximize the zeal of the Association founders. Moreover, it is clarified that "high theories and scientific dogmatism" do not belong to the Association while it is stressed that these tuition address female population as well, since the state cannot be complete if women's education is neglected (Anonymous article, "Athinaion", *Pandora*, 1 August, 1865, 235).

Finally, the members of the Association informed the public that the tuition would initially be held once a week, at predetermined time, while the right of participation would be given to association members on production of a ticket. The ticket, signed by the president and the secretary of the Association, would be valid for one year and would cost twelve drachmas for the gentlemen and six for the ladies; they also made provisions for foreigners who might want to attend lectures and for whom special tickets would be issued. The tutorials were scheduled for the autumn after the declaration

9. Also see Skaltsa 1983, 295-296, where there is a catalogue of associations of the nineteenth century in Athens.

of its foundation so that the necessary amount to cover the first expenses was raised (Anonymous article, “Athinaion”, *Pandora*, 1 August 1865, 236-237)¹⁰.

The declaration was signed by the members of the Association, all of whom were important names of the intellectual and political life of Athens. Among them were Dimitrios Stoumpos, professor of Science at the University of Athens, Dimitrios Vernadakis, professor of History at the University, the distinguished historian and professor Konstantinos Paparrigopoulos, Xaverios Landerer, first professor of Chemistry at the University, Alexandros Rizos Ragavis, professor of Archaeology, author and editor, who occupied key positions as ambassador of Greece, Georgios Tertsetis, who was a historian, lawyer, author and politician and many more (Anonymous article, “Athinaion”, *Pandora*, 1 August 1865, 237).

From the information that we draw about the organization of the Athinaion Association, we can infer that great attention was paid to the selection of people and the topics of lectures. The organizers’ idea to offer motives proves that the aim of the association was the attendance of a great number of listeners of both sexes and all ages from the middle class. Running the lecture organization smoothly could ensure, to a great extent, the communication of scientific knowledge to as many people as possible. This goal is also evident in the organizers’ intention to publish the content of the lectures, so that even those who were not able to attend could draw information.

The Association of People’s Friends was founded in 1865, aiming at “giving lectures, establishing libraries for people’s use and the publication of books for dissemination of practical and useful knowledge”. The Board of Directors consisted of “A.G. Soutsos as the president, K. Dosios as vice president and P. Lambros as treasurer while N. P. Deligiannis, M. N. Dragoumis were the secretaries and A. Damaskinos and A. A. Soutsos were the members” (Association of People’s Friends, *Announcements (Organizational Document, Rules)*, 1866).

The beginning of tutorials of the Association of People’s Friends was announced by *Pandora* in the 1st March 1866 issue. The columnist regards its members as more worthy than those of the Athinaion Association, because they addressed not only a specific and limited class of society but also all the people, offering free tutorials to everyone who was interested in the knowledge offered. It is characteristic that the Association members “by having doors open, struggle to make everything comprehensible to every citizen, teach conscience and love for work, respect to the state and obedience to all laws

10. . In order to better understand what this amount of money relates to, we need to know that around 1880 a day’s wage was ranging at about 2-3 drachmas for men, 1-1,50 drachmas for women and 1 drachma for children. Throughout the same period, the lowest salary – that of an usher – was set to 840 drachmas, whereas the highest salary – that of a minister- reached 9600 drachmas with intermediate variations for the rest of the civil servants. Therefore, the ticket price was quite low so as to ensure a wide middle class easily. See: Agriantoni 1986, 289; Tsoukalas 1999, 122.

without exception” (Anonymous article, “*Charitable Association. Athinaion. Association of People’s Friends*”, *Pandora*, 1 March 1866, 527).

The Philological Association Parnassos was the body that had the greatest cultural activity in the late nineteenth century, which aimed at the intellectual enhancement of middle and upper classes. It was founded on 24 June 1865 by the sons of numismatist Pavlos Lambros, Michael, Spyridon, Konstantinos and Dionysios, with their father’s support, “for the people’s shared progress and benefit”. They named it Parnassos, since in tradition Parnassos was dedicated to Apollo and the Muses. The Association was initially housed in their father’s residence.¹¹

On 17th March 1875, the Philological Association Parnassos was officially recognized with a royal Decree as a non-profit Private Legal Entity; until then it had been linked to 80 scientific associations inside and outside Greece, while it developed into a Pan-Hellenic intellectual center with great radiance, which had ensured collaboration with the intellectual, academic and political leadership of the place.

From 1877 to 1895, the Association published a journal under the same name, which was replaced in 1899 by the journal “Yearbook” (*Epetirida*), whose circulation continued until 1939. From 1959, the Parnassos journal was republished and was issued annually. This manifold activity aimed at people’s cultural, social and moral improvement. Since the first years of its operation, the Parnassos Association played an important role in the intellectual life of the place by organizing lectures, seminars, exhibitions and music events.

Its members were distinguished people of the country. Among them, there are some very important people in the scientific and academic field, such as the historian Konstantinos Paparrigopoulos, who in 1872, being the rector of the University of Athens, became an honorary chairman; also the philosopher Petros Vrailas Armenis, the jurist Pavlos Kalligas, the scientists Theodoros Orphanidis, Timoleon Argiropoulos, Dimitrios Vernadakis but also the literary figures Alexandros Rizos Ragavis, Aristotelis Valaoritis, Kostis Palamas, Grigorios Xenopoulos and a lot more.¹²

State bodies, Legal Entities and distinguished individuals contributed to its financial support. On 28 May 1890, after some temporary solutions that had proceeded for its accommodation, its inauguration by the heir, Konstantinos, took place at the current mansion of Parnassos, at Agios Georgios square on 8 Karitsis street, which was built by the architect Ifikratis Kokkidiss, a colonel engineer.¹³

Finally, in the Parnassos journal, the activity of the Association is mentioned in detail, in articles under the common title “Philological Association Parnassos”, from which we can draw information about topics of the lectures, as well as the lecturers

11. “Association<History”, www.Isparnas.gr. About The Philological Association Parnassos also see: Vovolinis 1951.

12. “Association <Members”, www.Isparnas.gr.

13. “Association < Aim and vision”, www.Isparnas.gr.

themselves. About the overall work of the Association in its longstanding course, where a series of tutorials are also included, we get informed by the “Report on the works of the Philological Association Parnassos (1875-1888)” and by the “Account for the Association’s proceedings during the years X, XI, XII, XIII”, signed by Simos Balanos, president of the Philological Association Parnassos from 1886 to 1892, and Michael Lambros, secretary of the Association; also by the “Account for the Association’s proceedings during the year XV, by an unknown publicist.¹⁴

“Tutorials for ladies” at the Philological Association Parnassos

Apart from the publications mentioned above, the *Ladies’ Newspaper* did not miss the opportunity to mention the organization of lectures and propagandize ladies’ participation in them, considering that such activity was instrumental in communicating knowledge.

In the 14th March 1892 issue, we first see Kallirhoe Parren’s reference to religious lectures and readings of the association Parnassos; one of these lectures was attended by Queen Olga with her daughter, Maria and daughter-in-law, Sophia. Apart from religious matters, though, the content of lectures often concerned literary readings, art events, even psychological studies (Parren 15/3/1892, 4,5/4/1892, 28/3/1892,22/3/1892, 16/5/1893, 5/12/1893, 12/12/1893).¹⁵

On 3 April 1894, the *Ladies’ Newspaper* announced that the Secretary General of Parnassos, Michael Lambros, suggested a series of tutorials for ladies to be started. Parren here includes Parnassos among other educational centers, such as the University and the Technical University and maintains that the need for higher and better education for women should be appreciable. The University educates scientists, the Technical University [educates] artists and Parnassos comes to complement this need for education, “by providing a new path for progress, new orientation in women’s mind and new food for their heart”; the auditory tutorials of Parnassos are beneficial if their meaning is grasped and a schedule is drawn up to suit the needs of the female audience.

14. Indicatively see: Anonymous article, “Philological Association Parnassos” *Parnassos*, 30 April 1877 316-317, March 1881, 282, September 1882, 772-773, February 1889, 329-332 etc. Also: S. Balanos and M. Lambros “Report on the works of the Philological Association Parnassos (1875-1888)”, *Parnassos* September 1888, 7-18; S. Balanos “Account for the Association’s proceedings during the years X, XI, XII, XIII” *Parnassos*, December 1888, 153-167. Anonymous article, “Account for the Association’s proceedings during the year XV”, *Parnassos*, July and August 1890, 389-408. About S. Balanos and M. Lambros, see Drandakis’ Encyclopedia, entry: “Balanos Simos” and “Lambros Michael”, respectively.

15. K. Parren, “Artistic soiree” *Ladies’ Newspaper*, 28 February 1893, 4, where it is mentioned that the ticket price for the participation in the soiree was 3 drachmas.

The *Ladies' Newspaper* does not, of course, miss the opportunity, when the schedule for “tutorials for ladies” at Parnassos is announced, to publish it, informing female readers that the tutorials would be forty in total and would last for about a semester, from October 1894 to April 1895. There would be two teaching days a week, Thursday and Saturday afternoon, while a ‘small entrance fee’ was determined, in order to cover the expenses of teaching experiments. The price for family tickets up to four people was set to 15 drachmas for the whole term, as mentioned in the newspaper. Parnassos journal also published a timetable for the ladies’ tutorials from October 1894 to April 1895 (Parren12/6/1894).¹⁶ The timetable also refers to professors, most of who were known in the academic and intellectual life of Athens, as well as to the subjects that each of them would teach.

Articles related to the lectures at the Philological Association Parnassos were published in many issues of the *Ladies' Newspaper*, in the late nineteenth century and early twentieth century, when it seems that the organization and attendance of lectures were a common practice for communicating knowledge, especially to women. Middle class women’s mass participation in scientific lectures places them in the general climate and the significance that the institution had in the social reality of the nineteenth century.

Conclusion

The public space of Athens in the second half of the nineteenth century was a place of strong interactions. In a landscape beset by intense political struggles and ideological ferment seeking to be expressed and communicated in the cafes, the lounges, the clubs and in the cultural associations, knowledge was being transmitted and a new reality was being created, that shaped the cultural map of the city and consequently of the state.

At these places, middle-class and high-class people became the carriers of an intellectual innovation and they were aiming at communicating their basic requests to the lower classes, by adopting nationalism and the Great Idea as prevailing ideologies. Their primary vision was the westernization and modernization of the state together with the dream for national liberation. Science, being dominant, was the vehicle that would lead to the realization of this dream for state regeneration. The people that served it assumed responsibility for the moral education of lower classes and the cultivation of ideas and values by which they were actuated. Their task was difficult and with uncertain results but there were those who consolidated the presence of science in all the places mentioned above, sometimes through their participation only and some other times through their work.

16. Also: Anonymous article, “Philological Association Parnassos. Association Works”, *Parnassos*, November 1894, 238; January 1895, 398; February 1895, 479; April 1895, 640.

The presentation of these sites and people who staffed them helps us to compose the image and highlight the dynamics of intellectual ferment that was created there. The cafes were the meeting points for the people of the middle and upper class. Intellectuals or others who were active in trade and economic fields frequented in lounges and clubs, exchanging ideas and promoting their interests. The cultural associations by the organization of “public courses” also functioned as the productive space of the new ideas.

Undoubtedly we would emphasize the participation of the middle and upper class women in this spiritual and cultural activity. They had an essential role in the public space of the late nineteenth century, mainly defending social issues. Their own presence was dominant in private lounges and in the lectures organized by the associations, where the issues of science were discussed along with the presentation of literary works. This activity was a part of the intellectual leadership and composition, which was a key vision of the modernization of the Greek state.

The multitudinous human presence and the transmission of ideas in these public spaces actually reshaped the map of the city, connecting the geography of the city with the geography of ideas, basically rearranging the landscape and remodeling ideas and people.

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SCIENTIFIC INSTRUMENTS AND PUBLIC
LECTURES FROM A PHILOLOGICAL
ASSOCIATION. THE CASE OF GREEK
PHILOLOGICAL ASSOCIATION OF
CONSTANTINOPLE.

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Introduction

The Greek Philological Association of Constantinople (GPAC) has been together with the Patriarchate the leading cultural body of the Greek community in Constantinople for over 60 years (1861-1923) and has supported ethically and economically the establishment and maintenance of many Greek schools in the then Ottoman Empire. The Journal “Σύγγραμμα Περιοδικόν” published by the GPAC is a rich resource for the researcher, both for the interesting studies it contains and for the information about the general structure and organization of the Association, which has been a model for many of the respective associations founded after it¹. The destruction by fire of the archive kept by the GPAC until 1870 and the (temporary?) loss of the subsequent archive, after its seizure by the Turkish state in 1825, make the Journal even more important.

The purpose of the GPAC, as stated in the first article of its regulation, was the cultivation and dissemination of letters and sciences in the East², adopting the lamp of knowledge as the symbol of the Association (Image of the symbol of the Association: <https://imagizer.imageshack.com/img922/4814/mZBDNz.jpg>). One aspect of the relevant action of GPAC, which is little studied, is that of creating a collection of scientific instruments and their use in the public lectures organized by the Association³. This is an initiative that is an innovation for that time in Istanbul.

Another element of particular relevance to the specific action of the GPAC is the fact that many members or speakers were educators in the schools of Constantinople. In fact, among them are teachers and directors from Greek Schools like the Great School

1. There were more than 160 Greek Associations founded between 1861 and 1922. See Mamoni 1975, 106.

2. Among the means that the EFNC was about to use to achieve the goal were to make public lectures and create collections of scientific instruments.

3. For public courses see: Giannakopoulos 1998, 65-69.

of the Nation⁴, the Theological School in Halki Island, the Commercial School in Halki island, the Zappeion Girls' School, the Zografeion School and private schools in Pera (Greek Lyceum and its successor Chatzichristou Greek – French Lyceum). But there are also foreign teachers such as the French professor of physics and chemistry at Galatas-Serai Lyceum, Louis Charrel (*Σύγγραμμα Περιοδικόν* vol. Z, 264, the professor at the Robert College Albert de Long (*Σύγγραμμα Περιοδικόν* vol. IA, 162) and Ch. Bonkowski, professor of chemistry at the Medical School (*Σύγγραμμα Περιοδικόν* vol. IZ, 161)⁵.

The GPAC has undoubtedly been a forum for the exchange of views, knowledge and experience on teaching by contributing to the dissemination of ideas and practices from one school to another. From this point of view, the institution of public lectures on science and the consequent use of scientific instruments in them are of great importance, as it reflects the way in which experimental physics was taught, or should have been taught, at that time.

The first collection

At the meeting on November 12, 1862, the president of the GPAC X. Zografos⁶ proposed that the Association should acquire scientific instruments “from Europe” for the “necessary experiments” for public lectures⁷ on experimental physics⁸. As a result of the proposal a committee was formed by X. Zografos, I. Galatis⁹, A. Kontostavlou and A. Paspatis¹⁰ who undertook to propose, after a relevant research, the place where the lessons would be held and what should be the absolutely necessary instruments. In

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4. Great School of the Nation or Phanar Greek Orthodox College is known as Μεγάλη του Γένους Σχολή in Greek. The percentage of the School's teachers that participate in the GPAC is impressive. Indicatively, we mention Spatharis, Aristoclis, Vilkiios, Nonotis, Filalithis and Lianopoulos. More generally, cooperation between the Association and the Great School of the Nation was very close. We note that almost every year the Principal of the Great School of the Nation sends a copy of his Annual Accountability to the library of the GPAC. Also, the large event hall of the GPAC is sometimes provided for anniversaries or musical events (see: vol. IZ', 173) in the “Υπέρ της Μεγάλης του Γένους Σχολής Αδελφότητα Ξηροκρήνη”, a brotherhood which acts for the benefit of the School. Such cooperation exists, of course, with other schools in the Greek community, especially with Zografeio School after its foundation in 1893.
 5. Charles Bonkowski was living in Street Faik Pacha 9. See Cervatti 1891, 238.
 6. Xenofontas Zografos was a physician and one of the founders of the Association.
 7. The decision of the acquisition of the instruments was attributed to the “kindhearted willingness of the audience” of the public lectures, according to a report in “*Ο εν Κωνσταντινούπολει Ελληνικός Φιλολογικός Σύλλογος. Πεντηκονταετηρίς 1861-1911. Παράρτημα του ΛΔ 'τόμου'*, [The Greek Philological Association of Constantinople. Fiftieth Year 1861-1911] 1913-1921, 55.
 8. During the first two years of the Association's life the meetings were taking place in a hall at the second floor of the Casino Sala in the Grand Rue in Pera.
 9. I. Galatis was a physician and one of the founders of the Association.
 10. Alexandros Paspatis was a physician and member of the GPAC since 1862.

addition, the Committee was to create a list of subscriptions from GPAC members for the purchase of the necessary equipment (*Σύγγραμμα Περιοδικόν* vol. A, 141).

Indeed, on 26 November 1862 the Committee presented to the bureau of GPAC a list of instruments for experimental physics (*Σύγγραμμα Περιοδικόν* vol. A, 142-143) covering a wide range of disciplines such as electricity, magnetism, special gravity, acoustics and optics¹¹. The cost of purchasing the particular ‘economic’ but ‘representative’ collection amounts to FF 2500, according to Soleil’s invoice¹². X. Zografos suggested that the bureau should be entrusted to a trustworthy and competent member of the GPAC to collect the required amount and to supply the instruments, but no final decision was made.

X. Zografos proposed again in the meeting of 11 March 1863 the creation of a list of subscriptions by the Treasurer of the Association Ch. F. Balakis for the purchase of instruments. The proposal was accepted and the collection of the necessary amount was started (*Σύγγραμμα Περιοδικόν* vol. A, 195). The decision to supply scientific instruments from France and not from another country is expected. In the second half of the 19th century, the French manufacturers of scientific instruments (or philosophical devices as they were usually called at the time) are a step ahead of their English and German competitors in terms of quality and variety. Also, the French books of experimental physics have prevailed in most European countries, spearheaded by Ganot’s famous books¹³. The extraordinary images that adorn the books were the best advertising for French scientist manufacturers. It is no coincidence, therefore, that almost all of Istanbul’s educational institutions had acquired French scientific instruments at this time¹⁴.

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11. Of particular interest is the absence from the proposal of scientific instruments relating to the oldest and most well-known branch of physics, that of mechanics. Preference to more modern (for that time) discoveries and technologies is obvious and reveals the modern spirit of the proposal.
 12. At this point, there is an interesting puzzle and a comprehensive reference should be made to the French instruments’ maker Soleil. The Soleil family has a rich tradition of 3 generations of manufacturers. The most famous manufacturer of the family was undoubtedly the representative of the second generation Jean Baptiste François Soleil (1798-1878). This great manufacturer ceased to work in 1850 and it is therefore unlikely that the committee’s proposal in 1862 would concern instruments of its own construction. His work continued - independently - his son Henri Soleil (? - 1879) and Jules Duboscq (1817-1886). The two makers were housed in the same building but had separate workshops. Henri Soleil produced optical glasses, crystals and optical instruments such as microscopes, polarimeters and prisms. Jules Duboscq had taken over the laboratory for the production of scientific instruments - although he also produced mainly optical instruments. The year that interests us, therefore, scientific instruments coming from Henri Soleil could not be instruments like those proposed by the Committee, except those relating to optics. Instead, Duboscq produced optical instruments as well as those about electricity, magnetism, etc. but these instruments were not under Soleil’s name. We suppose that the committee received a single offer from Soleil and Duboscq, which mentioned the first name because of the special prestige it secured. If that is the case, then the instruments could have been made by either of them, or even by - officially out of work - Jean Soleil. It cannot, however, be ruled out that the instruments were made by other French manufacturers and that they were traded by Soleil’s firm. This practice was particularly common in large and famous manufacturers. See: Brenni 1996, 7-16. Also see: Duboscq 1859; Soleil 1867.
 13. Ganot’s book “*Traité de physique*” was also translated into Turkish. See: Günergun 2016, 11. Also: Akbas 2011.
 14. The situation changed at the beginning of the 20th century when the schools turned to German instrument makers (e.g. Max Kohl or Leybold).

Some examples are the University of Constantinople (Akbas 2011), the Great School of the Nation (Lazos 2013), the Zografeio School (Unpublished recording of the collection by the first author), the Zappeion Girls' School (Unpublished recording of the collection by the first author), the Theological School of Halki Island (Unpublished recording of the collection by the first author) and the Galatasaray High School¹⁵.

In the lecture given by the chairman of the Association S. Mavrogenis on the meeting of 3 May 1864 it was reported that the necessary amount of “subsidized men’s grants” had been collected for the purchase of the necessary instruments of experimental physics for public lectures (*Σύγγραμμα Περιοδικόν* vol. B, 255). It was also noted that the next bureau of the Association would take action on the purchase of the instruments (*Σύγγραμμα Περιοδικόν* vol. B, 256). On June the 13th a letter from Zambakos¹⁶ from Paris was read by the secretary to the members of the bureau (*Σύγγραμμα Περιοδικόν* vol. B, 262). The letter contained the price list of the instruments of physics requested by the Association, but the list itself is not recorded in the Journal.

On 4 July 1864, Andreas Spatharis (1837-1901) was elected as a regular member of the GPAC (*Σύγγραμμα Περιοδικόν* vol. B, 265). For 36 years he had been teaching physics, mathematics, cosmography and chemistry at the Great School of the Nation (1864-1900) and almost in all the Greek secondary schools in Istanbul. A. Spatharis¹⁷ would serve for many years as a curator of the instruments collection of GPAC (1875-1880) and would deliver many public lectures. He also served as a vice-president of the Association for a short period of time during 1887-1888 (*Σύγγραμμα Περιοδικόν* vol. KA, κθ)¹⁸. It would not be an exaggeration to say that A. Spatharis was the authority at this time in experimental physics and chemistry issues in the Greek community of Istanbul¹⁹. Until 1880, when he ceased actively participating in the Association, he was the driving force in physics at the Association.

15. As mentioned on the school's website: <http://www.gsl.gsu.edu.tr/en/tarihce/1868-1923>.

16. The sender of the letter was Demetrius Alexandre Zambako(s) – Pacha (1831-1913), a Greek leprologist and dermatologist from Neochori (Yeniköy), a village near Istanbul. He studied medicine in Paris and he was living there in 1864, when the mentioned letter had been sent. He returned to Istanbul in 1872 although he spent much of his time in Cairo, where he died. He was an honored member of the GPAC since 1904 (See: *Σύγγραμμα Περιοδικόν* vol. ΚΘ, 93). The strong relationships of him with the Association leded Zambakos in 1910 to propose and sponsor a competition about Byzantine studies organized by GPAC. See: *Σύγγραμμα Περιοδικόν* vol. ΛΓ, 19-20.

17. Spatharis finished the Commercial School in Halki Island and then moved to Berlin to study Architecture at the Architecture Academy. and then attended general lessons, with emphasis on physics, at the University of Berlin.

18. He resigned at 19/4/1887.

19. Spatharis was the author of the following textbooks: *Γεωμετρία* [Geometry], Πατριαρχικό Τυπογραφείο, Constantinople (Istanbul), 1887. *Άλγεβρα* [Algebra], Πατριαρχικό Τυπογραφείο, Constantinople (Istanbul), 1887. *Στοιχεία Φυσικής Πειραματικής*, [Elements of Experimental Physics], Κωνσταντινίδης, Athens, 1886. *Στοιχειώδη Γεωγραφία, τεύχη Α' και Β'* (Elements of Geography, Vol.1 & 2), Πατριαρχικόν Τυπογραφείον, Constantinopl (Istanbul), 1888. This book was written in co-operation with his colleague, teacher of geography and history K. Zachariadis. *Στοιχεία Τριγωνομετρίας* [Elements of Trigonometry], Κορομηλάς, Athens, 1892.

At the meeting on October 3, 1864, the secretary read, among others, a letter from Zambakos about the purchase of the scientific instruments (*Σύγγραμμα Περιοδικόν* vol. B, 267). The exact contents of the letter were not mentioned, but a few weeks later (November 2, 1864) a new letter from the same sender is about the completion of the shipment of the instruments to the GPAC (*Σύγγραμμα Περιοδικόν* vol. B, 268). Consequently, the first letter concerned the latest details of the market and the shipment of the instruments. There is no mention of the number and type of the instruments neither about the instrument maker – except what has been mentioned in the committee’s proposal in 1862. The amount raised amounted to 2000 francs (8800 grosis) and was collected between May 1863 and April 1864 (*Σύγγραμμα Περιοδικόν* vol. E, 137)²⁰. The amount allocated was, however, 13200 grosis (*Σύγγραμμα Περιοδικόν* vol. E, 137) (3000 francs), but it is not clear how the additional amount of 4400 grosis was collected. It is recalled that the original proposal of the committee concerned an order worth 2500 francs.

Three lectures (1, 8 and 18 November) by K. Caratheodory²¹ on electricity are listed in the public lectures program for the period November-December 1864 (*Σύγγραμμα Περιοδικόν* vol. B, 276).

In the annual report of the GPAC Secretary given at the meeting on May 14, 1865, there is a very detailed - and therefore extremely interesting - description of K. Caratheodory’s lectures on electricity and A. Spatharis’s “About the air” (*Σύγγραμμα Περιοδικόν* vol. Γ, 46-47). It seems that the lectures of A. Spatharis took place after December 1864 and therefore do not appear in the aforementioned program of public lectures.

There were many experiments in K. Caratheodory’s lectures, but it is not entirely clear whether the experiments were carried out or were simply described to the audience. However, at one point it is reported that “... Mr Caratheodory has been involved in the demonstration of the induction in static electricity by using the electroscope of Coulomb and the electrophorus of Volta”. Based on this passage we assume that much - if not all - of the experiments were carried out with the newly acquired instruments, and if this the case among the instruments acquired should be a Coulomb electroscope and a Volta electrophorus²². It is also reminded that the second letter of Zambakos, which refers to the shipment of the instruments, was read in the GPAC on 2 November 1864, one day after K. Caratheodory’s first lecture. It is therefore possible for the instruments to have already been received and used in these lectures.

20. In particular, it is mentioned: «Διάφοροι φιλόμουσοι και φιλοπάτριδες ομογενείς (τον κατάλογον των ονομάτων τούτων μετά λύπης ημών δεν ανεύρομεν, ίνα ο Σύλλογος και τα γράμματα γινώσκωσι τους ευεργέτας τους) δι’εράνων φράγκων 2000 προς σχηματισμόν της οργανοθήκης του Συλλόγου». The list of names was apparently destroyed along with the Association’s record in the great fire of 1870.

21. Konstantinos Caratheodory was a professor in the Medical School of Istanbul. He was a regular member of the Association since 1867.

22. For details see: http://physics.kenyon.edu/EarlyApparatus/Static_Electricity/Electrophorus/Electrophorus.html

The lectures presented and analyzed the speed of “electric fluids”²³, static and dynamic electricity, the charging of bodies by friction, the electric pendulum, conductors, non-conductors and the theories of the time about the nature of electricity. Subjects such as the measurement of the electrical power, the accumulation of “electric fluid” on the surface of a conductor, the effect of the shape of the bodies on this accumulation and the leakage of “electrical fluid” in the vacuum and air were presented. The operation of the electric machine, of the Leyden jar (Lazos, Paparou 2015) and of the discharger was explained. The theory of electric hail²⁴, lightning and lightning rod was also presented. Then, Caratheodory presented elements from the “dynamic electricity” such as the Galvani’s experiment on frog legs. Finally, he focused on the operation of the Volta pile, the Daniel cell and the Bunsen cell, (types of electrical sources) and he explained electromagnetism and the function of the telegraph “in a very precise way”.

Regarding whether experiments were carried out in Spatharis lectures, the text is very clear: “... Mr. Spatharis performed the admiration of this great audience through the excellent selection of experiments and his very flexible word.” Unfortunately, no other information is available about the type of experiments performed, and this is because Spatharis has neglected, rather on a permanent basis, to deliver a detailed written report on his lectures. Also, Spatharis, who also taught mathematics, delivered a number of lectures on “Geometry Applied in Art”.

Based on the rich information on the public lectures of 1864-1865 - information that are not found in any other volume of the Journal – we can reasonably suppose that among the instruments acquired in 1864 were included: an electrostatic machine, a Volta electrophorus, a Coulomb electroscope, an electric pendulum, a cylindrical and a spherical conductor on insulated bases, at least one Leyden jar, an electric hail, a Volta pile, some Bunsen and Daniell cells, a telegraph and some devices to demonstrate electromagnetic phenomena such as coils and a galvanometer. Moreover, instruments which were necessary in the experiments presented by Spatharis, such an air pump with some accessories and a barometer, should be added to those.

Spatharis gave in 1868 a lecture on chemistry, presumably with experiments (*Σύγγραμμα Περιοδικόν* vol. Δ, 244) but no lecture related with experiments was given next year (*Σύγγραμμα Περιοδικόν* vol. Δ, 256). During 1868-1869 the maintenance and safe keeping of this collection, as well as the library, were entrusted to Ioannis D. Aristoklis (*Σύγγραμμα Περιοδικόν* vol. Δ, 201), who was a teacher of history and philosophy in the Great School of the Nation and one of the founders of the GPAC in 1861.

23. The terminology of this period is kept in this paper. The theory that some kind of electrical fluids are responsible for the electrical phenomena enjoyed almost universal acceptance during that period. Its gradual abandonment occurred slowly only after the discovery of the electron by J. J. Thomson in 1897.

24. For details see: http://physics.kenyon.edu/EarlyApparatus/Static_Electricity/Electric_Hail/Electric_Hail.html

The second collection

Ambrosios Mavrogordatos²⁵ donated to the GPAC an astronomical instrument (*Σύγγραμμα Περιοδικόν* vol. Δ, 252, 257), as announced at the meeting on 3 March 1870 and in the presidential lecture given on May 3, 1870. Unfortunately, this instrument, as well as any mobile and immovable property of the GPAC, was lost shortly after a major fire that broke out on May 24, 1870. The fire completely destroyed the building²⁶ of the Association in Pera (today is called Beyoglou). The archive²⁷, the library and the instruments collection of the GPAC were also destroyed and this temporarily stopped a 9-year rally (*Σύγγραμμα Περιοδικόν* vol. Ε, 181)²⁸. As a result, in 1870 the GPAC was again at the starting point for scientific instruments (and not just them) having permanently lost the whole of its equipment.

The fire marked the history of the GPAC deeply, initially as a wound. At the meeting, which was convened for the destruction on July 3, 1870, the president, S. Aristarchis, wonders (*Σύγγραμμα Περιοδικόν* vol. Ε, 132-133): “Where is the collection with the numerous instruments of physics which so many times in the public lectures have pleased both us and the public of this great city?”

Nevertheless, this catastrophe awakened the Greek community and eventually led to the beginning of a new course so impressive as to be the cause for the frequent comparisons of the GPAC with the mythological Phoenix. The Association was trying to acquire an owned building since 1867 and after the fire the required amount was collected through subscriptions²⁹. The architects Cleanthis and Parigoris designed a two storey building (*Σύγγραμμα Περιοδικόν* vol. Ζ, 340) that was inaugurated in 1873. Nevertheless, the final transportation of the GPAC happened in 1875³⁰. A third storey was added in 1917 to house the reading room³¹.

25. At his own expense, the surgery in the Valouclis hospitals was constructed. For details see: <http://www.chios-medical.gr/constantinoupolis.htm>

26. This building was rented by the Association.

27. The archive could provide valuable information about the type and number of the available instruments. Its loss means the definitive absence of relevant information.

28. “Μετά την πυρκαϊάν της 24^{ης} Μαΐου, ήτις εν ακαρεί κατέστρεψε παν ό,τι ο Σύλλογος εις το διάστημα του 9ετούς βίου του είχε δυναθή να αποκτήσει...”.

29. For lists of the subscribers see: *Σύγγραμμα Περιοδικόν* vol. Ε, 181; *Σύγγραμμα Περιοδικόν* vol. Στ, 300-301; *Σύγγραμμα Περιοδικόν* vol. Ζ, 329-331.

30. The banker Ch. Zografos donated an extra amount of 2000 Ottoman liras in order for the building to be completed. (*Σύγγραμμα Περιοδικόν* vol. Η, 286).

31. The relevant expenses were borne by Alexandros Mavrogenis. In his honor the reading room was named Mavrogenio. “Λογοδοσία Μηνιά Αυθεντόπουλου, προέδρου του εν Κωνσταντινουπόλει Ελληνικού Φιλολογικού Συλλόγου”, [Reports of Mina Afthentopoulou, president of GPAC] 1972, 16, 88. The building was in Topçilar 18, in Pera. Two photographs of the building can be viewed at: <https://imagizer.imageshack.com/img923/9269/xQ4VJO.jpg>. The first image is from around 1886 and the second has been taken a few years before its demolition in 1965.

The intention for recovery of the equipment for the public lectures is reflected in the provision of 50 Ottoman liras “for the gradual re-establishment of the library and the collection of scientific instruments” (*Σύγγραμμα Περιοδικόν* vol. Z, 340). Members of the relevant committee were I. Gion³², Z. Alexandridis³³ and M. Tsigaras. However, the purchase of any new instruments would be delayed enough.

The destruction of the archives is the reason why there is little available data on the Association’s action during the period 1865-1870. GPAC had not printed the Journal for those years until the day of the fire. A great effort was made to re-compile the necessary information for the lost five years, and the volume Δ was printed in 1871. It is the only volume of the Journal that covers such a long period (5 years) and obviously the description of the action of GPAC is quite succinct. The only recorded public lecture that could be related to scientific instruments is a lecture by A. Spatharis about chemistry in 1868 (*Σύγγραμμα Περιοδικόν* vol. Z, 340) but no further details are given. Probably, some instruments of chemistry existed in the instruments collection. The hypothesis of the existence of chemical utensils in the collections is reinforced by the fact that for the period May 1864 - April 1865, an expense of 720 grosis is reported for public lectures about, among other reasons, “chemical materials” (*Σύγγραμμα Περιοδικόν* vol. E, 137).

In any case, it is unlikely that lectures on experimental physics were not held within 5 years (when only the lecture year 1864-1865 was held at least 5 lectures) but given the circumstances, it is not strange that they were not mentioned in the Journal.

In the first year after the fire (1870-1871) the GPAC organized an impressively large number of public lectures. The destruction of the GPAC building makes it necessary to make lectures somewhere else. The School of Panagia in Pera offered the necessary space to the GPAC and twenty five lectures were given, two of which by A. Spatharis on the “Alterations of the Earth’s crust” and another two by A. Tagis on earthquakes (*Σύγγραμμα Περιοδικόν* vol. E, 88,101-103, 188). There are enough detailed descriptions of these lectures, but no experiments were included (*Σύγγραμμα Περιοδικόν* vol. E, 101-103).

Fifty-three more lectures were given at the headquarters of other cultural clubs, which was facilitated by the cooperation of seven cultural clubs, which started that year (*Σύγγραμμα Περιοδικόν* vol. E, 87, 176-177).

Spatharis presented nine lectures (*Σύγγραμμα Περιοδικόν* vol. E, 90) on the following subjects (into parenthesis there is the name of the club and the place where the lecture was given “A map of Istanbul with the mentioned places can be viewed at <https://img922/3412/rUh8rP.jpg>”, written both in Greek and English):

32. Ioannis Gion was manager of insurance companies and member of the GPAC since 1864.

33. Zacharias Alexandridis was a merchant and member of the GPAC since 1869.

- About barometer (Omonia Club in Diplokiono - Besiktas)
- About chemical attraction (Omonia Club)
- About the eye as a visual instrument (Omonia Club)
- About acoustics (Mnimosyni Club in Fanari - Fener)
- About Meteors (Mnimosyni Club)
- About Aurora Borealis (Mnimosyni Club)
- On the Solar Eclipse of 22 December 1870³⁴ (Mnimosyni Club)
- About Elevation of Moon (Mnimosyni Club)
- About the prehistoric state of man (Mnimosyni Club)

The only issues that could be supported by demonstration of experiments are the first, second and fourth but the GPAC instruments collection was destroyed. We either have to accept that those were purely theoretical lectures or suppose that Spatharis borrowed instruments from somewhere (perhaps from the laboratory of the Great School of the Nation, in which he was teaching?). Especially for the barometer it is difficult to imagine how a speaker could convey the relevant information (or even choose the subject) without having the instrument available at the lecture.

Other given lectures on science were (*Σύγγραμμα Περιδικόν* vol. E, 90):

from A. Konstantinidis: “On Physics” (Chalkidona’s Club in Chalkidona – Kadikoy),
from A. Tagis³⁵: “On Heavenness”, “On earthquakes’ and two lectures “On Volcanoes’ (Mnimosyni Club),

from I. M. Raptarchis³⁶: “About multiple worlds” (Club of Ipsomathia in Ipsomathia – Koca Mustafa Paşa and Omonia Club),

and from G. Georgiadis: “On the Sun” (Association of Vlaga in Vlaga – Yenicapi and Club of Ipsomathia).

It is worth noting that there is no information about the content of the above lectures, as opposed to lectures on other topics (e.g., literature or history). The reason is probably the negligence of the lecturers in the delivery of a relevant text, not the indifference of the GPAC.

In the years 1871-1872, there is no development in the supply of scientific instruments, as it appears in the GPAC’s list of expenses (*Σύγγραμμα Περιδικόν* vol. Στ, 229).

34. This eclipse was visible from Istanbul. It is characteristic of Spatharis’s pedagogical attitude and experience that he realizes that after the eclipse there will be a quite big audience who will want to understand the causes behind the phenomenon. In a following lecture he extended the subject by presenting lunar eclipses.

35. Anastasios Tagis was born in Monodendri in Epirus. He studied in the Rizario School and in the Faculty of Philosophy of the University of Athens. He taught in many schools in Istanbul for almost 40 years. He was a co-founder of the private Greek Lyceum and a member of the GPAC since 1869. He was living in Street Fakir 10. See: Cervatti 1891, 439.

36. Ioannis M. Raptarchis was a scholar, a poet, a translator and a journalist.

The six lectures by A. Spatharis were about cosmography (*Σύγγραμμα Περιοδικόν* vol. Στ, 279-284) [a lesson that he was teaching in the Great School of the Nation (Αρχιμανδρίτης Φιλόθεος Βρυέννιος 1871, 24)] and were probably chosen because no experiments were necessary. There were nine other scientific lectures (*Σύγγραμμα Περιοδικόν* vol. Στ, 305) by K. Karatheodoris and D. Maliadis³⁷ without any further information on their content.

The situation remains unchanged for the following year (1872-1873) (*Σύγγραμμα Περιοδικόν* vol. Ζ, 284). Quite typically, the report of the Scientific Committee of the Association stated that in order to be able to carry out its mission, it needed first of all access to scientific journals for information on new developments and to scientific instruments in order to be able to control and verify their own data.

The librarian of the Association, in his report, stressed, perhaps with an irresistible irony, that although according to the regulation he was responsible for the scientific instruments collection such a collection did not exist for well-known reasons (*Σύγγραμμα Περιοδικόν* vol. Ζ, 301).

There were seventeen scientific lectures (*Σύγγραμμα Περιοδικόν* vol. Ζ, 306) that year, where the term “scientific” covers almost everything except literary lectures. The speakers were A. Spatharis, K. Karatheodoris, G. Dimitriadis (“geometer”), X. Zografos, D. Maliadis (lawyer), A. Vernardakis (economist) and P. Kalivoursis (physician).

In the financial report of the year (*Σύγγραμμα Περιοδικόν* vol. Ζ, 324-333) there is no mention of income or expense for scientific instruments or public lectures. The same picture is repeated in the following year’s account (1873-1874 account (*Σύγγραμμα Περιοδικόν* vol. Η, 331-336). Again, the report of the Scientific Committee (*Σύγγραμμα Περιοδικόν* vol. Η, 326-329) highlighted the lack of “collections and utensils of physics and chemistry”.

However, something seems to change by the appointment of a five-member committee, chaired by the librarian, to enrich the library, the reading room and the scientific instruments collection. Schroeder, Zoiros, Perdikidis, Vasiadis and Spatharis were elected as members of the committee (*Σύγγραμμα Περιοδικόν* vol. Η, 340).

In his lecture, the president Ir. Vasiadis (*Σύγγραμμα Περιοδικόν* vol. Η, 349-350) quoted his goals when he took the presidency one year earlier. Among them was the purchase of instruments of experimental physics and chemistry. He then explained why the objectives could not be achieved, with the sole exception of the continuation of work on the new GPAC building.

The situation was finally reversed in 1874. In a letter written on July 15, 1874 and being read at the meeting of 19 August 1874, the banker G. Zarifis informed the Association that he offered 200 Ottoman liras to the GPAC for the purchase of instruments of experimental physics and natural history tables (*Σύγγραμμα Περιοδικόν* vol. Θ, 208). Zarifis (1807-1884) is a well-known benefactor and supporter of education and science.

37. Dimitrios Maliadis was a lawyer and member of the GPAC since 1865.

His contribution to the construction of the building of the Great School of the Nation was very important, while at his own expense the beautiful wooden displays were made, which still protect the scientific instruments of the School.

The fulfillment of the desire of Zarifis took place very quickly as is revealed from a letter (*Σύγγραμμα Περιοδικόν* vol. Θ, 211) sent to GPAC from Paris³⁸ by Stefanos Stamatiadis³⁹. The letter stated that the sender, following the instructions of Spatharis had ordered the instruments and would send them within a month or so. Once again, the prestige enjoyed by Spatharis in the field of experimental physics appears. At the meeting on August 28, 1874 Spatharis took over the position of the curator⁴⁰ of the instruments collection (*Σύγγραμμα Περιοδικόν* vol. Θ, 215). It was the first of 5 consecutive years he took this position⁴¹.

The instruments were finally sent on December 2, 1874, together with a relevant list and an invoice, as Stefanos Stamatiadis informed the GPAC with a new letter (*Σύγγραμμα Περιοδικόν* vol. Θ, 220). The list was not published, but the librarian of the Association G. Hassiotis⁴² mentioned in his lecture that those were instruments mainly about electricity and magnetism, which were unfortunately so few that it could not be supported that the GPAC has an adequate equipment to teach even the simplest physics (*Σύγγραμμα Περιοδικόν* vol. Θ, 251). He added that 16 more Ottoman liras had been collected from donators (namely: A. Vlastos⁴³, D. Tamvakos⁴⁴, N. Verisis, Th. Mavrogordatos⁴⁵, St. Rallis⁴⁶, M. Negrepontis, A. Rossolimos⁴⁷, K. Vlastaris⁴⁸ and M. Kamaras⁴⁹) to buy some more “absolutely necessary” instruments about electricity⁵⁰, specifically:

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38. Once more there is a preference for instruments from French makers.
 39. No information about Stefanos Stamatiadis has been found.
 40. The position of the keeper was empty at least since 1870 because there was no collection after the fire. Before 1870, there are available data only for 1868-1869 (see: *Σύγγραμμα Περιοδικόν* vol. E, 137), because of the destruction of the archives in the fire.
 41. On 25/5/1875 Georgios Dimitriadis was elected to the position of the keeper of the instruments collection (*Σύγγραμμα Περιοδικόν* vol. Θ, 264), but he resigned on 24/11/1875 and Andreas Spatharis took his place for the year 1875-1876 (*Σύγγραμμα Περιοδικόν* vol. I, 150).
 42. Georgios Hassiotis was a teacher, a co-founder of the private Greek Lyceum and member of the GPAC since 1869.
 43. Antonis Vlastos was a banker and one of the founders of the GPAC in 1861.
 44. D. N. Tamvakos was a merchant and member of the GPAC since 1863.
 45. Theodoros Mavrogordatos was a banker and member of the GPAC since 1873.
 46. Stefanos Rallis was a banker and member of the GPAC since 1863.
 47. Athanasios Rossolimos was a merchant and member of the GPAC since 1871.
 48. Constantinos Vlastaris was a merchant and member of the GPAC since 1874.
 49. Manouil Kamaras was a merchant and member of the GPAC since 1874.
 50. Instruments are described in this text with the French terms used in the Journal and in the brackets with the terms used in the list of 1880-1881

1. Moteur électrique⁵¹ (electric motor).
2. Rumkof (sic) bobine⁵² (Ruhmkorff coil).
3. Voiture électrique avec pile⁵³ (electromagnetic locomotive with a voltaic pile).
4. Lampe de mineur¹ (probably a Geissler's lamp for mines⁵⁴).
5. Piles a bicrowates⁵⁵ (The term is wrong, the right one is "pile à bichromate⁵⁶"). This is a type of battery, also known as Grenet cell⁵⁷.
6. Barometè Breguet (Breguet barometer).

The Breguet barometer, also known as an aneroid barometer, is a handy and portable instrument, as it does not use mercury like the other barometers of the time. In the 1880-1881 list the instrument is not mentioned, but there is a Breguet thermometer⁵⁸. It is obvious that the one of the two entries is wrong. Given that the Breguet thermometer is a rather unusual instrument and not very precise⁵⁹, we can reasonably assume that it is a mistake of the inventor of the catalog and in fact the instrument was an aneroid barometer⁶⁰.

The final cost was 209.21 Ottoman liras (*Σύγγραμμα Περιοδικόν* vol. Θ, 256). There is no reference to the supplier or the manufacturer of these instruments, but it appears from another letter by S. Stamatiadis, which was sent seven years later (*Σύγγραμμα Περιοδικόν*

51. No 26 in the list of the instruments of the Association

52. No 23 and No 24 in the list of the instruments of the Association

53. No 25 in the list of the instruments of the Association

54. First: "No 34 in the list of the instruments of the Association. A Geissler's lamp can be viewed at <https://imgshack.com/img924/4026/BMwg9r.jpg>"

Second: "The possible existence of flammable gases in the mines was a permanent danger to workers who were obliged to have a source of lighting. Davy's lamp had provided a safe solution to the issue already in the early 19th century, but new ideas were constantly showing up. One of these is this particular bulb, which is essentially a Geissler cathode tube, containing carbon dioxide or, in the second phase, nitrogen and fed by a small Ruhmkorff coil. The latter is in turn fed by an electric element (e.g. Bunsen, Grenet or Daniell). The small Ruhmkorff coil, listed in the 1880-1881 catalog, probably collaborated with this lamp. The coil and the electric element were contained in a leather case carried by the worker while holding the Geissler tube. A related video is available at <https://vimeo.com/21551806> (Accessed on 15/6/2018).

This particular invention, made by the French Alphonse Dumas and Camille Benoît, was used by Julius Vern in several of his books under the rather deceptive name of "Ruhmkorff's Lamp". It is a matter of wonder if and to what extent the presence of the lamp in the works of the famous French writer played a role in its acquisition by the GPAC. See: Lazos Panagiotis, Scientific Instruments and Jules Vernes, 2nd International Conference on Science & Literature, European Physical Society, Pöllau, Austria, September 2016."

55. No 36 in the list of the instruments of the Association. There were having been bought two of them.

56. The formula of Potassium Bichromate (Διχρωμική ποτάσα) is $K_2Cr_2O_7$.

57. See: <http://leradiofil.com/pileGrenet2V.htm>

58. No 32 in the list of the instruments of the Association

59. See: <http://physics.kenyon.edu/EarlyApparatus/Thermodynamics/Thermometer/Thermometer.html>

60. See: <http://www.bom.gov.au/info/aneroid/aneroid.shtml>

vol. ΙΣτ, 338)⁶¹, that the instruments were bought by Hachette. Hachette was, and still is, a publishing house⁶², which was also active in the sale of materials for schools, including scientific instruments. Hachette collaborated with various instrument manufacturers. For this reason, the origin of the GPAC instruments cannot be identified with certainty⁶³. The relationship between the two parties seems to have lasted, as in 1879 Hachette donated 80 volumes of various books to the GPAC library (*Σύγγραμμα Περιοδικόν* vol. ΙΓ, 148). It is also worth mentioning that the great order of instruments, made by the Great School of the Nation in the school year 1879-1880, after donations by Th. Mavrokordatos and G. Koronios⁶⁴, was made again by Hachette⁶⁵. It is no coincidence that both orders were made at the suggestion of A. Spatharis.

The purchase also included a total of ninety geological, zoological and botanical tables of Comte worth 650 francs⁶⁶. The tables were intended to be used in public lectures on natural history.

For the public lectures of the year many interesting information is given to the speech of S. Mavrogenis (*Σύγγραμμα Περιοδικόν* vol. Θ, 253). A total of ninety-five lectures⁶⁷ were scheduled from November to April; about 4 each week. K. Karatheodoris held four lectures on electricity experiments, which probably had a similar structure to those of 1864 but using the new instruments. Also, Karatheodoris completed a series of three lectures on botany. A. Spatharis gave 6 lectures on “Physical Geography” and, while he had promised eleven lectures on experimental physics, he failed to do so because of personal problems.

On October 28, 1874, Joseph Oikiadis, a government official, became a full member (*Σύγγραμμα Περιοδικόν* vol. Θ, 214). Oikiadis would donate a few years later to the Great School of the Nation the refractor telescope that adorns the dome of the imposing build-

61. The sender sent the GPAC a list of the instruments purchased in 1874 (does that mean that the original list was lost?) plus a list of the instruments asked by Stamatiadis to Hachette to be given free of charge to the Association to complete the collection. No other report was found about the progress of this case.

62. It was founded in 1826.

63. Accordingly, the commission of the Great School of the Nation (Phanar Greek Orthodox College) in the school year 1880-1881 from Hachette (see: *Σύγγραμμα Περιοδικόν* vol. Ε, 101-103) includes instruments from various manufacturers such as Breton Frères (Paris), Rohrbeck, W.J. (Wien) etc.

64. G. Koronios was a banker in Paris and a member of the GPAC also since 1872.

65. Παλαμάς Γρηγόριος [Palamas Grigorios], “*Εκθεσις της πνευματικής και υλικής καταστάσεως της Πατριαρχικής Μεγάλης του Γένους Σχολής κατά το σχολικόν έτος 1879-1880*”, [Report of the spiritual and physical condition of the Patriarchal Great School of the Nation during the school year 1879-1880], 1880.

66. The set consisted of 90 tables that could be hung on a wall. A detailed description of the content of each table, but not its image can be found in the book: Comte 1869. See: <http://gallica.bnf.fr/ark:/12148/bpt6k6581267s/fl.image>

67. The Mavrogenis’ statistics on the professional status of speakers are of interest. The group of 16 speakers consisted of five physicians, three lawyers, two teachers of Greek literature, one teacher of physics and mathematics (A. Spatharis), two journalists, one “scholar merchant”, one teacher of history and philosophy and one female teacher of French language who is also a director of a school for girls.

ing and an impressive celestial sphere made by the English manufacturer Malby. Once more a devotee of scientific instruments became a member of GPAC.

During the next year, five lectures on physics were delivered by A. Spatharis (*Σύγγραμμα Περιοδικόν* vol. I, 172, 182), other five on cosmography by G. Lianopoulos⁶⁸ and two on geology by A. Tagis. There are not any further details about the lessons, but it's probable that Spatharis used the new instruments in his lectures. Besides, it is not a coincidence that after many years there are a large number of lectures exclusively on physics.

In addition, it is characteristic of what is said in the presidential lecture of A. Paspatis about the lectures (*Σύγγραμμα Περιοδικόν* vol. I, 182): "... the fruits of these lectures are the most beneficial; we need most instruments, minerals and great geographical tables". It's obvious that some kind of relevant material had been used in the public lectures. Also, the existence of a mineral collection appears to be evident for the lectures on geology.

During the collegiate year 1876-1877 there was no change in the collection. One interesting piece of information is the application for the borrowing of three optical instruments, which will be used by G. Dimitriadis in lectures given in the "εν Μεγάλω Ρεύματι Αδελφότητα", a cultural club in the village Μεγάλο Ρεύμα (today is called Arnavutköy) near Istanbul (*Σύγγραμμα Περιοδικόν* vol. IA, 155). Those instruments, for which no other information is given, should belong to the collection of scientific instruments of the GPAC. The application was accepted. A. Spatharis gave four lectures on physics (*Σύγγραμμα Περιοδικόν* vol. IA, 177-178), while from the total of thirty-eight planned lectures there were given only twenty (*Σύγγραμμα Περιοδικόν* vol. IA, 177).

The situation is not better next year (1877-1878), but rather the opposite: Of the forty planned lectures, only fifteen were held (*Σύγγραμμα Περιοδικόν* vol. IB, 125-126). No lectures by A. Spatharis were given, without giving any indication as to whether he had planned some lectures or not. In any case the absolute absence of the curator of the collection from the public lectures is surprising. Among the lectures there were two about the physiological study of milk and especially that of women. The lectures were given by the physician K. Makris and included the performance of experiments, but no more details are given (*Σύγγραμμα Περιοδικόν* vol. IB, 125-126).

The GPAC launched that year a series of lessons aimed at craftsmen which took place at the "εν Σταυροδρομίω ενοριακή σχολή της Παναγίας" every Sunday. Lessons were delivered free of charge by teachers. Among the lessons is the experimental physics, which is taught by D. Livadeas (*Σύγγραμμα Περιοδικόν* vol. IB, 134). It is unknown what kind of equipment the teacher used and to whom it belonged. It seems totally unlikely that scientific instruments were moved from the GPAC building to that school.

68. G. Lianopoulos was a teacher of physics and mathematics. He served as principal at the Commercial School of Halki Island. He also taught at the Theological School of Halki Island and in the Great School of the Nation.

In the established presidential lecture by I. Aristoklis (*Σύγγραμμα Περιοδικόν* vol. IB, 131-142), there is no mention of the scientific instruments collection, a possible result of the very difficult economic situation that the GPAC had come to and which is dealt with repeatedly in this volume of the Journal.

In the collective year 1878-1879 there is a significant improvement in the subject of lectures with A. Spatharis coming back to the forefront with seven lectures (*Σύγγραμμα Περιοδικόν* vol. IG, 163). The president of the GPAC wrote a text full of admiration for Spatharis's ability to handle the elements of nature in his lectures⁶⁹. Altogether, seventy-two public lectures were planned of which thirty-six were held. Among those canceled included two of G. Lianopoulos (*Σύγγραμμα Περιοδικόν* vol. IG, 165).

Unfortunately, the improvement was to prove temporary and only four lectures were held next year (*Σύγγραμμα Περιοδικόν* vol. ID, 202)⁷⁰, none of which was related to physics or chemistry. A. Spatharis was missing again, and the instruments remained idle. A question should be posed if the collection is adequately maintained.

The unpleasant answer is given immediately at the first meeting of next collegiate year, on 19/5/1880. when one of the subjects is that of the «grim situation» of the physics instruments (*Σύγγραμμα Περιοδικόν* vol. IE, 29-30). The conversation initially revolved around a typical subject – if the responsibility of the collection of the scientific instruments lies with the librarian or the curator of the collection. The former⁷¹ argued that, although according to the regulation he is formally responsible, the Association had overcome it by placing a curator (A. Spatharis), who had not visited the collection for the last two years⁷². In addition, he argued that, having found that the instruments had become almost useless, he had asked the president to press Spatharis to visit the collection and to make the necessary repairs or at least to give up and replace it by someone with the necessary time and willingness to offer.

69. “[...] ο κύριος Ανδρέας Σπαθάρης καταβάλλει υπό το κράτος των χειρών αυτού τα ακατάβλητα στοιχεία της φύσεως, δίδωσι τοις ανέμοις τας διευθύνσεις αυτών και τω Ηλίω τας κλίσεις των ακτίνων αυτού, ελέγχει την αστασίαν της θερμοκρασίας των εν τη αυτή γραμμή της παρατάξεως διατελούντων κλιμάτων και εν γένει άγει ημάς μετά πνοής ανέμου ανά πάσαν την υφήλιον επιδεικνύς ημίν ψύχη και δρόσους και καύσωνας, νυν δε αναβιβάζων μέχρι των άκρων κορύμβων των Άλπεων και των Κορδιλλιερών”.

70. The causes of this inactivity were “the severe winter and many serious illnesses”.

71. The position of the librarian was held by Themistokles Saltelis, who was a teacher in the Great School of the Nation and colleague of Spatharis.

72. Even if it is not true what Spatharis is attributed to, it is obvious that he gradually moved away from his rich action at GPAC. Perhaps this was due to lack of time because of his intense activity at the Great School of the Nation. It is reminded that in 1880 the School purchased a very large number of instruments. Spatharis was responsible for the order and its reception. The next year began the construction of the impressive new building, which houses the School till today, in which the entire collection of scientific instruments was transported, organized and installed. It seems reasonable that this was a huge burden on Spatharis' shoulders.

T. Karatheodoris⁷³, acting diplomatically, proposed the election of a new curator in the position of Spatharis, who "... with all his good will and his love for the Association, because of his many occupations, he does not have time to come often to the Association and to maintain the instruments". Finally, the Association decided to ask Spatharis, either by himself or by a three-member committee, to visit the collection and after checking it to propose the necessary measures for its maintenance.

In the meantime, for one more year, there is no provision in the budget for expenses related to the collection of instruments or public lectures (*Σύγγραμμα Περιοδικόν* vol. IE, 35). Six months later, the committee⁷⁴, consisting of T. Karatheodoris and G. Dimitriadis, after inspecting the scientific instruments collection, reported to the Association that its situation was not good and asked for a credit of 10 Ottoman liras to make the necessary repairs (*Σύγγραμμα Περιοδικόν* vol. IE, 40). The application was approved (*Σύγγραμμα Περιοδικόν* vol. IE, 41) and a few days later 7 Ottoman liras⁷⁵ were given for the first actions. The presidential lecture of this year informs that the committee had successfully completed its work by cleaning and repairing the instruments (*Σύγγραμμα Περιοδικόν* vol. IE, 98). Moreover, the discontinuation of public physics and chemistry lectures was attributable to the poor situation of the instruments⁷⁶.

T. Karatheodoris⁷⁷ and G. Dimitriadis replaced (*Σύγγραμμα Περιοδικόν* vol. IE, κδ) A. Spatharis and an important evolution resulting from this change was the publication of a complete and accurate list of the scientific instruments and devices possessed by the GPAC at that time (*Σύγγραμμα Περιοδικόν* vol. IE, 142). The list was published in the Journal and it is of unique value for the study of the collection and it is presented in the appendix placed in the end of this paper⁷⁸. All the instruments mentioned in the list must originate from the purchase of 1874, since there is no mention of any addition to the collection since then. It is possible, though, that some of the instruments acquired were no longer in the collection because of destruction or heavy wear.

The collection consisted of forty-three instruments and ninety natural history tables⁷⁹. The majority of the instruments were associated with electricity and electromagnetism (33 out of 43 or 77%). This indicates the direction of the GPAC towards the

73. Tilemachos Karatheodoris was engineer and regular member of the Association since 1874. He was corresponding member since 1870, when he was studying in Zurich.

74. It is unclear whether, eventually, Spatharis participated in this inspection.

75. The amount, which of course did not exist in the budget of the year, should be part of the not scheduled expenses listed in this year's report. GPAC vol. IE, 81-82.

76. The collection was described as totally neglected and almost destroyed "[...] παρηγκωνισμένη [...] και καταστρεφόμενη".

77. T. Karatheodoris was the curator of the collection until the year 1885-1886. *Σύγγραμμα Περιοδικόν* vol. Κ, λ.

78. The original published list can be viewed at <https://imgazer.imageshack.com/img923/1885/kmp6je.jpg>

79. These are the Comte tables. By comparing the number of tables with that in Comte's catalog at <http://gallica.bnf.fr/ark:/12148/bpt6k6581267s/fl.image>, it is clear that GPAC had purchased the entire series (26 botanical tables, 54 zoology tables and 10 geology tables). Fortunately, the entire series is posted on the following web addresses:

modern applications of physics. Of course, the absence of instruments for the study of heat, optics and acoustics seems rather unexplained, since they would be very useful in public lectures.

The barometer (No 40) and the air pump (No 37) were absolutely necessary devices for a typical collection of this period. The magic lantern (No 41) is a very interesting addition to the collection, since it illustrates the focus of the GPAC to the public lectures. Perhaps the light source of the magic lantern was a carbon arc lamp (No 29). However, the GPAC building had a natural gas supply, which could be an alternative light source.

The bookseller Ernest Eilemann shipped from Leipzig to GPAC a series of 7 zoological tables for public lectures, as a sample offering a significant discount to the Association if there is interest in buying the whole series (*Σύγγραμμα Περιοδικόν* vol. IE, 40). The tables made an extraordinary impression on Ir. Vasiadis, who proposed their purchase, but no final decision was made.

T. Karatheodoris presented a series of lectures (*Σύγγραμμα Περιοδικόν* vol. IE, 64-65) on modern physics issues, such as spectroscopic analysis and about the technology behind the streets lights in big cities, at GPAC meetings (not public courses), but there is no mention of performing experiments⁸⁰. Also, D. Mavrogenis presented Bell's photophone (*Σύγγραμμα Περιοδικόν* vol. IE, 94)⁸¹.

Nineteen public lectures were delivered during the year 1881-1882, of which two by A. Spatharis with issues related to the planetary system and one lecture by A. Tagis on volcanoes (*Σύγγραμμα Περιοδικόν* vol. ΙΣτ, 382). The instruments seem to have not been used, and for one more year no resources are available for instruments or lessons (*Σύγγραμμα Περιοδικόν* vol. ΙΣτ, 342-343). S. Aristarchis, chairman of the Scientific Committee, considers it necessary to buy a microscope and suggests the Harnack in Paris⁸². Interesting information is that the Association's building faced moisture problems and,

Zoology: http://www.iessagasta.edurioja.org/elsagasta/museos/laminas-historia-natural/1869_zoologia/galeria.htm

Botany: http://www.iessagasta.edurioja.org/elsagasta/museos/laminas-historia-natural/1869_botanica/galeria.htm

Geology: http://www.iessagasta.edurioja.org/elsagasta/museos/laminas-historia-natural/1869_geologia/galeria.htm

80. It is noted that the collection of scientific instruments of GPAC had equipment suitable for supporting the second lecture.

81. About the photophone see: <https://www.princeton.edu/ssp/joseph-henry-project/photophone/>

82. Edmund Harnack (1826-1891) was born in Germany and he went to work to Paris in 1847. He initially worked under the famous Heinrich Daniel Ruhmkorff, later he moved to the workshop of the optician Georg Oberhauser and in 1854 the two men began a co-operation. After the death of Oberhauser in 1860, Harnack took over the company. In 1864 he started a co-operation with the mathematician and astronomer Adam Prazmowski (1821-1885). Harnack had to leave Paris because of the war between France and Prussia and he moved to Postdam. Until 1879, when Prazmowski bought the company in Paris, the Harnack's microscopes were labeled with both locations (Paris and Postdam) and the name Harnack & Co. After that year, there was only the city of Postdam and the name Harnack in the label. It's obvious that Aristarchis didn't know in 1881 this change in the status of Harnack's company, believing that its base is still in Paris. The microscopes made by Harnack were of high quality and they enjoyed a great

after a study, 40 Ottoman liras had been credited for the necessary repairs (*Σύγγραμμα Περιδικόν* vol. ΙΣτ, 387)⁸³.

In the collective year 1882-1883, there are again no expenses reported about the collection (*Σύγγραμμα Περιδικόν* vol. ΙΖ, 200). However, for the first time, a report on the state of the collection was reported to the GPAC (*Σύγγραμμα Περιδικόν* vol. ΙΖ, 202) by the curator T. Karatheodoris. Its content was not been printed in the Journal, but it was broadly mentioned in the presidential lecture of the year.

In particular, it was stated that after the Committee's efforts, the instruments are intact and without any deficiencies but require some serious repairs (*Σύγγραμμα Περιδικόν* vol. ΙΖ, 211). In addition, T. Karatheodoris believed that it was absolutely necessary to purchase immediately additional instruments, so that GPAC could follow the recent scientific discoveries. The president expressed his hopes that there would be some financial donation in the near future for this purpose.

A. Spatharis returned with four public lectures on physics, mainly about optics (*Σύγγραμμα Περιδικόν* vol. ΙΖ, 206). There were almost no optical instruments in the 1881 list and this raises questions about whether experiments were included in Spatharis's lectures. However, the magic lantern combined with some simple materials, could be an excellent tool in the hands of an experienced experimental physics teacher such as Spatharis.

In 1883-1884 references to the instruments collection are virtually eliminated⁸⁴. In addition, Spatharis's three scheduled lectures on physics were canceled because of the speaker's illness (*Σύγγραμμα Περιδικόν* vol. ΙΗ, 99)⁸⁵. The situation did not change during 1884-1885 since it was not even mentioned any lecture by Spatharis or some other speaker about physics (*Σύγγραμμα Περιδικόν* vol. ΙΘ, 126-127).

During 1886-1887⁸⁶ A. Spatharis gave two lectures on "physics" (*Σύγγραμμα Περιδικόν* vol. Κ, 93), while it is particularly interesting to refer to two lectures by Il. Valsamakis⁸⁷ with title "About the air" and "About the solar system" with experiments in one of these, apparently the first one. Two more interesting facts are the absence of the name of Spatharis from the list of members of the Association for the year 1885-1886, and

reputation. A price catalogue of the firm can be found in: http://obsolete.musoptin.com/Hartnack_Courant_1872.html?fbclid=IwAR3ufxu2hqSgfGYWdRou6a94_mk-ptU2fqy1LcRM-tBs4geNsCbIxz8X8Fo

83. To what extent the presence of moisture is responsible for the poor state of the scientific instruments the preceding years?

84. The absence of expenses for the collection of scientific instruments is permanent in the coming years and will not be reported again in this paper.

85. A total of 21 lectures were held.

86. It was not possible to locate a report on the public lectures of 1885-1886.

87. Ilias Valsamakis was a teacher of mathematics and chemistry. He was teaching in Zografeio School since 1893. He was also a member of the GPAC since 1883 and the collection keeper for the collective year 1887-1888. He was the author of the textbook "Chemistry", printed in 1894 and used in Greek Schools in Istanbul. The reference to the experiments he used in his lecture is the first clear relevant reference after several years.

that nobody was appointed as a curator of the collection during 1886-1887 (*Σύγγραμμα Περιοδικόν*, vol. Κ, λα’).

The presence of Valsamakis and A. Spatharis in public lectures continued next year⁸⁸. Spatharis gave four lectures titled “on cosmography, about the shape of the Earth”. Valsamakis gave three lectures entitled “from physics, about weather or temperature” (*Σύγγραμμα Περιοδικόν* vol. ΚΑ, 217)⁸⁹, in which he could have used some of the instruments of the Association. He also served as the curator of the collection for that year (*Σύγγραμμα Περιοδικόν* vol. Κ, λ).

In 1887-1888 two lectures were given (*Σύγγραμμα Περιοδικόν* vol. ΚΑ, 280) by Th. Akestoridis⁹⁰ with the help of Ch. Bonkowski, professor of chemistry in the Medical School. The lectures included “chemical experiments” and they were on “Analysis from experimental chemistry”.

Vasilios Ritsos, a physician and member of the GPAC since 1887 held the position of the collection’s curator in 1888-1889 (*Σύγγραμμα Περιοδικόν* vol. ΚΑ, λβ), 1889-1890 (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, κθ), 1891-1892 (*Σύγγραμμα Περιοδικόν* vol. ΚΓ, κθ), 1908-1909 (*Σύγγραμμα Περιοδικόν* vol. ΚΓ, κγ) and 1910-1911 (*Σύγγραμμα Περιοδικόν* vol. ΔΓ, κβ). No curator is mentioned for 1890-1891 (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, λα) and no public lecture included physics or chemistry was given at this time (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, 65-66, 137-138). There were, however, two lectures by the physician P. Makris (*Σύγγραμμα Περιοδικόν* vol. ΚΒ, 137-138) with the title “On microbes after microscopic observations”. The way in which the microbes were observed was not mentioned. Possibly the magic lantern of the GPAC’s collection may have been used with ready-made samples on slides. The Association did not have a microscope. After all, observation with a microscope would not be a convenient solution for a wide audience.

A new member of the Association, the architect Fragkiskos Mavrogordatos, gave an interesting lecture in 1892 about the history of artificial lighting. During the lecture various old and new sources of artificial light were presented (*Σύγγραμμα Περιοδικόν* vol. ΚΓ, 59) and some experiments were made but no further information is given. Perhaps some of the equipment of the collection was used, such as the Geissler’s lamp.

In the year 1892-1893 Stavros Vrahamis⁹¹ was the curator of the collection. He served in this position for the longer time than anyone else, since he served in 1892-1893 (*Σύγγραμμα Περιοδικόν* vol. ΚΔ, κη), in 1893-1895 (*Σύγγραμμα Περιοδικόν* vol. ΚΕ, κη; *Σύγγραμμα Περιοδικόν* vol. ΚΣτ, κη) and in 1896-1900 (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, λ, λβ;

88. Spatharis and Valsamakis were colleagues in the private school of Chatzichristou, at least in the school year 1890-1891. See: Cervatti 1891, 567-568.

89. There were 42 lectures (39 planned and 3 out of schedule).

90. Theagenis Akestoridis was a pharmacist and was elected a member in GPAC in 1888. He graduated the Great School of the Nation in 1870 with excellent grade.

91. Stavros Vrahamis studied chemistry in the National University of Athens. He was teaching chemistry and natural history in Zografeio School since 1893. He was a member of the GPAC since 1892. See: Vetsopoulos 1969, 218-220.

Σύγγραμμα Περιδικόν vol. ΚΗ, κζ), whereas no data are given for the period 1900-1902. It is worthy of reference that since 1892-1893 the curator was no longer responsible only about the scientific instruments but also about specimens of zoology and phytology⁹². Vrahamis gave only one lecture that year about earthquakes, while no lectures with probable relevance to the collections were given by other speakers.

Vrahamis also gave one lecture the next year about “The Universe” (*Σύγγραμμα Περιδικόν* vol. ΚΕ, 123). Thirty-one lectures were scheduled but only twenty were finally given. Among them, there was a series of four lectures of Ιλ. Valsamankis about “Heat” but no experiments are mentioned (*Σύγγραμμα Περιδικόν* vol. ΚΕ, 123).

The year 1894-1895 was a richer period with quite many lectures about science (*Σύγγραμμα Περιδικόν* vol. ΚΣτ, 124). Athanasios Ioannou⁹³ gave two lectures; one about the “Causes of the earthquakes” and one “About the atmosphere and the living nature” in which some experiments were included. Ιλ. Valsamakis also gave two lectures “About hail”. Another scheduled lecture by S. Vrahamis about “Physics” was canceled. After quite many years a new instrument was added in the collection. It was a barometer donated to the Association (*Σύγγραμμα Περιδικόν* vol. ΚΣτ, 126) by Themistoklis Kosoudis⁹⁴.

Twenty public lectures were given in 1895-1896. The lecture “About electricity”, given by the engineer Ι. Β. Fachris⁹⁵, could have included experiments but no such information is given (*Σύγγραμμα Περιδικόν* vol. ΚΖ, 87). Nevertheless, in the presidential speech about the course of the GPAC during that year, the president referred that the collection was well maintained “for the shake of teaching”, even if there was no addition for quite many years (*Σύγγραμμα Περιδικόν* vol. ΚΖ, 88).

In 1896-1897 there were sixteen lectures (*Σύγγραμμα Περιδικόν* vol. ΚΖ, 165). G. Akestoridis⁹⁶ spoke “About the anesthesia with chloroform with some experiments”. The “Rontgen Rays” were presented by ΚΙ. Kokkolatos⁹⁷. According to a later reference the lecture was accompanied by experiments⁹⁸, although the Association had not the appropriate equipment according to the available information. During next year there was

92. This change may indicate a change in the priorities of the Association.

93. Athanasios Ioannou was a mathematician. He was teaching mathematics, physics and chemistry in Zografeio School where he also served as the principal in 1913-1914 and 1916-1922. He was a member of the GPAC since 1894. He wrote one textbook about organic and inorganic chemistry and two books about elemental arithmetic. See: Vetsopoulos 1969, 200-202.

94. Themistoklis Kosoudis was a merchant and one of the founders of the Association in 1861.

95. Fachris was the author of the book *Ηλεκτρομηχανική* [Electromechanics], Valentin Hilbert, Constantinople (Istanbul), 1914.

96. Giorgos Akestoridis was a physician and a member of the GPAC since 1888.

97. Kleovoulos Kokkolatos was a physician and member of the GPAC since 1891.

98. “*Ο εν Κωνσταντινούπολει Ελληνικός Φιλολογικός Σύλλογος. Πεντηκονταετηρίς 1861-1911. Παράρτημα του ΑΔ ‘τόμου*” [The Greek Philological Association of Constantinople. Fiftieth Year 1861-1911], 1913-1921, 479.

no lecture that could include experiments among the twelve given lectures (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 165).

In 1898-1899 fourteen lectures were given and the one that stood out was about the Rontgen rays given by the physician Ch. Christidis. The introduction of this lecture included elements of electricity, electric light and photography combined with experiments presented by “S. Vrahamis and Isoard” (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 210-211). Leon Isoard was teacher of physics and mathematics at Galatasaray High School and he was quite experienced in X-rays as he had taken images of his son’s hand in 1896 (Yıldırım, Ulman, Tunacı 2018, 75-91).

K. Kalkovoresis, an engineer and president of the committee about physics and mathematics, stated that the committee could not work properly without scientific instruments and a chemistry laboratory in good working order. Therefore, he asked from the curator Vrahamis a catalog of the instruments with comments about their condition. He also asked for proposals about new instruments, how they could be acquired, how a chemistry lab could be set up and how the committee could have access to them (*Σύγγραμμα Περιοδικόν* vol. ΚΖ, 204). This is the first mention about recording of the instruments after the catalogue of 1880, eighteen years earlier. Nevertheless, there is no information about Vrahamis’s response to this request.

During 1899-1900 thirty-eight public lectures were given. A. Spatharis reappeared and gave two of them, entitled “About the Calendar” and “Easter and seasons in Byzantine times” (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 26)⁹⁹. Those were his last lectures in GPAC. The president of the GPAC noted that the Association had missed Spatharis’s lectures for quite many years. The bureau decided to make him an honorary member in 6/11/1900 on the occasion of completion of 40 years of teaching (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 34). Few months later Spatharis died (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 38).

Next year only ten lectures were given but no one was relevant to physics or chemistry (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 49). This is exactly what also happened in 1901-1902 (twenty eight lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΗ, 80-82), in 1902-1903 (seventeen lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΘ, 29), in 1903-1904 (thirteen lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΘ, 59), in 1904-1905 (twenty six lectures) (*Σύγγραμμα Περιοδικόν* vol. ΚΘ, 91-92) and in 1905-1906 (fourteen lectures) (*Σύγγραμμα Περιοδικόν* vol. Λ, 38-39). It is not a surprise that the president Christos Chadzichristou did not mention the collection at all in his annual lecture for 1905-1906 (*Σύγγραμμα Περιοδικόν* vol. Λ, 35-45).

The president L. Limarakis informed the Association in his annual speech that during 1906-1907 a committee was formed in order to decide which instruments are broken or are out of order (*Σύγγραμμα Περιοδικόν* vol. Λ, 87). He also noticed that the repair seemed impossible for quite many of them. The results and the members of the committee were not published somewhere though. Nineteen lectures were given, again with

99. It is obvious that no experiments could have been included.

no experiments (*Σύγγραμμα Περιοδικόν* vol. Α, 84). The committee for physics and mathematics was not formed because there were no members at all (*Σύγγραμμα Περιοδικόν* vol. Α, 49).

In 1907-1908 no one of the twenty-one lectures could have included experiments (*Σύγγραμμα Περιοδικόν* vol. ΑΑ, 80-81). The president gave some interesting pieces of information in his annual speech (*Σύγγραμμα Περιοδικόν* vol. ΑΑ, 79), namely that the committee for physics and mathematics didn't work at all ("it gave no signs of life"), the curator of the collection hadn't delivered his annual report and finally that the Association had planned to repair the magic lantern ("electrical projector") but they hadn't found the necessary amount of money. The president stressed that this device was too useful for the lectures, so it is obvious it was used quite often, in fact it should have been the most frequently used device of the collection.

Fourteen lectures were given in 1908-1909, all dedicated to medicine, literary and history (*Σύγγραμμα Περιοδικόν* vol. ΑΒ, 38-39). Α. Ιοαννου taught "Physics and Chemistry in the industry and the arts" in a series of nine public lessons.¹⁰⁰

The absence of experiments continued in the twenty six public lectures given in 1909-1910 (*Σύγγραμμα Περιοδικόν* vol. ΑΒ,75) but it must be stressed the one entitled "About comets in general and Halley's comet in particular" given by S. Stamatiadis¹⁰¹. Obviously, the pass of the famous comet near Earth in 1910 was the cause of that lecture. Α. Ιοαννου taught an unknown number of public lessons about chemistry and physics, again without any mention to experiments. There were twelve lectures in 1910-1911, all irrelevant with the collection (*Σύγγραμμα Περιοδικόν* vol. ΑΓ, 21-22).

After volume ΑΓ the publication of the Journal was banned. Nevertheless, an appendix of the volume ΑΔ of the journal was printed for the 50 years of the GPAC (1861-1911) but the rest of the volume was never printed. Thanks to this appendix, it is known that there were nine lectures in 1911-1912, three lectures in 1912-1913 and nine lectures in 1913-1914¹⁰². Among those lectures was one given by N. Kalamartzis¹⁰³ entitled "About wireless telegraphy with experiments". There is no information about the existence of such telegraphy in the collection of the GPAC. Perhaps the necessary equipment was

100. The public lessons must not be confused with public lectures. The former were a series of lessons on a specific theme and they were introduced in order to ensure a solid and useful body of knowledge for the participators.

101. Stamatis Stamatiadis studied agriculture, chemistry and mathematics in France. He was also known by the nickname Eliseos Gianidis and was one of the pioneers for the introduction of the vernacular language in the education.

102. "Ο εν Κωνσταντινούπολει Ελληνικός Φιλολογικός Σύλλογος. Πεντηκονταετηρίς 1861-1911. Παράρτημα του ΑΔ 'τόμου', [The Greek Philological Association of Constantinople. Fiftieth Year 1861-1911], 1913-1921, 486.

103. Nikolaos Kalamartzis was a mathematician. He was born in Siatista and he studied math in the National University of Athens. After teaching some years in schools in Siatista and Kozani he moved in Istanbul in 1911. He taught math and physics in Zografeion School, in Great School of Nation, in the National Lyceum, in the Ioakeimio School for girls, in the Zappeio School for girls and in the Kentriko School for girls. He served, also, as the principal of Zografeion School and of the National School of Languages and Commerce.

part of the physics laboratory of Zografeion School or the Great School of the Nation where he was teaching since 1911.

There is no available information about the lectures or the collection after 1914. However, the First World War brought many difficulties to the everyday life in Istanbul, particularly for the Greek community. In such an environment it seems improbable that there would be any notable usage and maintenance of the collection.

Conclusions

The Greek Philological Association of Constantinople has, since its foundation, set out as one of its main objectives to promote and disseminate scientific knowledge. Public lectures were one of the most important tools in this effort. For lectures on physics and chemistry, it was considered absolutely essential to present experiments, and thus to create a well-equipped scientific instruments collection¹⁰⁴. Indeed, with the help of donations, there were 2 large purchases of instruments from French manufacturers. The first was completed in 1864 and was used quite often in the lectures of the following years, until it was totally destroyed by the fire of 1870. The second one took place in 1874, and it was used in several public lectures, but rather fragmentary, until the middle of the decade 1880-1890. After that the collection was gradually abandoned and finally almost fallen into disuse.

It is not easy to value both the effectiveness of using the instruments in public lectures and their contribution to the diffusion of scientific knowledge to the audience. Surely, the average number of public lectures per year almost never reached the level that the founders of GPAC would like. On the other hand, it seems that the audience was more than satisfied from the content and the scientists who devoted time and effort to those lectures, such as A. Spatharis, K. Caratheodory, T. Karatheodoris etc.

It was not, however, an easy task. The persistent economic tightness and the direction of the minimal available resources to the most important and urgent objectives (mainly to the support of schools in the Greek communities) was a permanent obstacle for the enrichment and operation of the collection of scientific instruments. We must not forget that both the purchase and the maintenance in an operational situation of such a collection have an increased cost, while the total destruction of 1870 increased the problem to the utmost. As a result, there are numerous references in the Journal in which many of the instruments are described as damaged and broken but no action is taken. It is also common that an amount of money for the collection can be found in the budget of the Association but not in the final balance (*Σύγγραμμα Περιοδικόν*, vol. Λ, p. 47; *Σύγγραμμα Περιοδικόν*, vol. ΛΒ, p. 9).

104. The significance given by the Association to the scientific instruments is also apparent from the references made to them in the review of the history of the GPAC published in Vol. IB, 8, 18.

The lack of a permanent and salaried curator was a second important reason for the under-operation of the collection. The almost permanent absence of written reports by the curators is indicative of the problem. Only one paid employee would be a safe solution for the permanent maintenance of the collection at a high operational level. Of course, when it was not always possible for the Association to ensure the financial resources for a salaried librarian, it is clear that a salaried curator would be a luxury for the less important and less frequently used collection of scientific instruments.

Moreover, the absence of numerous GPAC members with the necessary experience with the laboratory and teaching experimental physics and chemistry -like physics and chemistry teachers¹⁰⁵- is another cause for the not satisfying use of the collection. The GPAC had a scientific committee that later changed its name to committee about physics and mathematics. As long as this committee had enough active members there were enough lectures with experiments too. But after 1895 the committee practically paused to work (*Σύγγραμμα Περιδικόν* vol. ΚΗ, 29; *Σύγγραμμα Περιδικόν* vol. Λ, 58; *Σύγγραμμα Περιδικόν* vol. ΛΑ, 79¹⁰⁶; *Σύγγραμμα Περιδικόν* vol. ΛΒ, 38)-even if it theoretically continued to exist- and this caused problems to the use of the collection as well. Especially after 1900 almost all the curators were physicians (Table 1), whereas some years there was no curator at all. The lack of lectures devoted to experimental physics and chemistry during the same period empowers this argument. It must be also noted that, as it results from the various presidential speeches, the references to the necessity and significance of the collection of the scientific instruments gradually diminished and finally disappeared as the GPAC turned its attention to other fields, like biology and medicine while its basic field remained history, literary and geography.

Table 1:

The curators of the collection of scientific instruments of the GPAC.

Year	Curator	Profession	Member since
1868-1869 ¹⁰⁷	Ioannis Aristoklis	History and Philosophy Teacher	1861
1869-1870	Not mentioned	-	-
1870-1871	Not mentioned	-	-
1871-1872	Not mentioned	-	-
1872-1873	Not mentioned	-	-
1873-1874	Not mentioned	-	-

105. A. Spatharis was not only a teacher of physics and mathematics at the Great School of the Nation. He had undertaken the responsibility of maintaining, adjusting and keeping in working order the instruments of the School's laboratory. After some years of teaching in the School, he was receiving an extra amount of money for this duty. See: Palamas 1880, p. 157.

106. The committee "showed no signs of life".

107. *Σύγγραμμα Περιδικόν* vol. Δ, 201.

Table 1: (continued):

The curators of the collection of scientific instruments of the GPAC.

Year	Curator	Profession	Member since
1874-1875	Not mentioned	–	–
1875-1876 ^{108,109}	Georgios Dimitriadis (March-November 1875) Andreas Spatharis (November 1875–1876)	Geometer - Math and Physics Teacher	1866 - 1864
1876-1877 ¹¹⁰	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1877-1878 ¹¹¹	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1878-1879 ¹¹²	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1879-1880 ¹¹³	Andreas Spatharis	Math, Physics and Chemistry Teacher	1864
1880-1881 ¹¹⁴	Tilemachos Karatheodoris & Georgios Dimitriadis	Engineer & Geometer	1874 & 1866
1881-1882 ¹¹⁵	Tilemachos Karatheodoris	Engineer	1874
1882-1883 ¹¹⁶	Tilemachos Karatheodoris	Engineer	1874
1883-1884 ¹¹⁷	Tilemachos Karatheodoris	Engineer	1874
1884-1885 ¹¹⁸	Tilemachos Karatheodoris	Engineer	1874
1885-1886 ¹¹⁹	Tilemachos Karatheodoris	Engineer	1874
1886-1887	Not mentioned	-	-
1887-1888 ¹²⁰	Ilias Valsamakis	Math and Chemistry Teacher	1883
1888-1889 ¹²¹	Vasilios Ritsos	Physician	1887
1889-1890 ¹²²	Vasilios Ritsos	Physician	1887
1890-1891	Not mentioned	–	–
1891-1892 ¹²³	Vasilios Ritsos	Physician	1887

108. *Σύγγραμμα Περιοδικόν* vol. Θ, 264.109. *Σύγγραμμα Περιοδικόν* vol. I, κδ.110. *Σύγγραμμα Περιοδικόν* vol. ΙΑ, κδ.111. *Σύγγραμμα Περιοδικόν* vol. ΙΒ, κγ.112. *Σύγγραμμα Περιοδικόν* vol. ΙΓ, κγ.113. *Σύγγραμμα Περιοδικόν* vol. ΙΔ, κδ.114. *Σύγγραμμα Περιοδικόν* vol. ΙΕ, κδ.115. *Σύγγραμμα Περιοδικόν* vol. ΙΣΤ, κδ.116. *Σύγγραμμα Περιοδικόν* vol. ΙΖ, κδ.117. *Σύγγραμμα Περιοδικόν*, vol. ΙΗ, ρ. κδ.118. *Σύγγραμμα Περιοδικόν*, vol. ΙΘ, ρ. κδ.119. *Σύγγραμμα Περιοδικόν*, vol. Κ, ρ. λ.120. *Ibid.*, λ'.121. *Σύγγραμμα Περιοδικόν*, vol. ΚΑ, ρ. λβ.122. *Σύγγραμμα Περιοδικόν*, vol. ΚΒ, ρ. κθ.123. *Σύγγραμμα Περιοδικόν*, vol. ΚΓ, ρ. κθ.

Table 1: (continued):

The curators of the collection of scientific instruments of the GPAC.

Year	Curator	Profession	Member since
1892-1893 ¹²⁴	Stavros Vrahamis	Chemist	1892
1893-1894 ¹²⁵	Stavros Vrahamis	Chemist	1892
1894-1895 ¹²⁶	Stavros Vrahamis	Chemist	1892
1895-1896 ¹²⁷	Alexandros Efstathianos ¹²⁸	Math Teacher	1893
1896-1897 ¹²⁹	Stavros Vrahamis	Chemist	1892
1897-1898 ¹³⁰	Stavros Vrahamis	Chemist	1892
1898-1899 ¹³¹	Stavros Vrahamis	Chemist	1892
1899-1900 ¹³²	Stavros Vrahamis	Chemist	1892
1900-1901	Not mentioned	–	–
1901-1902	Not mentioned	–	–
1902-1903 ¹³³	Athanasios Ioannou	Math, Physics and Chemistry Teacher	1894
1903-1904 ¹³⁴	Periklis Tiverios ¹³⁵	Physician	1903
1904-1905 ¹³⁶	Periklis Tiverios	Physician	1903
1905-1906 ¹³⁷	Periklis Tiverios	Physician	1903
1906-1907 ¹³⁸	Dimitrios Varsamis ¹³⁹	Physician	1904
1907-1908 ¹⁴⁰	Vallianos Kombothekras ¹⁴¹	Physician	1905
1908-1909 ¹⁴²	Vasilios Ritsos	Physician	1887

124. *Σύγγραμμα Περιοδικόν*, vol. ΚΔ, p. κη.

125. *Σύγγραμμα Περιοδικόν*, vol. ΚΕ, p. κη.

126. *Σύγγραμμα Περιοδικόν*, vol. ΚΣτ, p. κη.

127. *Σύγγραμμα Περιοδικόν*, vol. ΚΖ, p. κθ.

128. Alexandros Efstathianos was a mathematician and he was teaching in Zografeion School since 1901-1902. He was a member of the GPAC since 1893. Efstathianos wrote the textbook: *Στοιχειώδης αριθμητική* [Elemental Arithmetic], Τυπογραφείο Παλλαμάρη, Constantinople (Istanbul), 1899.

129. *Σύγγραμμα Περιοδικόν*, vol. ΚΖ, p. λ.

130. *Ibid.*

131. *Σύγγραμμα Περιοδικόν*, vol. ΚΖ, p. λβ.

132. *Σύγγραμμα Περιοδικόν*, vol. ΚΗ, p. κζ.

133. *Σύγγραμμα Περιοδικόν*, vol. Λ, p. κβ.

134. *Σύγγραμμα Περιοδικόν*, vol. ΚΘ, p. κγ.

135. Periklis Tiverios was a physician and member of the GPAC since 1903.

136. *Σύγγραμμα Περιοδικόν*, vol. Λ, p. κβ.

137. *Ibid.*

138. *Σύγγραμμα Περιοδικόν*, vol. Λ, p. κγ.

139. Dimitrios Varsamis was a physician and member of the GPAC since 1904.

140. *Σύγγραμμα Περιοδικόν*, vol. ΛΑ, p. κγ.

141. B. Kombothekras was a physician and member of the GPAC since 1905.

142. *Σύγγραμμα Περιοδικόν*, vol. ΛΑ, p. κγ.

Year	Curator	Profession	Member since
1909-1910 ¹⁴³	Dimitrios Varsamis	Physician	1904
1910-1911 ¹⁴⁴	Vasilios Ritsos	Physician	1887
1911-1912 ¹⁴⁵	Kleovoulos Kokkolatos	Physician	1891

Besides, the incomplete and fragmented use of collections of scientific instruments was probably the norm in most of Europe's educational institutions, even in those that did not lack financial resources (Brenni 2012, 191–226). It is not possible, therefore, to judge strictly an Association which, even if it did not have inexhaustible resources, acquired a collection of scientific instruments earlier than the University of Constantinople and almost all the schools in Istanbul¹⁴⁶.

This was, in fact, the most important contribution of GPAC: It presented a solid model for the experimental teaching of physics and chemistry; a model that faithfully followed all the Greek schools in Istanbul in the years to come. The Great School of the Nation (1866-1867, 1878-1879 and 1880-1881), the Zappeion Girls' School (1875), the Zografeio School (1893) and the Theological School of Halki Island (some when after 1870) were equipped with more or less rich collections of scientific instruments, thus providing an adequate infrastructure for the teaching of science to the pupils and students of the Greek community.

It should be noted that nowadays the collection is ignored. The decision of the GPAC to donate the whole collection to the Central Girls School of Stavrodromiou (Κεντρικό Παρθεναγωγείο Σταυροδρομίου) is mentioned,¹⁴⁷ but doubts are expressed (Giannakopoulos 1998, 380), as to whether the donation had been completed. Moreover, no other evidence has been found that the Central Girls School ever received those instruments. Most probably, the collection had the same fate as all GPAC's movable and immovable property, which were seized in 1925 by the Turkish state and their present condition and location are unknown. Finding them would give the researchers a great opportunity to understand better the action of the GPAC.

143. Ibid., κδ.

144. *Σύγγραμμα Περιοδικόν*, vol. ΑΓ, p. κβ.

145. Ibid., 12.

146. Only the Commercial School in Halki Island should have earlier purchased instruments about Experimental Physics, since this lesson was taught as soon as 1841. "Πρόγραμμα ιστορικών της ανέκαθεν οικοδομής του κατά την Χάλκινη Ελληνικού Φροντιστηρίου και της ενεστώσεως αυτού καταστάσεως εκθετικών", [Historical Programme of the Greek Tutorial in Halki Island and report of its current situation] 1841, 12. We also have some reservations about the Robert College and some French private schools.

147. "Λογοδοσία Μηνά Αυθεντόπουλου, προέδρου του εν Κωνσταντινουπόλει Ελληνικού Φιλολογικού Συλλόγου", [Reports of Mina Afthentopoulou, president of GPAC] 1972, 94.

Appendix

Κατάλογος των εν τη οργανοθήκη του ΕΝ ΚΠ. Ελληνικού Φιλολογικού Συλλογού Οργάνων

1. Ηλεκτρική μηχανή Van Marum
2. Ηλεκτρικόν ωόν
3. Βολτάμετρον του Faraday ήτοι όργανον προς αποσύνθεσιν του ύδατος
4. α' Ράβδος εκ ξύλου μελανού
β' Ράβδος εκ ερυθρού ισπανικού κηρού
γ' Ράβδος εκ ρητίνης
δ' Ράβδος εκ υέλου
5. α' και β' Ηλεκτροφόρον
6. α' Εκκενωτής
β' και γ' Λαβαί εκκενωτού
δ' Σφαίρα μεταλλική
ε' Δίσκος μεταλλικός
7. Ηλεκτρική συστοιχία λαγήνων εξ
8. Τράπεζα μονωτήρ
9. Λάγηνος μετά κινητού οπλισμού (Ελλειπής)
10. α' Λουγδουνική λάγηνος
β' Λουγδουνική λάγηνος
γ' Λουγδουνική λάγηνος
δ' Λουγδουνική λάγηνος σπινθηροβολούσα
11. Μαγική πλαξ
12. Ηλεκτρική χάλαζα
13. Συμπυκνωτικόν ηλεκτροσκόπιον του Βόλτα μετά του δίσκου αυτού
14. Ηλεκτρικόν τύμπανον
15. Υελοτρυπητήρ
16. Αλύσεις δύο
17. Ηλεκτρικός όλμος
18. Ηλεκτρική λυχνία οιοσπνεύματος
19. Γενικός εκκενωτής του Henley
20. Στατήρ μεμονωμένος φέρων δίσκον
21. Βάσις οργάνου κυλινδρική
22. Στατήρ μετά δρομέων
23. Ηλεκτρομαγνητική μηχανή του Ruhmkorf
24. Ηλεκτρομαγνητική μηχανή του Ruhmkorf μικρά
25. Ηλεκτρομαγνητική άμαξα
26. Ηλεκτρομαγνητική κινητήριος μηχανή

27. Ηλεκτρομαγνήτης πεταλοειδής μετά οπλισμού
 28. α', β' Σύστημα διά τον άνω ηλεκτρομαγνήτη
 29. Λύχνος ηλεκτρικός εξ ανθράκων
 30. Τηλεγραφικός χειριστής Breguet
 31. Τηλεγραφικός δέκτης Breguet
 32. Θερμόμετρον του Breguet
 33. Επτά σωλήνες του Geissler
 34. Λύχνος του Geissler διά μεταλλουργεία
 35. Τεσσαράκοντα στοιχεία του Bunsen, το εν ελλειπές
 36. Δύο στοιχεία διχρωμικής ποτάσεως μετά 26 τεμαχίων ψευδαργύρου
 37. Αεραντλία επί τραπέζης
 38. Συσκευή προς παρασκευήν αερίου
 39. Σωλήν διά το αέριον της άνω συσκευής
 40. Βαρόμετρον του Fortin
 41. Φανός δι'οπτικής προβολάς
 42. Πλεγμάτιον εκ πλατίνης
 43. Σωλήν μετ' ερυθρού οινόπνεύματος
- Έτι υπάρχουσι σύρματα χάλκινα μεμονωμένα και μη, 3 χοάνοι υέλινοι, αγγεία, φιάλαι κτλ.

Πίνακες φυσικής ιστορίας

Βοτανικής 1-26

Γεωλογίας 1-10

Ζωολογίας 1-54

Εν Κων/πόλει τη 10/22 Νοεμβρίου 1880

Τ. ΚΑΡΑΘΕΟΔΩΡΗΣ

Γ.Α.ΔΗΜΗΤΡΙΑΔΗΣ “

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PICNIC AT HANGING ROCK: FICTION IN A TIME AND AT A PLACE

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Relevant literary theory

The text, *Picnic at Hanging Rock* is complex. As a literary text it is a message transfer from sender to receiver Wells (1981) and its meaning is a continuing debate Fish (1980). *Picnic at Hanging Rock* seems to defy the kernel of text-determined theory, that is, according to Mishler (1979) that a text is independent of context. Its complexity is such that its interpretation is determined by understanding and the complicated elements of time in the story make it difficult to expect there will be a constant and stable core interpretation. Because of the various time elements absolute meaning seems illusive, despite Poulet's (1959) insistence that the text is a network of relations forming a central core of meaning.

Picnic at Hanging Rock is rather a text which constitutes its own objects, following Isner (1978). Thus meaning is unstable, Reid (2009) with its meaning emerging from each reader's known Wisner (1985). Meaning therefore is multi-faceted, Tulviste (1986). *Picnic* is sometimes authoritative discourse which is transmission, a term identified by Bakhtin (1929), for example in segments from newspaper reports. At other time it is artistic discourse, with its elaborate descriptions of the environment, drawing stimuli from the external physical world. These elaborate descriptions stimulate the reader's artistic perspective, Lowenfeld (1964).

There is complex and contradictory ideology in the text. It despises materialism yet admires and seeks wealth. It does this through a peculiar conjecture of concrete and abstract, Terry Eagleton (2003). Throughout there is a system of symbolic negations through the manifestation of the rock as a physical monster, Francesco Orlando (1978). There are male heroes such as Albert and Michael, and a female monster in the guise of Mrs Appleyard, the principal, who may well have been Albert and Sara's headmistress at the Orphanage, years earlier, and perhaps Sara's murderer. The reader will likely have her or his own suppressed heroes and monsters awakened during the unfolding of *Picnic at Hanging Rock*.

It is said by some that the genre of science fiction includes texts about an imagined future event, (*Cambridge Dictionary of English*) and *Picnic at Hanging Rock* is a text about an event in the past. Nevertheless, it deserves to be included within the genre of science

fiction following the inclusive definition of Bruce Sterling (n.d.). Sterling identifies science fiction as a form of fiction that deals principally with the impact of actual or imagined science upon society or individuals. The science impacting upon the individuals in *Picnic at Hanging Rock* can be identified as the metaphysical conundrums of identity and the nature of reality. As in much of the work of Philip Kindred Dick, *Picnic at Hanging Rock* depicts the psychological struggles of characters trapped in illusory environments. For example, all of the Appleyard schoolgirls are trapped in the illusory environment of St Valentine's Day. Mrs Appleyard, the headmistress, is ensnared within the comfort of brandy. The Honourable Michael Fitzhubert struggles with his dreams of the beautiful blonde woman and Albert the coachman is caught by the haunting memory of incarceration in Ballarat Orphanage with his little sister.

On St Valentine's Day, 1900, The Rock, is the environmental impetus which causes the discomfiting consequences upon the characters. The consequences for the various characters are radically different. There is death for some, for example, Mrs Appleyard, the orphan Sara, the junior teacher Dora Lumley and Dora's brother. On the other hand, for Albert and Michael, and the girls whose parents remove them from the College, there is release from the physical and societal environment of the Victorian countryside. The speculation in *Picnic at Hanging Rock* is not resolved and the sense of dread engendered by The Rock is as eerie and 'spooky' at the end as it is at the beginning.

Aesthetic and societal aspects of the environment

The stark differences in Australian society in 1900 are revealed through a subtle comparison of the lifestyle of the Fitzhuberts with that of their servants. This provides authenticity to the narrative.

The Fitzhubert family is met at The Rock picnic ground on Valentine's Day, the same day as the schoolgirls' picnic there. Colonel and Mrs Fitzhubert are members of the English aristocracy, with their family connections traceable back to the Battle of Agincourt. They have settled in Melbourne and attempt to create their known English lifestyle in Australia. They have a city house as well as a country estate, Lake View, which they inhabit during the summer. Their nephew, the Honourable Michael Fitzhubert is holidaying with them. He is fresh out of Cambridge University and very aware that his family is one of the oldest and richest families in England. The Fitzhuberts have established enviable social ties with administrative personnel in Australia, for example, the Victorian Lieutenant Governor is a regular guest. By contrast, their servants have a very different background. For example, the Fitzhubert's coachman, Albert Crundall, was brought up in a Ballarat orphanage, with his sister, with whom he has lost contact. Albert's mother deserted her husband and children for a sailor in Sydney. The father subsequently left both children to be cared for

by the Ballarat Orphanage. Albert is unsure of his surname because his father changed it frequently to evade trouble with the police.

Also by way of contrast, Michael has the security of 500 years of ancestry and sees his own ancient name as a valuable personal possession. Albert however, sees no difference in names; to him one is the same as another. Albert's enduring memory of his life in the orphanage is of his little sister having her head shaved by the headmistress, as punishment.

Colonel Fitzhubert, his wife and Michael, together with Albert Crundall, their coachman, are picknicking at Hanging Rock on Valentine's Day 1900, when the Appleyard School party arrives at the Picnic grounds.

Behaviour borne out of class is evident in the way Albert and Michael respond to women. For example, Albert whistles the schoolgirls and refers to them as "shielas" while Michael rebukes him saying, "Nice girls don't like being whistled". However, Albert is not convinced, replying, "Shielas is all alike when it comes to fellers". The two men have different preferences for women stereotypes, for example Albert "Wants another look at them shielas – especially that beaut little one with the black curls". Michael, on the other hand, fantasises over the "tall pale girl with the straight yellow hair". Despite their different backgrounds, the two young men become firm friends, each admiring the differences in the other.

The narrative demonstrates a continual underlying contrast of life in Australia with life in England, frequently from the differing perspectives of Albert and Michael. Michael is shocked that the four school girls are allowed on their own to climb on The Rock, but he reminds himself that 'This is Australia where anything can happen, whereas in England everything has been done before, quite often by one's ancestors.

Time dimensions of the environment

Time is of central importance in the narrative of *Picnic at Hanging Rock* and it is the distortion of time which clearly establishes the narrative within the genre of science fiction. The text travels through at least three different time zones: human-made reality, supernatural illusory space and environmental actuality. Characters lose count of time.

Human-made time is frozen when so many clocks and watches stop. Mr Hussey, the coach driver is the first to lose time, saying "My old ticker seems to have stopped dead at 12 o'clock". There is illusion in this statement, because his watch only 'seems' to have stopped, and there is a peremptory foreboding in the word 'dead'. The student Miranda says she no longer wears her watch because she "...can't bear to hear it ticking above her heart". Extraordinarily, Miss McGraw's watch has stopped at 12, too, and she exclaims that "...it is the first time it has ever stopped". So the stopping of the human-made time pieces begin to destroy the sense of time orientation.

Clock time initiates insecurity when Mrs Appleyard, the headmistress, plays patience awaiting the late return of the Picnic party. The striking of the grandfather clock through 8 o'clock, ½ past 8 and then ½ past 10 increases the tension, until eventually the coach returns without Miss McCraw and three of the girls, and the hoarse voice of Mr Hussey announces, "Something terrible has happened" and "Nobody knows what's happened".

After the girls and Miss McCraw are missing, time takes on a deeper urgency and time cues are introduced as the days after the event, for example, 'the 2nd day', 'the 3rd day', 'the 4th day' and so on. Questioning by police reveals a lack of awareness of time, for example, the policeman's question: 'What time?' is met with the reply, 'I didn't look at my watch' and "Round about..." This increases the undercurrent of uncertainty.

The date of the picnic is Saturday 14th February, 1900, and the narrative is initially telescoped within this date. St Valentine's Day associated with romance and the receipt of anonymous tributes from love-sick admirers. St Valentine takes on the persona of a real person when the girl Miranda exclaims, "He's a darling – sends people gorgeous cards with tinsel and real lace". The girls raise a cheer to St Valentine, drink his toast in lemonade and eat a St Valentine's Day cake. St Valentine is the answer to all problems for everyone, except Mrs Appleyard, the headmistress, who strenuously disapproves of St Valentine and his 'ridiculous messages'.

As if in contrast to the girls' St Valentine obsession, Miss Greta McCraw, the maths teacher's fixation is on another legendary hero, Pythagoras. She speaks enthusiastically of Pythagoras' theory of angles and triangles. On the journey to The Rock she suggests to Mr Hussey, the driver of the 5-horse buggy, that they should make the return journey via a different route, along the hypotenuse. This conversation vaguely pre-empted the sudden disappearance of Miss McCraw, who is last seen at the picnic sitting under a tree, reading, and then suddenly vanishes, with nobody seeing her walking away.

The physical environment is actualised, for example, as, the coach driver, Mr Hussey, gives factual information about the Rock, during the coach journey. He explains its height of more than five hundred feet, its volcanic origin and its composition of several monoliths aged millions of years.

The physical setting of the Australian bush is emphasised through the technique of contrast, for example, from the perspective of Michael, who observes that, 'the closely-drawn shutters of the Australian bush night are a stark contrast to the orderliness' of his ancestral English home, Haddington Hall. Michael's observation indicates there is a predictability of England's natural environment as distinct from the unpredictability of the Australian bush environment.

The actualisation of the natural environment gives way to supernatural illusory time and space. Uncertainty is embedded in the way the coach enters The Rock's picnic grounds, where "the five bay horses drawing the coach are guided through the gate, moving from the known dependable present into the unknown future". This uncertainty continues with the description of the environment, for example, "violet shadows pass

across The Rock's secret face", the forest has a "green gloom" and the night is "restless and windy". These images place the narrative in an environmental time bubble, not unlike that of the complicated hyperspace bubble, following Michael Sherman (1961).

During the search for the missing girls and teacher the search dog suddenly stands on a circular platform on The Rock and bristles and growls for ten minutes yet the searchers see nothing. What is it that disturbs the dog yet remains hidden from humans?

The Rock is a 'crawling monster'. It casts long shadows and darkness seeps out of it as if it were a bleeding body. Its shadow 'creeps down' towards the picknickers. As night falls 'The Rock presses unseen against a starless sky'. This powerful personification transforms The Rock into an enfolding time telescope. It is augmented by another powerful device: silence. The girl, Edith, comments upon the quiet of the picnic grounds saying 'How dreadfully quiet it is out here, we might be the only living creatures in the whole world'.

The characters themselves have extraordinary experiences with the supernatural through their various different time and reality orientations. Physical reality slides into the supernatural throughout the narrative. For example, after Edith, the only girl who is found, has recovered from her ordeal of being on The Rock, her only memory is of a 'funny looking cloud' of a 'nasty red colour' and below the cloud the vision of Miss McCraw, the maths teacher, walking up the hill without her skirt, wearing only pantaloons.

Michael Fitzhubert's complex and ambiguous character is noticed by the police. As a result they question closely question his friend, Albert Crundall, about what Michael was doing after the girls walked up The Rock. Albert states that he was surprised to find Michael sitting on a log and the girls nowhere to be seen. Albert testifies that Michael rode home on the white Arab pony, sometimes ahead of the Colonel's wagonette and sometimes behind. Michael was not actually seen by Albert throughout the entire homeward journey, but Albert is sure they all arrived at Lake View at the same time, because Albert's dinner had been saved. This does not seem a particularly convincing reason for Albert's certainty.

The intriguing space of Michael's dreams and thoughts reveals Michael wondering about the tall pale girl with straight yellow hair and his vision of her skimming over the water like a swan. Michael's recurring nightmare is the image of a swan that he is chasing on a lake, yet always disappears before he can touch her. This swan is actually the metamorphosis of the girl with golden hair, Miranda, whose mother owns a vast cattle property in Queensland. Miranda is the girl who boldly takes the lead in the walk up The Rock, and is never seen again, except in Michael's thoughts. Michael's thoughts and dreams result in a time compression intersecting past and present.

Engendered dimensions of environment

Picnic at Hanging Rock could well be seen as having characteristics of early feminist narrative. It was first published in 1967 and is set in 1900. In keeping with Australian social mores of the 1960's female sexuality is expressed in veiled terms and innuendo rather than explicit or blatant vocabulary. The use of physical environment and movement to communicate the awakening of female sexuality marks an important stage in the development of Australian literary practice.

The four girls who ask permission from the French teacher to leave their classmates and walk to The Rock itself are Miranda, described as a "Botticelli angel from the Uffizi", Irma Leopold, "a wealthy heiress", Marion Quade, a student with particular facility in mathematics, and the youngest girl, Edith Horton, identified as "the College dunce". Permission is granted by the French teacher, "after a moment's hesitation". The hesitation signals apprehension and pre-empts evil.

The girls begin The Rock climb by following the creek upstream to a pool four-feet deep, according to the ruler calculations made by Marion Quade. There are no stepping stones over this pool so the girls jump the fast-flowing stream leading into it, without incident. Ahead of them Hanging Rock rises up as if it is a phallic symbol, described as a 'splendid spectacle golden and deep violet'. Miranda is said to "tilt her head back towards the glittering peaks" as if she is a willing participant in an anticipated sexual act. The four girls walk slowly as the "earth groans making creakings and shudderings". The girls observe the "peaks" of the rock where there are no tracks, maidens excited yet afraid of the anticipated experience. Fear is shown in Edith's "white face" when she experiences the "pain of ferns pricking her legs". She doesn't want to continue and begins to whimper. Miranda "knows they must not go further", yet at each step 'the prospect of continuing grows more enchanting". In the bush setting "the glossy mountain laurel is seen above the dogwood's silver leaves, a slit between two rocks where maidenhair fern trembles like green lace", thereby emphasising the sexual fantasy.

The girls are unable to resist the temptation to continue. They follow Irma, who picks up her voluminous petticoats, and the four girls scramble onto a waist-high shelf of rock. It is then that tears flow from Edith's eyes, tears not of sorrow, because she "has no desire to weep, only to love" and she "begins to dance barefoot" and is "joined in the dance by Irma".

The four girls continue their walk up The Rock, now with Miranda in the lead, "thrusting her shoulders", until they reach another semi-circular shelf where they fling themselves down and fall into a deep sleep, as if they are exhausted lovers. It is here that time slows to a halt, with the girls' experiences on The Rock akin to a stasis field, similar to that developed by John Gloag (1954). When they awake, Marion's muslin skirts are torn and Edith is flushed and whimpering and says she feels "awful". Edith again expresses a desire to "go home" but Miranda, Irma and Marion ignore her and continue walking on

and upwards. Edith panics and scrambles down The Rock, running back to the safety of the picnic grounds, thereby breaking the time-freezing power of The Rock.

The very wealthy heiress, Irma Lumley, is rescued from Hanging Rock by Albert and the Doctor. They are led to the unconscious Irma after Albert is given almost unintelligible instructions from a comatose Michael and notes in Michael's diary. Albert is rewarded by a cheque for one thousand pounds from Irma's grateful, very wealthy father. When Irma Lumley is properly recovered she visits the school to say goodbye. During that visit her former schoolmates attack Irma because they believe she knows what happened on The Rock and is deliberately refusing to tell. However, Irma says, "I can't tell you, I don't know". However, Edith Horton, the girl who ran away from the group and returned to the safety of the picnic ground, screams "I'll tell you... They are all dead...They are rotting in a filthy cave". Is this really the truth? Does Edith know what happened? Is it because she is seen as a "dunce" that nobody listens to her?

The French teacher and Dora Lumley, a junior mistress, are unable to control the rioting students and Dora Lumley hides in a cupboard. After Irma leaves, and the melee subsides, the teachers discover Sara Waybourne gasping for air, tied to the horizontal gym board. The French teacher compels Dora Lumley to promise not to tell Mrs Appleyard what has happened in the gym. This promise is extracted by the French teacher threatening Dora Lumley with a wooden baseball bat. This event is a trigger for Dora Lumley's brother to arrive at the school and take his sister from her employment. However, this move precipitates yet another tragedy. There is a serious fire in the Melbourne boarding house where the brother and sister stay en route to their country home, and they are burnt to death. The death of the two siblings is published widely in the press. They are given a public funeral in their hometown of Warrigal and a half-day holiday in the town is declared to mark their passing. Thus, they achieve notoriety in death.

Sara becomes ill after being left tied to the gym board during Irma's farewell visit and does not attend the evening meal. When Minnie the maid takes some food to the sick child in her bedroom, Sara confides to Minnie that she is an orphan, and while she was in the Orphanage the headmistress had punished her by shaving her head. This information corroborates Albert's story and it becomes apparent that Sara is actually Albert's sister, however the brother and sister do not know this. Surprisingly when Minnie is on the stairs that night delivering Sara's meal, she meets Mrs Appleyard. In a moment of what appears to be uncharacteristic kindness, Mrs Appleyard asks Minnie to tell Sara not to turn out her light until the headmistress visits her.

On Sunday morning, Palm Sunday, when the girls are at church, Minnie sees Mrs Appleyard on the stairs, carrying a small basket. The headmistress gives Minnie a five-pound note and the day off work. The headmistress tells Minnie that she will be opening the door to Mr Cosgrove, Sara's guardian, who is intending to make a surprise visit to see his ward, Sara. Minnie is surprised at the headmistress' uncharacteristic generosity by giving her a five-pound note and the day off work.

Also on Palm Sunday morning Michael visits Albert to say goodbye. Michael has decided to travel to Goondiwindi in Queensland, to have work experience on a cattle station. At this meeting Albert confides his dream of the previous night. He says that during the dream he experienced an overpowering fragrance of pansies, his lost sister's favourite flowers. When fully awoke he saw bright lights and his orphaned sister, Sara, sitting at the foot of his bed. Albert's sister said to him "Don't you know me Bertie?" Bertie replied, "Yes of course I know you..." After a few minutes, Sara said "Goodbye Bertie, I've come a long way to see you and now I must go". She disappears.

Michael is not shocked by his friend's recollection of the dream. Both of these young men, while being of very different backgrounds, have a sixth sense of being aware of a dimension beyond reality.

A troubling sequence occurs when the gardener, Mr Whitehead, discovers Sara Weybourne's headless body in the school's vegetable garden on Good Friday. Mr Whitehead takes solace in whisky before going to inform Mrs Appleyard of the terrible discovery. Dated statements made to police establish the authenticity of this sequel of events.

Surprisingly, immediately upon being told of the discovery, Mrs Appleyard instructs the gardener, Mr Whitehead, to harness the horse because she would be visiting the police. The gardener then drives Mrs Appleyard in the cart to a place near Hanging Rock. The headmistress then walks through the bush to The Rock and jumps to her death.

Duty of care & the tort of negligence

The law of torts is concerned with the protection of personal, property and economic interests Davies & Malkin (2015). The tort of negligence is probably the most litigated action and it revolves around the alleged carelessness of the defendant.

It has long been recognised that a school has a duty of care to students and an employer has a duty of care to employees when the employee is acting in the course of employment, *Joel v Morrison* (1834). Breach of these respective duties of care culminates in the tort of negligence. Both of these duties of care are breached in *Picnic at Hanging Rock*.

The headmistress of Appleyard Girls College is Mrs Appleyard and her duty is to take care of her students and staff.

As a teacher she is harsh and unkind to the student, Sara, the youngest boarder, and the only girl not permitted to go on the picnic. On the day of the picnic Sara is locked in the schoolroom, having been given, what is for her the impossible task, of trying to learn Tennyson and Shakespeare. Because the child could not rote learn the poetry, Mrs Appleyard sends her to bed with a plate of cold mutton and a glass of milk while Mrs Appleyard eats cold chicken, Stilton cheese and chocolate mousse. Not surprisingly Sara hates Mrs Appleyard. The child sobs, "O Bertie, Bertie, where are you? Jesus where are you?"

Sara is an orphan, and remembers Albert, or Bertie, her brother, from whom she is separated. Sara's fees at Appleyard College are regularly paid by an elderly gentleman, Jasper Cosgrove, a solicitor in New Zealand. This pleases Mrs Appleyard, who knows that "money is power, strength and safety". The finances of the school are all-important because first and foremost, Appleyard College is a business. Mrs Appleyard is well-aware of the financial backgrounds of her students. She knows that Miranda's mother has solid Australian wealth, owning a cattle station in Goondiwindi, Queensland, Marion Quade's parents live in India and are intelligent and wealthy. Irma Leopold's parents are very wealthy and powerful. When the girls are missing, Irma's father demands a full enquiry into the mystery and informs Mrs Appleyard of his intention to engage a Scotland Yard Detective to investigate.

When the disappearance of the girls and teacher becomes public knowledge, Mrs Appleyard's primary consideration is its potential commercial impact upon the school. Reporters from Melbourne seek out information about the disappearance. It is published in the press and is gossiped about by clergy, clairvoyants and parents. The implications are severe: only nine of the twenty students intend returning to the College after the Easter break.

Mrs Appleyard inflicts a restrictive rule of silence throughout the school, so that nothing is to be so much as whispered about the disappearance. She considers options such as closing the College and going to England or selling the College as a going concern. She becomes increasingly dependent upon cognac for comfort.

There is no indication that Mrs Appleyard has any more concern for the well-being of her staff than she has for her students. She resents administrative duties because they keep her chained to her desk. The Maths teacher, Miss McCraw, who vanishes at the picnic, is last seen by Edith, who testifies that she saw the teacher running in the distance clad only in her pantaloons. Mrs Appleyard only knows that Miss McCraw's father lives alone with a dog and a Bible in the Hebrides. Miss McCraw did not have a friend or acquaintance so Mrs Appleyard is confident that the teacher's father will not be concerned about the unexplained disappearance of his daughter.

Conclusion

The narrative concludes with an extract from a Melbourne newspaper, dated February 14th 1913. This extract states that despite intensive searches conducted by police and public, the only clue to the disappearance that has ever been found is a small piece of frilled calico, discovered by rabbiters camped at the foot of Hanging Rock in 1903. It is thought by police that this could be part of a petticoat worn on the day of the picnic by the missing teacher, Miss McCraw. The newspaper extract brings a sudden return to reality. It is an abrupt ending like the sudden awakening from a dream. The journey through the various parallel time environments of *Picnic at Hanging Rock* ends without disclosing the answer.

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LIFE AND DEATH OF CYBERSPACE, OR WHEN TECHNOLOGY GRABS A CYBERPUNK NOVEL

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Introduction

In 1984, William Gibson described, in his novel *Neuromancer*, cyberspace as

[a] consensual hallucination experienced daily by billions of legitimate operators, in every nation [...]. A graphic representation of data abstracted from the banks of every computer in the human system ([1984] 1986, 51).

Seven years before the birth of the World Wide Web and five years before the emergence of the expression “virtual reality,” technology and literature met each other, developing the imagination of a psychotechnical and immersive environment accessible to all, at any time and from everywhere. Until the late 90s, many scientists theorized this imaginary world and worked on its implementation. Yet it is clear that its technical realization never came to fruition. Moreover, as W. Gibson said, today the concept of cyberspace is outdated. How was the imagination of cyberspace born, how was it cultivated and how did it become obsolete? Those are the questions that will lead our study.

We shall first draw up the picture of the imagination of cyberspace from W. Gibson’s works “Burning Chrome” ([1982]1986) and *Neuromancer*. We will pay particular attention to the spatial metaphor used in them and to its taking up in science-fiction literature and cinema. Then, we shall turn to the exploitation of this Gibsonian imagination of cyberspace in the academic and scientific circles. Cyberspace is then theorized and idealized as a new space favorable to the emergence of a planetary consciousness, imbued of spirituality, even mysticism. However, and that will be our last point, the imagination of cyberspace finds itself very soon confronted with its technological concretisation, meaning virtual reality and the Internet. As we shall see, it is from this confrontation that the obsolescence of cyberspace will result.

Neuromancer, the fiction of cyberspace—The Gibsonian cyberspace, the birth of an imagination

The word cyberspace, a contraction of cybernetic and space, appeared for the first time at the start of 1981 in the short story “Burning Chrome,” written by William Gibson and first published in 1982. In “Burning Chrome,” the “Ono-Sendai Cyberspace Seven” is a console, a “matrix simulator” (Gibson [1982] 1986, 176). When Jack, the main protagonist in the story, connects himself to this simulator, “[a] silver tide of phosphenes boiled across [his] field of vision as the matrix began to unfold in [his] head, a 3-D chessboard, infinite and perfectly transparent” (Gibson [1982] 1986, 176-177). But what is the matrix? In “Burning Chrome,” it is defined as a “mankind’s extended electronic nervous system” (Gibson [1982] 1986, 176-177), “an abstract representation of the relationships between data systems,” an “electronic consensus-hallucination that facilitates the handling and exchange of massive quantities of data,” a “monochrome nonspace where the only stars are dense concentrations of information, and high above it all burn corporate galaxies and the cold spiral arms of military systems” (Gibson [1982] 1986, 178). The simulator, the “Ono-Sendai Cyberspace Seven” allows the access, or rather the immersion, into a global informatic network: it is a psycho-technical immersive device, that is to say an interface between the mental space and the informatic machine. We are then in 1982, fifteen years or so after the first Head-Mounted Displays (HMD), which are virtual reality interactive visualization helmets, were created. As for the Internet as we know it today, it was born a year later (1983), and the World Wide Web, one of the main applications of the Internet aside from peer-to-peer software and electronic messaging services, was made accessible to the public only in 1993, eleven years after the publication of “Burning Chrome.”

In “Burning Chrome,” Jack is a “cow-boy,” a computer pirate, a “hacker” before his time. The informatic space, the “matrix” as Gibson calls it then, appears as a new frontier to be crossed, away from our very tangible territories. It is only in 1984, with the novel *Neuromancer*, that the word “cyberspace” will mean not only the console allowing the immersion into this matrix—that we find again under the name “Ono-Sendai Cyberspace Seven”—but also the matrix itself, the informatic and electronic space of data flux and information networks. In the documentary *William Gibson: No Maps for these Territories*, Gibson comes back to the creation of the neologism:

[a]ll I knew about the word “cyberspace” when I coined it, was that it seemed like an effective buzzword. It seemed evocative and essentially meaningless. It was suggestive of something, but had no real semantic meaning, even for me, as I saw it emerge on the page (Neale 2003).

Indeed, Gibson often plays with words, and “neuromancer” is thus obviously another portmanteau word, based on *Neuro*, *Romancer* and *Necromancer*,¹ *neuro-* designating intelligence and *-mancy* divination or magic, a variation on the word *necromancer* which is a wizard who predicts the future by invoking the dead. The novel tells the story of Case, protagonist of a hostile world where everybody is already hybridized by technology, “cyborgized,” their bodies augmented by prostheses, implants and software improving their chances of survival. Case is a “cow-boy” demeaned after a neurotoxin was injected to him, destroying part of his nervous system and preventing him to connect to the cyberspace again. When he is offered to be “repaired” in exchange for a mission, which consists in neutralizing an Artificial Intelligence inside the informatic network itself, Case accepts without hesitation. The word “cyberspace” and its imagination thus come from the cyberpunk literary current², a part of the cyberculture³, and is characterized by an omnipresent technology and informatics (ICT, cybernetics, artificial intelligences, etc.) in societies that border strongly on dystopia.

The beginnings of the cyberspace imagination

In *Neuromancer*, Gibson writes: “[t]he matrix has its roots in primitive arcade games, [...] in early graphics programs and military experimentation with cranial jacks” ([1984] 1986, 51) before describing cyberspace like this:

A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts... A graphic representation of data abstracted from the banks of every computer in the human system. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding... ([1984] 1986, 51)

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1. “‘Neuromancer,’ the boy said, slitting long gray eyes against the rising sun. ‘The lane to the land of the dead. Where you are, my friend. Marie-France, my lady, he prepared this road but her lord choked her off before I could read the book of her days. Neuro from the nerves, the silver paths. Romancer. Nec-romancer. I call up the dead. But no, my friend,’ and the boy did a little dance, brown feet painting the sand, ‘I am the dead, and their land.’ He laughed. A gull cried. ‘Stay. If your woman is a ghost, she doesn’t know it. Neither will you.’” (Gibson [1984] 1986, 243-244).
 2. Notable cyberpunk fiction includes the novels *Do Androids dream of Electric Sheep?* By Philip K. Dick (1966), *Crash!* By J.G. Ballard (1973), all works by William Gibson, but also a number of Japanese manga and anime like *Akira* by Katsuhiro Ôtomo (1982), *Gunnm* by Yukito Kishiro (1990) or *Ghost in the Shell* by Mamoru Oshii (1995). Authors include Bruce Sterling, William Gibson, Neal Stephenson or Maurice G. Dantec. For a study of the cyberpunk current, refer to Downham [1988] 2013.
 3. Cyberculture includes a number of cultural productions (literature, cinema, etc) in connection with information technologies and so-called “cyber-” issues (informatic networks, virtual universes, robotics, man-machine hybridisation (cyborg), artificial intelligence and life, etc.). For a history and analysis of cyberculture, refer to Sussan 2005.

Cyberspace is therefore depicted as a spatial, multidimensional representation of data circulating on global informatic networks: it is an in-between space that opens between man's mental space and the computer, that is to say a psychotechnical space, immersive and depending on the informatic and technic system (Roussel 2015). As we wrote elsewhere (Roussel 2012b), the interconnection of several computers superimposes another layer to our common space: that of the sensible translation of the geography of flux and of the global treatment of information (Desbois 2011): a global ocean of data, having "no particular relationship with the deck's physical whereabouts" (Gibson [1984] 1986, 105). Although the word "cyberspace" only appeared in 1982 and gained its current definition in 1984, the idea of an immaterial space of communication was already present in the science-fiction novel *True Names* (Vinge 1981), a work considered as the foundation of the cyberpunk movement. In the novel, ethereal meeting places allow extraterrestrial civilisations to communicate. In its first editions the book's cover depicted a man with electrodes attached to his head. In the fiction of the 1980s, the theme of cyberspatial travel is added to that of interstellar and intergalactic travel: the virtual informatic space is viewed as a new territory to be conquered.

However, the imagination of cyberspace comes from older sources and is thus a product of the informational paradigm, through Shannon and Weaver's theories of information and communication, and the cybernetics of the 1950s and 1960s. According to Norbert Wiener, the father of cybernetics, the world, the space as well as living beings and objects are sums of information, susceptible of being quantified and translated into a series of 1 and 0 (1948). Marshall McLuhan's idea of a "global village," defined in the 1960s, constitutes for us one of the first starting points of the imagination of cyberspace. In *Understanding Media: The Extensions of Man*, McLuhan writes:

Today, after more than a century of electric technology, we have extended our central nervous system in a global embrace, abolishing both space and time as far as our planet is concerned. Rapidly, we approach the final phase of the extensions of man—the technological simulation of consciousness. ([1964] 1995, 4)

Electronic media are therefore, for him, an extension of the nervous system to the whole planet, an idea that will, besides, be reused by Gibson. By saying this, McLuhan imposes the idea of a transindividual consciousness, simulated technologically and extended to the whole planet. He adopts the image of a "global village" because, according to him, the idea of recovering information very quickly in any place on the planet that is connected to the network really gives this impression. This village is characterized by interactivity, community and tribalism, the variety of media (words, images, sounds) and vitality (emergence of collective actions and decisions) and we recognize indeed a prefiguration of our current World Wide Web. Moreover, the metaphor of electronic media as an extended nervous system dialogues, for us, with the notion of "noosphere." For the French Jesuit Pierre Teilhard de Chardin (1955), the "noosphere," from Greek *νοῦς* (*noûs*, "the intellect") and *σφαῖρα* (*sphaira*, "the sphere") is

an ethereal envelope akin to the atmosphere or the biosphere, a “Global Human Intellect,” aggregate of all the thoughts, consciousnesses, and ideas produced by humankind.

Cyberspace representations in science-fiction

In *Neuromancer*, Gibson, in his description of cyberspace, referred to “city lights” ([1984] 1986, 51). The use of an urban metaphor to represent cyberspace is extremely commonplace in science-fiction, something that can be particularly felt and seen in cinematographic works. Many common characteristics can be found in those cinematographic and literary representations of cyberspace. First, it is an immersive space, accessible instantly and collectively by telepresence. It is inhabited by avatars, meaning dematerialized corporeal projections. Secondly, represented as contemporary urban settings (vertical cities like Tokyo or New York, often at night) (Desbois 2006), it belongs to the Euclidian spatial model. *Tron* (Lisberger 1982), sets an analogy, based upon a similitude of form between the structure and network of the North-American city and the printed circuit boards of computers, the electronic components of these boards representing buildings (Desbois 2006, 128). A common motif between cyberspace and the city would thus be that of the grid, the network. In *Johnny Mnemonic* (Longo 1995), adapted on screen from the homonymous short-story by Gibson, cyberspace becomes a megalopolis, overloaded with neon signs, congested, vertical and futuristic (Desbois 2006, 129-130). Finally, in *The Matrix* (Wachowski 1999), based on *Simulacra and Simulation* by Baudrillard ([1981] 1994), the simulation of the matrix is totally similar to our own physical and tangible space, appearing as a North-American city. However, the image of a reticular and multidimensional labyrinth, enclosing, enveloping, in which it is impossible to get one’s bearings, is soon substituted to that of an ordered city plan, orthogonal and Cartesian. In *The Matrix*, we see these two imaginations overlap. If the space of the Matrix takes the form of a very actual city, its traveling rules are different: one can jump kilometers away by using phone lines, and parts of the city appear or disappear instantly.

Thus, and although our literary and cinematographic cyberspaces obey mostly to the Euclidian realistic model, in the film *The Matrix* many laws of physics and geometry are challenged or reinvented⁴. That is because, as we mentioned elsewhere (Roussel 2012a), cyberspace relates more to an abstract and mathematical spatial dimension, somehow navigable, than to a physical space (Joliveau and Péaud 2010). Cyberspace is first and foremost a means of broadcasting information and communication: a *medium*. According to French philosopher Pierre Levy, it is “a new communications space

4. “Because virtual worlds—of which cyberspace will be one—are not real in the material sense, many of the axioms of topology and geometry so compellingly observed to be an integral part of nature can be there violated or re-invented, as can many of the laws of physics.” Benedikt ([1991] 1992 b), 119.

made accessible through the global interconnection of computers; it is a material infrastructure of numerical communication and a world of information inhabited by humans that browse and feed it” (1997, 17). Therefore freed from the constraints of ordinary physics, other geometries, topologies, temporalities and traveling rules are made possible (Roussel 2014b, 150). The typology of cyberspace is complex: it follows a logic of multiple and interconnected nodes and networks, in which new nodes, new places are constantly forming while others fade (Galland 1996, 91). The topography of cyberspace is thus constantly rewriting itself; in constant instability, it seems indeed non-bordered. Needing to be discovered by immersion and navigation, it appears impossible to get one’s bearings geographically, despite the efforts made to draw their maps. Then, for French sociologist and researcher Blaise Galland:

Wishing to picture this reticular dispositive with a geographical map would obviously be a mistake. Cartography is made to picture the physical territory in 2 or 3 dimensions. A better idea would be to picture, thanks to the holographic paradigm, a kind of totally interconnected magma: as soon as you reach a single node, you are virtually in immediate contact with all others. (1996, 90)

The exploitation of the Gibsonian cyberspace imagination Theorisation and idealisation of Gibsonian cyberspace

From the start of the 1990s, cyberspace was the object of a large theoretical literature in the United States and Europe, often using Gibson’s idea of a “consensual hallucination.” Among those publications two are of particular interest to us: *Cyberspace, first steps*, directed by Michael Benedikt ([1991] 1992), an architect and professor of architecture specialised in digital design; and *The Metaphysics of Virtual Reality* by philosopher Michael Heim (1993). We can already see that an ambiguity between virtual reality and cyberspace emerges and we shall come back to it later. In *The Metaphysics of Virtual Reality*, Heim defines cyberspace like this:

The juncture of digital information and human perception, the “matrix” of civilization where banks exchange money (credit) and information seekers navigate layers of data stored and represented in virtual space. Buildings in cyberspace may have more dimensions than physical buildings do, and cyberspace may reflect different laws of existence. It has been said that cyberspace is where you are when you are having a phone conversation or where your ATM money exists. It is where electronic mail travels, and it resembles the Toontown in the movie *Roger Rabbit*. (1993, 150)

Moreover, for Heim,

Cyberspace is more than a breakthrough in electronic media or in computer interface design. With its virtual environments and simulated worlds, cyberspace is a metaphysical laboratory, a tool for examining our very sense of reality (1993, 83).

As for Benedikt, in his introduction to *Cyberspace: First Steps*, he gives several definitions or descriptions of cyberspace, among which:

Cyberspace: A new universe, a parallel universe created and sustained by the world's computers and communication lines. A world in which the global traffic of knowledge, secrets, measurements, indicators, entertainments, and alter-humans agency takes on form: sights, sounds, presences never seen on the surface of the earth blossoming in a vast electronic night, ([1991] 1992a, 1)

or:

Cyberspace: A common mental geography, built, in turn, by consensus and revolution, canon and experiment; a territory swarming with data and lies, with mind stuff and memories of nature, with a million voices and two millions eyes in a silent, invisible concert of enquiry, deal-making, dream sharing, and simple beholding ([1991] 1992a, 2).

Benedikt then announces that the cyberspace he just described does not exist, or not yet. Because for him, and as we already wrote elsewhere (Roussel 2014a), this artificial and multidimensional reality of cyberspace, which referred according to him to this “ancient space,” that of a “mental geography” or “a collective memory or hallucination, an agreed-upon territory of mythical figures, symbols, rules, and truths, owned and traversable by all who learned its ways, and yet free of the bounds of physical space and time,” was on the verge of being technologically implemented, realized ([1991] 1992a, 3). This should have allowed the setting and collectivization by technology of this particular, mythical space, the mental space of conscious or unconscious dream, the space of imagination, of replayed memory, “inverted reflection of the private mental space” (De Kerckhove [1997] 2000, 260) penetrable at any time and by several people, modifiable at will. The artist and anthropologist David Tomas declares in the same book that: “Gibson has presented us with the most sophisticated and detailed “anthropological” vision of cyberspace to date: its social and economics facets, and the outlines of its advanced postindustrial form” ([1991] 1992, 32). However, according to him, Although cyberspace has been popularized by Gibson's books, it is neither a pure “pop” phenomenon nor a simple technological artifact, but rather a powerful, collective, mnemonic technology that promises to have an important, if not revolutionary, impact on the future compositions of humans identities and cultures” ([1991] 1992, 31-32). Finally, and concurring with Fredric Jameson for whom cyberspace is “a supplement of spatiality” (Jameson [1991] 2007), the American architect and theoretician Marcos Novak declares that: “the synthesis of cyberspace occurs in the

mind of the user as a mental space, a spatialization of the sum of affordance into a series of worlds of opportunity and restriction, promise and constraint" ([1991] 1992, 233). Thus, for him, cyberspace "always reserves the additional space of possibility, in contrast to actuality" (1995). Cyberspace is a reserve or a matrix of unknown, alternative worlds. For Novak, it is then a space of experimentation in which "the singular can be replaced by the multiple, the solid by the fragmented, the insular by the permeable, the closed by the open" (1995): a technological matrix of virtual worlds, whose mode of being is virtuality, worlds that are not "false," "illusory" or "unreal," but are simply not in actuality.

Marcos Novak the mystic of cyberspace, towards the figure of the "techno-shaman"

For Marcos Novak, developing Heidegger's idea that "man inhabits as a poet" ([1958] 1980), "Cyberspace is poetry inhabited, and to navigate through it is to become a leaf on the wind of a dream" (Novak [1991] 1992, 229). Going beyond ordinary prose by innovation and new constructions of sense (ellipses, rhythm and images, asonances and consonances...), cyberspace is thus compared to a poetic discourse (Novak [1991] 1992, 229). For Novak, this discourse of cyberspace is imbued with "hechos poéticos," with "poetical facts" (Lorca [1940] 1989), that is to say images that do not answer to any analogy or logical explanation ([1991] 1992, 228). That is because, as we mentioned elsewhere (Roussel, 2012a), more than a cold representation of spatialized informatic data, cyberspace must first be entered with the imagination: "[c]yberspace is a habitat of the imagination, a habitat for the imagination. Cyberspace is the place where conscious dreaming meets subconscious dreaming, a landscape of rational magic, of mystical reason, the locus and triumph of poetry over poverty, of 'it-can-be-so' over 'it-should-be-so'" (Novak [1991] 1992, 226). Calling for a poetical, onirical, magical and mystical inhabitation, cyberspace is not only animated, but also animist (Novak [1991] 1992, 240). So to immerse oneself in it requires something like the invocation of the "duende," a spirit or daemon (Novak [1991] 1992, 228) manifesting itself in poetry, singing or dance—moments of inspiration, intense emotion, a flirt with ecstasy, a dissolution of reason in affect, a power of the acting or the doing that goes beyond simple knowledge, simple technique. The inhabitation of cyberspace is thus raised to the rank of art: an art of inhabiting, where the user becomes at the same time the inhabitant and the creator of this space, that he can model at will, as in dream. If, for Novak, the metaphor of cyberspace is indeed that of "being there," this "being" as this "there" are modifiable, changeable at will ([1991] 1992, 234).

Like the dancers of the performances "Dancing with the virtual dervish: Worlds in Progress" (M. Novak, Banff Center For The Arts, Canada, 1994), who, their heads covered by head-mounted displays, blinded to the external world, enact the trance of whirling dervishes lost in their secret vision (Novak 1996, 303), the cybernaut adopts the face of the shaman. He manipulates and dialogues with the invisible forces of cyberspace, glid-

ing through the meanders of those internal spaces between the conscious and the unconscious, enveloped in the synthetic sensorium of this artificial world. The immersion in cyberspace, internal sojourn into the limbo of the mind, takes the air of a spiritual or initiatic journey. Then is it not all about going to meet this alter-ego, intimate but other than the self, “extimate” to use Lacan’s word, “unheimliche” to use Freud’s? For Heraclite, “[e]thos anthropoi daimon,” “in man’s inner home there is a daimon” (Rouzel 2004). In the performance “Eduction: the Alien Within” (M. Novak, M. Lutyens, 49th Venice Art Biennial, 2001), the purpose is, at least, to make a willing spectator a stranger to himself, absorbed in a virtual universe and led by hypnosis to a state of temporary amnesia and agnosia (Lutyens 2001). Cyberspace therefore seems accessible only through a splitting, at once of identity and of space. Anyone who penetrates it seems to go through a strange mirror–oneself like another, here and yet there. To a saturated global space, spoiled of its *terrae incognitas*, the “ninth continent” of cyberspace proposes a new territory to explore, mysterious and unknown, full of wrinkles and small corners, extensible at will, submitted to other rules, other laws, where one becomes another while staying the same, from which one can only come back with a changed view, an enriched experience.

Although, for Max Weber, technical progress and the increase of scientific knowledge should inevitably have led to a rationalization of society and the fading of metaphysical questionings ([1905] 1989), cyberspace, as an electronical space and technological system, imposes itself as an invisible elsewhere, immaterial and transcendental, in which poetical and magical thoughts replace Cartesian reasoning, in which manifestations and experiences of the sacred can be reached by those who accept to abandon themselves to it. The hierophanies give back some sense: on the one hand, the world that we call “real,” the one in which we actually and physically move, is just a world among others, that are linked together as cyberspace is linked to the tangible space; on the other hand, this “strange stranger,” the part of shadow at the heart of the intimate, is rediscovered. Finally, this experience is lived by several people, actualizing the ancestral collective trances in a new be-together. A spirituality that was thought to have been forgotten is thus reanimated. A poetical and poetical reading of the world is invoked, its mysteries are tasted, ordinary life in our reality is reenchanting. Showing a will to symbolically reinvest the technic, to articulate it to a spiritual space, cyberspace assumes a mystical and transcendental dimension. Anyway, in the 1990s, the cyberspace of Gibson, Benedikt and Novak “although it depends on them technically, cyberspace itself is neither a hardware system, nor a simulation or a sensorium production system, nor a software graphics programs or “application.” It is a place, and a mode of being” (Benedikt [1991] 1992b, 130): a phenomenological world, perceptual and phenomenal, collectively inhabitable, from anywhere and at any time. And yet, as we can see nowadays, what was promising to be a new territory, opening via technology between the tangible and mental worlds, a new field of action for the collectivity of consciousnesses, will never have lived elsewhere than in imagination (Roussel 2014a).

The obsolescence of cyberspace

Cyberspace and virtual reality: an ambiguity

It would be tempting to say that cyberspace exists only in fiction while virtual reality is the effective and partial realisation of this imagination of cyberspace. And yet, for our theoreticians and during the 1990s, this is far more complicated: the ambiguity between cyberspace and virtual reality is rooted so deeply that one cannot tell with certainty, as we are about to see, where one begins and where the other ends. The expression “virtual reality,” a false oxymoron coined by Jaron Lanier, who is considered as the father of virtual reality and was the director of *VPL Research*, first company to market immersion peripherals (data gloves or visualization glasses), appears for the first time in 1989. It designates on the one hand a group of techniques, systems and devices allowing the immersion and interaction in real time inside synthetic universes, modeled informatically⁵; and on the other hand the environments themselves, which are defined as interactive three-dimensional worlds, either realistic or detaching themselves from this mimetic desire by shaking up our traditional physical laws for example, controlled by computers, and that can be virtually browsed. For the French philosopher Alain Milon, this polysemy is really problematic because, calling to and partially overlapping that of cyberspace, it refers to two universes: “that of informatic modelisation, through immersion and augmented reality models, and that of fictional literature, notably through science-fiction” (2005, 13). Indeed, the techniques of virtual reality are consubstantial to the imagination of cyberspace. From its start, the idea of cyberspace, whatever the name given to it during the 1980s and 1990s—“metaverse” in *Snow Crash* by Neal Stephenson (1992), “infosphere” in the series of the *Hyperion Cantos* by Dan Simmons (1989-1997)—is, as much in literature as in the cinema, inseparable from a whole set of equipment constituted of technological interfaces (screens, suits, visualization helmets, prostheses, neuronal implants, etc) that hybridized the body, allowing the plugging, the connection, the immersion into the artificial and informatic environment of cyberspace by telepresence, the body being then dematerialized and represented under the form of an avatar.

5. Several types of virtual reality technologies can be distinguished depending on the systems used. Artificial reality proposes an immersion via a spheric or cubic room in which the walls, and sometimes the floor and the ceiling, are covered with screens projecting a geometrically coherent space. Immersive virtual reality proposes the experimentation of tridimensional environments generated by computers, that are immersive, interactive, multi-sensorial, and centered on the user via the use of gloves, helmets or even CAVE systems (spheric or cubic room covered with projected images) and creating a strong sense of presence: the gloves, via a system of feedback, allow the sense of touch, of a resistance from the virtual world, while the helmet allows the instant recalculation of perspective to adapt to the user's vision. Interactive virtual reality does not propose a physical immersion but an interaction via a screen, as in the case of virtual tours offered by some museums on their websites. The networked environments or metaverses are accessible by the Internet and allow several users to enter them at the same time. It is for instance the case for *Second Life*. Finally, telepresence allows the user to act in a distant environment via a screen, for example to control a robot on a distinct site.

Michael Heim, Michael Benedikt, Marcos Novak, Mike Featherstone and Roger Burrows have all attempted to precise the links that are established between virtual reality and cyberspace. In “Trans Terra Form: Liquid Architectures And The Loss of Inscription” (1995), Marcos Novak begins by saying “virtual reality is the enabling technology and cyberspace the ‘content’,” before recognising that such a division between the form and the substance, like that of the body and the mind, is unsustainable. Then he affirms that cyberspace and virtual reality belong to the same continuum, the cyberspace constituting “the “exterior” of virtual reality.” Thus, “[t]here is something of what we call cyberspace in virtual reality and something of what we call virtual reality in cyberspace. Once this is understood, the distinctions can be seen to be distinctions of emphasis and quality, locations along a continuum that runs along several dimensions.” On one side of the continuum described by Novak, one would find the worlds of virtual reality, worlds based upon a principle of mimetism (flight simulator, etc.). Then, nearer to the middle of this continuum, environments that exist in our actual space but to which we do not have any access: macroscopic or microscopic environments, the surface of Mars, the Chernobyl nuclear plant or the inside of the body. Still further, there would be environments like those of the black holes, of the Big Bang, worlds with a superior number of dimensions than ours or those of quantum mechanics, that is to say worlds at the border between the real and the virtual. Finally, at the extremity of the continuum, one would find the worlds of cyberspace; potential worlds questioning “what it is that makes a world in the first place, what kinds of worlds can there be, where does this world fit in the scheme of possible worlds, how would this world appear from the viewpoint of another world?” (Novak 1995).

As for Michael Heim, he more or less shares Novak’s opinion. For him, virtual reality is one of the phenomena that take place inside cyberspace (1993, 134-135). As for Michael Benedikt, considering the links that are established between virtual reality, informatic networks, data visualization etc., he determines cyberspace as a notion globalizing and including all the fields that concern the developments of the informatic technologies of the 1990s. Thus, “cyberspace as a *project* and as a *concept* has the capacity to collect these disparate projects into one—to focus them on a common target” (Benedikt [1991] 1992b, 122). Finally, for Mike Featherstone and Roger Burrows, virtual reality, defined as a real or simulated environment in which one experiments a situation of telepresence, that is to say the realistic sensation of being immersed in an artificial, informatically generated sensorium, is a type of cyberspace. In “Cultures of Technological Embodiment: An introduction,” they write:

The term cyberspace refers to an information space in which data is configured in such a way as to give the operator the illusion of control, movement and access to information, in which he/she can be linked together with a large number of users via a puppet-like simulation which operates in a feedback loop to the operator. Virtual reality represents the ultimate extension of this process to provide a pure information space populated by a range of cybernetic automatons, or data constructs, which provide the operator with a high degree of vividness and total sensory immersion in the artificial environment. ([1995] 2000b, 2-3)

All these reflexions allow us, in fact, to touch upon an interesting phenomenon: that of the transition from fiction to science, a transition that does not happen without difficulty as far as the imagination of cyberspace, as defined by Gibson, is concerned, and that will end by the affirmation of its obsolescence. What happened to cyberspace? That is what we shall now try to understand.

From Gibsonian cyberspace to the Internet

In 1995, Mike Featherstone and Roger Burrows tried to grasp the reality of cyberspace by giving not one, but a triple explanation of it, strongly prefiguring the nowadays affirmed obsolescence of cyberspace ([1995] 2000b, 5-7). For them, there are indeed three types of cyberspace: virtual reality, Gibsonian cyberspace, and Barlovian cyberspace. Gibsonian cyberspace would be the original cyberspace, that of fiction and science-fiction, “*the inspiration for the generic term*” ([1995] 2000b, 6). Barlovian cyberspace, named in reference to John Barlow, founder of the “Electronic Frontier Foundation,”⁶ and author of the “Cyberspace Declaration of Independence,” would designate the existing informatic network, meaning the Internet, the World Wide Web or the metaverses hosted in the WWW.⁷ In “Crime and Puzzlement,” Barlow writes:

In this silent world, all conversation is typed. To enter it, one forsakes both body and place and becomes a thing of words alone. You can see what your neighbors are saying (or recently said), but not what either they or their physical surroundings look like. Town meetings are continuous and discussions rage on everything from sexual kinks to depreciation schedules.

Whether by one telephonic tendril or millions, they are all connected to one another. Collectively, they form what their inhabitants call the Net. It extends across that immense region of electron states, microwaves, magnetic fields, light pulses and thought which sci-fi writer William Gibson named Cyberspace. (1990)

It is the American author of science-fiction Bruce Sterling who popularises this definition of cyberspace as an existing informatic or electronic network. In his introduction to *The Hacker Crackdown: Law and Disorder on the Electronic Frontier*, Sterling says, still referencing to Gibson:

6. Foundation for the protection of civil rights on the Internet: <http://www EFF.org>

7. It has to be noted that the Internet and the World Wide Web are not synonymous. The Internet is a system of interconnection of machines that constitutes a global informatic network. It is therefore an infrastructure. The World Wide Web is a public hypertext system functioning on the Internet and accessible via a browser. It is therefore an application of the Internet, as much as instant messaging services, peer-to-peer software, etc. As for metaverses, they are persistent virtual reality environments (they continue to develop in the absence of players) accessible via the WWW. Best known examples include *Second Life* or *World of Warcraft*.

A science fiction writer coined the useful term “cyberspace” in 1982, but the territory in question, the electronic frontier, is about a hundred and thirty years old. Cyberspace is the “place” where a telephone conversation appears to occur. Not inside your actual phone, the plastic device on your desk. Not inside the other person’s phone, in some other city. THE PLACE BETWEEN the phones.

[...] in the past twenty years, this electrical “space,” which was once thin and dark and one-dimensional—little more than a narrow speaking-tube, stretching from phone to phone—has flung itself open like a gigantic jack-in-the-box. Light has flooded upon it, the eerie light of the glowing computer screen. This dark electric netherworld has become a vast flowering electronic landscape. Since the 1960s, the world of the telephone has cross-bred itself with computers and television, and though there is still no substance to cyberspace, nothing you can handle, it has a strange kind of physicality now. It makes good sense today to talk of cyberspace as a place all its own. ([1992] 1993, xi-xii)

Very soon, then, the word “cyberspace” becomes a synonym for “the Internet,” and more precisely of the immaterial space where it takes place. The spatial metaphor borrowed to Gibson is run in all the vocabulary proper to the Internet and particularly to the World Wide Web. Indeed, we go on the Internet, we navigate from site to site, we surf the web. All this vocabulary implies another, almost liquid, spatiality, that is not located in our physical and tangible world but in cyberspace, which then appears as a singular place, separated from our world. Very soon, again, the word cyberspace is not commonly used to designate virtual reality environments anymore, except in digital art, where this appellation remains however discussed. If the imagination of Gibsonian cyberspace was deeply entwined with the techniques and environments of virtual reality, it would seem that in the transition from fiction to reality, those two cyberspaces have finally really dissociated from each other. To the technological implementation of Gibsonian cyberspace is now associated the Internet and the WWW, thus ignoring the principal characteristic of science-fiction cyberspace, that is to say immersion. And it is precisely like this that the obsolescence of cyberspace affirms itself. Because it has to be acknowledged that we do not enter the Internet as we would any other room, but rather, as the Italian sociologist Antonio Casili says, that “in reality, the space in which our online interactions take place is our daily space, our tangible space” (2010). While the spatial metaphor of cyberspace entertains the idea that the informatic space constitutes a world well separated from ours, an immaterial and ethereal world, we have to face the facts: Internet is indeed a part of our actual and physical reality. Therefore, a gap is appearing between fiction and reality, and for Casili, “it is time to say goodbye to the myth of cyberspace, to admit that it is only a kind of superstition...” (2010).

Conclusion

Augmented reality, mixed reality: towards an ordinary trance

Gibsonian cyberspace has nourished a rich and fertile imagination for almost 20 years: that of a new technological realm between the physical and mental worlds, a new field of action for consciousness. But it was never made a reality in a tangible way, it remained only a fictional or mythical space, a kind of mental space akin to that of shamanic trance, that of the theatre or the reading of a novel (Benedikt 1991] 1992a, 3; Roussel 2014a, 264). Long used to designate the Internet or the WWW, the word “cyberspace,” referring to the imagination of a proper space separated from our physical space, finally turned out to be inadequate. Gibson himself recognised that “Cyberspace, not so long ago, was a specific elsewhere, one we visited periodically, peering into it from the familiar physical world. Now cyberspace has everted. Turned itself inside out. Colonized the physical” (2010). The cyberspace has turned over completely, the virtual bubble has expanded into the space of everyday experience. That space is now hybridised by the technological virtual. As smartphones and tablets invade the public space, as augmented reality glasses will soon be on all noses, as the interface promises to be more and more incorporated, the popular dualism real/ virtual—that, we would like to remind, is in fact biased since what opposes the virtual is not the real but instead the actual—seems definitively evacuated. One would thus be confronted, nowadays, to a complex reality, as if it was woven or layered: an augmented or mixed reality.

Augmented reality refers to the superimposition of 2D or 3D elements to the perception of the actual environment. This superimposition is made in real time via an interface (phone, tablet, etc.), generally in a video flux. As for mixed reality, it designates systems and environments articulating elements of our physical actuality and numerical elements in the same perception of reality, fusing the material and numerical worlds. The American artist Roy Ascott likens this condition, which tends more and more to be ours, to that of North American and Australian native cultures “where ‘ordinary’ perceptions, ordinary reality, ordinary state of being are crossed by, converge with, are entwined within, non-ordinary states of awareness and non-local states of consciousness” (Ascott 2001). Thus, “[a]s is the case with the advanced tools of the West, the shaman’s two realities mix on the plane of imagination, their convergence offering the potential of new ways of being, perceiving and behaving” (Ascott 2001). As we can see, the tales that emerge are in the continuity of those developed in the 1990s concerning cyberspace: we would be becoming techno-shamans. Yet, these tales are now stressing the potential of actual and future numerical technologies to make perceptible, and mostly to link visibly or perceptibly the different levels of reality in which we live, inside the same space: our own space. Will this remain a fiction? We will probably discover it soon.

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