

## Leopardi and the ancient Greek mathematics

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“I consider Leopardi’s poetry and pessimism to be the best expression of what a scientist’s credo should be”. This quotation is from Bertrand Russell, no less. With these very emblematic words, the greatest man of letters, the supreme icon of the Italian Parnasse, the author of such collections of poems as *Canti* (Poems) and *Operette Morali* (The Moral Essays) and philosophical thoughts as *Zibaldone* (Miscellany) has been associated to the world of science. This relationship, very intense and to a certain extent new, was greatly emphasised on the occasion of the poet’s birth bicentenary. During the celebration in 1996, an exhibition with the name of *Giacomo and Science* was organized in his birthplace to underline the close connection between the poet and the scientific culture of his epoch. This point has also been stressed recently: “Leopardi must be acknowledged as a man of extraordinary learning, since he blended literature and philosophy with interests of quintessentially scientific nature”.

He developed this passion for science from a very young age, as an analysis of the Italian poet’s bibliography reveals. He was only 14 when, together with his brother Carlo, he published *Saggio di chimica e di storia naturale* (A study on chemistry and natural history). Only a year later, in 1813, he wrote *Storia dell’Astronomia* (A history of astronomy), later followed by *Dissertazioni fisiche* (Discourses on physics), *Dissertazioni sull’origine dell’Astronomia* (Discourses on the origin of astronomy) and *Saggio sopra gli errori popolari degli antichi* (A study on the common mistakes of the ancients).

These works demonstrate that Leopardi, though very young, was already a man of his time. He was indeed very learned, as a result of the rich encyclopaedic (in the etymological sense of the word) knowledge that every aristocratic child was given at the beginning of the nineteenth century. The Italian poet did not dismiss his past as *homo scientificus* from memory even when, as an adult, he turned to “feelings” and to a completely intimate poetic ethic. *Zibaldone*, with all its explicit references and hints, bears great witness to this scientific heritage. Indeed it expresses a relationship which could be defined as intense, dialectic – a relationship which met with strong opposition, a deeply analysed relationship, a relationship that changed as the poet’s attitude towards life changed. Even moving away from the verses of his poetry, we still find important elements to explore this relationship between Leopardi and science.

Thus far, science has been dealt with in generic terms, works on astronomy (to which Leopardi probably devoted most of his time) have been mentioned as well as the study on chemistry, but no reference has been made to mathematics, which indeed is a more complex matter. Mathematical references, though not very frequent, are to be found in Leopardi’s literary production. The most significant of these is a passage from *Zibaldone*, in which the author states that “there can be no poetry when one looks at nature in terms of pure and cold reason, therefore no poetry can be inspired by pure and simple reason and mathematics”. To a certain extent, this statement expresses a “lyrical” mistrust towards mathematics, which becomes more and more evident as Leopardi’s poetics develops from the optimism of his first works to the cosmic pessimism of his last.

In the case of the ancient Greek mathematics this “lyrical” mistrust can be defined as a “conspiracy of silence”, for Leopardi does not mention ancient mathematics, which is surprising, if we consider that the ancient world, and especially the Greek culture, had a great influence on Giacomo Leopardi’s poetics and philosophy.

Our purpose is therefore to discover the reasons for this “conspiracy of silence” towards the exact sciences of the ancients. In other words, we have tried to find out whether the author simply ignored them out of an ambiguous attitude towards all sciences, bearing in mind that he was deeply influenced by Enlightenment thought, even though there was a totally unique evolution of thought and poetry to be reckoned with.

Furthermore, we also took into account that Leopardi might have avoided mentioning the exact sciences for stylistic purposes. Being influenced by Petrarch and the literary tradition of ‘belles lettres’, full of rhetorical devices, he could not accept

“the plain and natural language of scientists”, as was stated by the first historian of the Royal Society, Thomas Sprat.

Through an in-depth analysis of the infinite, a key concept for the Italian poet, we have also tried to understand whether Leopardi was afraid he might explode the myth of the perfect ancient world in terms of philosophical truth and poetic sentiment, by discovering anti-philosophical and anti-sentimental elements (which refer to Leopardi’s “system” and “sentiment” respectively).

Considering the first hypothesis and the artistic career of the poet, we have noted that the passage from the ‘scientific’ to the ‘poetic’ Leopardi was not sudden, even though this dualism took on different features as the author devoted himself more to poetry than encyclopaedic study. It is true that the encyclopaedic optimism characterizing his first works, *Dissertazioni filosofiche*, *Storia dell’Astronomia* and *Saggio sugli errori popolari degli antichi*, is followed by the lyrical pessimism of his last *Canti*, especially *La ginestra*. It is also true, however, that the poet’s attitude towards the world and science had not changed – if the purpose of men is to search for the truth, (as Leopardi states in *Saggio sugli errori popolari degli antichi*) science is a very good means to do so, as it enables men to free themselves from the mistakes which conceal the truth. Indeed science preserves its power to save individuals, typical of the Enlightenment, until the poet reaches “the arid truth” and “the infinite uselessness of everything”. Nevertheless, science is not discredited even when the author discovers “the truth of the doom and the desperate place that nature has given to us” during his quest for knowledge or when he comes to the conclusion that the world is dominated by a cogent logic, though it might not seem logical at all to those who see the world through the eyes of sentiment. The poet refers to a world in which there is no room for free will, and therefore science is not rejected, being the means by which we can understand this view of the world. Indeed its theoretical value is beyond question and, even though the poet is reluctant to accept the conclusions it leads to, science undergoes no cognitive criticism, because it is simply not susceptible to such structures. What is questioned is rather its existential value, and therefore its potential for salvation. In our dissertation we have analysed two passages: one is taken from *Zibaldone*, the other contains Pierre-Simon Laplace’s definition of probability theory. Leopardi states: “I am certain that the universe is the work of an infinite intellect. Are you aware that there is an infinite space between the extent and strength of man’s intellect and an infinite extent and strength? Human intellect is not able to imagine such a plane as the universe. Yet, an intellect one thousand times as strong and broad as the human intellect will be

able to imagine it. You will never be able to have an infinite intellect, never a great intellect, perhaps a relatively great one, never a divine intellect”. Laplace states that: “If, for a given moment, an Intelligence were to know all forces present in nature and the respective situation of the creatures of which nature is composed, and if at the same time it could analyse these data, the same formula would govern the movements of the biggest bodies and the lightest atoms in the universe. As a consequence, nothing would be uncertain for this Intelligence and the future would be, as the past, like the present in its eyes. The spirit offers, in perfection it has given to astronomy, a pale example of this intelligence”. It is surprising that both passages are parallel, yet they are bound not to draw the same conclusions: unlike Laplace, Leopardi has no faith in the progress of the spirit, which seems to have reached the boundaries of a confident intelligence thanks to astronomy. The poet does not deny that science and techniques can lead to progress, yet men must not expect to advance in knowledge, as that can only be seen as a means better to understand one’s limits and conditionings.

Astronomy is doubtless the scientific field which most interested Leopardi, especially in his youth, as we pointed out when we quoted his early works. In one of these works, *Storia dell’Astronomia*, mention is made of ancient mathematics. It is necessary to point out that it is just a mention as this reference aims at a better description of the science of stars from a historical point of view. The poet stated “(...) Much is owed to Apollonius for he applied Astronomy to Mathematics, which gives rise to an intimate and great relationship. Astronomy needs Mathematics. Indeed it made progress when it was supported by Geometry.” This relationship is also stressed in *Zibaldone*: “Astronomy without any mathematical support was like metaphysics without ideology – hence a most uncertain and vulgar science, trifling, full of dreams and surmises, without any support. Metaphysics receives the same certainty from ideology as astronomy does from mathematics and calculations”.

The tones are probably harsher and the terminology more precise, yet his point of view has not changed very much. Even though he does not set a time limit, it is evident that Leopardi considers mathematics as the foundation of scientific rigour, a “method”. A question arises: is mathematics in the poet’s view an autonomous discipline or is it to be considered a minor one?

Let us take into consideration one of his early works, the *Saggio sopra gli errori popolari degli antichi*, whose objective is the search for the truth. Since the world is full of errors, as the young poet states, “men have to know the truth first of all”. “The ancients were once looked up to with superstition, whereas now most people look down

on everything that concerns them”. In Leopardi’s opinion, both attitudes are erroneous. “The ancients did commit gross errors; but (...) modern people do exactly the same. Most prejudices of the past are still present today”.

Most of these errors concern physics, astronomy, biology, hence sciences. This concept is further emphasized in *Zibaldone*: “literature and poetry go in the opposite direction as sciences. The former are sterile, the latter prosper. The former lose their value once they have reached a certain point, the latter grow in value as they progress. The former are more and more important, beautiful and wonderful for the ancients, the latter for the moderns”. This could actually be the reason why the poet does not mention (ancient) mathematics, the more rigorous and least imaginative of sciences. In his study, it plays an important role, even though it is considered only as a support. Furthermore, comparing the quality of sciences and letters in a measure inversely proportional to their chronological progress it is evident that the former do not favour the exaltation of Classical Civilization. They clash with the “favola bella”, with the myth, and therefore it is better to acknowledge them as “imperfect”.

Thus, Leopardi’s intolerance towards the style of science becomes part of this cultural background which contemplated the triumph of ancient arts and letters as opposed to the modern. In Petrarch’s lyrical tradition, like all Italian men of letters Leopardi accepted the Renaissance distinction between arts and scientific culture which had been all the more stressed in the seventeenth century through Galileo and Newton’s development of a scientific literature, style and language by means of Galilei and Newton. The scientists’ language is too inelegant, cold and impersonal, their vocabulary too limited, their style lacks personality and rhetorical devices. “No matter how hard one tries, scientific works can never be well written, in an elegant and good style”. That is not all. “When I speak of scientists, whom I do not consider capable of fine and elegant writing, I do not refer to moralists, politicians (...), proper philosophers. (...) And I do not consider mathematics and physics professors capable of fine writing, or those professors who teach subjects of that kind”. Leopardi indeed appears to be very categorical. “There is just a small minority, both in the past and in the present, of good and elegant writers of this kind of science. The Greeks dealt with these sciences in a half poetic way for they experimented a little and imagined a lot”. There is only one type of style, or rather fine writing, as Leopardi defined it – that of poetry, strictly linked to imagination, to the capacity of “feeling”, which is killed by exactness and sacrificed by the scientists’ plain and natural way of expression in favour of rational demonstration. In this respect Leopardi creates a slightly forced syllogism of will,

almost as if he had to do everything in his power to save the Greeks from deceptive thought. The Greeks, elegant in all other arts, dealt with science in a “half poetic” way, which is why their science was considered to be elegant. Poetry and Leopardi’s strictly connected idea of the infinite is half an explanation of his conspiracy of silence towards ancient mathematics.

What is the infinite for the poet? Everyone knows all too well the infinite described in the renowned poem of that name, but Leopardi also reflected upon the infinite even in such prose works as *Zibaldone*, *Operette Morali* and *Storia del genere umano*, in which he explained his “theory of pleasure”, which we shall now illustrate.

“Pleasure, in other words happiness, is what the human soul longs for and aims at. It is a “natural” drive, a “tension” that men cannot relinquish as it is strictly linked to their existence. The poet states: “This or that tendency has no limits, for it is innate and congenital in existence and therefore it cannot finish with this or that pleasure which is not infinite, but it ends with life. This drive, this desire, has no limits “in duration as it can only finish with existence and therefore men would not exist if they did not feel this desire”. It also has no limits in extent, for “it is part of us, not as desire for one or more pleasures, but as desire for pleasure itself. All these utterances represent a fundamental point in Leopardi’s poetics: the human soul experiences an infinite desire for pleasure which is unreachable by definition. There are certainly moments in which men believe they have found happiness: only as long as desire remains a kind of waiting, expectation, a hope that it will be realized is it possible to find a moment of happiness. The poet himself states in *Il Sabato del villaggio* (The village Saturday Night): “Of the seven, is this the most welcome day/ full of hope and joy/ the morrow sadness and boredom”. But when there is nothing else to wait for and men sooner or later awake from the limbo of expectation, every happy moment reveals itself as an illusion. Men themselves are bound to discover their full unhappiness through their finiteness and the truth. In other words, men cannot have what they desire, yet they cannot renounce it. We are talking about “a need for the infinite which stems from the fact that life feeds on itself (...) beyond its specific (...) finite manifestations (...).But human life is finite”. It gives rise to unhappiness, sadness, boredom, a more extreme feeling than pain, an endless *taedium vitae*. In brief, if all that exists is finite and therefore boring, painful, bad, dead, then its opposite, the infinite, the non-existent will be diametrically opposite. “Nothing in our nature contains the notion of the infinite, the existence of any infinite thing. The idea of the infinite is created by our imagination, our smallness and at the same time our arrogance. It seems that the infinite is made of the same substance as

nothingness, and it does not accept individuality". Furthermore, "Nothing can be infinite if matter, which is finite, is eternal and if the infiniteness of time corresponds to the infiniteness of nothing, which can only exist in imagination and language". Thus, the infinite is nothing and it can only survive within imagination. This infinite, this not being evil, this deliverance from evil is what the poet aims at. "The only good is non-being, there is no other good than that which is not, the things which are not". The infinite is the product of imagination, of the abstracting intellect; it is the infiniteness of Kant's regressum ad infinitum, Hegel's "evil infinity". The infinite is connected to the negative infinite of the ancients, an idea of incompleteness, imperfection, lack of form. It is the apeiron (the boundless), the non-being of the Pythagorean School, Aristotle's pure negativity of potential matter.

Yet Leopardi differentiates between his philosophical-poetic point of view and the heritage of the past. Paolo Zellini states: "From the Greeks Leopardi does not inherit what was considered the antidote to the pain caused by the infinite, the theory of measure and the art of binding the unlimited in a series of relationships, limited logoi (reasons), which was one of the objectives of Greek mathematics. Arithmetic, geometry and "logistics"(the algorithmic science of ratios) had proved useful not only for the foundation of mathematics in the West but for the definition of an abstract profile of ideal behaviour, a useful reference for the life of feelings and Plato's "conversion" of the soul or the salvation of our life. As Archita said, "logistics was connected to sofia and the canons of logismos, the art of calculating relations which had the aim of balancing the life of feelings both in Plato's *Dialogues* and in Aristotle's *Nicomachean Ethics*. Those canons contributed to defining a sort of "science of measure" of pleasure and pain, which was meant to avoid opposites. Nor should it be believed that Aristotle's "happy medium" was just an "average" between opposites. The "medium" as the ideal point of excellence in ethics was, in Aristotle's view, a "climax" or an "extreme" and it was a prerogative of "great" souls. For Leopardi this philosophy of measure is not acceptable. It is true that it can be an antidote to the problems of the infinite, but it is also powerless in the face of the radical non-being of the unlimited". "It is evident that mathematics itself cannot have the same meaning as for the Greeks. As mathematics searches for a measure for the great, the unlimited and the measureless, it is bound to exclude the only poetic and pleasant aspect for the soul, which consists in the vagueness, imagination and illusion that go together with the experience of the infinite", by whose elements Leopardi's poetics is characterized.

In conclusion, mathematics and the sciences in general are not foreign to Leopardi, they are indeed part of his hard-earned and very rich cultural background. Even though he rarely made any direct references to it, the scientific heritage probably influenced his prose works and poetry and led him to typically scientific reflections, thoughts and elaborations. We have also noted that the poet had a different approach, for stylistic reasons (the style of scientific disciplines being so inelegant, far from the poetic). But above all it was science (including ancient mathematics) that led to different conclusions, totally opposite to Leopardi's philosophical doctrine and poetics. There is a point, where the two different systems could have converged. But it is actually the point where they differ the most – the infinite, which is a two-faced Janus in Leopardi's poetics as it is a constant aspiration but at the same time beset by limits. It represents desire and the impossibility of fulfilment. The ancients had found a solution to the evils of infinite, a measure, what they called logos. Leopardi cannot accept this point of view, as it leaves out the imagination, vagueness and illusion which are necessary to the experience of the infinite. The poet sets up the a-logon, song and poetry, against logos, the measure.

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