

# About the Arithmetic and the Geometry of Human Proairesis and the Natural Asymmetry by Which Unhappiness Wins the Game Against Happiness 3 to 1

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**Abstract:** Only recently the study of human 'Proairesis' has become a respected area of scientific research. However, still today the very starting point of any such inquiry appears exceedingly difficult because the nature of human proairesis seems inherently refractory to explanation, especially in materialistic terms. Following the fundamental suggestions of Epictetus and Euler, the major contribution of this paper consists in the mathematical demonstration that it is possible to understand and treat the human 'Proairesis' (the famous 'egg' of the Montefeltro altarpiece by Piero della Francesca) as a material entity having the Arithmetic of a natural exponential function written in complex numbers and the Geometry of a square inscribed in a circumference (the famous 'Homo Vitruvianus' of Leonardo da Vinci).

**Keywords:** Nature of Things, Proairesis, Complex Numbers, Natural Exponential Function, Euler Identity, Science of Happiness

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## 1. Introduction

All the philosophers of antiquity ignored the principle of inertia and believed in the existence of only two types of motion: the natural and the violent ones. The violent motions were those caused by the action of an impulse, while the natural motions were those which took back the material bodies to their 'natural place'. This happened because, according to those philosophers, all bodies were mixtures of varying amounts of the four basic elements; and they considered 'earth' and 'water' as elements endowed with the quality of heaviness and of a natural downward motion, while 'air' and 'fire' were considered elements endowed with the quality of lightness and of a natural upward motion.

## 2. Physics and Biology Have Learned to Read the Great Book of Nature

About two thousand years had to pass before Galileo (1564-1642) [6] and Newton (1642-1727) [7], by defining the principle of inertia and elucidating the arithmetic and the geometry to which the motion of all bodies obey, could lay the

modern pre-relativistic Physics upon an entirely new basis.

A little more than two centuries after the death of Galileo, Mendel (1822-1884) [8] laid the foundations of modern Genetics discovering the existence of an exact arithmetic law even there where its existence was thought impossible, that is in the generation of plants and animals.

In fact, he found that concerning the generation of living beings like the garden peas, we can say the following: all the individuals of the generation born from a cross between individuals with pure and simple hereditary characters, such as seed shape ('smooth' or 'wrinkled' in the case of garden peas), show the 'smooth seed' character. However the individuals of the second generation, that is those born from a cross between individuals of the first generation, show the 'smooth seed' character but also the reappearance of the 'wrinkled seed' character. Now, the astonishing discovery made by Mendel was that the ratio between the 'smooth seed' and the 'wrinkled seed' peas of the second generation was not at all random and unreproducible but was always exactly the ratio 3: 1, which means that whatever the amount of 'smooth seed' progeny, the 'wrinkled seed' progeny was precisely one third of that amount.

All garden keepers knew the existence of 'smooth seed' and

‘wrinkled seed’ peas, but none of them had cared about it or thought to count the number of individuals of a second-generation cross. Mendel just counted and recounted these numbers, and in this way he began to understand what other people had not even noticed or thought of no importance at all.

Well then, Galileo was perfectly right when stating [9]: *“Philosophy is written in this grand book which stands continually open before our eyes (I say the Universe), but cannot be understood unless we first learn to understand its language and to recognize the characters in which it is written. It is written in mathematical language and its characters are triangles, circles and other geometric figures, so that without mathematics and geometry it’s humanly impossible to understand a word of what is written, and all our efforts come down to a vain wandering in a dark labyrinth”*.

To understand Nature we must therefore find the mathematics and the geometry that are hidden in it and place no more confidence in whoever sets them aside: be it the ‘Authority’ of the Academics, the ‘Tradition’ of the Sacred Texts or the ‘Common Sense’ of the People. In short, we must become able to think, whenever it is the case, in a counter-intuitive way. This is what Galileo and Newton were able to do in the field of Physics and Mendel was able to do in the field of Genetics.

### 3. What About Psychology

Where do we stand today in the field of Psychology, the birth and the recent history of which is exactly coeval with that of Genetics? It seems to me that in the field of psychology we are now where Physics stood before Galileo and Newton and Genetics before Mendel.

In Psychology we still wander vainly in a dark maze and we continue to rely upon Authority, Tradition and Common Sense. This has produced and continues to produce an uncontrollable proliferation of ‘ad hoc’ theories, of dead end research and of personal rivalries among scholars, so that the overall result of this immense mass of addresses and attempts is of little or no value.

Which is the reason of this situation? The reason is the lack of an absolute and invariant frame of reference, of some basic theory rooted in Arithmetic and which is therefore beyond doubt and accepted by all. Like the principle of inertia, the laws of motion of Galileo and Newton, the ratio 3: 1 of Mendel? Yes, it is exactly so. And why have we not been able to establish psychology on a solid foundation? Because we continue to look to Authority, to Tradition and to Common Sense, instead of reading this great book which stands continually open before our eyes, the name of which is ‘the human soul’ and which is written in mathematical language: so that if we do not learn to read its key numbers, all our efforts come down to a vain wandering in a dark labyrinth.

### 4. What Is the Psyche

To make some progress we must therefore open our eyes, look at the human soul and go back to the origin of the word

itself that is to the term ‘Psyche’.

The philosopher who defines and structures this term in the fourth century B. C. is Plato (427-347 B. C.). According to him the human psyche is tripartite, being composed of a ‘rational’ part which is located in our head, of a ‘spirited’ part which is located in our chest and of an ‘appetitive’ part which is located in our umbilical zone.

In his famous dialogue ‘Phaedrus’, [10] he gives us a well known and easy to remember picture of the psyche, by comparing it to a chariot drawn by two winged horses, a white one and a black one, and driven by a charioteer. The black horse representing the appetitive part of the soul, the one that contains our most powerful and trivial instincts, the divine lust for material entities, tends to drag the chariot downwards (as ‘earth’ and ‘water’ naturally do in the physics of Plato) and is unruly to the commands of the charioteer. The white horse representing the spirited part, the one that contains our most noble instincts, the divine frenzy of celestial entities, tends to drag the chariot upwards (as ‘air’ and ‘fire’ naturally do in the physics of Plato) and is more obedient to the commands of the charioteer. The charioteer represents the Reason, whose task is to direct the course of the chariot towards the Hyperuranium, that is the seat of the ‘ideas’: the ultra terrestrial and immortal reality which is the only one that deserves to be known.

According to Plato, then, the dynamics of the psyche entails the existence of two distinct components: an energetic one, represented by the winged horses and which is divine Erotic power, and a steering component represented by the divine power of Reason. The outcomes of this dynamics between Eros and Reason are completely random, though it clearly appears that Reason without Eros is powerless, and that Eros without Reason is blind. Also in his ‘Symposium’ [11], and in particular in the speech of Diotima, Plato carefully details the possible path of the chariot, from the shadowy and deceptive appearance of earthly things to the bright Hyperuranium’s reality. For Plato there is no doubt that Reason must be the absolute rule making power for all men; but it is also evident that, according to him, our Reason is under the constant threat of the divine power of Eros, with all the ensuing consequences of its violence and devastations.

This is Plato’s picture of human psyche, and the vast majority of modern psychology still finds a comfortable seat on that chariot. With regard to this I remark that, if there was anything real and serious in the Psychoanalysis of Freud (1856-1939) [12], well, that was already known to Plato, who speaks extensively about it in the ninth book of his ‘Republic’ [13]. Most of the modern psychology is still founded on this idea of Plato and is therefore condemned to wander in a dark labyrinth. Where are the numbers with which Nature is written? Nowhere, Plato does nothing more than transposing and applying to an alleged entity that he calls ‘psyche’ some fundamental concepts of his Physics. These seem to me the hard facts, and next to Plato there is no Ariadne who could help him, and help us, to emerge from the darkness.

I consider, of course, as being of great significance and dictated by the best intentions all the theoretical and practical

efforts that have been made so far to offer palliatives to the endless 'psychological' pains of human beings. Nevertheless I continue to believe that Theseus is still in the labyrinth, that the Minotaur has not yet been killed and that Ariadne is still spinning her thread.

## 5. A Farewell to Plato

To bid the last farewell to Plato means, of course, to abandon to their fate many tenets of classical philosophy and to allow, for example, the autonomy of the concept, the transcendence of the ideas and the gap between the essence of the phenomena and the sensible knowledge of them to fade away.

Placed then in front of an enigmatic reality, the smallness and the transience of all material objects, the violent conflicts and the mortal wars that men wage each against the other, the fickleness of their ideas and the filth of their customs, shall we definitely surrender ourselves to the incomprehensibility of it all? Is Nihilism a faithful summary of how things went and of how they will always go? If all the 'cultural models' are subjective and devoid of permanent value, where must we look to find a safe place, a firm and unshakable foundation?

## 6. Interlude

So tell me: do we have anything in our exclusive power, or everything in our exclusive power, or some entities are in our exclusive power and others are not?

- I do not understand. What do you mean?

Listen, if you want a body that is intact and healthy for a lifetime, is this in your exclusive power or not?

- No, it's not in my exclusive power.

And a beautiful body?

- Not even this is in my exclusive power.

And the possibility to live or die when you want?

- This too is impossible for me.

So your body is not in your exclusive power, but is subject to everything that is mightier than your body is.

- I must admit that it is so.

And what are your fields, your home, your servants, your horses?

- I acknowledge that none of these entities is my exclusive power.

And if you want your kids or your wife or your brother or your friends never die, is this in your exclusive power?

- Not at all, not even this.

So, nothing is in your exclusive power, or there is something that is in your exclusive power?

- I don't understand your question.

Look; let us analyze the matter in this way. Answer me: can someone make you assent to something that you judge to be false?

- No one can make me assent to what is false, if I decide to withhold my assent to it.

So, you agree that in the field of assents you are not subject to impediments and obstacles.

- That's right.

And can someone force you to do something that you don't want to do?

- Of course he can. For if he threatens to kill me or to put me in chains, he forces me to do what he wants even if I don't want to do it!

But if you were to despise the death or to be fettered, would you still think that you are forced to do what you don't want to do?

- No, in that case I would feel free and I would never do what I don't want to do.

So to despise death and to be fettered, is it in your exclusive power or not?

- It is in my exclusive power.

Therefore, the decision to do something is in your exclusive power or not?

- Yes, now I understand and acknowledge that it is my exclusive power.

And the opposite decision; that is, the decision to not do something: is it also in your exclusive power or not?

- Also this decision is my exclusive power. But wait: if I decide to walk and yet someone prevents me from doing it, you see that I do not walk anymore. So you see that walking is no longer in my exclusive power.

But what have you been prevented to do by someone else? Is it perhaps your decision to walk that has been prevented?

- No, it is not my decision to walk that has been prevented.

And what, then, have you been prevented to do by someone else?

- My act of actually walking has been prevented.

So he did not stop what he can never stop or prevent: that is your decision to walk, since this is something that is in your exclusive power. He has prevented only what he can always prevent, because is something not in your exclusive power: that is the movements of your body.

- Let it be that way, but the fact is that I do not walk anymore.

And who ever told you that walking is something in your exclusive power and not subject to all kinds of possible impediments? As I said, what is not subject to impediments is only your decision to walk. But when the actual act of walking is concerned and the body and its cooperation are needed, then you've heard long time ago that nothing is in your exclusive power.

- Yes, it's true. I admit it.

And can someone force you to want what you do not want?

- No one can.

Can anyone force you to aim at something or pursue a design; in short, to use the impressions that befall you in a way that you reject?

- No, no one can do this. But he can stop me from actually obtaining what I want.

But if you covet any of the entities that are in your exclusive power and that are not subject to hindrance by other people, who can prevent you to get it?

- You are right: no one can, no one in no way can.

## 7. The Proairetic Things, the Aproairetic Things and the Proairesis

What we have just read is not a dialogue invented by me, but a fragment -slightly modified in order to assure its better readability- taken from Book IV, 1, 68-75 of the 'Discourses' of Epictetus (about 50-130 AD) [2]. If we are firmly convinced, like Galileo was, that the great book of Nature is written in mathematical language, and that in order to understand it we must first work out the language in which it is written, it doesn't make anymore sense to rely on the 'Authority' of the Academics, the 'Tradition' of the Sacred Texts and the 'Common Sense' of people. Side by side with Epictetus we eventually enjoy the company of someone who has started to read this great book of Nature that stands continually open before our eyes.

The first major acquisition which, I believe, we can rely on is then the following: as Epictetus puts it, it is written in the great book of Nature that some entities are in our exclusive power, while others are not in our exclusive power. As we are Nature's creatures, this means that Nature consists of only two sets of things: those that are in our exclusive power, namely the 'proairetic' things [1]; and those that are not in our exclusive power, namely the 'aproairetic' things [1].

Why do I use the adjective 'proairetic' and not the adjective 'psychic'? Because the reading of the great book of nature shows that a lot of psychic activities, such as memory, response to stimuli, dreams, are absolutely not in our exclusive power.

First of all we must therefore introduce the terms 'proairetic' and 'aproairetic', because there is a pressing need to define properly the mental activities that are in our exclusive power and to distinguish them very clearly from those that are not in our exclusive power. From now on, I therefore shall call 'proairetic things' the mental activities that are in our exclusive power: such as judgments, desires, assents, etc.; while I shall call 'aproairetic things' the mental activities that are not in our exclusive power, as well as all the other entities that are not in our exclusive power.

Secondly, we must abandon the Platonic noun 'psyche' because reading the book of nature shows that many of the so-called 'psychic' activities are common to men and animals. In fact, even animals use the representations, and often do it in a much more sophisticated and refined way than men do; but we are the only ones who, thanks to the possession of proairesis [1], have the understanding of the use we make of our mental representations. Therefore, we shall use the noun 'proairesis' to indicate exactly this faculty which is solely ours and defines us as human beings: that is, the ability to distinguish what is in our exclusive power from what is not in our exclusive power [1].

## 8. A Necessary Terminological Clarification

Some of the ancient Stoics, in order to indicate the

proairesis have used the term 'hegemonic'. In fact 'proairesis' and 'hegemonic' are terms, not always but most of the times meaning exactly the same thing. My personal choice has been from the beginning to use the term 'proairesis', and I'll continue to stick to this choice as I did in the past. The reason is that the noun 'proairesis' offers the possibility to derive quite naturally the adjectives 'proairetic' and 'aproairetic', while the word 'hegemonic', being itself an adjective, makes impossible or greatly complicates what the term 'proairesis' facilitates.

## 9. The Myths of Plato Versus the Stoic Reading the Great Book of Nature

The Stoics, after turning their back to the myths of Plato, were the first to read the great book of Nature. Their exploration dates back to some two thousand years, between the third century B. C. and the second century A. D. The men who fortunately have left us many of their lecture notes of the human soul were, among others, Zeno of Citium (336-263 B. C.), Chrysippus of Soli (280-207 B. C.) and Epictetus (about 50-125 A. D.) [14].

The Stoics were the first to ask if everything that exists is in our exclusive power, or if nothing of what exists is in our exclusive power, or if some of the things that exist are in our exclusive power while other are not in our exclusive power.

By reading the answer in the great book of Nature, as we know from the Interlude, the Stoics were able to demonstrate in a convincing way that of all the existing entities some are in our exclusive power, while others are not in our exclusive power. In our exclusive power are, for example, evaluations, assessments, projects, desires, impulses, and so on. In particular, Epictetus was the first to call these entities 'proairetic' things. Not in our exclusive power are entities like our body, money, reputation, work, and so on: all entities that he defined as 'aproairetic' things.

According to the Stoics, this has always been, is, and will always be the 'Nature of Things', which is invariant, inviolable and valid for all men without exception.

## 10. The Proairesis

Epictetus [2] has introduced the term 'proairesis' [15] specifically and exclusively to indicate the faculty which is exclusively ours and which defines us as human beings: that is the ability to distinguish what is in our exclusive power from what is not in our exclusive power. It is therefore clear that for the Stoics the 'proairesis' is a faculty, like are faculties our sight or our hearing, except for the fact that with reference to these last faculties we do not differ at all from other animals. As with the term 'sight', we mean the faculty able to distinguish many different colors and many different shapes of things, not the ability to see things of a single color or of a single form; likewise, with the term 'proairesis' Epictetus defines the ability to distinguish what is proairetic [1] from what is aproairetic [1], not the ability to recognize

only proairetic things or only aproairetic things. Again, as with the term 'hearing' we mean the ability to distinguish myriads of sounds without confusing them with each other; so the proairesis as a 'faculty' is confronted with a much easier task, since it only has to distinguish two sets of things: the proairetic ones and the aproairetic ones. Our proairesis does this job by producing a couple of judgments of judgments, or 'superjudgments', that can be called 'Diairesis' and 'Counterdiairesis' [16].

Now, if we admit that the 'diairesis' [21] is the superjudgment that certifies our ability to distinguish in any circumstance what is and what is not in our exclusive power, and that the 'counterdiairesis' [21] is the opposite superjudgment, namely the one that states to be in our exclusive power what is not in our exclusive power, or not to be in our exclusive power what instead is in our exclusive power, then we get the key that allows us to find the right behavior in any situation, because nothing can happen to us that is out of harmony with the 'Nature' in general; and it is in the exclusive power of our proairesis to ensure that we do nothing that could be in contrast with the 'Nature of Things' [17].

## 11. The Role of Reason

What is then the discursive 'Reason' that Plato taught men to regard as the only form of truth, the only science, the only bulwark guaranteed from any failure?

The answer written in fine characters in the great book of nature is the following: the famous 'Reason' is nothing but 'Antidiairesis' [18]. Just let us continue to read the book in order to understand why it is so. In fact, all our common behaviors and activities - such as those of the carpenter, the fisherman, the architect or the doctor, for instance, - can be defined as works of the Antidiairesis. This happens because the decision to put together a chair, to go out fishing, to build a house, to take care of a sick person, to rob a bank, to kill a man, as the decisions exactly opposite to them are all 'proairetic' things, and the same 'reason' is perfectly capable of performing either the ones or the others. This means that the implementation of totally opposed decisions always occurs through a series of standard operations guided by simple judgments that remain subject to the original decision. The antidiairesis, that is the discursive 'reason', can then correctly and operationally be defined as the set of subordinate judgments working on what is not in our exclusive power and which, as complementary to Diairesis [21] or Counterdiairesis [21] are competent to carry out and to realize the project of the first or of the second.

It follows that the Platonic reason is structurally incapable of any choice of 'purpose' and of any protocol different from the mere preparation of the necessary 'means', and from doing the work needed to realize what it is delegated to pursue. Reason, our common everyday behavior, can then be imagined as the trunk of a tree at whose roots lie either the diairesis or the counterdiairesis. When the work is finished, freedom and happiness or unhappiness and slavery are the

fruits hanging from the branches of the tree depending on whether at the root of the tree we have placed the diairesis or the counterdiairesis. If the craftsmen know that in order to make whatever job it is necessary to strictly follow the appropriate antidiairesis and do not rely upon the opinions of incompetent people, it is amazing how we instead ignore that the realization of ourselves as men, that is wisdom, means to respect the 'Nature of Things' and make the correct use of our proairesis, by putting the diairesis at the root of the antidiairesis.

At this point Plato, red with shame, might better go away under the amused gaze of all proairesis operating properly. And in place of the myths of Plato, the Stoics have managed to put us in front of a model no longer consisting of two winged horses and a charioteer but of five elements: 'Proairesis', 'Nature of Things', 'Diairesis', 'Counterdiairesis' and 'Antidiairesis'.

## 12. The Foundations of a New Science

Let us summarize and further point out the meaning of the terms we have just introduced, by answering the following five basic questions:

### 12.1. What Is 'Proairesis'

The 'proairesis' [1] is the natural human faculty able to distinguish what is and what is not in our exclusive power, and to assume accordingly a 'diairetic' or a 'counterdiairetic' attitude. The proairesis of all men is by 'Nature' free, infinite, impossible to be subordinated to other human faculties and impossible to be made servant to anything aproairetic. It assumes a 'diairetic' attitude when it makes the right distinction between what is in its exclusive power, that is the 'proairetic' things [1]; and what is not in its exclusive power, that is the 'aproairetic' things [1]. It assumes a 'counterdiairetic' attitude when it does not this that is when it makes a wrong distinction, decreeing as 'proairetic' what instead is 'aproairetic', or 'aproairetic' what instead is 'proairetic'.

### 12.2. What Is the 'Nature of Things'

The 'Nature of Things' [17] is the particular property of the 'Nature' or Universe to which we all belong, to be made up of only two sets of things. The first set is the set of 'aproairetic' things, namely the things that are not in the exclusive power of the human proairesis. This set is perfectly summed up in the second inscription on the pediment of the temple of Apollo at Delphi: 'Nothing too much'. The second set is the set of 'proairetic' things, namely the things that are in the exclusive power of the human proairesis. And this set is perfectly summed up in the first inscription of the temple of Apollo at Delphi: 'Recognize yourself'. The 'Nature of Things' and the human 'proairesis' are in fact the two aspects of one and the same absolute, invariant, inviolable reality: a reality empirically valid for any man belonging to any culture.

### 12.3. What Is 'Diairesis'

The 'diairesis' [21] is this specific operation of the human proairesis, by which the proairesis shows itself able to produce a judgment of a judgment, that is a superjudgment, incorporating the right distinction between what is proairetic (for example, the desire to walk) and what is aproairetic (for example, the action of actually walking), and behaves accordingly [19].

### 12.4. What Is 'Counterdiairesis'

The 'counterdiairesis' [21] is either the simple absence of diairesis or the specific operation of the human proairesis which is opposite to the diairesis. When it operates in the 'counterdiairetic mode' the proairesis produces a judgment of a judgment, that is a superjudgment, incorporating the wrong distinction between what is proairetic (for example, the desire to walk) and what is aproairetic (for example, the action of actually walking), and behaves as if what by the nature of things is 'proairetic' were 'aproairetic', or if what by the nature of things is 'aproairetic' were 'proairetic'.

### 12.5. What Is 'Antidiairesis'

The 'antidiairesis' [18] is the correct name of what has hitherto been called 'Reason' and that has a purely executive role in the chain of command led by the proairesis. The antidiairesis can be defined as the set of simple subordinated judgments about aproairetic things and which, as complementary to the message of the 'diairesis' or of the 'counterdiairesis' is competent to carry out the project of the one or of the other. This means that the reason itself is structurally incapable of any protocol different from the mere pursuing of the goals that it is delegated to pursue.

## 13. The Arithmetic of Proairesis and the Fundamental Identity

If we accept as correctly defined and demonstrated the existence of the 'Nature of things' and of the 'Proairesis', we shall have no difficulty in accepting the fundamental identity of Euler [3].

$$(\text{NOT}) \text{ Nature Of Things} = e^{i\pi} = -1 = \text{Proairesis (P}^d) \quad (1)$$

It would be difficult to find a more compact and concise way to say that the 'Nature of Things' and the human 'Proairesis' (in my opinion the famous 'egg' of the Montefeltro altarpiece by Piero della Francesca [4]) are the two sides of the same coin; one and the same absolute, invariant, inviolable reality: a reality empirically valid for any man belonging to any culture. This fact appears to be the legitimate equivalent at the 'proairetic' level of the absolute, invariant, inviolable reality, empirically valid for any observer represented at the 'aproairetic' level by the speed of light. It is on the basis of this identity that we can now move on and see if it is possible to find how many actual and different human behaviors the proairesis can dictate, if this

number is finite, and if there are numerical relationships between these possible behaviors.

## 14. The Proairesis Can Take Only Four Possible Attitudes and Consequently There Is a Natural Arithmetical Asymmetry Between Human Happiness and Human Unhappiness

Since it is empirically true that any man finds beautiful, happy and good to get what he wants, and judges ugly, unhappy and bad to run into what he averts, the 'happiness' and the 'unhappiness' of any man is strictly correlated with the 'diairetic' or 'counterdiairetic' attitude of his proairesis. This means that the only happy man is the man whose proairesis respects its nature, who recognizes the 'nature of things' and treats accordingly what is 'proairetic', led by the judgment that the outcome of the operation is in his exclusive power, and thus obtains what he wants; and interacts with what is 'aproairetic', led by the judgment that the outcome of the operation is not in his exclusive power, and therefore with the due reserve so as not to run into self-failure and distress. It is evident that, on the contrary, the man whose proairesis does not respect its nature and who tries to violate the nature of things will be unhappy, because he is treating what is 'proairetic' as if it was not in his exclusive power, and what is 'aproairetic' as if it was instead in his exclusive power.

Now, if we try to define the theoretically 'pure' types of all possible human behaviors based on the previous empirically true assumptions, it will be enough to examine all possible human behaviors with respect to what is 'proairetic' (for example, the project of walking) and with respect to what is 'aproairetic' (for example, to take an actual walk). The examination of both aspects is paramount, as happiness is the result of a combination of two factors which must both be in accordance with the nature of things. Otherwise happiness will sooner or later become unhappiness, when even just one of the two factors is in a state contrary to the nature of things.

We find then with some surprise, that this research is not only feasible but also rather simple, since the 'pure' types of all human possible behaviors are in theory only four in number, as can be clearly seen in the following diagram.

In it: the "+" sign is equivalent to the human behavior resulting from the judgment: 'it is in my exclusive power';

The "-" sign is equivalent to the human behavior resulting from the judgment: 'it is not in my exclusive power':

1. PROAIRETIC / APROAIRETIC	+ / + → unhappiness (i. e. vice)
2. PROAIRETIC / APROAIRETIC	- / + → unhappiness (i. e. vice)
3. PROAIRETIC / APROAIRETIC	- / - → unhappiness (i. e. vice)
4. PROAIRETIC / APROAIRETIC	+ / - → happiness (i. e. virtue)

1. The type 1 man is convinced that everything is in his exclusive power. Although his relationship with what is proairetic is correct, his relationship with what is aproairetic is incorrect. Inevitably, sooner or later, the nature of things will make him run into what he averts, with the inevitable misery that will follow. We could point to this type of man as the model of a 'tyrannical man' or of 'despotic exaltation'.

2. The type 2 man is convinced that what is proairetic is not in his exclusive power, while what is aproairetic is in his exclusive power. This is the type exactly symmetrical and contrary to the fourth one and depicts a man prey to continuous unhappiness, a man who systematically doesn't get what he wants and runs into what he averts. I would point to this man as the model of the 'fool man'.

3. The type 3 man is convinced that nothing is in his exclusive power. Although his relationship with what is aproairetic is correct, his relationship with what is proairetic is incorrect. The misery of this man is as deep as difficult to delineate. I would characterize him as the model of 'self-destructive depression'.

4. The type 4 man is convinced that what is proairetic is indeed in his exclusive power, while what is aproairetic is not in his exclusive power. This man lives in happiness, because he has the correct attitude both towards what is proairetic and towards what is aproairetic. I would greet him as the model of the 'wise man'.

Now, the natural asymmetry that we have discovered in this way is a consequence of the nature of things and of the natural characteristics of human proairesis. The asymmetry consists in the fact that, by definition, only one type of man, namely the 'wise' one, has an harmonious and happy life, while the three other types must be associated with a troubled and unhappy life.

This means that, in the absence of additional limiting factors and statistically speaking, unhappiness wins the game against happiness by 3 to 1.

The same result could be obtained by composing a 4x2 matrix in which we give:

The value "1" to human behavior resulting from the judgment: 'it is in my exclusive power', and the value "0" to human behavior resulting from the judgment: 'it is not in my exclusive power'.

This matrix would look like this:

PROAIRETIC	APROAIRETIC	
1	1	2 → unhappiness (i. e. vice)
0	1	1 → unhappiness (I. e. vice)
0	0	= 0 → unhappiness (i. e. vice)
1	0	1 → happiness (i. e. virtue)

and the result is again 3 to 1.

This also means that, disregarding all other parameters and reasoning upon purely theoretical grounds, it is to be expected that 75% of human beings have troubled and

unhappy lives, while only 25% of them are expected to have harmonious and happy lives. It seems therefore correct to conclude that, in the very long run, unhappiness wins the match against happiness by a score of 3 to 1, but also that the door to happiness is open, even if it is three times smaller than the door to unhappiness. This conclusion does not exclude, however, that in the short term there might be, due to a variety of factors, large fluctuations and deviations from the average, so that at certain stages of human history virtue could prevail significantly over vice.

## 15. In the Great Book of Nature the Arithmetic and the Geometry of Proairesis Are Written with Complex Numbers

A complex number  $z$  is formed by an ordered pair of numbers, the first of which is a real number and the second an imaginary number. It has thus the form  $z = a + ib$  where 'a' and 'b' are real numbers and where 'i' is the imaginary unit, the value of which is by definition  $\sqrt{-1}$ . Since the proairesis defines itself by the relationship that it has in an orderly manner with both 'proairetic' and 'aproairetic' things, and since all the operations that are done with the usual real numbers can be done also with complex numbers, we have the tool that allows us to perform arithmetic operations with proairesis and to give a geometrical representation of it.

Complex numbers can be represented as points on a complex plane (usually called a Gaussian plane), defined by two perpendicular axes and formed by four quadrants with the usual orientations. The x-axis is called the 'real' axis and on it we identify the real part of the complex number, with positive values towards the east and negative values towards the west. The axis perpendicular to it, the y-axis, identifies the imaginary part of the complex number with positive values towards the north and negative values towards the south. As 'origin' we consider the point 0, that is the point in which the two perpendicular axes meet.

Now, let us establish conventionally to put on the real axis the value of the attitude of the proairesis towards what is 'proairetic', and assign the value +1 to the judgment: 'this is my exclusive power'; and the value -1 to the judgment: 'this is not in my exclusive power'. We establish then to put on the imaginary axis the values concerning the attitude of the proairesis towards what is 'aproairetic', and assign the value +i to the judgment: 'this is my exclusive power'; and the value -i to the judgment: 'this is not in my exclusive power'.

1. Now consider, for example, what we referred to as type 1 proairesis, that is the unhappy man who is prey to the despotic exaltation and therefore whose motto is: 'everything is in my exclusive power'. The proairesis of this man judges that all proairetic things are in his exclusive power. We shall therefore give the value +1 to this judgment, make it the real part of the complex number and identify it on the real axis at a unit distance from point 0.

Which is the attitude of this man towards what is

aproairetic? This man judges that all aproairetic things are also in his exclusive power. We shall therefore give to this proairetic attitude the value  $+i$ , make it the imaginary part of the complex number and put its value on the axis of imaginary numbers at a unit distance from point 0.

We have thus constructed the complex number  $z_1 = 1 + i$ , which has the coordinates  $(+1, +i)$ , and therefore is identified, as usual, in the first quadrant of the complex plane at the point of corresponding coordinates.

2. Let us go on and analyze what we have referred to as type 2 proairesis, namely that of a fool man whose motto is: 'what is proairetic is not in my exclusive power, while what is aproairetic is in my exclusive power'. The proairesis of this man judges that proairetic things are not in his exclusive power. We shall therefore give the value  $-1$  to this judgment, make it the real part of the complex number and identify it on the axis of real numbers at a unit distance from point 0.

Which is the attitude of this man towards what is aproairetic? This man considers everything that is aproairetic to be in his exclusive power. We shall give to this proairetic attitude the value  $+i$ , make it the imaginary part of the complex number and put its value on the axis of imaginary numbers at a unit distance from point 0.

We have thus constructed the complex number  $z_2 = -1 + i$ , which has the coordinates  $(-1, +i)$  and that therefore is identified, as usual, in the second quadrant of the complex plane at the point of corresponding coordinates.

3. Let us now examine what we have referred to as type 3 proairesis, namely that of a man prey to self-destructive depression and whose motto is: 'nothing is in my exclusive power'. The proairesis of this man judges that nothing of what is proairetic is in his exclusive power. We shall therefore give the value  $-1$  to this judgment, make it the real part of the complex number and identify it on the axis of real numbers at a unit distance from point 0.

Which is the attitude of this man towards what is aproairetic? This man is convinced that nothing of what is aproairetic is in his exclusive power. We shall give to this proairetic attitude the value  $-i$ , make it the imaginary part of the complex number and put its value on the axis of imaginary numbers at a unit distance from point 0.

We have thus constructed the complex number  $z_3 = -1 - i$ , which has the coordinates  $(-1, -i)$ , and is identified in the third quadrant of the complex plane at the point of corresponding coordinates.

4. Finally, we examine what we have referred to as type 4 proairesis, namely that of a wise and happy man whose motto is: 'what is proairetic is my exclusive power, while what is aproairetic is not in my exclusive power'. The proairesis of this man judges that all aproairetic things are in his exclusive power. We shall therefore give the value  $+1$  to this judgment, make it the real part of the complex number and identify it on the axis of real numbers at a unit distance from point 0.

Which is the attitude of this man towards what is aproairetic? This man believes that nothing of what is aproairetic is in his exclusive power. We shall give to this proairetic attitude the value  $-i$ , make it the imaginary part of

the complex number and identify it on the axis of imaginary numbers at unit distance from point 0.

We have thus constructed the complex number  $z_4 = +1 - i$ , which will have the coordinates  $(+1, -i)$  and is identified in the fourth quadrant of the complex plane at the point of corresponding coordinates.

In summary, on the basis of the values defined in the introduction, we have identified and established on the complex plane the following four complex numbers:

In the first quadrant	The complex number $+1 + i$	'the tyrannical man'
In the second quadrant	The complex number $-1 + i$	'the fool man'
In the third quadrant	The complex number $-1 - i$	'the depressed man'
In the fourth quadrant	The complex number $+1 - i$	'the wise man'

## 16. These Are the Arithmetic and the Geometry of Proairesis

As is well known, the so-called Euler's 'jewel' [3] establishes a correct link between the arithmetic and the geometry of all the 'aproairetic' things. In fact, as the validity of his equation linking arithmetic and geometry has been proven

$$e^{i\pi} = \cos \pi + i \sin \pi \quad (2)$$

we can deduce that

$$e^{i\pi} + 1 = 0 \quad (3)$$

which means

$$e^{i\pi} = -1 \quad (4)$$

Given the correctness of what has been proven valid in the field of 'aproairetic' things, I suggest that the Euler's jewel becomes the road that allows us to enter into the heart of proairesis and of all 'proairetic' things too, revealing their arithmetic and their geometry.

In fact, the human 'proairesis' -denoted by the symbol  $P^4$  - appears to be, and can be treated as, a fourth power complex number, since it is possible to prove the identities:

$$-n = ne^{i\pi} = P^4 \quad (5)$$

where  $n$  is any positive real number.

In order to demonstrate this assumption, let us take as an example one of the simplest cases, that is the case in which 'n' is the positive integer '4'.

I suggest that the human proairesis is a fourth power complex number because  $P^4$  shows to have four roots that are exactly the complex numbers that we just obtained in the previous paragraph.

Indeed if:

$$\sqrt[4]{ne^{i\pi}} = \sqrt[4]{P^4} \quad (6)$$



then

$$\sqrt[4]{n} \cdot \sqrt[4]{e^{i\pi}} = \sqrt[4]{P^4} \quad (7)$$

and accordingly

$$\sqrt[4]{n} \cdot e^{i(\pi+2k\pi/4)} = \sqrt[4]{P^4} \text{ (with } k=0, 1, 2, 3) \quad (8)$$

After a series of a relatively simple algebraic passages, we obtain the following four complex roots of  $P^4 = -4$ :

$$p_1 = +1 + i$$

$$p_2 = -1 + i$$

$$p_3 = -1 - i$$

$$p_4 = +1 - i$$

where  $p_1, p_2, p_3$  and  $p_4$  are the four different roots.

But we already know very well these four complex numbers, since they describe the only four basic attitudes that, because of the 'Nature of Things' (NOT), the human proairesis ( $P^4$ ) can take with respect to what is 'proairetic' and to what is 'aproairetic'. At the same time, we find that in the complex plane these four complex numbers represent the vertices of the square inscribed in the circumference with center at the origin, having radius  $\sqrt{2}$  and the sides parallel to the coordinate axes.

The equation  $p_1 = 1 + i$  identifies the type of the 'tyrannical man' and the types similar to it;

The equation  $p_2 = -1 + i$  identifies the type of the 'fool man' and the types similar to it;

The equation  $p_3 = -1 - i$  identifies the type of the 'depressed man' and the types similar to it;

The equation  $p_4 = +1 - i$  identifies the type of the 'wise man' and the types similar to it.

If instead of assuming  $n = 4$  we consider the human proairesis ( $P_4$ ) as the fourth power of Unity and then we do the calculations assuming  $n = 1$ , we find that my suggestion continues to hold on perfectly, except that instead of the complex numbers ( $\pm 1, \pm i$ ) the four roots are  $(\pm\sqrt{2} \cdot \frac{1}{2}, \pm i\sqrt{2} \cdot \frac{1}{2})$ .

It seems to me of no small interest the fact that among the infinite variety of possible powers of complex numbers and of the related geometries, the Nature has reserved for the human proairesis, and only for it, the grade four.

Nor it goes unnoticed to me the fact that if under the Mendel's law of 3: 1 -which is the basis of the transmission of hereditary characters- Nature was hiding the existence of the chromosomes and therefore of the DNA; something not random at all must hide under the so precise, simple and elegant arithmetic and geometry of the proairesis that we have just discovered.

Everything in the Universe is interaction of energy, of atoms and of molecules according to very precise rules. The proairesis is no exception, and the road to a new Science, the Science of Happiness, seems to me eventually opened because it looks now framed by some mathematical basis. Anyway it is certainly true that if my teachers of mathematics,

when I was in my early manhood, had made it clear to me that I do not only have a proairesis, but also that the mathematics touches so deeply and so closely my true essence, my interest in it would have made great strides.

## 17. Some Remarks on the Theory

As far as human happiness and unhappiness are concerned, I have already mentioned the arithmetic asymmetry written in the great book of Nature and that our proairesis can do nothing but understand and accept. At this point I think worth to make some brief remarks upon the geometry of the proairesis.

1. First, if one considers the distribution of the four possible attitudes of proairesis in the four quadrants of the complex plane, the symmetry that characterizes the opposite attitudes becomes immediately evident. In fact, the form 'the tyrannical man' occupies the position I, and is symmetrical to position III 'the depressed man'; while the form 'the fool man' occupies the position II and is symmetrical to the position IV occupied by 'the wise man'.

2. Secondly, the four forms appear to have very different 'logical stabilities': and with 'logical stability' I mean the presence or the absence of contradiction in them. As has been indisputably demonstrated in the 'Interlude', the Nature of Things is such that the man has a complete and exclusive power upon what is 'proairetic' but not upon what is 'aproairetic'. On the contrary, the 'tyrannical man' is convinced that he can deny this empirical truth and claims to have a complete and exclusive power over both. The same but opposite thing does the 'depressed man', who claims to have no power at all both upon what is 'proairetic' and upon what is 'aproairetic'. However, the Nature of Things is such that between different 'aproairetic' things there can be strong conflicts and true oppositions but never contradictions. This happens because the contradictions are possible only between 'proairetic' things. It is impossible to believe that something is 'white' and at the same time 'not white' and every man must choose the one or the other judgment. Those that in the case of human beings are wrongly called 'inner conflicts' cannot therefore exist, while it's true that there can be from time to time 'inner contradictions' that are only temporary and are always resolved, even if they can reappear in a compulsive way. Both the 'tyrannical man' and the 'depressed man' are exactly in this condition and, despite their words or their deeds, they perceive the discomfort of being in contradiction and they always resolve it, as we shall soon see. If, therefore, the proairesis of the tyrannical man and that of the depressed man are in a metastable state, this doesn't happen in the case of the proairesis of the 'fool man' and of the 'wise man', because their proairesis do not suffer from contradictions; so that one of them - the fool man - lives basically in stable contrast with the Nature of Things and is almost continuously in a state of 'living war', while the other - the wise man - lives basically in stable harmony with the Nature of Things, and is almost continuously in a state of 'living peace'.

3. Thirdly, it is worth to try to answer the following question: “Can the proairesis of a human being freely turn on itself and move from one quadrant to another quadrant? And being in any one of them, is it bound to remain there forever? And if it can move from one quadrant to another, how can it happen?” The response is straightforward and is positive, since it is the mathematics itself that shows us how this can happen. The proairesis being an exponential function and given its geometry, the operation of multiplication of the complex number that characterizes each ‘p’ (for example  $p_1 = +1 + i$ ) by the imaginary unit ‘i’, generates its counterclockwise rotation of ninety degrees, as well as its division by the imaginary unit ‘i’ generates its clockwise rotation of ninety degrees. This means that the ‘tyrannical man’ may well move from quadrant I to quadrant II with a ‘proairetic’ - and therefore in his exclusive power - operation of multiplication by the imaginary unit ‘i’, with the result of becoming a ‘fool’. But, at least in principle, the proairesis which is in the ‘tyrannical’ state is free also to operate upon itself the division by the imaginary unit ‘i’, with the result of switching to quadrant IV and becoming ‘wise’. The decision on what to do is entirely proairetic and can be done only by the proairesis.

4. Fourth, the fact that the geometric form of the human proairesis is a square - and not some other polygon - inscribed in a circle (in my opinion the famous ‘Homo Vitruvianus’ of Leonardo da Vinci [5]), is a consequence of the ‘Nature of Things’ (NOT), because there are only two, not three or four or infinite sets that at the maximum possible level of generalization describe the ‘Nature’ or Universe of which we are a part: the set of proairetic things and the set of aproairetic things.

Furthermore, since the set of real numbers is infinite, it is worth noticing that the number of possible squares inscribed in possible circumferences is also infinite, and so that also the number of possible proairesis is infinite. In addition to this, since in the case of complex numbers the request of knowing if a complex number is greater or smaller than another one is meaningless, to ask if a proairesis is larger or more powerful than another proairesis becomes also meaningless.

Since all the operations of human proairesis are necessarily the result of the interaction of atoms and molecules in harmony with precise rules, being myself a Molecular Biologist I find it wiser today not to venture into wild hypotheses and to resist the temptation of explaining complex phenomena on the basis of known molecules, the possibility that they will be explained only on the basis of molecules that are yet to be discovered being very high.

## 18. Conclusion

AN AMAZING COINCIDENCE: THE DEFINITION OF ‘PROAIRESIS’ BY MARCUS AURELIUS (121-180 AD).

Σφαῖρα ψυχῆς ἀγνοειδής, ὅταν μῆτε ἐκτείνηται ἐπὶ τι μῆτε ἔσω συντρέχη μῆτε ἐπαιρῆται μῆτε συνιζάνη, ἀλλὰ φωτὶ λάμπηται ὅ τὴν ἀλήθειαν ὁρᾷ τὴν πάντων καὶ τὴν ἐν αὐτῇ.

“Sphere of bright light is the soul when it doesn’t spread out over something, it doesn’t shrink in itself, it doesn’t become elated, it doesn’t become depressed but shines of the light by which it sees the truth of all things and the truth that is in itself” (Marcus Aurelius ‘Meditations’ XI, 12 - Translation of F. Scalenghe).

Even if here he uses the generic word ‘soul’ (ψυχή), the one I just mentioned is basically the definition of ‘proairesis’ or ‘hegemonic’ that Marcus Aurelius [20] - not by chance a Stoic - gives in Book XI, § 12 of his ‘Meditations’.

It is a stunning thing to note the coincidence, almost word by word, between my characterization of the four complex roots of proairesis, and the four characterizations of proairesis that Marcus Aurelius gave already over nineteen hundred years ago:

- a) he whose soul becomes elated, is he not the tyrannical man?
- b) he whose soul spreads out over something or shrinks in itself, is he not the fool man?
- c) he whose soul becomes depressed, is he not the depressed man?
- d) he whose soul shines of the light by which he sees the truth of all things and the truth that is in himself, is he not the wise man?

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