

## NOTES ON A MATHEMATICS OF SENSATION

“I am able to prove that not only light, colour, and the like, but also movement, shape, and space are all nothing but apparent qualities”

LEIBNIZ

“I only use numbers because it is a way of writing without describing”

HANNE DARBOVEN

## NUMBERS.

Sensual and optical realities both hide a common question: their apparent solidity. What represents the concrete character of sight, of feeling, of smell, when compared with the logical process with which we qualify our quantitative presence in the world? Every process is enumerable. Numbers are that necessary instrument for defining a thought which processes the Infinite. In order to accept a mathematical description of nature, physicists were forced to abandon the common world of experience, the world of the perception of the senses. To understand the meaning of this abandonment, we must go beyond that fragile boundary that divides physics from mathematics. Art, whenever it has to do with numbers, when it flaunts its structural version, can be the mobile threshold through which we link quality and quantity by way of the iconic value of numbers. The number takes on the part of the main character with the Avantgardes. It enters into the picture, into the painting itself, into the collage, into the installation, it enters into the system of exchange and hardens as irreplaceable thought in order to understand the speed and progress of chance. As in the comparison between physics and mathematics, art has posed queries able to understand the relationships between observer and reality, between subject and object, in other words it has placed those questions – that have tormented philosophers since the dawn of reason, since the original cyphers were still immersed in the nebula of original experience – onto a visual level.

## 1. Euclid and Fibonacci: numeral space

Euclidean space is an axiomatic one. His own form of geometry which is based on certain commonly-shared notions that are accepted as postulates, has produced elementary theorems, upon which even today we base minimalist, rationalistic, naturalistic thought: the 'correct way of thinking' (which he calls the rules of inference), are posed as if provided by propositions whose truth is accepted without any demonstration. The propositions (the axioms) act as starting-point from where we rigorously demonstrate (using the rules of inference) all that follows (the theorems). Euclid's theory of numbers is at the basis of the fundamental theorem of arithmetic. Each natural number can be written as a product of prime numbers and this product (not considering the order of factors) is unique. Euclid lays the basis for a verism that does not open discussion. Within Euclidean truth that retinal truth that Marcel Duchamp wished to lay bare is concealed. The naked truth is axiomatically a hidden truth with its own thermic, libidinal economy which can potentially generate sense and new shapes. Art is a multiplier.

Quot paria conicorum in uno anno ex uno patto germinantur. This assumption forms the basis for Fibonacci's theorem (1202 Liber Abaci). How many rabbit pairs will be produced from a pair of rabbits? The rule says that every month the original pair will generate a new pair. Therefore, a month later there will be another pair, from 1 to 2, another month later another pair (the second pair is not yet fertile), therefore 3, then at the end of the third month another two pairs will be generated – therefore 5 and so on. The following succession of numbers is obtained: 1, 1, 2, 3, 5, 8, 13, 21, and so forth. Precisely the numbers of Fibonacci. The dual progression creates an alteration in Euclidean thinking, even though it recognises the axiomatic essence in it. In the case of the rabbits breeding, the calculation follows a natural and elementary process, as does poor art that even though is lacking aestheticism, yet is axiomatic and concrete, based upon both cosmic as well as natural principles.



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## 2. Artists, engineers and architects:

Leonardo da Vinci and Piero della Francesca.

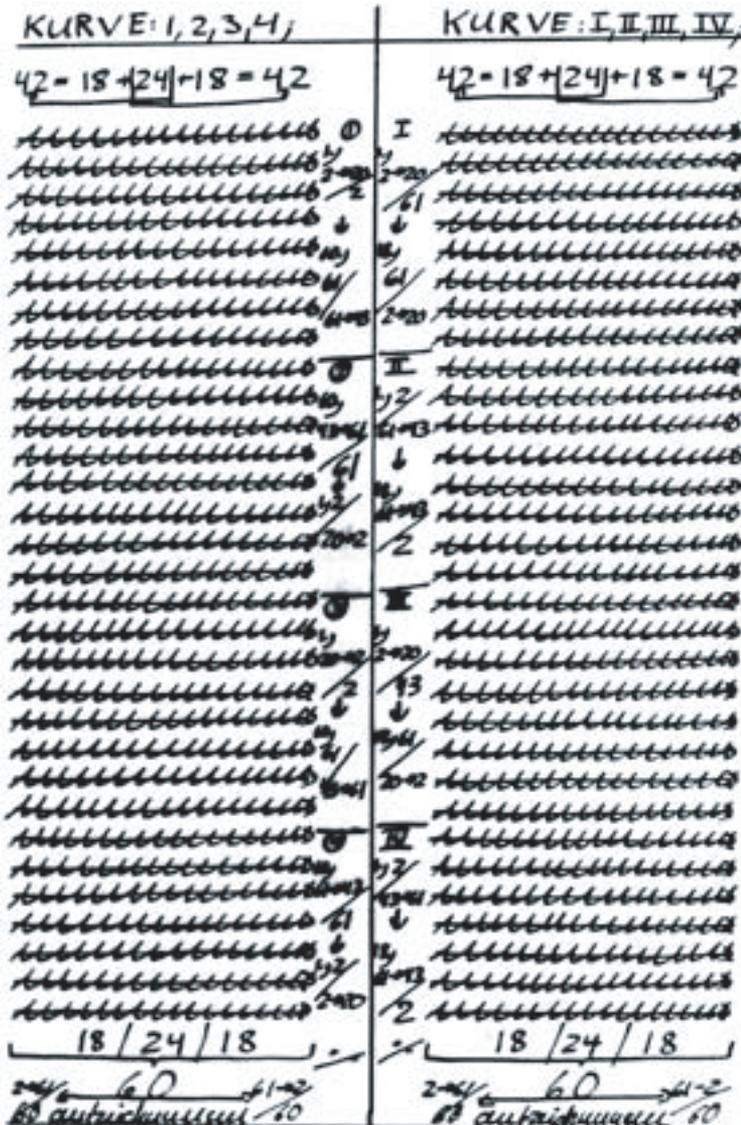
Leonardo da Vinci noted that the numbers of Fibonacci matched the position of leaves upon different types of plant, or rather phyllotaxis. That progression corresponded to the golden proportion. The French painter, Seurat, made conscious use of it in many of his works. Use of the numbers of Fibonacci are to be seen in the "fugues" of Johannes Sebastian Bach, in the Sonata in A D959 by Schubert, in some of the works of Debussy and Ravel, in the Allegro Barbaro of Béla Bartók. One of the most astonishing examples of a wide application of stylistic elements directed towards golden proportion can be seen in the *Le Sacre du Printemps* (The Rite of Spring) by Stravinsky. The first part of this masterpiece has been structured in accordance with the first of the series of Fibonacci (2-3-5-8 etc.) , the second part presents articulations than are referred to the second series (3-4-7-11).

Leonardo established the origins of the anatomy of numbers, using the quantitative element to define the human body, in search for proportions, those proportions have defined our objective sight, while they signal our objective hearing in music. Piero della Francesca had already dealt with the element of numbers at great length. *De corporibus regularibus*, the *Tractatus abaci* (Treatise on the abacus) and the *De prospectiva pingendi* are the texts where he attests his scientific stature as well as his faith in objective transcendence of numbers.

The *De prospectiva pingendi* represents the first true organic treatise compiled along the lines of Renaissance perspective science and such is its validity that, not for a short amount of time, it would have remained as an example and source of reference for future authors of works using perspective. This was written about the year 1475, when its author was more or less sixty and had already displayed his excellent pictorial skills many times. In the three books Piero develops, in a clearly mathematical sense, the problems of the representation of perspective offering operating examples which not only pertain to complicated geometrical and architectonic shapes, but to absolutely any form of natural shape. The first book, concerning plane geometry, contains didactic aims detailed with clean, linear and precise drawings. The second, about solid geometry, orientates on perspective representation of solids. The third book objectively determines the perspective image of complex objects. Perspective responded to the need, that belongs to Humanist cultures, of leading the experience of the world towards those clear-cut rules and regulations of human reason. In paintings, the question of representing men and things on to a flat surface was born, adding to the two dimensions of height and breadth, that illusory quality of depth (the question is solved by bringing all visible lines of the object to a set vanishing point by way of a rigorous geometrical system). Precisely with the *De prospectiva pingendi* perspective will take on a more analytical formulation and be constantly based upon Euclidean geometrical foundations, especially during the Florentine 15<sup>th</sup> century.







Lautreamont said (numerical-ionic mathematical axiom of surrealism): "Beautiful as the fortuitous meeting of a sewing machine and an umbrella on an operating table". Surrealist mathematics, or rather the process of the chance assimilation of the art of Surrealism, adopts magical factors that follow the grammar of mathematics in a purely apparent and external manner, or in the exclusive possibility of becoming "addenda", factors of addition. Not for this reason do they assure the causal result of addition. Taken in its Surrealist sense, Euler's formula may highlight itself as being an opening to a surrealist mathematics where the numbers belong to the traditional Arabic system, only apparently so: in truth they are abstract entities, loaded with richly imaginative symbolic potentialities. A Zero, taken outside the mathematical and geometrical system could be a face without eyes.

The number One, a big-nosed silhouette. The Two, a part of a moustache coiled around the chin. This epiphany of hidden signs, of signs risen from the semblance of numbers, makes the minimal assumptions of mathematics explode thus making it marvellous, a portent capable of producing completely unpredictable imaginative potentialities:  $1+1 = 0$ , we said, but  $1+0 = 0$ , too, hypothesising in this case that the authority of the ordinal and cardinal system, or rather One, nullifies itself in the vacuum, disperses and totally vaporises in space, all because of an unforeseen system change: therefore, that from mathematics we go on to geometry, that from the



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western horror vacui we move on to a Zen matrix of fullness of vacuum. Every formula in modern science, anyway, proposes itself as a sequence of elements which alternate letters and numbers without distinction. Like in the following example:  $E = mc^2$ . Where 'E' represents energy, 'm' is mass and 'c' the speed of light in a vacuum. This theory of Einstein is at the basis of his scientific research which lead to the "general theory of relativity" where, on the basis of the postulate of the equivalence between all inertial and non-inertial systems, the scientist formulated a new theory of gravitation in which the gravitational field generated by each material body is represented as a modification of the geometrical properties of physical space. Consequently, Euclidean geometry resulted insufficient to describe the laws according to which bodies behave in space.

Numbers, when simply added up, are not enough to qualify matter to its most substantial values: like temperature, for example. Trivialising Einstein: a body produces light (energy) during its day-to-day transformation. Light and heat: according to the Second Principle of Thermodynamics, we call "entropy" the quantitative measure of the degree of disorganisation of a system, and "the peculiar function of the internal state of a body, whose variation – in whatever elementary reversible transformation – is given by the relationship between the quantity of heat exchanged by the body with the outside during the said transformation and the absolute temperature which the body measures at the beginning of the transformation".

The cooling down of the body of art leads to sense exhaustion.

The end of art will produce new art in accordance with a system that is no longer analogue in character, but rather is a digital one: not out of likeness but out of correspondence, of identity.

1

1

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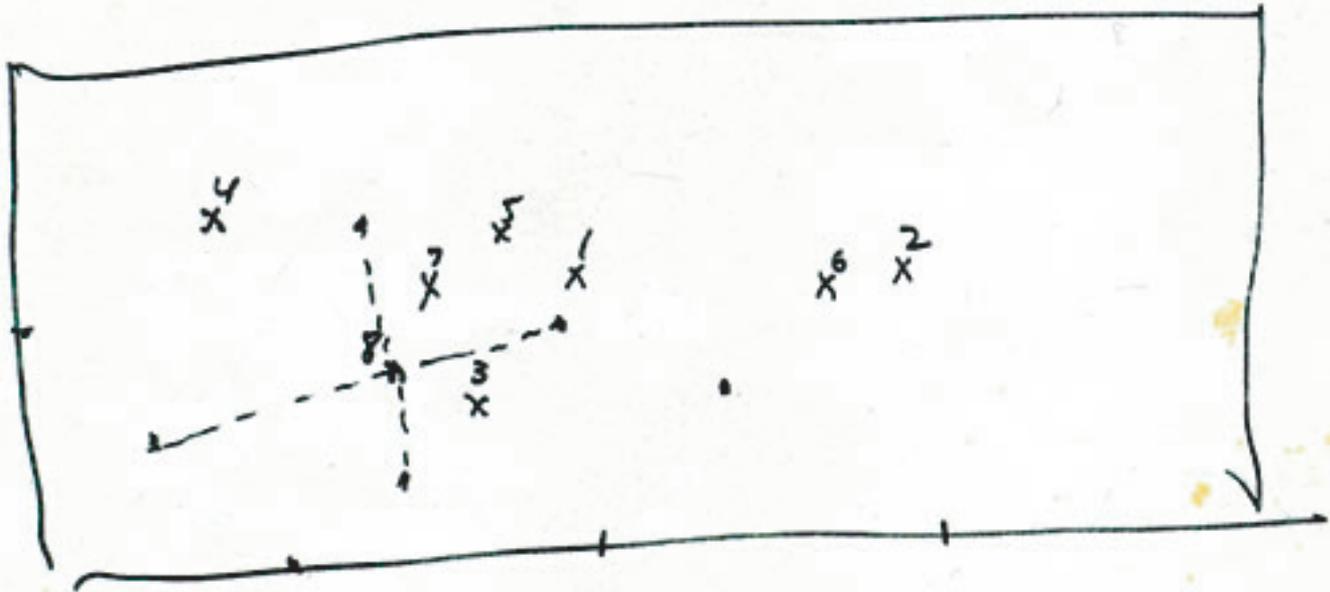
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34

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89

144



S. Kellias



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## 5. Florensky and De Chirico: the experience of the sacred and of the enigma

The metaphysical experience brings about infinite unity. Numbers signal the interpretations of the symbol. The number One mirrors itself and in such a way, coming back to itself, comes true like a new One, which is Two and so gradually becomes all the successive numbers. Just like in the obsessive repetitions of Warhol, repetition produces a harmony which frees the shape from the contents. Every number, being a unit, is a partial recall to One, it does not exist if not in as much as it manifests, it symbolises One. Two is the number of the computer. It is the binary system, which divides the principle of rhythm into two. To divide into two, to halve, to pair off, to couple, to double, are principles which lead back to One, to the original experience.

Three is the number of the trinity. Body, Soul, Spirit are the angles of a perfect triangle. Three are the primary colours. Nine is the time of birth. Nine months for every new creation. De Chirico proposed an enigma scenography within which perspective is made up of numbers, set-squares, rulers, easels, manikins, piazzas, shadows, stopped watches, lay silences of history. Within all that paraphernalia of scenographic elements the origin of thought is reconstructed, its numeral essence combines the objects like elements of a grammar made up of Arabic figures that are useful for calculating infinite hypotheses of progression. The complexity of the number system delineates the geographical network of the finite globe, which the Artist unrolls onto the table like a limited surface area within which it is possible to unmask the infinitude of its Euclidean appearances. Pavel Florensky, a Russian mathematician and theologian, pierced a hole in this veil of appearances with a theory of archetypes, or visual standards, turning perspective upside-down: if every two-dimensional spatial investigation starts from a given point in space, doubling that point means squinting and constructing an objectivity based on vision: in every icon there are two points, two black holes, two portentous magnets that coagulate space within its multiple perceptions and reconstruct the mystery of infinite existence. Unreachable and unrepeatably One. Two is its multiplication. Three is its emanation. Five, their addition. Seven, creation. The Artist, like Prometheus, steals fire exposing his strategy of subtraction: confirms the existence of NUMBERS.

