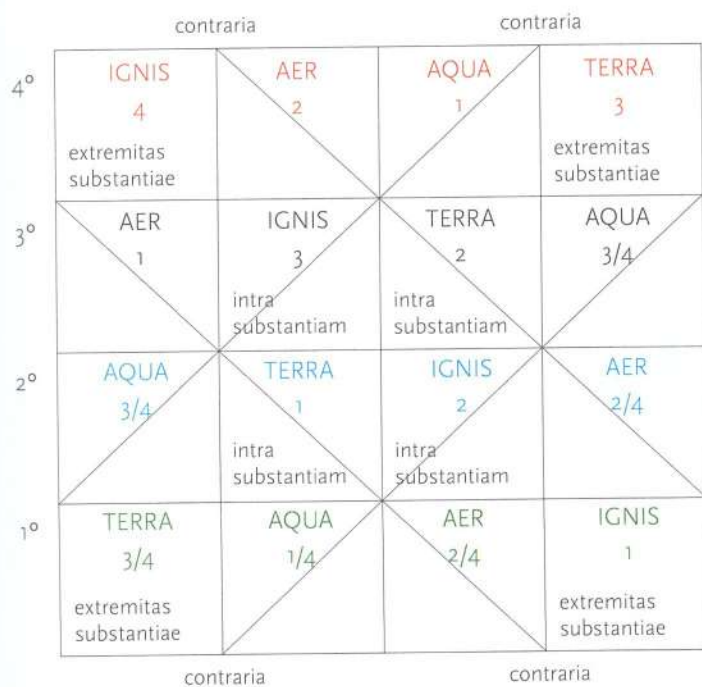


**Image 9.** The first figure is the Elemental Figure (*figura elementalis*). In this figure Ramon Llull represents the four elements and the dynamics of their relationship. Llull assigns to the four elements the first letters of the alphabet, to be able to express natural phenomena with combination formulas (AB, CD, etc.), from which one sees the connection between natural philosophy and Llull's art. The *figura elementalis* already appears in the pre-Art phase, namely in 1274 in the *Ars compendiosa inveniendi veritatem*. It is described as part of figure T. This fact is very important, because it gives the Elemental Figure a gnoseological function in the art of Llull. The figure of fire can be likened to the peppercorn which, according to Llull's natural philosophy, is found in the fourth degree of heat.



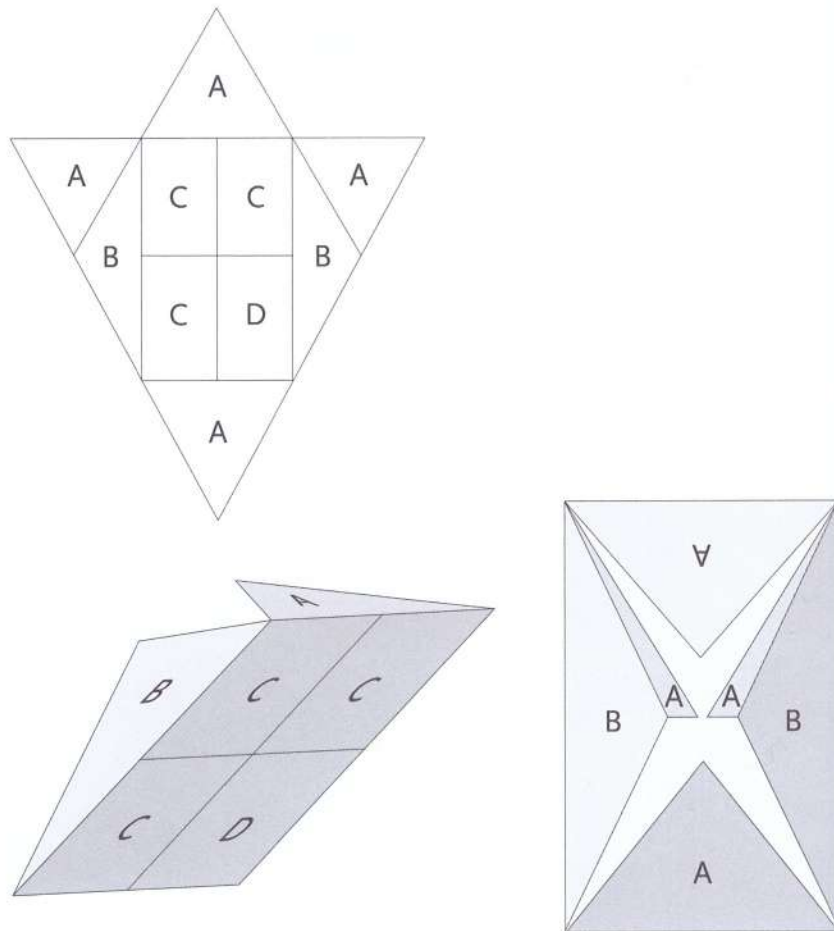
From Wisdom to Data



*Figura elementalis* – diagrams designed by Carla Compagno.

**Image 10.** The second figure is a three-dimensional reconstruction of the Figure of the fourth heat degree (*figura quarti gradus caloris*), that appears in the *Liber de nova geometria* (1299). In this figure, the four degrees of fire are represented by the letter A, the three degrees of earth by the letter C, the two of air by the letter B, and the sole degree of water by the letter D. This seems an attempt to represent the elemental particles within material substance. After a brief introduction to Lull's system of diagrams, here we will focus on the *figura elementalis* in the ars, and on the evolution of its meanings in Lull's works.

From Wisdom to Data



*Figura quarti gradus caloris* – diagrams designed by Carla Compagno.

# 1. Ramon Llull's *Figura Elementalis*. The Evolution of Diagrams and their Gnoseological Functionality

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## Introduction

When Llull is discussed, everyone associates his name with combination mathematics, and he is remembered as one of the forerunners of computer language (Fidora & Sierra, 2011). This is because he draws up a logical and combinatorial system, with which he discusses the theological and philosophical truths of his time (Künzel & Cornelius, 1991). He himself describes this system as an "art." Llull's art was studied, in the 17<sup>th</sup> century, by Leibniz, who later adopted Llull's idea of universal language for his theories in the field of combination mathematics and logic (Colomer, 1979).

Llull's art appears as a tool for researching all sciences, becoming the science of sciences, a vision and an intuition (Domínguez, 2018), or, to use an expression that first appeared after Llull, a scientific method (Sales, 1998). By means of the correspondence between letters and principles, the Artist obtains combinations that reveal themselves to be nothing short of logical propositions concerning God, the world, dogmas, and articles of faith. The principles of the art are common and constant principles that can be shared by the three major current monotheistic religions. In other words, they are principles with claims to universality, which the interlocutor can accept as a basis for logical, and thus religious and philosophical, dialogue. Llull understands that the premises for logical and rational debate must be the same, and agreed upon, i.e., universal, otherwise no accord on the processes of discourse, and on their results, can subsist (Romano, 2002).

Without going into the heart of the workings of the art (Rubio, 2008), which would require a separate discussion, an important consideration is needed at the outset to clarify the most significant stages in the development of Llull's philosophy. The system of the ars experienced an evolution over time; this evolution led two

academics, Lola Badia and Antony Bonner (Badia & Bonner, 1983), to identify four key stages, subsequently recognized by all Llull's scholars. The four phases are marked by the appearance of central works: 1. *Lògica del Gatzell – Liber contemplationis* (1271-1274). 2. *Ars compendiosa inveniendi veritatem* (1274) – *Ars demonstrativa* (1283). 3. *Ars inventiva veritatis* (1290). 4. *Ars generalis ultima* (1307). The two middle phases constitute the commonly called quaternary phase and the ternary phase of the art. The quaternary art is so called because its center of inspiration lies in the theory of the four elements: the research into nature, and the study of God as prime cause, constitute the speculative cornerstones of this phase. Meanwhile, the ternary phase is informed by the reflection that the author cultivates regarding the theory of correlatives that constitute the threefold structure of every being. This stage reflects the maturity of the theological discourse on the trinity, and on how this can be discussed by the art.

The art makes use of definitions, rules, alphabets, tables and illustrations. The alphabets, the tables and the diagrams exploit their potential to present information visually, acting as aids to memory with an epistemological function.

The *Ars brevis* (1308) contains, for example, the following alphabet:

- B significat bonitatem, differentiam, utrum, Deum, iustitiam et avaritiam.  
 C significat magnitudinem, concordantiam, quid, angelum, prudentiam et gulam.  
 D significat aeternitatem siue durationem, contrarietatem, de quo, caelum, fortitudinem et luxuriam.  
 E significat potestatem, principium, quare, hominem, temperantiam et superbiam.  
 F significat sapientiam, medium, quantum, imaginatiuam, fidem et accidiam.  
 G significat uoluntatem, finem, quale, sensitiuam, spem et inuidiam.  
 H significat uirtutem, maioritatem, quando, uegetativam, caritatem et iram.  
 I significat ueritatem, aequalitatem, ubi, elementatiuam, patientiam et mendacium.  
 K significat gloriam, minoritatem, quo modo et cum quo, instrumentatiuam, pietatem et inconstantiam.

Corresponding to each letter is a set of principles. Corresponding to the letter B are goodness, difference, whether, God, justice, avarice; corresponding to

letter C are greatness, concordance, what, angel, prudence, lust and so on. Also associated with the alphabet is the *tabula*, showing in visual form all the possible combinations between the letters of the alphabet. For example, the combination BCtB, applied to God as subject, could formulate the question: "Vtrum Deus habeat differentiam in bonitate et magnitudine?", namely whether there is a difference in God between goodness and magnitude.

The most important illustrations in the art are Figure A, Figure T, and Figure S. Figure A is the figure showing divine attributes or principles. Each principle is assigned a letter; B in the case of goodness, C in the case of greatness, F in the case of eternity, and so on. Figure S is the figure showing the rational soul, in which the combinations between its three powers (memory, intellect and will) are represented. Figure T is the figure of meanings, the *figura significationum*. This is very important, because it groups together the relative principles of the art, namely those concepts that regulate relations between subjects, and between all existing things. All three figures would undergo simplifications from the quaternary phase to the ternary phase. For example, Figure A would no longer have sixteen dignities, or principles, but nine, and Figure T would also see a reduction in the number of its triangles, from five to three.

The three figures are not independent of each other, their meanings are applied to the terms of the other figures, in line with the rules of artistic discourse. Llull writes in the *Ars compendiosa inveniendi veritatem* (p. 3):

Nota, quòd, sicut S. est Figura communis in hac arte, sic similiter T. est Figura communis eidem arti; quoniam S. non potest inquirere nec tractare de arte sinè T., nec T. potest significare de A. V. X. Y. Z. sinè S.: quare ista ars praecipit, quòd homo sciat concordare S. T. in significando et inquirendo A. V. X. Y. Z.

### The figura elementalis

Here we will focus on the elemental figure (Damberg, 2000), its visual representation, and its gnoseological functionality – **Image 9**.

It may be strenuously asserted that the author shows a real, genuine interest in the philosophy of nature, speculation on which, in his day, could not be separated from a consideration of the dynamics of the four elements, regarded as the constituent principles of living material bodies. The four elements and their processes of mixture are, in medieval natural philosophy, the basis of all natural processes in the physical world. Knowledge of them is useful not only to medical science, in which Llull shows a certain interest (Pereira, 1979), but also to all of the

philosophy of nature, to astronomy, and to cosmology. Indeed, the four elements refer to the dynamics of the astral influences on the life of men, and of all creatures, since stars and planets are also characterized by elemental complexions (Pring-Mill, 2007).

Llull assigns the first letters of the alphabet to the four elements, to be able to express natural phenomena with combination formulas (AB, CD, etc.), from which one sees the connection between natural philosophy and Llull's art.

The *figura elementalis* already appears in the at the beginning of the quaternary phase, namely in 1274 in the *Ars compendiosa inveniendi veritatem*. It is described as part of Figure T:

Figura ipsius T est duplex: una circularis composita de dictis triangulis; alia de quattuor figuris elementalibus. (p. 42)

This statement is highly important, because it allows us to place the elemental figure within the compilation of the other logical figures of the *ars*. It does not put itself forward as a means of research that only relates to natural phenomena; it rather takes the form of a heuristic tool in general, because the operations of the four elements, namely the operations of nature, reflect the operations of logical and artistic discourse in the other areas of interest of the real:

Figura elementalis significat in hac Arte operationem ipsorum A T V X Y Z; quia, sicut elementa operantur naturaliter, ita S. per simile in illis accipit demonstrationem in figuris istius Artis, loquendo metaphoricè cum illo, qui objicit, ut in illo simili convenienter possim habere meum propositum de ipso in caeteris figuris. (p. 42)

The elemental figure in the art means the operations of figures A T V X Y Z. From the operations of the four elements, the rational soul derives, by similarity, the demonstrations of the other figures, and founds logical discourse on the elemental metaphor.

In the *Ars compendiosa inveniendi veritatem*, Llull dwells on the visual representation of the four degrees of the elements in the elemental figure. In nature, the elements are four in number, and are found in living beings in differing amounts, which can be perceived thanks to experience, and to the bodily senses, and which can be measured in degrees. No element ever presents itself in a pure way; instead, each of them has a quality of its own, and one that is appropriated: fire is hot, and takes its dryness from the ground, air is moist, and draws its heat from fire, water is cold, and takes its moistness from air, while the earth is

dry, and it derives its coldness from water. Hot, dry, cold and moist are thus the four elemental qualities present in the elements, that are always forming mixtures between themselves.

In visual terms, the four elements are identified by different colors. Fire is red, air is blue, water is green, and the earth is dark. Associated with each horizontal line of the quadrangle is one of the four degrees of the corresponding element. The first line corresponds, in the figure of fire, to the fourth degree of heat, the second to the third degree, the third to the second, and the last to the first degree of heat. The same procedure holds for the other three elemental figures.

In the later work *Lectura artis compendiosae inveniendi veritatem*, Llull develops the description of the elemental figure, and clarifies the application of Figure T to the four elements. He also discusses the arrangement of the spheres of the elements within the four quadrangles. The spheres of the elements, in cosmological terms, are arranged in accordance with their lightness and heaviness. Equally, we can observe that, in the first vertical line to the left of the figure of fire, the lightest element, namely fire, is also the highest; going down, we find air, water, and earth. However, the four elements are never found in their state of simplicity in nature, they are always found mixed together, according to the processes of generation and corruption of substances. The other lines of the *figura elementalis* reflect none other than the *mixtiones* of the elements, which are depicted according to different orders, namely according to their rising and falling movements.

If we want to understand the application of Figure T on the *figura elementalis*, it will be enough to cite an example. Let us take the triangle of Difference-Concordance-Opposition of Figure T, and let us start from difference. The principle of difference relates to all four elements, given that each has a different quality of its own. For that matter, relations of concordance can be established, in pairs, for those elements that share one of the two qualities: for example, fire and air have heat in common, a quality that belongs to fire, and is appropriated in the case of air. However, there is also a relationship of opposition between them, given that the quality belonging to air, moistness, goes against the appropriated quality of fire, dryness.

The concept that the elemental figure is a part of Figure T is reaffirmed by Llull in the *Liber principiorum medicinae* (1275), in which the author sets out the principles of medicine, representing the four elements and their qualities in the figure of a tree.

In it, the roots are the four human humors (yellow bile, blood, phlegm, and black bile) corresponding to which are the four elements: yellow bile is associated with the element of fire, blood is associated with air, phlegm with water, and black bile with earth. On the branches that lead off from the left-hand side of the trunk, Llull locates the principles of ancient medicine (*res naturales, res non naturales, res contra naturam*). The branches leading off from the right-hand side of the trunk contain the principles of Figure T of Llull's art (*principium-medium-finis, differentia-concordantia-contrarietas, maioritas-aequalitas-minoritas*), namely the three

triangles of Figure T according to which the mixture of the degrees of medicines will be discussed. In the other part of the trunk, Llull locates the four elemental qualities and their gradation in simple medicines, assigning letters to them. A is heat, E is plant in the fourth degree of heat, F is a plant in the third degree, G is a plant in the second degree, and H is one at the first degree. This also applies to the other qualities. Furthermore, Llull gives instructions on how to make use of the tree diagram, and how to reproduce it. He writes (Bonner & Soler, 2016):

Quicumque autem hanc artem intelligere et scire desiderat, oportet ipsum scire perfecte alphabetum superius positum et ipsum in memoria semper retinere; et etiam oportet ipsum facere flores alios similes floribus dictae arboris fabricatos et mobiles, ut alios ipsorum florum cum aliis commiscere et formare demonstratiue possit, necnon ipsos augmentare et diminuire ac etiam adaequare ad declarandum, qualiter medicus suas debet componere medicinas (Liber principiorum medicinae, p. 445).

This passage shows us that the art must be understood not only intellectually, by anyone wanting to make use of it, but also learnt by heart with respect to certain sections of it. For example, the alphabets are to be retained in one's memory (*in memoria semper retinere*). Moreover, the diagrams are to be not only drawn, but created, so that their parts have movable form, to make the geometric figures turn, thereby obtaining the various compositions or combinations.

At the height of his quaternary phase, Llull composed the *Liber exponens figuram elementalem*, between 1285 and 1287, in which the elemental figure is analyzed from new points of view. The author adds certain considerations, compared to his previous works, which seem to reflect his particular devotion, in that period, to the study of material substance, and in general to the philosophy of nature. Indeed, it is no coincidence that the *Lectura artis demonstrativae sive Liber chaos* also dates to this period, in which the Majorcan philosopher concentrates on highly complex issues of natural philosophy. Llull writes:

Elementa sunt quatuor principia [...]; ut autem de ipsis et de operationibus eorum in corporibus physicis habeamus notitiam, per quam possimus propriè vel etiam metaphoricè respondere ad factas Quaestiones, sunt figurata in hac praesenti Figura Demonstrativae Artis ipsa quatuor Elementa. (Liber exponens figuram elementalem, p. 1)



After discussing the degrees of the elements and the arrangement of the spheres, Lull dwells on the position of the elements within matter. He asserts that fire and earth, found in the corners of the quadrilateral, represent the extremity of matter in the fourth degree of heat; he calls them *extremitates substantiae*. At the same time, these two elements are also located within matter, *intra substantiam*, compared to air and water, because they have, in the same substance, the maximum intensity or virtue. However, in material substance we find all four elements, and thus also the relations of opposition between them. Thus, the four median diagonal lines connect the opposites, the simultaneous presence of which in matter appears possible thanks to the different gradation of their qualities.

In trying to get inside the force of Lull's imagination, perhaps what he had in mind can be represented in this way, by likening the figure of fire to a peppercorn which, according to Lull's natural philosophy, is found in the fourth degree of heat.

Overlooking any amusement that such an image may very well produce, it nevertheless gives an insight into the multifunctionality of Lull's elemental figure. On the one hand, it serves the purposes of calculation, and acts as an aid to memory. On the other hand, it serves the purposes of representation that, intuitively, makes it comparable to modern atomic models – so to speak. Whereas Thompson, at the start of the 20<sup>th</sup> century, shows in his atomic model the protons and electrons within an atom, Lull does the same thing in representing within a peppercorn its constituting elemental particles, seeking to give it an arrangement in accordance with a logic which he makes very certain he explicates.

The same attempt, namely the representation of the elemental particles within material substance, is also present in the *Liber de nova geometria* (1299), and thus at the height of the ternary phase.

#### Image 10

In this picture, Lull depicts a plant in the fourth degree of heat differently from the original elemental figure. Indeed, this figure is composed of triangles and rectangles forming a rhombus with two additional lateral triangular extensions. In this figure, the four degrees of fire are represented by the letter A, the three degrees of earth by the letter C, the two of air by the letter B, and the sole degree of water by the letter D.

If we try to close the figure, we shall see that the heart of the composition will be constituted by fire, and that the lighter elements will constitute the highest part of the solid; the base will be comprised of the two heaviest elements, and earth will have a greater extension, in view of its higher degree compared to water. The figure also harks back to the Platonic tetrahedron of fire, which the author refers to probably in a conscious way. In the *Liber de nova geometria* Lull uses new figures for the four elements, such as for example the *figura de mixtione elementorum*, trying out new representations which, however, no longer seem to appear in his later output.

## Conclusions

In the ternary phase, and here I conclude, the elemental figure is thus still present. One need only recall the composition of the medical work *Liber de levitate et ponderositate elementorum* (1294), in which the issue of mixture of degrees is still dominant within Lull's literary output, and the *figura elementalis* is the central figure of the work. However, in this ternary phase, the author experiments with new geometric representations, as shown by the *Liber de nova geometria*. Finally, in the last phase, the post-Art phase – namely from the *Ars generalis ultima* onwards – Lull would no longer use the elemental figure, resorting instead, always, to similarities between the elemental processes and the relationship dynamics of the other beings to explicate the theory of correlatives in relation to each degree of existence.

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