# BETWEEN REASONING AND RESONANCE
# PROPOSAL OF INTELLIGIBILITY FOR INHABITING THE CROSSROADS OF THE FIVE CHINESE ELEMENTS AND THE FIVE PLATONIC SOLIDS

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***Abstract:*** *This thesis explores the heuristic virtues of a correspondence hypothesis between two cosmogenesis, the Greek 5 Platonic solids and the Chinese 5 agents - wuxing. This research deploys its coherence by weaving transdisciplinary links, from works in Chinese medicine, polyhedral geometry, philosophy, mechanics of structures, and systemic - and by using different methodologies: translation, metaphor, mathematic isomorphism… Hypotheses follow one another: 1- clarify the classification 5 or 6 of the wuxing (Granet, Lavier); 2- develop the geometric organon (Serres); 3- identify the sphere as a matrix (Fuller); 4- deepen the structural dualism (Wester); 5 –recognize each of the cosmogonies as a general system (Bertalanffy, Rosen). By clearing a path between the epistemological regimes of the different disciplines, this work - if it sheds light on this mysterious Timaeus and explains the different systems of TCM - proposes more broadly, a new intelligibility of living in resonance with the world (Rosa).*
***Keywords:*** *Cosmogeneses, platonic solids, Chinese agents, resonance, geometric organon, general systemology, architecture, structural dualism.*

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## Introduction

### Issues and objectives of the thesis

This article is a summary of the presentation of the architecture thesis that I defended on 8 December 2023 at the Ecole Nationale d'Architecture de Lyon - with Isabelle Lefort as research supervisor. The jury was composed of: - Jean-Pierre Chupin, Professor, PhD, CRC-ACME Chair, University of Montreal, rapporteur and president of the jury; - Jean Dhombres, Professor Emeritus at EHESS, Rapporteur; - Romain Anger, Professor STA at Ensa de Lyon, examiner; - Françoise Ged, Professor at UMR - EHESS China, examiner; - Antonella Mastrorilli, STA Professor at ENSAP, Lille, examiner; - and Isabelle Lefort, Professor Emeritus at Lyon 2, thesis supervisor.

This thesis - started at the Faculty of Philosophy of Lyon 3, with J.-C. Beaune, in the 90s - is the culmination of a long professional path - as a teacher of geometry and structural morphology - and an intellectual path - as a researcher and practitioner of Chinese culture, through *taiji quan* and its medicine.

Ultimately, I aim to try to establish a correspondence [1] between Greek thought and Chinese thought:

- Greek thought produced geometric abstraction. It enabled what is known as Western modelling, the basis of the sciences, which are founded on primarily *causal reasoning*,
- Chinese thought - on the other hand - developed a non-dichotomous approach, more closely linked to movement and energy transformations - it is closer to the living - and is based on more *correlative knowledge* [2].

To explore this correspondence, I have chosen to work on the foundations of these two cultures: firstly, the Platonic cosmogenesis that appears in the 5th century BC in the *Timaeus* [3] - with the 5 regular polyhedra, also known as *Platonic solids* - and the Chinese cosmogenesis, the *5 elements* (*wuxing* in Chinese; 五行 which link man to his environment [4] and which appear in the work *Shu King*, from the same period [5]. The question then is: are we talking about the same cosmogenesis - or even of the same *general system*? (Fig. 1).

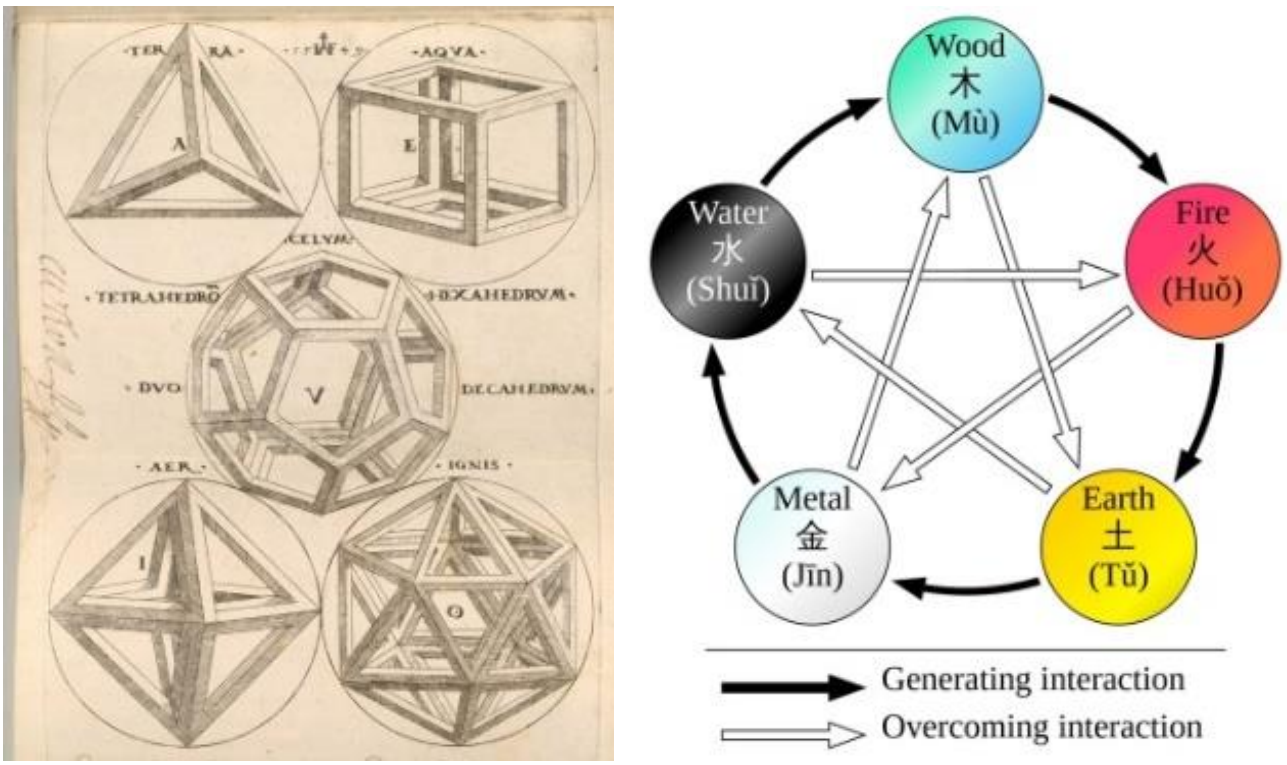


**Fig. 1.** *On the left: polyhedral variations based on the five Platonic solids. Etching from "Ein aigentliche und grundtliche anweysung in die Geometria" - Hirschvoge, 1543 (Public domain)*
*On the right: diagram of the interactions between the wuxing. The "generative" cycle is illustrated by blak arrows running clockwise on the outside of the circle, while the "destructive" or "conquering" cycle is represented by white arrows inside the circle.(Wikipedia - GNU Free Documentation License)*

Why work on the 5 Platonic solids and the 5 Chinese elements?

First of all - on the Western side - because Plato describes the creation of the universe with these 5 polyhedra: this cosmogenesis is based on geometric forms "*in their nascent state*". However, the text of the *Timaeus* remains obscure! It offers few clues. The 5 polyhedra are associated with the 4 Greek elements. They are presented as *bodies in constant motion* (53c-54c). As a whole, therefore, they can be seen as a complete cycle of transformations (57d-58d). Architects are obviously concerned by this morphogenesis: geometry, proportions and harmonic lines are the basis of all architecture in the West - numerous treatises on the subject have been written from antiquity to the present day [6] (Fig.2).

On the other hand, on the Eastern side, the *5 Chinese elements* are based on experience and observations dating back thousands of years concerning man's interaction with his environment: they are therefore a possible model for *inhabitation* in the sense of M. Heidegger [7]. These Chinese observations and experiences are brought together in the following table of correspondences (Table). In this Table, the *5 elements - wood, fire, earth, metal,* and *water* - are associated with orients, seasons, the components of man's body, and everything that influences and interacts with his environment... For example, the element *fire* is associated with the South, summer, the color red, the organ of the heart, the tongue, joy, bitter taste, and so on.

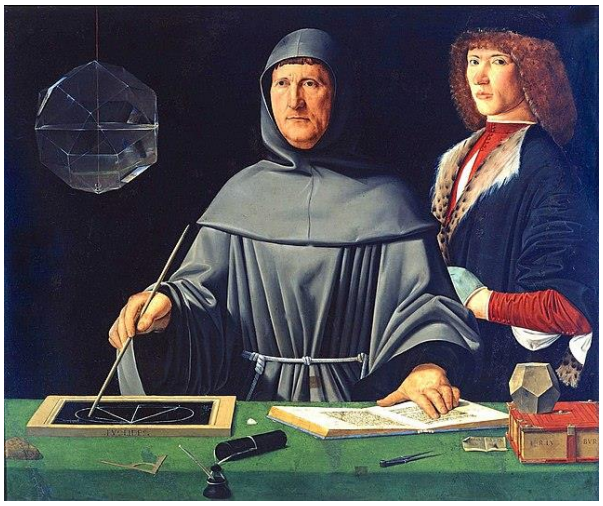

**Fig. 2.** *Portrait of Luca Pacioli, traditionally attributed to Jacopo de' Barbari, 1495 (Wikipédia- Public Domain)*

**Table.** In order to explain the integrity and complexity of the human body, Chinese medical scientists and physicians use the Five Elements theory to classify the human body's endogenous influences on organs, physiological activities, pathological reactions, and environmental or exogenous influences (https://en.wikipedia.org/wiki/Wuxing_(Chinese_philosophy))

| Movement | Wood | Fire | Earth | Metal | Water |
|---|---|---|---|---|---|
| Planet | Jupiter | Mars | Saturn | Venus | Mercury |
| Mental Quality | idealism, spontaneity, curiosity | passion, intensity | agreeableness, honesty | intuition, rationality, mind | erudition, resourcefulness, wit |
| Emotion | anger, kindness | hate, resolve | anxiety, joy | grief, bravery | fear, passion |
| Virtue | Benevolence | Propriety | Fidelity | Righteousness | Wisdom |
| Zang (yin organs) | liver | heart/pericardium | spleen/pancreas | lung | kidney |
| Fu (yang organs) | gall bladder | small intestine/San Jiao | stomach | large intestine | urinary bladder |
| Sensory Organ | eyes | tongue | mouth | nose | ears |
| Body Part | tendons | pulse | muscles | skin | bones |
| Body Fluid | tears | sweat | saliva | mucus | urine |
| Finger | index finger | middle finger | thumb | ring finger | pinky finger |
| Sense | sight | taste | touch | smell | hearing |
| Taste[23] | sour | bitter | sweet | pungent, umami | salty |
| Smell | rancid | scorched | fragrant | rotten | putrid |
| Life | early childhood | pre-puberty | adolescence/intermediate | adulthood | old age, conception |
| Covering | scaly | feathered | naked human | furred | shelled |
| Hour | 3–9 | 9–15 | change | 15–21 | 21–3 |
| Year | Spring Equinox | Summer Solstice | Summer Final | Fall Equinox | Winter Solstice |
| 360° | 45–135° | 135–225° | Change | 225–315° | 315–45° |

One of the ambitions of this architecture thesis is ultimately to be able to activate these correspondences and link the different qualities of built forms with *inhabiting*. In concrete terms:

- The first objective is to complete this table with the 5 regular polyhedra, in both their *structural* and *structural* aspects [8] - and thereby propose an explanation of Platonic cosmogenesis,
- In the 2nd stage, we will use - reciprocally - Plato's geometrical system to provide a cartography of Traditional Chinese Medicine: this in turn will make it possible to explain the *wuxing* and, once again, to relate forms and human existence in a new light,
- Finally, the last ambition of this thesis - less developed in this article - is to consider how Plato's system and the *wuxing* can correspond to a *general system*, in the sense of L. von Bertalanffy.

**Methods, Context and Difficulties**

In carrying out this work, I came up against epistemological and methodological obstacles.

On the Greek side, since Plato, cosmogenesis has remained an enigma as to its origin and meaning. This mystery has never been solved, despite attempts such as that of Kepler (Fig.3).

On the Chinese side, *wuxing* accounts for living processes, and is present in traditional thought and medicine throughout Asia. But as M. Porkert [9] points out, *wuxing* remains the doctrine of an empirical tradition - and therefore not credible to Western scientists. In addition to these difficulties, a rapprochement between these two cultures is rarely envisaged. M. Foucault considered such a rapprochement improbable [10] - so alien are these two modes of thought and expression considered to be [11] - and many sinologists (J. A. Lavier, F. Jullien) are similarly unencouraging [12]!

This epistemological context is compounded by other methodological difficulties. I'm not a specialist in the history of science, nor in Greek and Plato, nor Chinese: so I don't have direct access to historical sources. Despite this context - like the old Yugong of Lie Zi - I took up the challenge, and to get around these difficulties, I envisaged three main strategies - *ruses*, in reference to the *metis* of the Greeks [13].

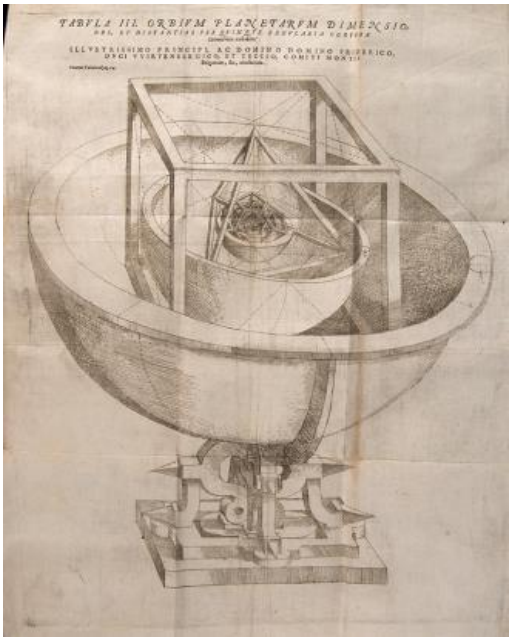

**Fig. 3.** *Inner part of the Universe model with the 5 polyhedra according to J. Kepler (Mysterium Cosmographicum. Translated by A. P. Segonds, Le secret du monde, Gallimard, 1993)*

**First strategy - the investigator uses clues to reformulate hypotheses**

The first strategy is based on J. Dewey's *theory of inquiry*. There is no research without an investigator [14] - and at every stage of research, experience is transformative: of the subject, the objectives and the methods. As it is impossible to be a specialist in several disciplines, the investigator's posture enables him or her to orchestrate much expertise to move the research forward [15]. Thus, the researcher does not proceed by conventional argumentation, but by *abduction*, cross-checking clues and spotting anomalies [16]. And, as with an architectural project, he designs a unified proposal - a totality [17]. For my research, one of the anomalies is the 4 elements for 5 polyhedra in the *Timaeus* [18]; but also in China, the Five Elements themselves are sometimes counted as six! [19].

To sum up, this research is mainly part of a *minor* approach to science [20], as opposed to the *major* approach that has defined the rules of so-called scientific research. It accepts *paths with zig-zag itineraries* [21], reference to *minor* sources as much as first-hand ones, and questioning by successive hypotheses [22] - to end up with new propositions.

**Second strategy - a detour outside to flush out the unthoughts**

The second strategy consists of identifying the *unthoughts* of our own Western culture. In my opinion, we can only flush them out by a detour outside. I developed this approach – out of step – through China to understand Greece [23]. To highlight the desired correspondence, I carried out a *translation*, starting from *wuxing* towards polyhedra and not the reverse (except for the 5th Season). I therefore opted for a *correlative* approach [24] - which takes a step aside from the *causal* approach, dominant in the West.

Thus, to avoid the trap of the *unthoughts* of my own culture, I have avoided all sources and methodologies from the Western world concerning Plato's system. With this epistemological posture of a researcher in a *minor science*, my research method is therefore not a work of *comparativism* between China

and Greece, because the humility of the researcher makes any overhanging position impossible [25]. Rather than compare, F. Jullien proposes a translation as close as possible to the words, to reveal our *unthoughts*. For my work - which concerns not words, but *systems* - I propose to transpose as closely as possible to the processes of transformation of the Chinese and Greek systems, which, incidentally, enabled me to carry out this investigation without any prior linguistic knowledge. Finally, the aim of this detour via China is to shed light on my original discipline; mainly architectural design processes and structural morphology, but also to propose a response to General Systems Theory.

**Third strategy - holistic, systemic approach and notion of organon**

The practice of architectural projects has indeed led me to seek a holistic approach, an approach reinforced by my training in systems philosophy – with an emblematic work *Le Macroscope* by J. de Rosnay [26]. But, it is the reference to M. Serres that is central in this study - because he launched the idea of a *purely geometric, qualitative, and rigorous organon* - which would be the *summary of the sciences* [27]. He then clarified that for the description of a system - *topology and energetics are sufficient* [28]. In another seminal work of his philosophy, he puts it another way: "*Yes, knowledge has two centres*" [29]. I have thus been able to hypothesize that the 5 elements (wuxing) are this *energetic* description that is missing to understand Plato's *topological* system, forming together the two centres of knowledge. For my research, this is a real key to revealing the organon!

**M. Serres' notion of the geometric organon: the guiding concept of this thesis**

Indeed, this intuition of an *organon* - a kind of formal matrix evoking *geometric forms in their nascent state* - undoubtedly refers to Plato's system. This allusion to Aristotle's organon - the definition of which is linked to the notion of *tool* or *instrument* - is clarified in this central extract from M. Serres:

*If we were to consider this in its purity, i.e. outside the historical example proposed here [...] we could easily obtain the general organon of sciences that are still only at the descriptive stage [...]. Assuming the success of this undertaking, which is required by all contemporary thought, a new family of real sciences would undoubtedly emerge, which could be called morphological sciences. [...] the language of this geometry, taken in its nascent state, is capable of providing this set of structures, sought after, consciously or unconsciously, by many of the thinkers of our time [27].*

To ensure correspondence between Timaeus' cosmology and Chinese cosmology, the *organon* sought in this study is therefore a spatial arrangement of the 5 regular polyhedra, which expresses - by synthesizing them - the inter-relationships of this geometric system in 3D space. This arrangement is also intended to *translate/transpose* the logic of the *wuxing* transformations. The search for this *organon* became central to this thesis - conceived in 5 Seasons following the *wuxing* model (Fig.4). All the more so I have found no researcher who has successfully linked the 5 elements with polyhedra and even less who has transposed the *wuxing* into a *geometric organon*.

The argumentation will take place in 3 stages.

The 1st stage is the hypothesis of correspondence between the 2 cosmologies, Greek and Chinese, from system to system: matching these two worlds, East and West, through their cosmologies, is already a real challenge.

The 2nd stage consists in updating this *organon* - and checking that the geometric transformations at play in the chosen spatial arrangement do indeed translate the properties of the *wuxing*.

The 3rd step is to explore the properties of this *organon* in greater depth: - firstly, as a general system, to shed light on, or even propose, an organization and classification of Traditional Chinese Medicine systems; - secondly, to highlight the role of the sphere as a site for transforming geometric duality.

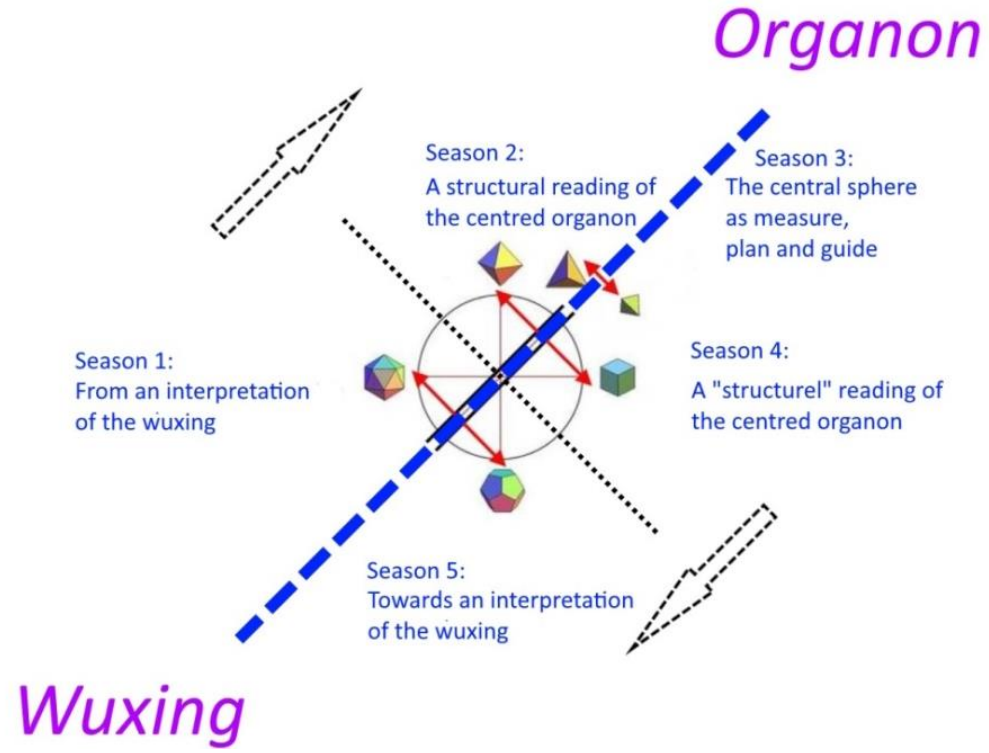


**Fig. 4.** *Structuring the thesis into 5 seasons in correspondence with the wuxing*

**First step of the argument: polyhedral-wuxing correspondence - from system to system**

The 1st stage of this thesis consists of establishing the *correspondence* between these two *systems* [29] (starting with *wuxing* and transposing to polyhedral geometry), which can finally be interpreted as the *correspondence* of two *models* of the same *system* (Fig.5). Indeed, the *structures* of these two *models* are analogous [30], which means that they can be brought together:

- the elements, like polyhedra, are organised with 5 poles and follow a *cyclic time* [31],
- the poles are divided into 2 series, *dual* for polyhedra [32] and *yin/yang* for the *wuxing*,
- with a common *central* pole - the *earth* element and the tetrahedron which each belong to both the *yin/yang* and *dual* series - and which in both cases serve as the *origin function* [33] (cf. *compound polyhedra*),
- the 2 main operators which define them have analogous transformation modes: *generation* and *control* [34]; and 2 to 2 nesting with portions of common faces or vertices and *duality* for polyhedra [35].

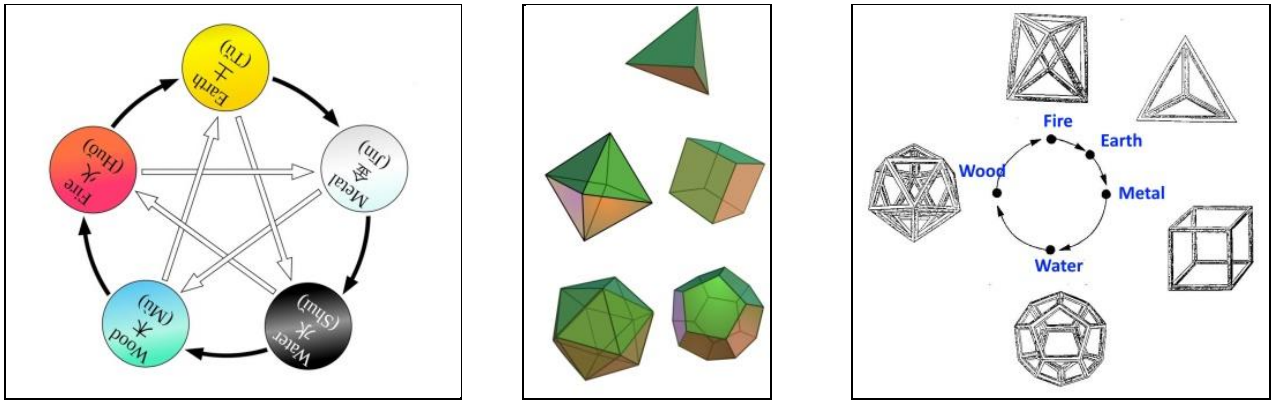


**Fig. 5.** *Left: wuxing diagram, with the central element earth at the top - it is the "support" for both the yang series on the left and the yin series on the right (Wikipedia - GNU Free Documentation License).*
*In the middle: the 5 regular polyhedra arranged in two series: the series of polyhedra with triangular faces on the left and the series with triangular solid angles on the right - the tetrahedron belongs to both series.*
*Right: correspondence between the two systems based on the wuxing time diagram oriented with the fire element at the top (personal illustration)*

Thus the series of polyhedra with triangular faces will be considered *yang* - on the left in Figure 5 -, while the series with trihedral solid angles will be *yin* - on the right.

**Second stage of the argument: to highlight the organon**

**John Conway polyhedra nesting principle**

The *wuxing generation operator* being, by analogy, the 2 by 2 nesting for polyhedra, to form the *organon*, a first hypothesis consists of bringing together these successive nesting in a centred assembly. All that remains is to choose a particular nesting *sequence* to express as many of the relations in the cycle of transformations as possible - this in as minimal a configuration as possible. The English mathematician J. Conway recently developed a nesting configuration that starts with the icosahedron and ends with the dodecahedron [36] (Figs. 6,7).

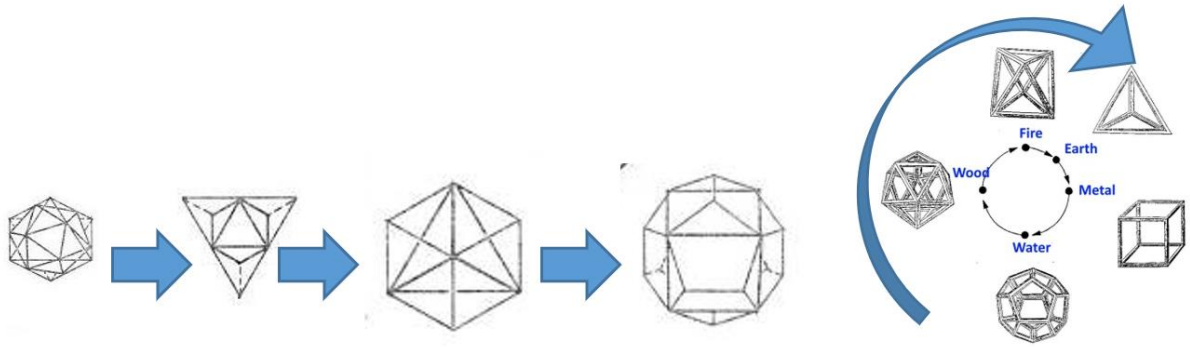


**Fig. 6.** *Sequence of nesting polyhedra 2 by 2, starting with the icosahedron (based on A. Pugh's sketches [32]). On the right, is a timing diagram of the wuxing, which also shows the correspondence with the polyhedra*

In this hypothesis, the transformations between polyhedra are simply *2 by 2 nesting*, without expressing the passages by *geometric duality*. This sequence of nesting polyhedra follows the cycle of the seasons from spring to winter. It begins with the icosahedron fitting into the octahedron, which in turn fits into the tetrahedron, then (on the 2nd line of Figure 7) the tetrahedron fits into the cube, which fits into the dodecahedron. Conway's model was made using a *Zometool* construction set sold under the name *Keplers Kosmos*. Figure 7 (on the right) shows the scale model.

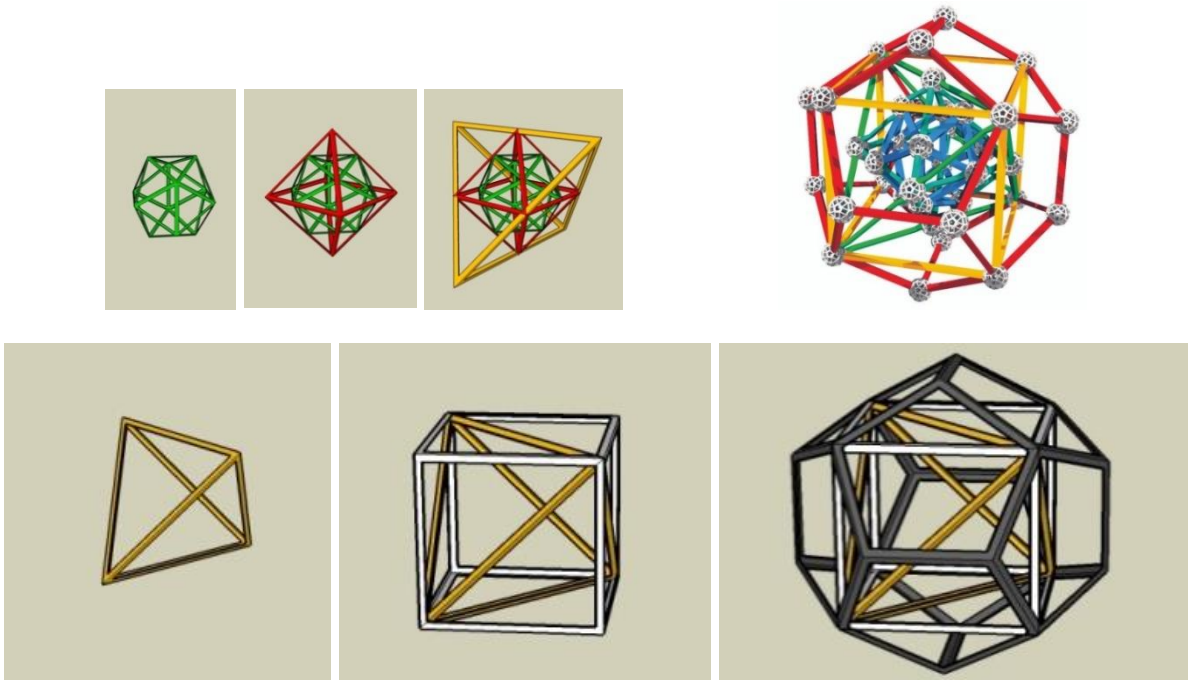

**Fig. 7.** *The different stages of nesting 2 by 2, starting with the yang series at the top left, then the yin series underneath. The colours of the polyhedra correspond to the colours traditionally associated with the Chinese elements (personal illustrations). Above right, Conway's Zometool model with other colours*

Is *Conway's model* an organon according to the criteria defined above? This model is interesting because:

- it does have 5 polyhedra,
- it corresponds to Plato's account - with the dodecahedron on the outside *ending* the series,
- and it places the tetrahedron at the centre - *central polyhedron* according to our correspondence.

However, there is no intrinsic geometric property of this nesting that allows the next cycle to be restarted, unless additional smaller and larger models are added indefinitely: we can therefore conclude that it does not reflect the continuity of the cyclical operation of *wuxing*. So we have to look for another way!

**A 1st interpretation gap between Greek and Chinese spatiotemporal representations**

To look at things differently, we need to pay attention to an initial discrepancy between the two cultures, Greek and Chinese. The structure of wuxing is based on a specific representation of space-time [37] - this representation is out of step with the Greek spatiotemporal representation, as J. A. Lavier has clearly identified in his various works [38] (Figs. 8,9).

For the Greeks, man was subject to two cycles of energy input:

- that of the sun, which peaks at midday and at the summer solstice (if the day and year cycles correspond),
- and that of the earth - a passive system - shifted by 6 hours for the day or 3 months for the year,
- which defines 4 seasons: a hot summer season (white), a cold winter season (dark grey) and two shoulder seasons.

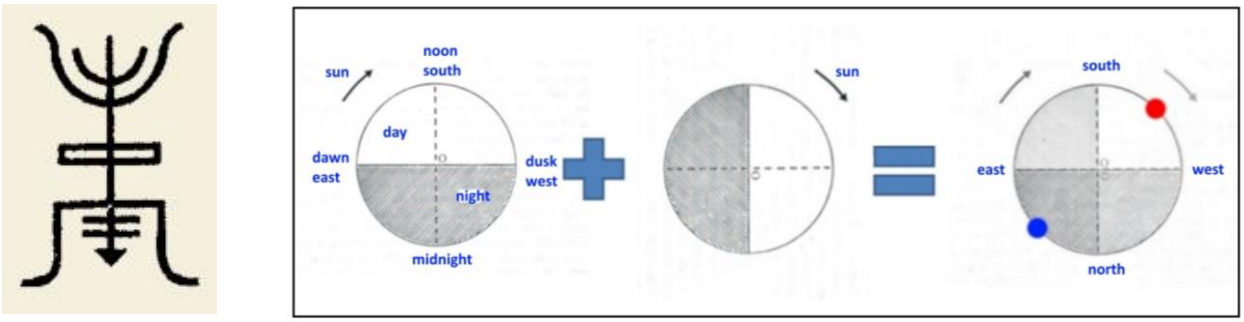


**Fig. 8.** *On the left, the two influences of the sky and the ground on man's ternary energy structure, according to the ideogram attributed to Mencius [39]. On the right, the superposition of the two fundamental energetic influences, that of the sky on the left with a maximum during the day and that of the earth with a maximum in the afternoon (Personal illustrations based on J. A. Lavier's sketches [38])*

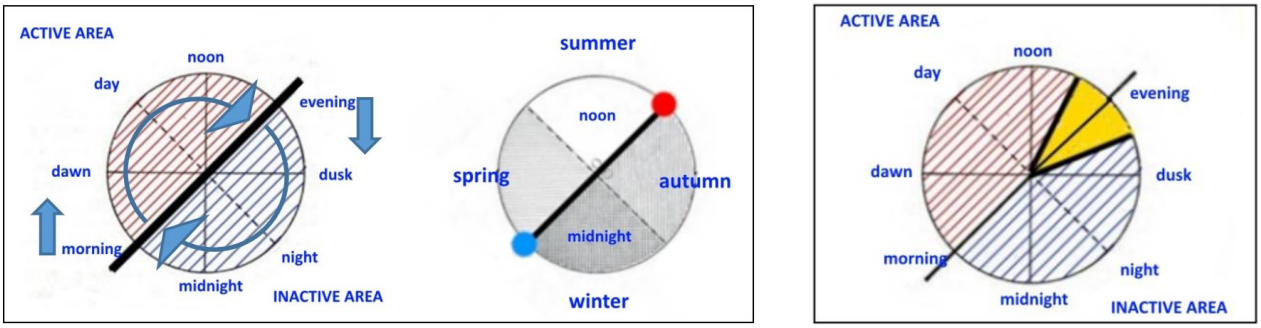


**Fig. 9.** *The 5 Chinese seasons (personal illustrations based on sketches by J. A. Lavier)*

So the Western world sticks to this representation of the Attic calendar with 4 seasons, and this choice fits logically with the 4 *Greek elements*.

But for the Chinese, the red point below - which corresponds to the hottest point in the cycle - marks a boundary, a tipping point. This red point can be seen as an inflection point for the *yin-yang* function - i.e. a change in functioning between:

- a 1st *yang* period - in energetic growth (*anabolic*),
- and a 2nd *yin* period - decreasing (*catabolic*),
- This means that the 4 Chinese seasons are shifted and centred on the solstices and equinoxes.

What's more, the Chinese calendar has 5 seasons, because the Chinese believe that between the *yang* period and the *yin* period, there is a middle period - a 5th *central season* that allows them to be linked. If the *yang* period is associated with the sky and the *yin* period with the earth, the middle period is associated with man [40], so there are 5 seasons in the year and, more generally, *5 Chinese elements*.

**The double manifestation of the centre: a fundamental characteristic of Chinese thought**

It should be noted that this *central season* - which corresponds to the *earth element* between *yin* and *yang* - is itself dualise. It is therefore double, belonging to either the *yang* or *yin* series. The consequence for Chinese thought is that there are always two ways in which the *central element* functions, even if this central modality only admits of a single geometric representation. In fact, the tetrahedron is double as soon as we consider the different size and orientation of its dual. This explains, in particular, the ambiguity linked to the number of *wuxing agents*, counted as 5 or sometimes 6.

Identifying a real flip-flop in the functioning between the two series *yin* and *yang* (i.e. an empty zone within the central season itself) means that all the elements that correspond to the *centre* (to the *earth* element in the correspondence tables) belong either to the *yang* series or to the *yin* series: they cannot be on this frontier, which has no *being* in China [41]. These choices of representations have given Chinese culture a particular conception of its relationship with the world - due to the attention it pays to the movement and functioning of the things it observes; whereas Greek culture took a different path, one more concerned with morphology and the state of things.

The aim here is to understand the implications of this shift for the geometry and design of the *geometric organon*. As J. A. Lavier identified, this double functioning of the centre - with a borderline at 45° on the temporal diagram of wuxing - corresponds, for example, to the two yellow colours of sodium [42]. This observation can also be linked to a remark made by F. Jullien in *Ce point obscur d'où tout a basculé* - where he clarifies his criticism of Greek geometry. He compares two motorway signs, one marking the 45th parallel and the other the boundary of a watershed [43]. In the first case, the line is a single, abstract geometric line; in the other, the line is dualized by two functions: the raindrop will reach either "*the olive trees of the Mediterranean or the mists of the Atlantic*". Finally, in the rest of this work, we will find the same distinction in the way the tetrahedron works, with the work of T. Wester. But first, we need to design the organon in a way that is consistent with this double consideration of the central element.

**New organon hypothesis, tetrahedron to tetrahedron nesting**

To incorporate the dual function of the tetrahedron into the design of the *organon* from the outset, this new hypothesis is based on a centred nesting (like that of J. Conway), but which starts with the first tetrahedron (which is on the inside of the *organon*) and ends with the last tetrahedron (on the outside). This new configuration of the organon is therefore made up of the 5 nested polyhedra - plus the last tetrahedron which completes the cycle: making a total of 6 polyhedra (Fig.10). We might also speculate that it was the same initial intention - to express the whole manifestation of forms - that led Lai Zhide to design his *taijitu* with two inner/outer circles thus expressing this dualization of the centre (Fig.11, on the right).

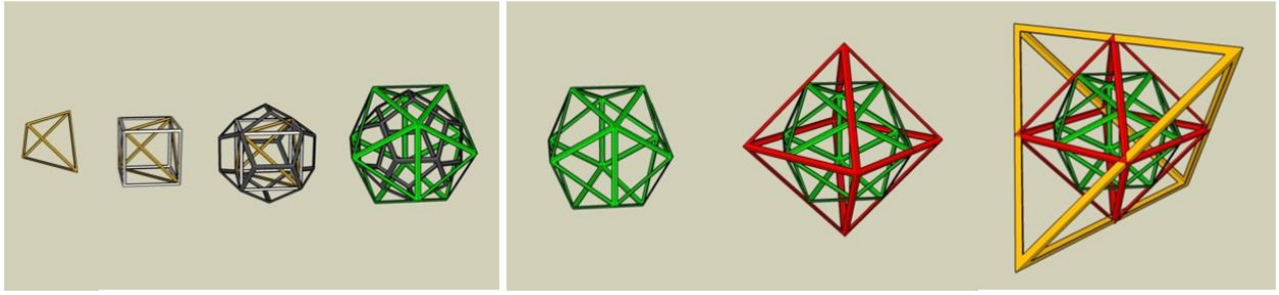

**Fig. 10.** *Nesting of yin polyhedra on the left, then yang polyhedra on the right (own drawings)*

In this particular sequence, on the spatiotemporal diagram of the *wuxing* that serves as a reference (South above - in Figure 11, on the left), we can identify a transformation by duality, between dodecahedron and icosahedron. Initially, the one that operates between the two tetrahedrons is not represented.

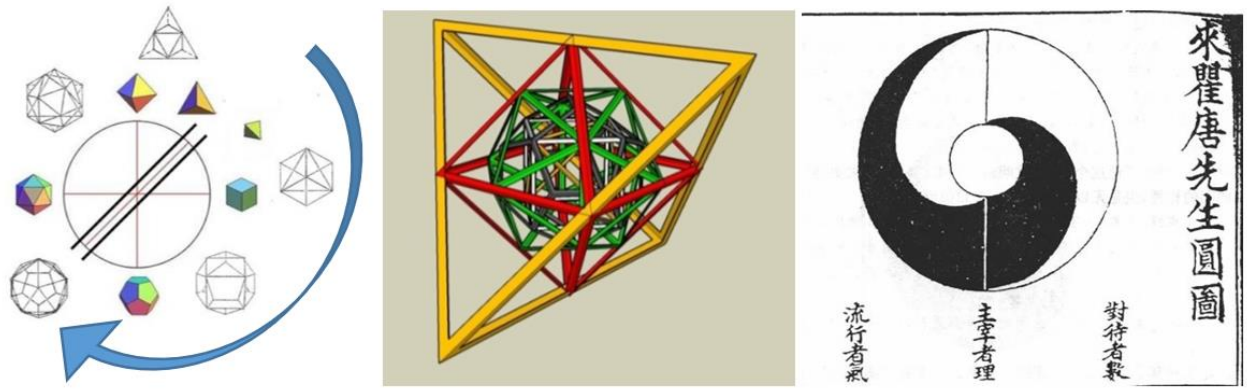


**Fig. 11.** *On the left, representation of polyhedra and 2 by 2 nesting in correspondence with the wuxing time diagram; in the centre, the centred organon; on the right, Lai Zhide's taijitu*

The same question then arises as for Conway's model: does this nesting with the 6 polyhedra "translate" the functioning of the *wuxing* completely, and is it in fact the *organon* we are looking for?

**Operation of the *wuxing* and geometric transformations of the *organon***

Now that the correspondence between polyhedra and elements has been established, we need to check that the logic of the *wuxing operators* has been correctly transposed into the geometric system. The main problem is still the transition between 2 cycles - with the tetrahedron ending the previous cycle and its dual tetrahedron starting the next. There are two possibilities:

- or the next dual tetrahedron is larger than the previous one (which is normal in a growth cycle) and the model grows indefinitely, changing orientation with each cycle,
- Or the dual tetrahedron that starts the next cycle is merged with the small initial tetrahedron - (in blue): in this case, the model reproduces itself identically and its orientation remains unchanged.

It is obviously this 2nd option that I have chosen to design the *organon*, because we can imagine that the large tetrahedron, through its *dual transformation*, reproduces itself - in the sense of biology - into a smaller one, which is coherent since this *passage* takes place at the beginning of autumn with the temporal correspondence. The *geometric organon* I propose is thus complete, autonomous and minimal: it can reproduce itself geometrically, indefinitely, without changing shape, orientation or size. Note that the *control operator* corresponds to the *dual transformation* capacity of each pair of polyhedra within the *organon*. This *dual* relationship operates through the 4 points of contact that link the tetrahedral pair and the 6 polyhedra together, and we can hypothesise that these 4 points of exchange belong to a central sphere that would be the very locus of the *dual transformation* [44] (Fig.12) - a hypothesis not developed here.

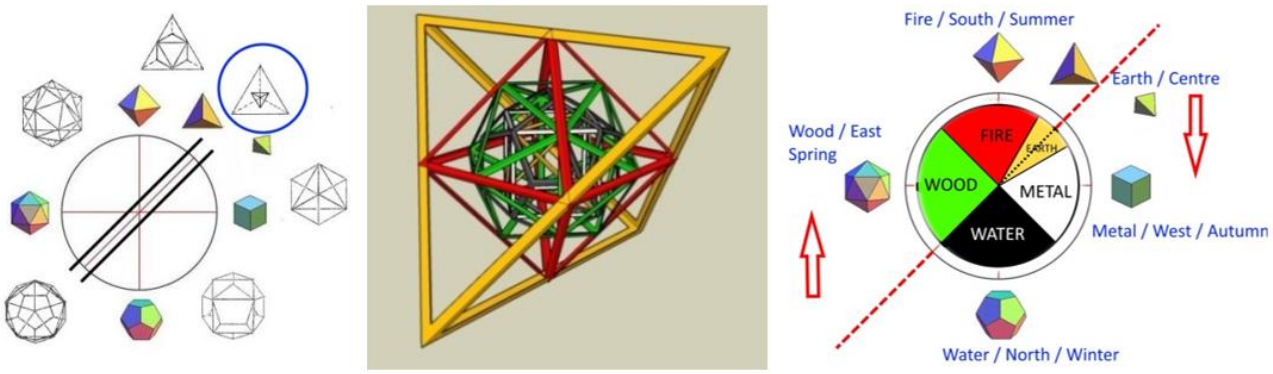


**Fig. 12.** *How wuxing works and the geometric transformations of the organon*

We should again highlight this difference with Conway's model, which has only one tetrahedron and could therefore be considered from a strictly geometric point of view as a Greek interpretation of the *organon*. Moreover, the question of the orientation in traditional Chinese space required to model the *organon* is addressed later.

**The Organon and T. Wester's *structural dualism***

To give substance to this discovery (and to clarify the problems of classifying architectural structures), I then delved into the work of Ture Wester, since he is the only researcher to have identified the dual functionality of the tetrahedron, extending the notion of *geometric dualism* to structural morphology [45] (Fig. 13).

Although T. Wester made some errors of interpretation [46], this dual structural existence of the tetrahedron is essential for understanding the *organon*. Indeed, we have seen that the series of polyhedra with triangular faces is *yang* - and the series with trihedral solid angles is *yin*. When we look at the digital model of the *organon*, we can see that in order to make a stable scale model, it is necessary to materialise what connects the *yang* polyhedra - i.e. their common face portions - and what connects the *yin* polyhedra, i.e. their common trihedral solid angle portions. To do this, it is possible to conceive of the *yang* polyhedra as made up solely of their faces - and the *yin* polyhedra solely of their vertices. This leads us to design and represent the two tetrahedral *supports/shells* of the *organon* (inner and outer) - in expressing their structural dualization, and then to give them a name. The outer tetrahedron, created solely by means of its faces - using *plates* (as defined by Wester [45]) - I called it a *tetraplate*. The inner tetrahedron made only with its vertices uses an embedment of its solid angles, a structural mode that I decided to call *podes*: it will be called a *tetrapod* (Fig.14).

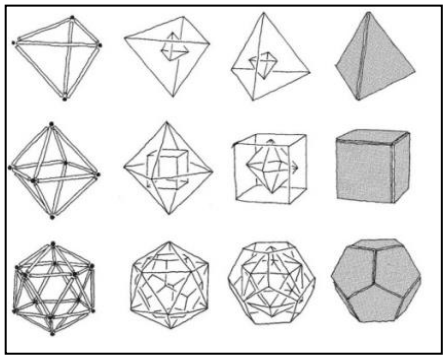

**Fig. 13.** *In a 1987 preprint article entitled "The plate-lattice dualism", T. Wester highlights the difference between the purely geometric aspects of duality (the two central columns of the figure, where he already identifies a difference in the size and orientation of the dual tetrahedra) and the fact that materiality is taken into account, where he distinguishes between a "vertex tetrahedron" and a "face tetrahedron" (in the peripheral columns)*

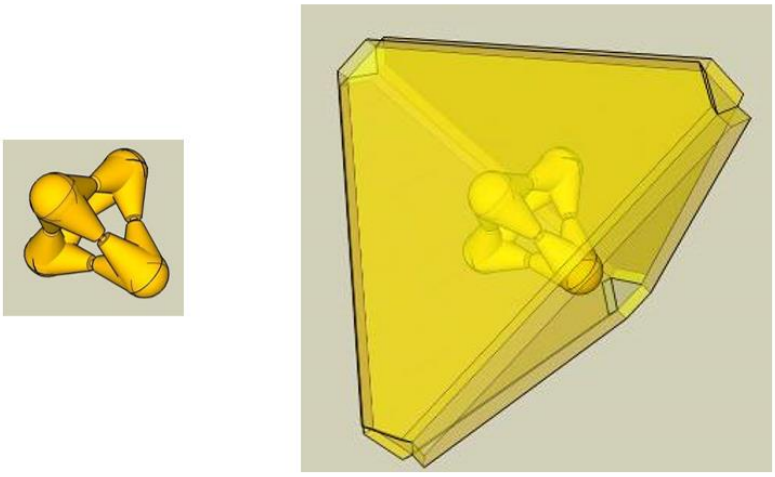

**Fig. 14.** *The tetrapod on the left and the tetraplate on the right with the tetrapod inside (personal drawings)*

The whole *organon* is then made up of *yang* polyhedra made up of *plates* and *yin* polyhedra made up of *podes*. The advantage of this conception of Plato's system is that the transformation of a polyhedron into its *dual* transforms not only the general shape of the polyhedra, but also the functioning of its components: *plates* can be transformed into *podes* and vice versa. We can thus define two fundamental structural modes in structural morphology: *polyplates* and *polypodes*.

To these two modes can be added a 3rd intermediate mode - corresponding to the *central element* in Chinese way of thinking - which ensures their relationship and which is made up of two force members with dual functions - traction or compression. This makes it possible to rethink structural morphology, as well as its various architectural applications and the teaching of structures [46].

**Two organon modes: centred/yang and off-centre/yin**

On the basis of the founding *tetraplate/tetrapod* pair just as there is 2 *wuxing* diagrams - temporal and spatial [47] - I have highlighted a variant of the *centred organon*, which I have called the *off-centre organon*. The 2 *organon* I propose share the same structure of 2 nested tetrahedra; but in the case of the *off-centre yin organon*, the 4 other polyhedra are located in the 4 free spaces of the large tetrahedron (Fig.15).

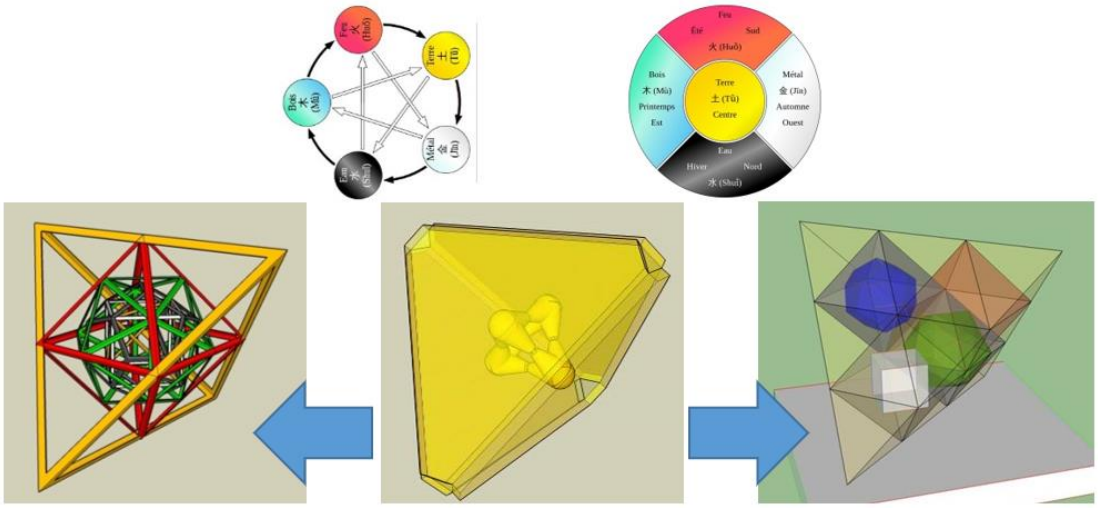


**Fig. 15.** *Temporal and spatial diagrams of wuxing (Wikipedia, GNU Free Documentation License) Below. Starting from the tetrahedral core/shell: the centred organon on the left - the off-centre organon on the right*

The advantage of this off-centre - spatial - expression of the *organon*, in keeping with the correspondences of the *wuxing*, is that it makes it possible to differentiate the polyhedra by attributing to them the colours of the Chinese elements - the red octahedron, for example - and to take into account a process of materialisation for these volumes [48]. Moreover, the fact that this *yin* organon was envisaged as a formal matrix for designing an architectural project [49] has raised the problem of the general orientation of the *organon* between *sky* and *ground* (Fig.16).

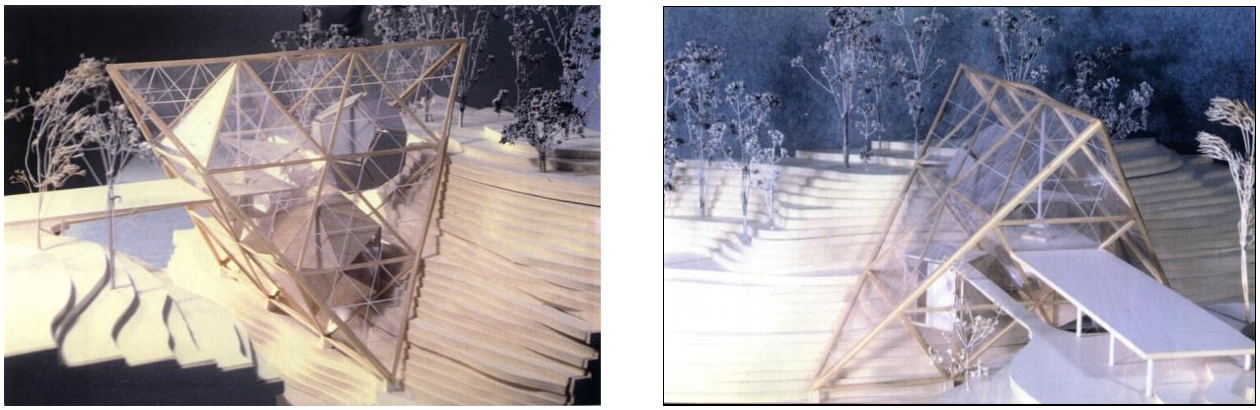

**Fig. 16.** *Architectural project based on the off-centre organon*

As the edge is the *central component* (dual to itself) in relation to the dual face/vertex pair, it is logical to position the external tetrahedron on an edge. The choice of the lower East-West edge allows us to have an upper North-South edge - which may correspond to the 2 *celestial* and *terrestrial axes* defined in Traditional Medicine [50] - and to orient the 4 volumes in plan, with the octahedron to the South.

**Third stage: reciprocally, the organon as a resource and hypothesis of an isomorphism**

From the outset, the aim of this thesis was to develop the hypothesis of M. Serres (and perhaps also of his mentor G. Bachelard [51]) of a general *organon* summarising the sciences - even if this remains a very ambitious objective! According to this study, if the *organon* transposes all the properties of the *wuxing* and vice versa, by analogy - or *isomorphism*, if we consider it as an ideal form of analogy [52] - there is nothing

to prevent us from hypothesising that the *organon* could shed light on the structure of the *wuxing* and hence on the foundations of TCM - TCM being based on the *yin/yang-wuxing* foundation [31].

It is therefore conceivable that the *off-centre organon* could provide a map of the various TCM subsystems. This bold hypothesis is possible by considering a perfect analogy [53] between:

- the ratio "*face of a regular polyhedron*"/"*polyhedron of the organon system*" in their ability to characterise, by a number n of boundaries, the limit of a closed space (2D and 3D),
- and the ratio "*sub-system of the TCM associated with a pole*"/"*pole of the large wuxing system*" in their capacity to organise a cyclical system of a type of man-environment relationship with a number n of polarities.

This analogy and the orientation of the two *celestial* and *terrestrial axes* make it possible to classify the various TCM sub-systems - such as the meridian systems (8 extraordinary and 12 standard) or the 6 energy system - according to the general logic of the *wuxing* (Fig. 17, right) [54].

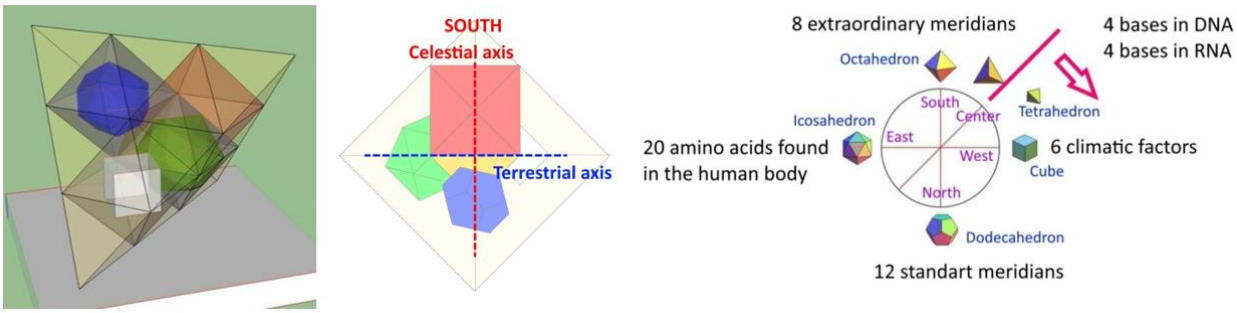


**Fig. 17.** *The 2 celestial and terrestrial axes and the classification of the different TCM systems*

**Results and Discussion: wuxing and organon, the same general system?**

This thesis proposes a *geometric organon* that complements the Chinese *5 element* energy system. If these two symbolic halves find their meaning - once brought together - and respond to the four major functions of the *symbol* identified by G. Durand [55], is it reasonable to think that they constitute what can be considered a *general system* [56]? Firstly, the *organon/wuxing* correspondence provides an answer to M. Porkert's remark that *wuxing* cannot be considered a scientific theory - and it is difficult not to consider *wuxing* as a *general system* in its cultural context. And at the same time, this correspondence, thanks to the *minimality* of the *organon*, answers R. Rosen's problem [52]:

> *[To establish the most adequate definition of a "general system"] One can study modelling in the context of an arbitrary equivalence relation imposed on a class (or category) of systems; such an equivalence relation says precisely that any two systems in the same equivalence class are indistinguishable with respect to a certain property P that defines equivalence. (...) One of the fundamental problems of modelling is to extract from this equivalence class a certain canonical representative, characterised by an additional property of simplicity and minimality.*

It thus becomes possible to hypothesise the same *equivalence class* and an *isomorphism* between these *wuxing* and *organon* representatives. This thesis ultimately proposes several models for the knowledge of this *general system*, the truth of which only emerges through these different interpretations [57] - others could be the narrative structure of certain films or the *C-K Design Theory* [58]. Can we conclude from this that this *general system* ultimately needs no further - additional - demonstration? Yes - by *correlative reason* [59] - because it exists by itself, defined by the interplay of its Chinese correspondences and its *minimal geometry*.

**Conclusion - *Greek unthought*: geometry?**

"*Geometry has no colour*", as Jean Dhombres so aptly pointed out in his thesis report: that is the problem. Because geometry retains only the state of things - having chosen to abstract them - it forgets how they work.

This is one of the *unthought* of Greek culture, as F. Jullien has developed in his work. This choice has had consequences for the whole of Western culture. Geometry can be seen as the origin of Greek thought, with its capacity for modelling. It is the power of the Western world, with Newton's science applied to mechanisms [60] - the *major mode* of science. But if geometry had developed in China, it would very likely have had different colours. Geometry alone cannot account for the living world. And our space-time, because it is inhabited, is part of the living world. The association of polyhedral geometry with the correlations of the *five elements* - thus linked to the human body and its environment - makes it possible to qualify these pure forms to think and design a habitat *in resonance* - in H. Rosa's meaning [61] - and finally to open the way for a *correspondence* between China and Greece cultures.

**Conflict of interest**

The author declares that there is no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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