

PONTIC REASONING AND ARCHITECTURAL PARTI: A SYSTEMIC REINTERPRETATION OF C-K THEORY



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Abstract: *C-K Theory is currently one of the most sophisticated theoretical frameworks for modelling design processes. Based on the interaction between a space of concepts, C, and a space of knowledge, K, it accurately describes the mechanisms of producing and transforming design objects. However, certain concepts used in architectural practice remain difficult to integrate into this model. This is the case with the architectural concept (architectural parti in French), which is frequently presented as a decisive stage of the project, yet its theoretical status remains unclear. This article aims to shed light on this difficulty based on the hypothesis of a general system in Bertalanffy's sense. Previous research, which has highlighted an isomorphism between the wuxing of the Chinese tradition and Platonic solids, is employed as a heuristic tool to identify several structuring properties of this system: duality of transformation regimes, dynamic antagonism, the role of the 5th polarity, and the activating centre... Comparing these properties with the CKT leads to the identification of a central mediating mechanism, which is scarcely explained in its classical formulation. We interpret the architectural scheme as this very mechanism, this bridge that ensures the transition between the exploratory regime of space C and the stabilising regime of K. The study of this bridge leads to the formulation of the hypothesis of a third modality of rationality, complementary to the causal and correlative reason described by Vandermeersch. This rationality, referred to here as 'bridging reason' in reference to M. Serres, denotes the capacity to establish relationships between heterogeneous domains to enable the emergence of new configurations.*

Keywords: General System, Isomorphism, C-K Theory, Platonic Solids, Five Chinese Elements, Wuxing, Fifth Element, Bridge Metaphor, Architectural Concept, Causal Reasoning, Correlative Reasoning, Bridging Reasoning.

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Part One: Problem, Method, Objectives

Background

As teachers and architects grappling with *design* issues, we find that a theoretical framework for the concept of the '*architectural parti*'—a notion that is often difficult to define and subject to varying interpretations in France—will be a significant challenge.

To address this question, we first drew on previous research [1]. Indeed, the recognition of an *isomorphism* in the mathematical sense (belonging to the same equivalence class, i.e. a perfect structural and functional coincidence between two *systems* [2]), between the founding cosmologies of *processual Chinese culture* – the *five Chinese elements* (*wuxing*), 五行 – and that of Greek geometry – the *five Platonic solids* – enabled me to confirm the existence of a *General System* in the sense of L. v. Bertalanffy's *general systems theory* [3]. The intention is not to start from a few empirical definitions of the *architectural concept* – often equated with a *true synthesis of the various principles that will structure the forthcoming project* [4] but rather to reflect on how to utilise knowledge of this General System as a genuine *systemological tool* [5]. The aim will therefore be to consider how to apply this tool to the modelling of the *design* process, first from a general perspective and then within the theoretical framework of architecture.

In the course of this earlier research, we first highlighted the isomorphism between the two cosmologies and concluded that there exists a ‘meta-system’ of which each cosmology is a particular interpretation (i.e., a *system* belonging to the same *equivalence class* of the *General System*). We then sought other possible *interpretations* of this *General System*, derived from contemporary theories, in particular a general theory of design, the C-K Theory [6], originally developed by A. Hatchuel and B. Weil, two engineers from the École des Mines de Paris. This theory draws on earlier work, notably J.P. Guilford's work on human intelligence [7].

In 2023, at the 2nd ICAHCA International Conference in Armenia, we put forward the hypothesis that it is possible to conceive of an isomorphism between this *C-K Theory* (hereafter referred to as CKT) and the *General System* (hereafter referred to as GS) [8]. This isomorphism is achievable through a few graphical transformations; however, we have noted that a particular stage of the design process, which features in architects’ discourse, is not considered an important step in this system by CKT.

Hypotheses

This appears to be a genuine *blind spot* for the CKT (perhaps because Hatchuel and Weil are engineers rather than architects?); other authors have clearly identified this particular moment, this remarkable phase of transformation – the “passage” between what is broadly referred to as *the research process* and *the development process*.

The hypothesis developed in this article is that this “pivotal stage” of *the design process*, which architects have termed *the architectural concept* (*architectural parti*), corresponds to the *central phase of inversion* identified in the GS. To envisage the CKT functioning similarly to the GS, it will be necessary to reformulate and reinterpret the CKT, incorporating external theoretical contributions that address this transition phase by detailing its various characteristics.

Methodology and references

To reinterpret the CKT based on the principles that underpin the GS, we propose re-examining and elaborating on these principles using the five Chinese elements (the standard French translation of *wuxing* [9]). This method is therefore based on the *wuxing*, particularly their processual and temporal representation (Fig. 1), as this interpretation of the GS is most directly comprehensible in Western culture. To ensure that this *temporal representation* conveys all the dimensions of the *wuxing* – their *overarching principles* – we will draw on the work of the French sinologist and doctor J.A. Lavier, as he is one of the few authors to have established coherent links with Greek thought within this central framework of traditional Chinese medicine [10]. We shall also refer to the work of L. Vandermeersch concerning the antagonism between Chinese and Greek thought and the inherent question of their epistemological validity [11].

Our approach will therefore involve *comparing* the representations of the GS and the CKT to establish *correspondences*. In practical terms, this will involve describing the *main principles* of GS using the Chinese temporal representation and then transposing them to the CKT representation. Where necessary, we will incorporate concepts from other works into the CKT system – notably those of A. Koestler and M. Serres. Our approach can be characterised by what M. Serres describes as a *process of "rapprochement"* – *to bring into relation* [12] (Koestler’s being similar). He uses this term not only to denote the *connection* (in the sense of F. Jullien [13]) of concepts that share similarities, but also to express the possibility of relying on a *passage* – provided by a framework we have constructed – which allows thought to “*traverse*”, to move *from one sphere of discourse* to another (to use the words of P. Ricœur [14]). This genuine possibility for thought to *traverse* and *connect* different spheres is also closely related to the principle of *metaphor*. The *metaphor* connects by virtue of its dual nature and, as a possibility for linking, can also become a generator of *models* within a systemic context [15]. To use Serres’s vocabulary and approach, the aim is therefore to *bring together* concepts – similar in structure, but of distant geographical, disciplinary, or historical origins. In this article, we shall focus primarily on four areas: philosophy, the design sciences (broadly termed the cognitive sciences), systems theory, and the theoretical framework in the discipline of architecture [16].

Objectives

This approach presents a range of challenges. It provides a *translation* of the logic of *the Five Elements (wuxing)* as applied to a context close to our culture and Western ways of thinking, with an educational focus on project-based teaching methods. It will also enable the development of each of the *wuxing* principles *transposed* to CKT – the aim being to explore, in turn, this new paradigm of GS through this new *interpretation*. At the same time, the aim will be to identify and highlight works that have developed logics converging with GS's, even though the authors did not have access to this general framework. *Bringing* these works *together* allows new connections to be established: the initial aim will be to explore a broader range of metaphors from a heuristic perspective, with the ultimate goal of recognising genuine isomorphisms, which would then serve as proof [12].

Ultimately, incorporating the concept of an '*architectural parti*' will enable the CKT to be refined through the use of other *metaphorical frameworks*, as practised by Koestler [17] and Serres, whose philosophy has developed a new *category of knowledge* that is essential not only for the training of architects but also for higher education as a whole [18].

Part Two: How to recognise a General System in Bertalanffy's sense

Before detailing the main principles that structure the SG (through the lens of its Chinese *processual* interpretation of *the wuxing*), let us briefly recall *the isomorphism* between these two traditional Greek and Chinese systems and, above all, how M. Serres very early on had the intuition to raise the question of a possible *connection* between Plato's solids and something else that might characterise them. These reminders will help clarify two points that are important for the argument that follows: the strategic choice of Chinese thought, as opposed to Greek thought, to recognise the existence of a fifth element, and, equally important for L. v. Bertalanffy, the need to envisage a truly *general systemology*.

Isomorphism between Platonic solids and Chinese elements: a single General System

In our quest as architects to harmonise built forms with the rhythms of *the inhabitants* [19,20], we first demonstrated that the topological *structure* (spatial forms) and the *functioning* (sequence of temporal *processes*) of both Greek and Chinese cosmologies – 5 Platonic solids and 5 elements – are perfectly identical (Fig. 1). These two cosmologies can be regarded as two *systems* in the contemporary sense of the term, even though they appear in 'archaic' contexts (5th century BC) [9]. This then enabled us to argue in favour of a true *isomorphism* (in the mathematical sense and as defined within the framework of *general systems theory* by its specialists [21,22]) between these two *systems*, and thus to address the problem posed by R. Rosen [23]. If one finds a *canonical representative* of an *equivalence class* characterised by *high minimality*, then one can "define" the *General System* conceived by Bertalanffy.

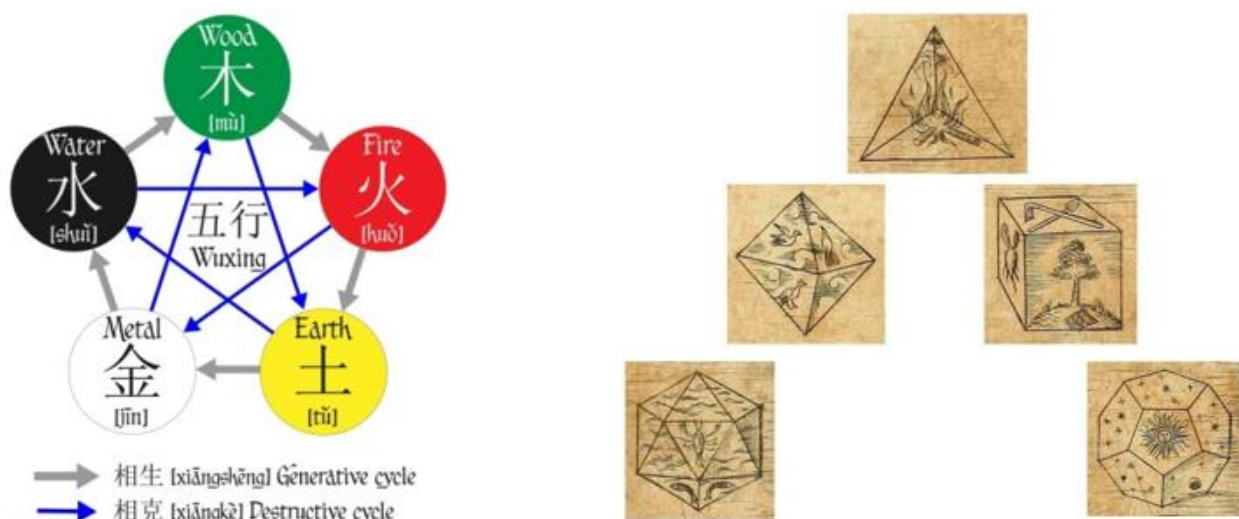


Fig. 1. Chinese and Greek cosmological systems: the *wuxing* (translated in French as '5 elements', but more accurately as '5 processes') and the 5 Platonic solids (Illustrations from Wikipedia)

Isomorphism and the search for organons

The demonstration of this *isomorphism* between *Platonic solids* and *Chinese movements* – the starting point of this research [24] – has shown that the Chinese *system* of generalised correspondences (tables associated with the *wuxing* [25]) ultimately aligns well with the concept of the GS developed by practitioners of *general systemology*. Thus, the dual geometric and functional *interpretation* of a single *systemic logic* – which can be described as GS, but also as *a meta-system* or *mother system* – has in turn served to legitimise the coherence of the two cosmologies (Fig. 2). On the Chinese side, the *wuxing* had hitherto been perceived in the West merely as a set of beliefs [26], whose very singularity, the *fifth element*, was regarded by some as nothing more than an anecdotal construct [9]. Through the demonstration developed in the previous articles [19], they become a coherent whole, since they directly *reflect* the fundamental properties of space, in another *language* that might be described as *processual* [27]. On the Greek side, Plato's account (whose two-dimensional geometric explanations seemed incomplete [28]), illuminated by the connection with the *five elements*, ultimately bears witness to genuine knowledge. Indeed, *translating* the *temporal* sequence of *processes* described by the *wuxing* into *spatial* terms makes it possible to understand this part of the *Timaeus*, which had long remained enigmatic.

Simply incorporating Platonic bodies into the *wuxing* framework was not sufficient to claim a true *isomorphism* between the Greek and Chinese systems; whilst the *wuxing* certainly involve networked correspondences, they are also *represented* in China by means of two *models* [29], two *diagrams*. The best-known of these depicts the various *processes* that succeed one another over *time* (Fig. 3a,b).

The other diagram illustrates the relative positions of these *processes* within the traditional Chinese spatial framework [10]. To establish a true *isomorphism*, it was therefore necessary to find two equivalent *representations* concerning Platonic cosmology: i.e., ones that utilise the five regular polyhedra, *together, in an oriented space*, whilst *translating*, through the language of geometry, the same relationships and structures expressed by the *wuxing*... Yet this problem is akin to the search for an *object* that would maximise the geometric properties of regular polyhedra whilst synthesising their relationships – as imagined by various researchers: Kepler in particular [30] or, more recently, J. Conway [31]. Surprisingly, Serres also took up this quest with a keen awareness of the issues surrounding this enigmatic object.

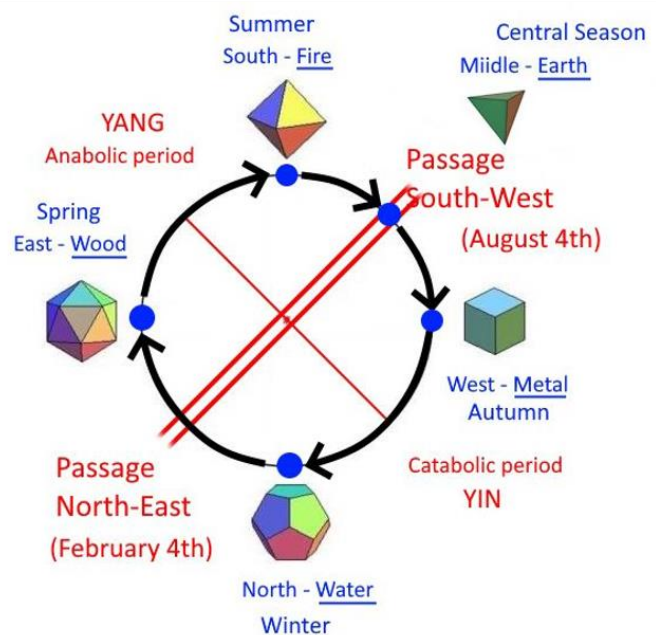


Fig. 2. Temporal representation of the correspondence between the Chinese movements and Greek polyhedra (personal illustration)

The search for a geometric organon in the sense of M. Serres

Indeed, as early as 1969, in the first issue of *Hermès*, 'La communication', whilst commenting on Foucault's work **The History of Madness in the Classical Age**, M. Serres made this remark: *If one were to consider it in its purity, that is to say, outside the historical example proposed here [...], one could easily arrive at the general organon of the sciences which are still only at the stage of description [...], and to which one attempts, through various methods, to apply falsely qualitative structures. Assuming this endeavour were to succeed—which demands the full force of contemporary thought—a new family of true*

sciences would undoubtedly emerge, which might be called morphological sciences. [...] the language of this geometry, taken in its nascent state, is capable of providing that set of structures sought, consciously or unconsciously, by many thinkers of our time [32].

In this book, Serres makes little use of the concept of *the organon* in its original sense (as a formal instrument for the constitution of the sciences). Still, in this quotation, he expands on its definition by pointing out that the primary forms of space are few in number and therefore, in his view, necessarily highly structuring (since, at a deeper level, *causality* is in any case *topological*). He also appears to criticise the fact that certain sciences – biology, linguistics, the humanities... – are still at a stage that is too descriptive and lack a common formal tool – an *organon* – that would enable a transition from empirical description to a true *structural science*. While the choice of the term ‘*geometric organon*’ is particularly apt in this context – we shall adopt it in the remainder of this presentation – Serres nevertheless envisages the need for only a single *organon*, of a *spatial* nature; whereas a few years later, he would write: “*To describe a system, one can sketch its configuration and follow its operation. It is then a question of structures, and of the forces that attach themselves to them and move within them. A topology and an energetics suffice for the description.*” [33] – emphasising the need for a dual description. Moreover, he had already emphasised (in the first excerpt) the need “*to apply qualitative structures*” to give meaning to this purely spatial *organon*.

The Gascon philosopher, as he likes to describe himself, would never find this *morphological organon*, neither at the time nor even afterwards; but the modes of expression he employs in this part of the work—*geometry in its nascent state, the primary qualities of space* [31], *a set of structures...* and later, with direct allusions to *regular polyhedra* in his work on bridges [18]—suggest that he sought this *morphological science* throughout his life.

Finally, we hypothesise that the two remarkable nesting arrangements of regular polyhedra developed as part of the doctoral thesis, as *a geometric interpretation* of Chinese cosmology (Fig. 3) – do indeed constitute *geometric organons*, as M. Serres had envisaged. Similarly, the Chinese cosmological representation, described by the successive processes of wood, fire, earth, metal, and water, is sufficiently qualitative and integrated to be considered, by ‘dual parallelism’, an *organon*, albeit one that is *processual* and temporal in nature.

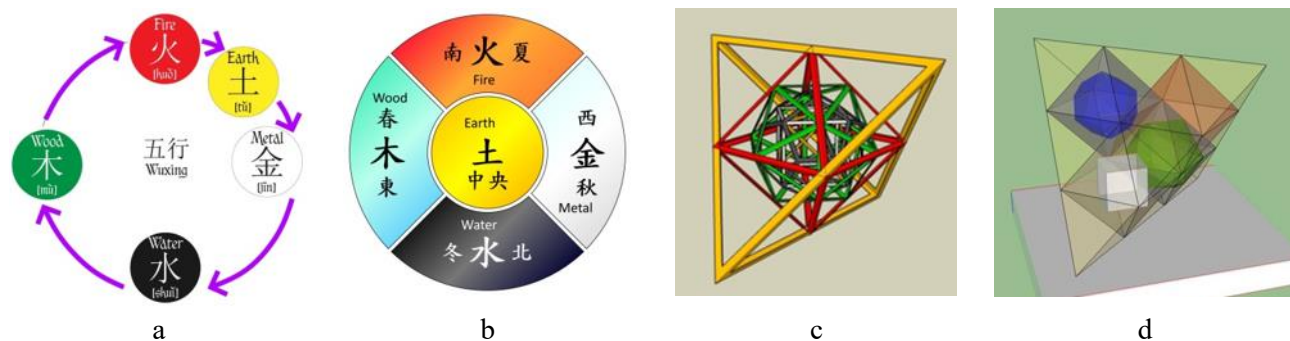


Fig. 3. The two Chinese processual (temporal and spatial, with the South on the top) organons and the two Greek geometric organons according to our correspondence hypothesis [1]

To summarise this first central hypothesis: the cosmology of *the wuxing*, expressed in two variants—spatial and temporal—constitutes two *Chinese processual organons*; in the same way that Greek Platonic cosmology is expressed through two *geometric organons*—also expressed in spatial and temporal versions (described as *centred* and *off-centre*). Finally, establishing a spatial correspondence between *the geometric integration* of regular polyhedra (with a high degree of *regularity*) and the Chinese *model* of life processes seems to correspond to what M. Serres had more or less consciously sought and intuited.

How might we define the General System?

We have seen that it was *the Chinese interpretation* of the GS, when compared and contrasted with the Greek one [19], that enabled us to establish a clear picture of the GS. Precisely because of its generality and

adaptability to various contexts, the GS does indeed have a single logical structure and a single identifiable operating principle (which the Chinese have succeeded in summarising). Still, our understanding of this system can only grasp all its facets by engaging with multiple *interpretations*. To support this view, we rely primarily on the work of C. Canullo [34].

One might nevertheless be tempted to imagine that a purely mathematical description of these transformation processes (*graph theory*, *catastrophes*, or *systems of differential equations*...) would provide access to a single definition – an ultimate *truth* of the GS. But here again, it is indeed *the set of correspondences* – always to be completed – that will enable us to explore the various aspects of the GS.

Finally, it may be noted that the intention to identify a *General System* is not insignificant in the contemporary context of *complexity*. This research ambition has been the subject of numerous publications across all disciplines [35] – particularly within the framework of the scientific society dedicated to the development of *general systemology*, SAGS [3]. Establishing this *correspondence* [36] between cosmologies was only possible by adopting an approach that *reverses the perspective*, by employing what J. de Rosnay termed the *macroscope* [37]: in contrast to contemporary practices that tend ever towards greater specialisation [38]!

Thus, the hypothesis of this new systemic *paradigm* [39] opens up a considerable new field of research, within which we wish to explore a new avenue here: comparing the C-K Theory with the structuring principles of the General System.

Part Three: How can C-K Theory be integrated into the General System?

Whilst this work of *establishing connections* has so far helped us to understand the relevance of *the two cosmologies* (Greek and Chinese) to *general systemology* and has provided an initial overview of this General System, it has not explored the various *processes* that constitute it – the specific functioning of each of the system's five polarities.

How can the General System be represented to better grasp its principles?

To consider (with the CKT) this new possibility for *interpreting* the GS, let us return to the study of *the Chinese interpretation* (since the Greek geometric system is more difficult for a non-specialist to grasp).

With the *wuxing*, the Chinese sought to account for the various *processes* that guide and accompany human life, since Traditional Chinese Medicine is based primarily on the two theories of *yin/yang* and *the five processes* [40]. However, even in China today, there are very different *representations* of *the wuxing*. We shall adopt the remarkably detailed version by J. A. Lavier.

To assess whether a representation is consistent with the principles of the *wuxing*, one must ensure that it emphasises the most important ones. In Chinese thought, the *wuxing* occupies a central place in the conception of human life, which is itself strongly connected to the practices of traditional medicine. As a doctor and sinologist, Lavier elaborated on these principles in particular detail by contrasting them with possible equivalents in Greek thought [41]. One might even consider that his approach equated *wuxing* with the concept of a *General System*, without his having any *prior* knowledge of Bertalanffy's research.

We will focus on the following five *key principles*.

Point 1. Firstly, thanks to their *analogical* approach, the Chinese associate *space* with the *earth*, *time* with the *sky*, and *humankind* in the *middle*, between *sky* and *earth*. For the *earth* associated with *space*, they identify four main *directions*: East, South, West and North; and for the *sky* associated with *time*, four *seasons*: Spring, Summer, Autumn and Winter (which correspond analogously to the four phases of the daily cycle: Morning, Midday, Evening and Night). However, the Chinese *seasons* correspond exactly to *the cardinal directions*: they are centred on the solstices and equinoxes and therefore begin earlier than in Greece (Fig. 2). The cycle of the seasons is modelled as a circle with polarities, which constitutes a *temporal system*. These polarities are identified by means of physical phenomena, the *elements* (or *processes*, to use a more accurate translation) that pertain to human daily life: *wood*, *fire*, *metal*, *water*. We shall examine the specificity of the fifth element, *earth*, later on.

Point 2. Second difference from the Greeks: through the direct warming of the sun and the indirect warming of the earth, the Chinese distinguish two major periods: one of warming, which begins on 4 February (corresponding to the North-East) and ends on 4 August (South-West) – thus comprising Spring and Summer; the other of cooling, from 4 August to 4 February – which encompasses Autumn and Winter. The Chinese have characterised this fundamental alternation of life on earth through the two categories of *yang/hot* and *yin/cold*: in the *wuxing*, there is a clear boundary between these two major periods.

Point 3. By choosing to place the South, Summer, and the *Fire* element at the top of the *wuxing* diagram (Fig. 2), the Chinese cleverly draw attention to the notion of *effort* and difficulty associated with any *ascent*, in addition to the fact that the sun is high in the sky, and therefore above us. This allows for a visual representation of the difficult growth and increase in energy required to move from Spring to Summer; whereas the decline in energy from Autumn onwards is depicted by a descent on the right-hand side of the diagram, which is, *in fact*, easier to perceive as a fall, a more rapid one. With reference to TCM, Lavier describes the *yang* ascending period as *anabolic* – i.e. linked to the laborious process of synthesising complex molecules – and the *yin* period as *catabolic*, i.e. the set of breakdown reactions that release energy. The symbols chosen to represent the five Chinese elements corroborate this orientation of the diagram: *wood* and *fire* are two *yang* processes that rise upwards, whilst heated *metal* and *yin* *water* flow downwards. Lavier, moreover, prefers to represent this temporal cycle not with a circle, but with a sort of distorted ellipse, with a ‘bulge’ in the South-West [10].

Point 4. In China, there is a fifth season: the *Central Season* between summer and autumn, which the Romans referred to as *the dog days*. What might seem like a minor difference from Greek thought is an essential element in understanding traditional Chinese thought. This consideration of a *central process* allows us to identify a ternary logic at various levels: at the level of the *wuxing* as a whole, we identify three periods: *yang-centre-yin*; but also, within each *yang* or *yin* period, we identify three phases of transformation: a time of initiation, then of fullness, and finally of completion.

It should be noted that this ternary structure – characteristic of *Chinese thought* [42] – corresponds analogously to the ternary structure highlighted in the isomorphism, with the polyhedral structural morphology (Fig. 4): geometric progression of polyhedra with 3, 4 or 5 edges for the solid angles, for the *yang* sequence; similarly for the faces in the *yin* sequence.

Let us emphasise this point: the isomorphism between *Platonic solids* and the *Wuxing* fully validates the choice of traditional Chinese thought to retain a fifth season – a central process. The *Earth* element serves as a link between the *Yang* and *Yin* periods, just as the Tetrahedron serves as a link between the two series of polyhedra. Each incorporates within itself the two opposing characteristics: *anabolic/catabolic* for the Chinese temporal system and face-triangle/angle-trihedron for the Greek spatial system. This dual affiliation of the *SG's* central polarity is fundamental to the remainder of this study.

Point 5. Finally, there is one last essential aspect that Lavier places particular emphasis on and that common conceptions fail to capture. The cycle of the *wuxing* – as a *system* that unfolds in space and time – is driven by a source of energy, which may be regarded as external to the system, yet which flows through it from within. To better understand this paradoxical phenomenon, let us note that in the cycle of the seasons, the *transition* from one season to the next (which corresponds to *the cycle of generation* of the *wuxing* [10]) normally unfolds *of its own accord*: once set in motion by its own momentum, Spring, when it reaches its

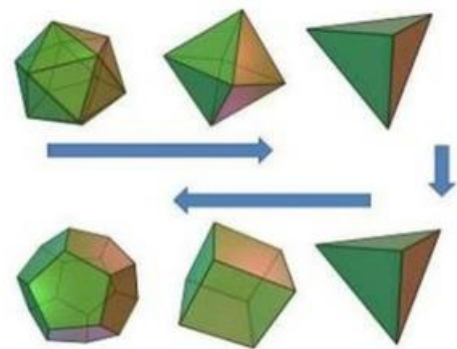


Fig. 4. Presentation of the 5 Platonic solids following the geometric progression: 3, 4 and 5 edges for the solid angles in the top row and 5, 4 and 3 edges for the faces in the bottom row [43]

fullness with time, transforms into Summer, just as Autumn transforms into Winter. However, the *transition* between Summer and Autumn or between Winter and Spring is a "re-energising moment". Much like in the ancient Greek *hoop game* – where the movement had to be restarted and maintained with a stick – at these two peak moments, the movement of the *wuxing* runs out of steam, and above all, changes direction. In the diagram representing the temporal cycle of the *wuxing*, Lavier expresses this external intervention by drawing a slanted line, sometimes double, at 45°. This dividing line in the diagram does not merely indicate that there are two periods, *yang* and *yin*; it also indicates a gap between these two peaks, a *space* traversed by an energy flow [13], which activates these two *passages* of different natures. Lavier calls the phenomenon corresponding to this central line the '*activating centre*'.

How can we understand the concept of *the activating centre*?

How can we understand that this energy of *the activating centre* is external and yet at the same time 'passes through' the *wuxing* system via the centre? The Chinese believe that we have several sources of energy that nourish our *vital principle* [41]. One of these is considered to come from Heaven and to pass through the being from top to bottom, via what the Chinese call the *central channel* or the *vital vessel* – the *extraordinary meridian Chong Mai*. This central *axis* is represented by the Chinese character wang 王 (king, emperor) [44] or by the pictogram of Mencius, which depicts a man between *Heaven* and *Earth* (an ideogram used by Lavier on the cover of his book *Chinese Medicine, Total Medicine* [10]) (Fig. 5).

In the representation of *the wuxing*, the two specific moments of transformation in the cycle driven by the *activating centre* – the two *passages* through the *activating centre* – are therefore situated on the diagonal separating the *yang* and *yin* periods, in the South-West and North-East (Fig. 2). Of these two specific *passages*, the *South-West Passage* (this notion of *passage* is taken here in reference to the subtitle of Serres' work *Hermès V* [45]) – is certainly the most paradoxical, for it is situated *on* the *Yang/Yin* boundary marked by the presence of a traversing energy flow, whilst simultaneously being the site of the *central wuxing process* involving the *earth* element – which corresponds to this 5th Chinese season (which does not exist within the framework of the *four elements* of Greek philosophy).



Fig. 5. An ideogram attributed to Mencius, depicting a central axis specific to the upright human being, situated between Heaven and Earth

Interpreting the CKT based on the principles of the GS

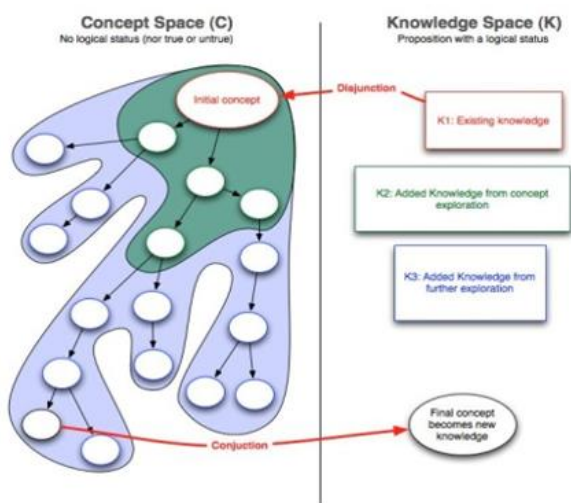


Fig. 6. Original representation of the C-K Design Theory (Wikipedia)

It was the similarity of the diagrams representing the *wuxing* and the CKT [8] that first led us to consider their *connection*, to hypothesise a possible *isomorphism* (Fig. 6). Whilst it may be difficult to demonstrate outright a perfect isomorphism between two such disparate systems [2], from a heuristic perspective, there is considerable scope for research in first hypothesising that an isomorphism may exist and then exploring all the consequences that follow from it.

Let us imagine that the CKT, like the *wuxing*, is another *version* of the GS and that it is possible to apply the *principles* of the *wuxing* to the CKT. This process of *transposition* can only be achieved by making a few modifications to Hatchuel and Weill's original diagram to align it with these new assumptions.

This is indeed a new *interpretation* of C-K Theory, just as it is possible to adapt a literary narrative for the cinema. Its value lies in putting the issues and functioning of this theory into perspective – other research teams are, in fact, working along these lines [46,47]. More broadly, this exercise of "*matching*" becomes a veritable testing ground for thought. It allows us to test the GS's functioning in a new context, revealing its as-yet-unexplored facets. It also enables us to envisage new points of reference in design theories for architects, engineers, and all those involved in project processes, as well as in philosophy, systems theory, epistemology...

The central driving force behind this argument – the *passage* – therefore consists in testing this reinterpretation of the CKT, based on the logic of the wuxing system and its *founding principles*. We will examine each initial choice made by the authors of the CKT diagram to verify whether they are consistent with the original intentions. In this way, we will be led to consider new interpretations of these intentions in relation to new challenges. Moving from the original diagram (Fig. 6) to the diagram we'll propose in the next figure is a good way to re-examine the five main principles of the wuxing presented in this third part.

Point 1. In the C-K diagram, the authors most often refer *to space* in the mathematical sense, but in fact, they are describing a *temporal* process. There is, therefore, a clear correspondence between space and time. Another question arises: in the K zone on the right, the CKT diagram is not 'closed off' by arrows, as is the case in any other system. This absence reflects the authors' intuition that there is a real difficulty in understanding how *the generation operator* functions in the *yin* zone of the *wuxing*. Moreover, Lavier has devoted a few pages in one of his works to answering this question [41]. Similarly, the authors identify three colours, and thus three essential polarities, in each C and K period of the cycle (the discussion in Point 4 will shed light on this aspect [8]).

Point 2. As in the *Wuxing*, the CKT diagram is clearly divided into two parts by a boundary. These two parts reflect two logics, two modes of thought organisation – cognitive processes – which are *antagonistic*. On the left of the diagram, the C section – for *Concept* – is conducive to the emergence of ideas or concepts in any order and without concern for their logical status or plausibility. On the right-hand side, the K section – for *Knowledge* – is a space where knowledge can be verified through logical reasoning, ultimately becoming part of the culture's existing body of knowledge, but by reorganising it. Rotating the C-K diagram 45° to the right does not alter the authors' two concepts, but before performing this rotation, let us move on to the following key point.

Point 3. We have seen that the most important thing for understanding the logic of the wuxing is that two major opposing movements express the activities of the human organism in harmony with its environment: first, *anabolic*, rising to the left, *yang*; then *catabolic*, descending to the right, *yin*. To be able to transpose this *antagonism* [48] to the CKT, we must retain the meaning of the two Greek roots *Ana* and *Kata*. We find these roots in the concepts of *analogue* and *catalogue*. The mode of knowledge expressed by the succession of frames in the K section illustrates quite directly the functioning of a *catalogue* that displays separate objects, perfectly known from the outset, whose presentation is observed from a vantage point. One might also imagine that the search phase in C is of a rather *analogical* nature in the broad sense; these are objects that appear through unpredictable associative mechanisms, without the need to follow any particular logic.

On the other hand, the prefix '*ana*' does indeed mean '*from the bottom up*' in Greek, whereas '*kata*' means '*from the top down*'. Moreover, given the first images that spring to mind when one looks at the left-hand side of the C-K diagram, it can be interpreted as a kind of seaweed or growing plant, as if a process were unfolding. Whereas on the right, the progression is more a matter of verification, of filing things away – once a new solution is found, it is added to the existing body of knowledge.

For both sides, common sense would therefore suggest that the graph should be inverted! This would accurately reflect, on the left, the difficulty of advancing in research by seeking new solutions, and a relative 'ease' on the right – even if reorganising knowledge based on new findings is not as straightforward as this suggests. Finally, if we directly apply the terms '*anabolic*' and '*catabolic*', we are indeed dealing, on the left,

with a process that synthesises new *complex* ideas and, on the right, with a process of destroying the established order of existing knowledge to organise a new order. Because of this renewal, the release of “innovative energies” often destroys the past: here we recognise J. Schumpeter’s concept of *creative destruction* [49]. Finally, with this reversal, the direction of rotation of *the temporal system* described by the C-K path is restored: in the same direction as the sun’s course across the sky and that of the hands of a clock!

In the 2024 article on the conditions for an isomorphism between GS and CKT, we proposed as a central hypothesis that the periods C and K – which might also correspond to Ricœur’s *poetic-speculative* dichotomy – are associated with the two modes of thought identified by L. Vandermeersch as *Greek causal reason* and *Chinese correlative reason*. As he explains, the first is linked to a *temporal* cause-and-effect sequence within a given space; whereas the second is linked to a *spatial* cause-and-effect sequence at a given time (this second type of sequence is commonly referred to as *transmission by resonance*, as with a tuning fork). To avoid changing the name of the C-K diagram, we associate zone C with *Correlative Reason* and zone K with *Kausal Reason* (*causal* in German).

Point 4. Regarding the first three points, the principles organising the *wuxing* lead to simple changes in the orientation of the original diagram by the authors of the CKT, which implies no fundamental transformation. On the other hand, we know that the GS admits a fifth polarity, a *process central to the South-West Passage*: is it consistent to apply this principle to the CKT?

In the original C-K diagram, the term ‘*conjunction operator*’ (borrowed from Guilford) is intended to express that there is a *transformation* between the last bubble in space C and the first in space K. But it is in fact the same object; it is simply our attitude – our perspective regarding this object of knowledge – that changes. There is, therefore, in fact, a shift in perspective, a *transition* [50] between what is *perhaps possible* for us, as participants in the research situation, and what becomes *knowledge* to be utilised. Indeed, Hatchuel and Weill likely intuit this, since they still represent it as a bubble within K, whereas rectangular frames characterise space K. We propose that this object be both a bubble and a rectangle and that it be situated on the *boundary*.

Point 5. The Hatchuel *boundary* is a single line, whereas in the GS, there is a double line representing a ‘circulation’, an ‘internal energy flow’ that crosses this boundary and feeds into the GS. In the 2024 article, we proposed a new representation without elaborating on this *point* (Fig. 7). What interests us here in this new version is to clarify how this *central process* operates within the framework of the C-K Theory, and more generally in any *research and development* process.

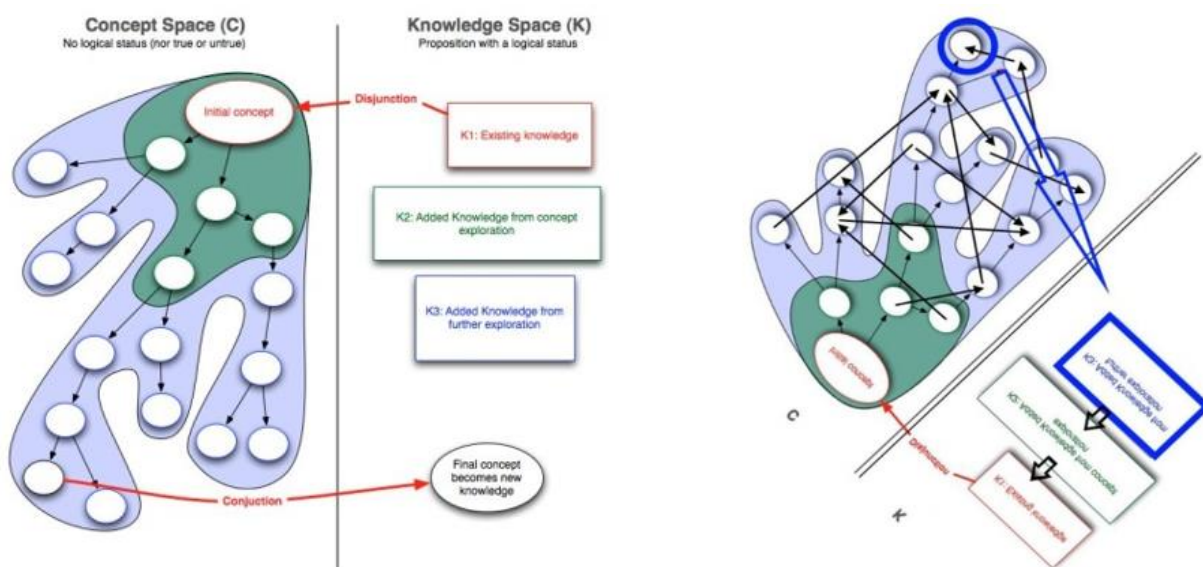


Fig. 7. The original diagram on the left and the new interpretation of the C-K theory proposed in 2024 on the right [8]. The Concept/Knowledge Passage is not yet represented on the boundary of the activating centre (Personal illustration on the right)

Between C and K: what *mechanism* enables the *South-West passage*?

In this new representation of the C-K theory, the main divergence from its authors therefore concerns *the conjunction operator*, from C to K – referred to as the *South-West passage* in the *Wuxing* representation. According to our hypothesis, it is thanks to the presence of a specific mechanism for establishing connections and simultaneously centrally reversing the GS's evolutionary dynamics that the passage can occur more easily; unlike the *North-East passage*, where nothing appears to assist *a priori* (this aspect will be the subject of further research). Thus, according to the properties deduced from the *wuxing*, this *South-West passage* is made possible because the central process of the CKT does indeed have a material status – although it lies on the boundary of *the activating centre* – but also because it belongs to both categories C and K at the same time.

To supplement the theoretical foundations of CKT, we propose, in the following section, to draw primarily on two outstanding works of research that have taken into account this distinctive feature of *the South-West Passage*. These are two books: **Archimedes' Cry** [17] by A. Koestler and **The Art of Bridges: Homo Pontifex** [18] by M. Serres. These approaches will then be enriched by J. de Rosnay's reflections on systems theory in **Le macroscope**.

Part Four: How can the *South-West Passage* be represented in a new interpretation of the CKT?

To take this investigation further, we must find works that describe a phenomenon akin to the South-West passage and can be integrated into the systemic logic of the CKT: studies that focus on the link between C and K. In order, I shall begin with A. Koestler, who has clearly identified this mechanism of *passage* and its dual affiliation.

A. Koestler's '*bissociation*'

Koestler is an author who has shown an interest in *innovation* and *creativity*. However, in all creative processes and with a view to systematising a method of creativity, he focused his attention on the processes of transition, of shifting between two (a priori distinct) categories of understanding a statement regarding a phenomenon or a situation... Koestler associated this sudden shift in awareness with Archimedes' cry upon solving the problem of weighing King Hiero's crown, thereby discovering a scientific method. *Eureka* comes from the ancient Greek εὕρηκα (*heúrēka*), meaning 'I have found'.

To underpin and generalise his argument, he brought together three fields in which he hypothesises that there is an *unexpected and sudden shift* between two modes of understanding – and which therefore share a similar structure: the fields of humour, discovery and art:

On the frontispiece, the three panels of a rounded triptych represent three areas of creative activity with blurred boundaries: humour, discovery and art. The reason for this seemingly perverse arrangement – the Sage between the Jester and the Artist – will become clear as the discussion progresses.

Each of the horizontal lines in this triptych represents a pattern of creative activity that appears in the three columns; for example, the comic comparison, the objective analogy, and the poetic image. The first aims to make us laugh; the second to help us understand; the third to fill us with wonder. The logical approach of the creative process is the same in all three cases: it consists of discovering similarities. [...] I shall endeavour to show that the types of creative activity are all three-fold: they can serve humour, discovery and art [...] [17].

Our interpretation of this study by Koestler is that in all three cases, it involves a '*South-West*' passage: that is to say, a specific, lived experience enables a shift from one *associative context* to another: - whether in jokes, where wordplay amuses us when we grasp the *discrepancy* (*écart* in French) between the two registers of meaning; - but also in scientific research, which is broadly described by *serendipity* [51] as well as the notion of a *paradigm* shift in the sense used by T. Kuhn; - or even in artistic metaphor, one might cite Rimbaud's '*Le dormeur du val*'.

Here is how he explains this *passage* and why he calls it ‘*bissociation*’:

It is the clash of these two associative contexts, of these two incompatible codes, that causes the tension to erupt. [...] The framework of the two anecdotes is the perception of a situation or an idea L across two reference planes M1 and M2, each with its own internal logic but usually incompatible. One might say that the event L, the point of intersection of the two planes, vibrates on two wavelengths. As long as this unusual situation lasts, L is not simply linked to a single context of association; it is bissociated with two contexts.

If I use this term – ‘bissociation’ – it is to distinguish between routine reasoning, which operates, so to speak, on a single plane, and the creative act, which always operates [...] on more than one plane. In the first case, thought would proceed in a single direction; in the second, it would be a transitional state of unstable equilibrium, divided between two directions, with the imbalance affecting both emotion and thought.

What is particularly interesting in Koestler’s research is that he models this *transition* using geometry—the straight line as the intersection of two planes [17]—through a phenomenon, a statement: thus a material object that is the concrete intersection of two families, of two *contexts of association*.

As for *discovery*, i.e. the emergence of a solution from a given problem, the reference to *serendipity*, alongside the difficulty of understanding a play on words, shows just how much finding the connection with another frame of reference, another *family of associations*, relies on a certain prior cultural background and on the ability to *step outside the box*, to *shift perspective*, to *decontextualize* (*décoïncider* in French [52]). This is illustrated by J. Rouxel’s caricature drawing often used to express the concept of serendipity: by depicting a Shadok (a cartoon character, Fig. 8) looking at a field of flowers through his glasses and declaring “*The real difficulty isn’t so much finding ideas; it’s knowing how to recognise a good idea when you see one*”.



Fig. 8. The caricature of a Shadok whose body has been replaced by the Wikipedia logo

Whilst Koestler’s model, through both its simplicity and its application to such diverse fields of knowledge, complements the CKT and clarifies the functioning of *the South-West passage*, it nevertheless fails to account for the final principle of the GS: the central process of the GS is situated on the boundary of the activating centre whilst at the same time leaving it unobstructed.

The concept of *the bridge* in Michel Serres’s philosophical approach

There is only one French-language author – Michel Serres – who ‘ticks all the boxes’ in offering a coherent, synthetic representation that fosters a better understanding of this *South-West Passage* – and which will truly complement the CKT and thereby provide a better understanding of the GS.

Already in the collection of the five *Hermès* [45], Serres uses the concept of *passage* and introduces the *god of translation*. In **The Educated Third**, he draws on the concepts of *milieu* and interchange... In **Eclaircissements** [12], he emphasises the need to *cross over* and to seek a *theory of relations*. Finally, he elaborates on this metaphor of *the bridge* in his major work, which he regards as a work of synthesis: “*I have never dreamt of anything but bridges, written of nothing but them, thought of nothing but what lies above or below them; I have loved nothing but them. This book on bridges ends up as the book of all my books*” [18].

Serres did not know about *the General System* in the sense in which we develop it (thanks to the isomorphism of *the organs*). Still, he had an intuition of it. His conception of *the bridge* is not only an important contribution to a better understanding of the GS, but, one might even hypothesise, as he developed it, the *bridge*, through its central and strategic position, makes it possible to synthesise and symbolise [53] the entire *process* of the GS. What is truly interesting about this work is that it shows that the *bridge* unites everything whilst enabling a *conversion*, a *translation* between two foreign territories, two geographical-

cultural families that, *a priori*, never meet; but that, at the same time, energy flows beneath this bridge and the surrounding activities benefit from this flow. He describes this *bridge* using two main theoretical models (which primarily illustrate the principle of union): first, the *hyphen*, and then the *white domino*:

From which beam, which stone, which concrete should bridges be built so that they may unite different shores? How can a single material—be it wood or iron—touch both right and left, France and Germany, earth and Paradise? The same mystery of simplicity lies in the hyphen [...]. As a materialised hyphen, the bridge likewise unites differences. Across the Bosphorus, it short-circuits Europe and Asia. I do not know whether it converts, translates, transmutes or transubstantiates; the fact remains that its material, its substance—be it wood, stone or concrete—adapts to shores that have no connection [18].

For him, it is truly a physical structure that structurally provides two superimposed *passages*, whatever the context – the universal dimension of this function does not escape him. This is why he tries to envisage all manner of *situations of passage*, drawing on numerous metaphors: it is a matter of seeing the world through spectacles that illuminate only the phenomena of *connection*, which *short-circuits*:

Just as in the line linking two words, as in the deck bringing two banks together, I suspect the universal. [...] Without a bridge, then, there is no path; by this I mean a connection from one point, such as this, to another, quite different. Without a bridge, then, there is no method; by this I mean a path from one to the other. (Passages underlined by us).

Serres sees in this *apparatus* — the *bridge* — that which encapsulates the very process of an intelligent and, above all, connecting life, which always proceeds by overcoming the difficulties that arise. It is also an optimistic philosophy: one can always *move* from a familiar family to an unfamiliar one; there is always the possibility of establishing a *passage* between what Koestler calls two *contexts of association*. However, this passage is made via a path that can be difficult, narrow, or even dangerous [*Hermès V*]. And this *bridge* must, of course, be sought out, and often even built, by selecting the most favourable banks, materials, forms, etc.

To understand the bridge, the hyphen and the method, I believe it is best to examine a white domino. [...] The hyphen, the bridge, plays the role of this white double which can, on one side, represent a digit or a number, the 5, for example, and, on the other end, represent a completely different one, for example, a 2. The double blank thus unites the 2 and the 5; it could just as easily link the 6 and the 3, any one to any other. This is the general equivalent; this is the universal token I was seeking. This equivalence permeates the hyphen, soft, and the bridge, hard, whose whiteness suggests a universal method.

Yet the word ‘method’ denotes a route that passes through, precisely a crossing. Starting from a familiar place, it leads to another, unknown one; it bridges the problem with its solution, knowledge with ignorance, research and invention. Through its crossing, the bridge, conversely, symbolises and realises a method. The same paradox of whiteness, the same universal simplicity, for the one, gentle, as for the other, hard. Both remain homogeneous, on either side, to the right and to the left, whilst they connect two unrelated places, one through signs or equations, and the other through cables, stones or concrete. They function as general equivalents of the relationship (Passages underlined by us)[18].

For Serres, constantly moving from the known to the unknown, from the past to the future, from difficulty to success, is to build bridges – to create passages in the South-West continually. Whether these crossings are material or conceptual, this is the human adventure: “*Building bridges in general becomes an activity so broad that it encompasses, perhaps, the human project, in that our body bridges flesh and word. Homo pontifex.*”

Homo pontifex: man (and probably living beings too) is a *bridge-builder*, and whatever the context, this *bridging* always forms part of the *south-western passage* of a system that replicates the same structure as the GS.

Serres sometimes mixes the two types of *passage*, that of the South-West with that of the North-East (to which he often refers in *Hermès V* and in *Le tiers instruit*), but he is aware that these are the two *decisive*

passages for human activity. It should be noted that even if there is an ‘intermediate sequence’ between these *passages*, these two moments are instances of renewal and reversal – ascent/descent, anabolic/catabolic – in the *wuxing* diagram as well as in the CKT.

Finally, what flows beneath these bridges is a significant energy for the surrounding activities, if only because it separates territories. It is this breach that establishes differences between regions, both geographical and cultural, and it is these *discrepancies* (*écarts*)—*these differentials*—that drive all that lives. From this separation created by the passage of *the activating centre* arises *the gap* that motivates the building of *bridges*: this type of human activity that Serres summarises with the adjective *pontic*. *Pontic* – derived from *bridge*, from the Latin *pons* – does not refer solely to the geographical sense – the Black Sea, known as the Pontus Euxinus – but takes on a metaphorical and philosophical meaning here. It denotes that which connects, that which facilitates passage between separate domains, that which enables one to cross obstacles. Throughout Serres’s work, the aim is to create connections rather than divisions, to know how and where to link: maritime routes, continents, the sciences and the humanities, specialised and fragmented fields of knowledge...

Thus, the *pontic* is not only an ethics of knowledge; it is also a particular capacity of human intelligence that must be recognised – and even prioritised, particularly in higher education [37]. We hypothesise that this ability to *make connections* (the competence of *reliance* [54]) is just as important to cultivate as our cognitive ability to construct *logical* arguments. Thus, what characterises CKT is also this mode of *crossing through*, which requires a different kind of *reason* – the one that Serres highlighted, and which we shall call *Pontic reason*.

Therefore, to express that, on the global scale of the CKT, there is a third period of central articulation that allows *movement* from C to K, we propose replacing the initial hyphen in C-K with the letter P for ‘Pontic’ and thus calling it the CPK Theory (CPKT for short), the theory that unifies the three reasons: *Correlative, Pontic and Causal*.

We can therefore conclude that Mr Serres had a keen intuition regarding the *General System* and the importance of *the South-West passage*, which for him symbolised the concrete possibility of always connecting what our Western culture often leads us to separate, with the intention of over-defining. He had understood this central role – and one that is essential for co-knowledge – of *the bridge* as a two-level interchange, which, above, connects two territories and, below, allows the flow of *the activating centre* to remain unimpeded. Always knowing how to recognise where and how to build bridges to cross over: this sums up Mr Serres’s true philosophy.

Looking up, I watch through the window the poplar swaying in the light breeze, bridging the celestial light and the mineral salts buried in the subsoil. To think of bridging is to contemplate the world in its detail and to unfold, within the whole, all the functions of the universe. All things form a bridge. Panta Pontes [18].

Part Five: The architectural concept, a bridge?

The concepts of *bissociation* and *the bridge* thus help to complete the puzzle of Hatchuel and Weill’s CKT. There are certainly other pieces still missing, notably the *North-East passage*, but understanding this second passage would require further development. In this fifth and final part, we propose to consider how the transposition and adaptation of these philosophical reflections to the specific field of architecture allow us to explore them in greater depth and ultimately enrich our understanding of this new CPKT.

In architectural design, adopting a design approach means finding a bridge!

We hypothesise that what architects call ‘*making an architectural choice*’ is precisely the act of discovering this *bridge* described by Mr Serres: a narrow passage that appears suddenly, sometimes difficult or even uncertain, but which triggers a *turning point* when the possibility of a *way out* finally becomes apparent! At that moment, one realises that amongst all the avenues explored – in every direction – there is a general organising principle that appears to be potentially more promising, more fruitful. Whether one refers

to concepts of *scale* [16], *schema*, *operator*, or *target model* [55] to describe the various processes that led to this shift, whatever the vocabulary used, this glimpsed organising principle becomes predominant. One has the intuition that following it will lead to a general structuring of the project.

What is taken into account here, therefore, are not the design processes involved before or after this pivotal moment (in each of the C or K zones), but solely this moment P – as in *Pontic* but also as in *Parti* – where intention and, above all, commitment are reversed. There is indeed, in the *architectural Parti*, the idea from Old French of ‘*taking a parti*’ (not to be confused with ‘*taking sides*’), that is to say, of making a decision, of committing oneself, amongst solutions that are all relevant, to a particular solution. This notion could be translated by the English word ‘*strategy*’. However, it is not a strategy decided upon *a priori*; it emerges through study (likely through observation of the situation’s potential [56]) and imposes itself as the result of a maturing process. The P in CPKT, therefore, also represents a turning point, like when a curve forms an S: the attitude reverses when the *bridge* appears as *an opening to cross*.

Going upstream to cross over

To illustrate this shift in attitude, we shall expand on this idea using additional metaphors. Let us place the search for this *bridge* within the broader context of the research process. When outlining the principles that summarise the *wuxing*, we noted that the Chinese represent the *yang* aspect – the left side of the SG – as ascending. In the CPKT, as we have seen, it is also important to symbolically associate the *research* phase with an ascent and the *development* phase with a descent.

Let us imagine the following situation: during the conquest of the American West, whilst exploring unknown territories, a group of pioneers come upon a river. To cross this obstacle, they have two possible solutions: either they cross where they are, as best they can – by swimming or by building a raft (they will then have to climb onto the *deck* from a *pontoon* – the notion of a *bridge* is still present in this method of crossing). Or, it is preferable to go upstream until they find a place where the *crossing* is easier: either a natural *bridge* exists – a tree trunk or a ford... – or it can be easily constructed, as the river is narrower.

The image of this *search* is interesting because it highlights several aspects: firstly, the difficulty of searching for a possible *crossing* upstream, as this involves going upstream and therefore requires extra effort; and, of course, secondly, the relative ease of going downstream; moreover, in a partially known territory, which one has already glimpsed from the other side.

Finally, viewed from this angle, the concept of a bridge can summarise the entire CPK research process. From the outset, *the intention* to explore the unknown leads us to seek a way to cross and finally access this new territory. To summarise this journey, we can also refer to the Chinese bridge, known as *the moon bridge*. Not only does it resolve the following dilemma—it is very much a physical structure (at the centre of the border of *the south-western passage*) and is itself dual in nature, being both an ascent and a descent (Fig. 9)—but furthermore, when one crosses it, during the ascent, the view of the other bank is not immediately revealed. One only truly discovers the other bank during the central swing.



Fig. 9. Moon Bridge in Yangzhou, Jiangsu Province: the ‘*synthesis bridge*’

A bridge or a mountain pass

It is difficult to conclude this argument – to shed light on the *Architectural Parti*’s research – without noting the similarity between the two metaphors of *bridge* and *pass*. One might look ahead and seek, in the same way, a *pass* to cross from one valley to another: this is also a kind of *bridge* in rugged, hard-to-reach terrain. In this adventure, the *activating centre* is no longer water flowing downwards. Still, the energy of the mountains rising upwards (the *mountain-water* pairing, 山水, *shān shuǐ*, is, incidentally, essential in China

for evoking the *landscape* [57]). One must try to get through – whilst staying as low as possible for many reasons: cold, terrain, oxygen, potential predators... The notion of a *pass* is therefore also the idea of *getting* through difficulties, through a narrow space, whilst trusting that on the other side of the mountain, the path down will also be ‘welcoming’. But on the other side, which route leads to the neighbouring valley? Sometimes one will hesitate between different routes: sometimes one will be forced to turn back to try a more favourable path.

These images naturally resonate with the practices of architects and writers. Thus, M. Serres reflects on P. Mérimée’s lesson in **Le Tiers–Instruit**:

By drawing networks of forks, Carmen teaches the Third-Educated to perfection, whilst also imparting a philosophy of creation. Whether one follows the course of a river or heads up the valley towards the mountains, one encounters as many confluences as one wishes. And to descend, one must choose: either you go right towards inscriptions and belles-lettres, or you turn left towards the narrative. But, at a certain moment—indeed, at every moment, since forks abound—the adventure remains in the third, in balance, in a common origin [...].

The short story describes the crossing of a threshold or a pass: science ascends there, and the tale descends. Clear proof that the spring gushes forth precisely at the crossing of the third bridge [...] [38].

To complete this image of the *architectural choice* as a *pass* – a *third place*, a narrow passage where everything can pass through, as Serres points out – and to conclude the process of *reliance* (re-linking) begun in this article, we propose to consider a metaphor by J. de Rosnay. To understand the *anatomy of his book*, the general organisation of **The Macroscope**, mirroring the approach he advocates and describes – his *medium* being also his *message* – he explains:

[...] this is the ‘logical’ approach. This book has the structure of a double cone. At the outset, we examine the structures and mechanisms common to many systems in nature; we observe.

We then move towards the tip of the cone; this is the general method that allows us to connect everything: the systemic approach. We then enter the second cone, focusing on the applications and the various representations, proposals, or suggestions that I submit for your consideration [37].

In this model (Fig. 10), all the information gathered from the first sheet of the cone of revolution *passes* through a point before being ‘reversed’. This apex belongs to both sheets, but above all, this zero-dimensional point receives, contains, and enables the conversion and transposition of all information.

It is, of course, difficult to *define* this *centre*: can we speak of a symbolic place, a seed that will germinate and enable a birth, followed by the *project’s development*? - The preceding phase being *gestation* – *research* within this overall process of *research-apex-development*?

In this image (this symbol?), one can also observe that all the information necessary for the project’s future is already present in the initial form of the *cone’s generating curve*: the research can continue almost of its own accord, with the passage of time. One need only let the cone narrow; then close until it inverts, and *expand* thereafter. Rosnay added an arrow symbolising the direction of time to the cone drawing: can this be considered the *system’s activating centre*?

Conclusion: the *nexialist* architect, a specialist in pontic reason

If we assume that this metaphor by J. de Rosnay can be applied to architectural design, this *cone’s apex* can also encapsulate the idea of the *design concept* – synthetic, yet indefinable: a dimensionless point which, like a seed, paradoxically contains the entire sequence of *temporal development* that precedes and will follow; and which centralises all *spatial relationships*.

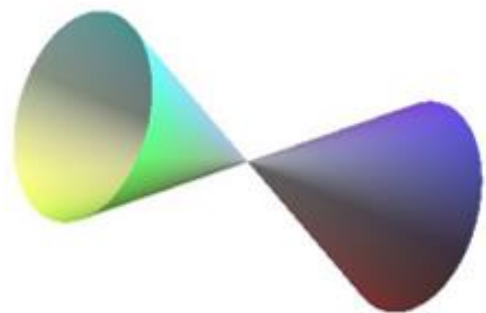


Fig. 10. Cone of revolution with two sheets and a vertex (Mathcurve)

However, to designate the point where the most important part of a problem lies, in French we use the metaphorical notion of a 'node', for which we find the following meanings in Latin: *Nexus* signifies *sequence, intertwining and/or link, knot, embrace*¹.

These properties likely led Alfred Elton van Vogt to write a novel – **The Voyage of the Space Beagle** [58] – in which the main character is familiar with the science of *nexialism*. In the distant future, aboard an exploratory spaceship, a scientist, Elliott Grosvenor, opposes the various heads of specialist departments – academics or engineers – who hold power but are incapable of acting effectively in the face of complex problems. Grosvenor's training could be described as that of a 'super-generalist': "*At the Nexialist Institute, we are taught that behind the general principles of every science, there is an inextricable link between that science and all the others.*"

Just as Rosnay confuses the *centre* of his *book's system* – the apex of the cone – with the potential summary of all the unfolding processes of *systems theory*, van Vogt evokes this *transdisciplinary science*, this integration of all knowledge, with the metaphor of *the node*, the meeting point of all sciences – *Rosnay's cone* could even become the emblem of *nexialism*!

But has Serres not developed this transdisciplinary science that A.E. van Vogt heralds throughout his life? Nexialists are specialists in *building bridges* between scientific theories. Through his various works, Serres has developed bridging reasoning not only between the sciences but also with the humanities, including literature...

Ultimately, might we not regard this book - Serres's testament, summed up by these two words, *Homo pontifex* - as the handbook of *nexialism* and, more broadly, of *designers*? All professions involved in *design* in one way or another are led to seek out and build *bridges* to articulate *ecosystems* [59] that are often foreign or even *antagonistic*. For architects, *architecture* can be conceived as a *bridge* between habitation and territory, and architectural design itself as a succession of *bridges* between the search for ideas and their implementation, the testing with models.

In conclusion, we approach the genesis of an architectural *project* with this distinction in mind among the three main stages of *the design process*: *Correlative, Pontic, and Causal (CPK)*, with, of course, educational programmes tailored to these three phases in schools. Are architects not in the same position as E. Grosvenor, super-generalists capable of applying a transdisciplinary approach to make decisions that *bridge* and interact with increasingly complex environments? Among these three major 'modes' of *reason*, are architects not, above all, specialists in *pontic reason*: *archi pontifex*?

Conflict of Interest

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