THE STRUCTURE OF THOUGHT AND KNOWLEDGE
(THE KERIGMA OF THOUGHT)

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To my children, ... and to any person, child or adult, of learning age

Why "Kerygma"? Because etymologically "Kerygma" is a solemn announcement and diffusion of a very important fact. Unfortunately the concept was hijacked by the "Christian Kerygma" (proclamation of the Christian Gospel), but it is clear that there are also other religions. And that explaining and diffusing something that is typical of the entire human species but so unknown until now as thought and its structure, is no less important than any other possible kerygma.

KEYWORDS

Structure of thought. Representation of knowledge. Sensitive identification. Sensitive/simple conceptualization. Virtual/composite conceptualization. Knowledge. Understanding. The "Relationators": the specific faculties of knowledge. Method. Transfer of methodological elements. The loop of thought ("ruminating"). Reasoning. Logic. Exact and complete tree of concepts. Conceptual system. Intrinsic semantics. Pedagogy. Teaching. FREGE. GÖDEL.

ABSTRACT

Thought characterizes Homo. "Thinking" is a repeated word, present in any conversation or writing. But is there a detailed definition of what it is strictly? It is unquestionable that it is a mental faculty, that is, a psychic faculty. But then, is it a sense?, is it a feeling?, is it a knowledge?, is it an intuition?, ... No, none of them on its own.

Thought is an intimate combination of many other simpler faculties, that is, a clear "complexation" of them. Consequently, it must have a structure based on its generating components. But, has anyone heard which faculties compose it and how they progressively structure it?

The reference RAE dictionary for Spanish-Castillian says: "Faculty or capacity to think" which is a tautology; as well as "Action and effect of Thinking", which is a serious polysemy. They do not improve at all in psychology dictionaries, which often solve it with a potpourri of synonyms. And if we search for their structure, proposals like "Concept, judgment, reasoning and demonstration" or similar, there are no structuring. Some even perceive thinking as a vice to be eradicated.

It is also common and logical, the question: "What is it that science still does not know?", about which even classifications have been developed, the top 25 problems, the top 125, … But, curiously, always forgetting the most important thing: "how can man know the many things that we already know?", but neither is asked nor is it known.

The "Representation of knowledge" is a detailed description of the psychic processes that allow human knowledge, but surprisingly, it has never been described before! We know everything and a lot, except what allows us to know all this. In my opinion, it is the biggest "black hole" of science.

In "The Representation of Knowledge..." (see [A]) it was clear, that even with two searches with "AI" asking: "How do we know?" or "What faculties allow human knowledge?", the ambiguous answers confirm that it is totally unknown to science, a "black hole". And knowledge is undoubtedly at the core of thought, as will be seen.

I do not think that 63 pages are many to answer clearly and definitively what thought is and how it is structured, and how knowledge is acquired. Nor do 87 pages to do the same with "What is consciousness(-raising)?" [1], both faculties that have eluded science for centuries. They are also related, which is why I wrote these two articles that explain them in the same year, 2007.

This article presents the **4 structural levels of thought**, and how each one progressively results from the previous one.   0) A previous level or "level zero" (the "**Sensitive Identification**", auditory and tactile from the last months of the fetus, and visual from the first months of the baby), 1) a first level of the **sensitive or simple Conceptuation** from two years of age, 2) a second level of the **virtual or composite Conceptuation**, 3) the level of strict or relational Knowledge from six years of age, and 4) a fourth level of the **Method**, from which applications such as **Reasoning** and **Logic** are derived. There is a close relationship between this article with the logic from FREGE and GÖDEL.

And in addition, I have been writing lately the recent articles of "The knowledge of children at 2 years old" [C], "... at 3 years old" [D], "... at 6 years old", and "... at 10 years old", even more detail the central part of this structure, which is how knowledge progresses with age. "Knowledge" but in its strictest interpretation, the most understanding and relational one, not in synonyms such as "Acquaintance", "Factual or historical knowledge", ... And at the same time it clarifies what other related concepts such as "Abstraction", "Idea", "Understanding", ...

The article describes the cognitive evolution of the child, and we have **all** been there before. It is like the intellectual **biography** of any person. The reader will be among the first to know what knowledge is and the thought that encompasses it. In addition, **intrinsic semantics** is introduced, a new discipline that intersects mathematics and psychology, without which it is **not** possible to do science of knowledge in a serious way.

Finally, we say that thought should be free, but, ¿is it true that we can think freely, as we want? Or, seeing the antagonisms that exist, ¿perhaps we can only do so within certain limits, those that condition us by the feelings of our unconscious, intimately related to thought?

INDEX

THE LAST TWO LEVELS OF THOUGHT, LEVEL 3 OF "KNOWLEDGE" AND LEVEL 4 OF "METHOD". [.3]

TREE OF KNOWLEDGE "RELATIONATORS". "TERMINATIONS" [.33]

ANNEX: MOVED PARTS [.34]

BIBLIOGRAPHY [.35]

WHAT DO WE KNOW ABOUT KNOWLEDGE? CURRENT STATE AND REFLECTIONS [.0]

Today, one of the greatest <u>inconsistencies</u> of human civilization is the **contrast** between the great knowledge of phenomenology external to man and the zero knowledge of our own internal cognitive phenomenology, which allows us the previous external knowledge.

We know what the material structures are that are studied from physics, from chemistry, ... We know what the structures of living organisms are that are studied from biology, and their heredity that is studied from the genetics. But our cognitive processes are even ignored if they have some kind of structure, or if we should continue to assume that they are something "ethereal" or "spiritual". We must limit ourselves to ambiguously describing the final effects, as if it were an inventory.

There is strictly no science of knowledge, there have only been unsuccessful attempts.

If we do not know what cognitive processes are like, it is clear that we cannot intervene efficiently or with guarantees in these processes. Only blind sticks can be given, as has been done until now as pedagogy. Efficient applications cannot be made either.

This is why there are so many communication problems. This is why there is school failure, or worse, it is not known how to solve it. That is why logic remains almost in the same state as it was 2000 years ago, in contrast to the explosion of the rest of mathematics (algebra, geometry and topology). On the contrary, demagoguery is increasingly present everywhere.

SOME PENDING QUESTIONS [.00]

Where can we find unequivocal answers to the following questions?:

If it is already known that there are no alphabetical structures in the brain, why do we continue to order concepts alphabetically (dictionaries, encyclopedias, ...)? Can the concepts be ordered according to the age at which they can be acquired by children?

Can knowledge be "ordered"?

If computers manage virtual structures as those of knowledge, if it is already known that in the brain there are no structures in the form of pages or lines, why with today's computers do we continue to use pages -such as Web pages- which is an ancestral material resource of representation from thousands of years ago (the papyri)?

How do they differ, or how are they related, instincts, feelings, consciousness or the different effects of thought (concepts, knowledge, reasoning)?

Can all the concepts that we attribute to our mind be defined unequivocally, exactly, just as we unequivocally differentiate any two numbers, no matter how close they are?

Which faculties -whether basic or composite- are involved in the cognitive process? That is, where they come from, how they act, ... and not simple conjectures or approximations.

Is it possible to structure a cognitive "space" that is intuitive, without discontinuities, without disconnections and compact?, and supposing this, is it possible to navigate through this space of knowledge?

What exactly does it mean to "internalize" or "mature" a concept or knowledge? Can understanding be defined and measured?

What are the limits of thought -which must have them- to take them into account in teaching?

Why do we often think better after sleeping? Why have many discoveries been made by dreaming and not thinking consciously?

Instead of the "Human Revolution" (the alleged genetic mutation that 40,000 years ago made thought "appear") what has been the evolution that has led to language and current thinking?

What are the laws of Pedagogy, which VYGOTSKY looked for? In such a case, what will be the "zero" principle of psychology or pedagogy? What does it have to do with contributions like some of those made by MONTESORI, FREINET, NEILL, DOMAN, ...?

How could school failure be solved easily and systematically?

What is the mathematical formulation of the cognitive processes that PIAGET wanted to find?

Following the proposal of LEIBNIZ's "Characteristica universalis", why did WITTGENSTEIN not find this "'ideal' language of exact signs that only allowed the formation of correct propositions"?

Despite FREGE and GÖDEL's admiration for LEIBNIZ, and that the Characteristica universalis was also a challenge for them, why could they not achieve it?

Does this "Universal Language" exist as has been repeatedly sought? What should this language be like?

As has been said, why is logic still almost in the same state as it was 2000 years ago, in contrast to the explosion of the rest of mathematics (algebra, geometry and topology)?

Is it possible to learn mathematics from language? Is it possible to improve the learning of mathematics?

Etc, etc, etc.

THE STRUCTURE OF KNOWLEDGE [.1]

First it must be said that knowledge has structure. A perfectly describable and representable structure, to the point of being <u>simulable</u>. Of course, it is a virtual structure*, that is, not tangible, not real. That is why its simulation cannot be done with, for example, mechanical devices. It must be done with a tool that manages virtualities, as is the case with a computer program.

*   The <u>real</u> is all what can be perceived by the senses (even if it is with microscopes, telescopes, amplifiers, concentrators, meters, ...). For example, matter – including objects and figures – and material phenomena.

The <u>virtual</u> is what is linked to processes that are not exclusively sensitive, such as:

   - images (not to be confused with materials figures), be they optical, mental (ideas, concepts, knowledge, ...)
   - languages, whether molecular (genetic, hormonal, pheromonal, ...) or human (body expression, dreams, languages, mime, software, ...)

As will be seen, the existence of this structure is not just another opinion about knowledge, another more conjecture. The simulation of this structure and in general its multiple applicability in practice, validates the theoretical statement regardless of the opinions that this theoretical structure may deserve: current ignorance, disbelief, denial, ... Opinions are one thing, all the respectable you want, and another is the verifiable knowledge.

HOW IS THIS STRUCTURE? [.10]

<u>Three-dimensionality, arborescence and relatability</u>. [.100]

The first characteristic to comment on this structure is its <u>three-dimensionality</u> (at least). The senses, perception and psychomotor skills make three-dimensional representations of external reality. We should therefore doubt a structuring of knowledge where this capacity of representation is not taken advantage of, and is restricted to two, or even less, to a single dimension (like alphabetical dictionaries, or text that is linear). It is a criterion of the most elementary common sense.

<u>Tree strategies</u> are everywhere including our own bodies, and also in man-made structures. Knowledge is also based on two tree structures, one very extensive, that of concepts, another **very limited** one that we will see, that of the "relationators" of concepts, which, when properly applied to the formers, generates **all** knowledge, that is, all the relationships "a**R**b".

<u>Relationships</u> are the characteristic of systems, systems with which we represent the complexity that surrounds us. Knowledge is a powerful system that can encompass and understand any real system. Neuronal interrelations seem to be the best support of relatability, and it is even known that their number develops as a function of psycho-motor, affective and/or intellectual stimulation. But, the study of psychic relatationability is one of the black holes of our culture.

<u>Expository conditions</u> [.101]

A text, or a speech, is not the best resource to explain a tree-like and relational three-dimensional structure such as knowledge. We insist that the text is one-dimensional, no matter how much we cut it up to fit it on surfaces like a page. This is why "a picture is worth a thousand words". See for example [5].

The structure of thought and knowledge is as rich as any scientific discipline can be (among other reasons because knowledge serves to understand all of them).

The tree-like characteristic of knowledge gives us an advantage: the tree itself is like a criterion for moving in an oriented way through the three-dimensional space in which it is immersed. That's what we'll do.

Relatability can lead to dispersion if it is not tidied up, but if we do not fall into this trap, today's computing –with links, hypertext and multimedia resources– facilitates a very efficient exhibition support.

Moreover, thought and knowledge are only a part of the psyche's functionalities. So this structure must also be able to harmonize with a "Global Model of the psyche" that includes the unconscious and all the other basic functions (senses, perceptions, feelings, ..., memory, ...).

With knowledge there is a great advantage: it is not about understanding something new and alien to us. It's about recognizing, "re"-knowing because we already have it inside. It's about becoming aware of our own intuitive processes, which enable us to know and think. You can deceive by explaining something new and external, but it is difficult to do so with what is familiar and common to everyone.

For a small child, explaining and making him aware of his own intuitive faculties as he exercises them is not only obvious to him –totally obvious– but also stimulates and helps to improve his own cognitive-comprehensive faculties. The children's willingness to learn, the absence of fear to incorporate new knowledge, is the other great help.

Warning

It is not easy to explain something new and not yet known like what is presented here: it is a new paradigm. For example, even if you resurrect SOCRATES or DESCARTES, it would not be easy for us to explain to them what a computer is (or to bring them up to date on chemistry, physics or mathematics). If that were the case and if it were possible to have a computer, it would be much better to teach them, make them use it (sensitivity) and limit ourselves to trying to resolve the countless doubts that would arise.

The reader will find new concepts, and conceptualizing anew is never immediate, but they will also find many known concepts that they have always treated disconnectedly and/or ambiguously, which here are related and located exactly in a new symbolic structure, that of knowledge, which has been unknown until now.

For this reason, it will be easy for parts of the writing not to be understood initially and it will take a few days to do so.

But you should think that everything explained is fully demonstrable and simulable with the computer, as long as you have the "Conceptual System" program (only programmed for local use), although the video [V] shows this simulator quite clearly. An image of the simulator is attached at the end.

Understanding or Comprehension

In Catalan and Spanish-Castillian, a distinction is made between 'entendimiento' (=understanding) and 'comprensión' (=relational comprehension), but in English, 'comprehension' is also used as 'global'. A polysemy is created.

"Comprension" indicates deep, relational and quality knowledge. By "Entendimiento" I mean the most sensitive and basic of knowledge, and more linked to language and/or cultural skills, such as "understanding what we hear or read (even if we don't understand it)", the first 'understanding' as "entendimiento" and the second understand as 'comprensión'.

That is why I have chosen to use 'Understanding' as the translation of "Comprensión", but bearing in mind that I am not referring to its less profound interpretation than 'Entendimiento'.

In [.31C] we will see that Understanding (Comprehension) can even be measured, something that until now no one had considered.

THE CONCEPTUAL SYSTEM [.2]

How can we call this structure of knowledge? [.200]

We will call it "Conceptual System". Briefly, it is <u>an extension of positional numerical systems</u> (with which we today manage quantitative concepts, i.e. numbers), <u>to a system with which to manage with similar efficiency all concepts</u>, be they quantitative, qualitative, real or virtual.*   This is the three-centenary proposal of LEIBNIZ's "Characteristica universalis".

* Which are also called, incorrectly, "abstract" concepts. It is explained further ahead.

Man has always tried to count. It is basic and essential to be able to think, to communicate and even to survive. But with perception alone, man is incapable of unequivocally recognizing more than half a dozen objects. Just a little more than the limited and simplistic grammar, which only represents "one" (singular), or "many" [=two, three, four, ..., hundred-thousand, ..., infinity] (plural).

A break is necessary because the reader is possibly ignorant of this brutal human limitation. If we see:

                                 or

perceptually, without counting, we know that the two groups of squares above correspond to different amounts. We also know with the naked eye, perceptually, how big each quantity is, how big the grouping on the left and the grouping on the right are.

But if we see:

at first sight we are not sure if they are seven or eight or nine objects. Worse if they are messy, non-aligned, because it will make it difficult for us even if we count. Even worse to save the amount of grouped squares and make comparisons with other groupings that we perceive in the future. We must necessarily resort to the cultural resource of some numbering system to count, counting that we can do as quickly as we can but we must do it, and once finished save the resulting number in our memory, eight in this case.

When I learned about this as an adult, I was very <u>shocked</u> by the enormous limitation of perception, and it made me <u>reflect many times</u> on how we can count so efficiently based on this limitation.

Today, adults, we count naturally, up to amounts so large as to be able to count the entire world population or globalize the economy. And operate between any numbers. But it could not be done by the same man only a few hundred years ago, when he was certainly as intelligent as he is today. Nor can any child young enough today do it. And the reader should never forget that a few years ago he was a child.

Miracle or simple accidental find? Principle zero of psychology and pedagogy [.201]

Has this ability to count and operate with numbers been a miracle? No, it's much simpler. After 4,000 years of playing around, looking for systems to represent numbers -there is historical evidence that the Syrians already tried 4,000 years ago- finally man found a structured system compatible with the structure of the its most developed and decisive faculty for survival: psychomotor skills.

Does the reader know the dependence between dyslexia and psychomotor deficiencies? It was a no-brainer for many years -"Mens sana in corpore sano"-, but a few years ago it was even verified with repeated scientific studies that started, already 100 years ago, with E. DUPRÉ (1907), H . WALLON (1925), ...

If it is as natural as moving, possibly as "intuitive", why did it take us so long? For a reason as obvious as it is ignored, what can be called "<u>Principle zero of psychology and pedagogy</u>" to be at the base of all human phenomena: <u>our psyche is not made to think but to feel and to move us</u> (psychomotricity). An ignored fact, of the same order as that of "The King Goes Naked". It's not just about accepting that before we were humans we were animals, but that we are and will continue to be animals no matter how much some people

don't like it. The reality is that if this were not the case, they could not be, in addition to animals, human animals.

Without a suitable sensory base, thought cannot function properly.   A suitable basis is a system of representation <u>semiologically compatible</u> with its innate faculties, with its animal faculties (the reader should save this "semiologically compatible" for later).

Few latins readers will understand that it is exactly "<u>Dreimilionen achtundert fünfundvierzigtausend, siebenhundert fünfundzwanzig</u>". But if they see "<u>3 845 725</u>", almost everyone –no matter what language they speak– will instantly understand what a quantity is and how big it is. "Good things, if brief, are twice as good". The differences in semiological efficiency are incredible. Why? For a simple matter of semiological compatibility.

Without suitable representation there is no practical application, and without practical application there is hardly any sensitivity to create new, more complex representations. It's like a fish that bites its tail, until one day it breaks with a blind man's stick that hits the pitcher squarely. Strictly speaking, it was hit many times in the pitcher, but it was ignored, because positional number systems were already found 1 200 years ago. But as I said, for almost 1000 years <u>human stupidity</u> was banning and persecuting them for different reasons, mainly religious.

The characteristic of man, which most distinguishes him from all other species, is not intelligence (beginning because the reader will not be able to give an unequivocal definition, an exact definition, of what intelligence is) but stupidity.   Man <u>is the only animal that performs stupid acts</u>.   If the reader does not have enough humility to recognize this limitation, if he believes that man is a superior being to any other animal, I do not recommend him to continue, he will surely be disturbed by this exposition.

What about the children? Well, children are already trying, from the age of two or less. And even with mathematical resources that until now are only studied in universities and in a few degrees (see the recent article of "The knowledge of children at 2 years old" [C]]). But it is one thing to do it on a small scale and another to be able to globalize the complex reality, an information flood, that invades the child. Let's go back to the zero principle of psychology: if the child already finds it difficult to coordinate movements, a purpose for which his body and psyche have been designed, we cannot demand that he knows how to apply it to solve a problem –knowledge– which is why it has not evolved or been designed. And even less so if due to a lack of basic pedagogical knowledge, we adults also repress their intuitions (see [C]).

The basic structure of knowledge is tree-like [.202]
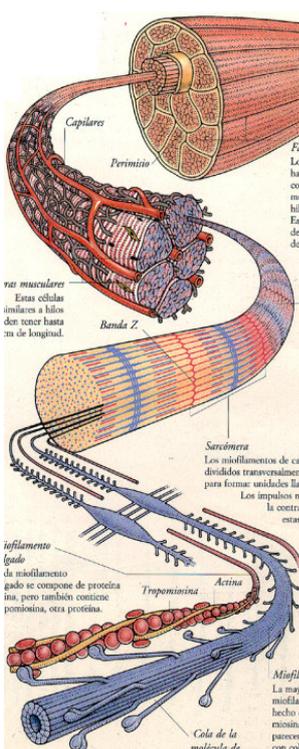
The most relevant characteristic is the <u>tree-like structuring of knowledge</u>, always without forgetting that it is a structure immersed in three-dimensional space (we will call it $\mathbf{R}^3$) and that it will be necessary to add other equally important characteristics (such as relatability).

It is not surprising. Tree structures are everywhere.   Almost all tissues are structured with this strategy: muscular, nervous, bone, ... Also many multi-individual organisms, ... etc, etc, etc.

If we make an easy representational abstraction, the Darwinian evolution of life also forms an immense tree, the tree of the species differences of living beings, the tree that LINNE had begun to establish years before, a previous step for which DARWIN could enunciate his irrefutable theory of evolution.

There is, however, an even more significant fact: man naturally, that is, intuitively, creates tree structures. The hierarchical social, business, institutional, ... structures are trees. Man hardly knows how to work with other structures. Non-hierarchical structures require a much higher level of acculturation, such as interdisciplinarity.

Source: Wiki

The positional numerical systems, key to current scientific and technological development, are also tree-like, and of an exacerbating monotony (always the same factor 10, or 2, or 8, or ... of the numbering base).

| Ten million | Millions | Hundred thousand | Ten thousand | Thousands... |
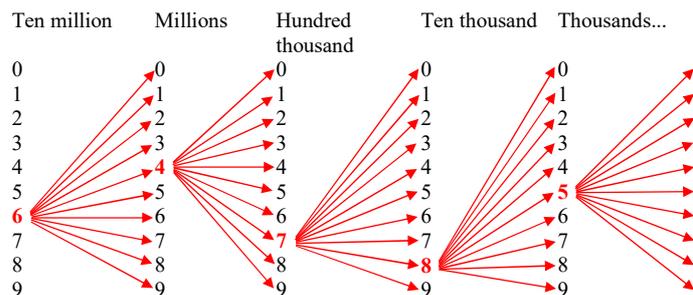
How could it occur to man to create structures that he does not understand or know how to manage? Man must create structures he understands, which reflect his own mental structures.

Certainly, a child is able to correctly manage three concepts such as "Mischa" (his cat), Cat (other cats) and Bichu (other animals). This is what the son of an acquaintance of mine did without any problems when he was not yet two years old. This means you are managing a tree,

No Bichu (=Everything except the Bichus)
Bug(=Any animal)   *Bug no Cat*
Cat   *Cat not Mischa*
Mischa
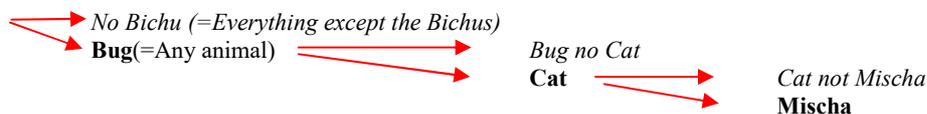
but a tree of PORFIRI, but converging, like the "Successions de CAUCHY". CAUCHY (1789-1857), was one of the pillars of mathematical topology, only 150 years ago.

But at the same time the sequences that form the tree are formed with "Exact Short Algebraic Sequences". The Short Exact Algebraic Succession is a mathematical element of even more recent use (from "Bourbaki"). See [C].

What a child does today, children should have done at least three thousand years ago, since speech was similar to today's.

So long before mathematics formalized it for us, children, for a few years now, have been creating numerous trees like this and trying to relate them to others of a similar nature in order to integrate them, but due to the absence of a system cultural of efficient representation –as happened with numbers until the implementation of positional numerical systems– is left with a fractional structure and contaminated by the absurd alphabetical order.

Is it possible to "label" with a kind of positional numerical system each element of any of the branches of the tree conceptual structure, unambiguously and accurately? [.203]

If it has been so good for us since we manage the numerical system positional* decimal, with which we can place exactly and immediately any amount and operate it with any other ¿why don't we stop in this "comfortable" place and from here we try new conquests duly replenished?

* The important thing is not that it is decimal, it can also be binary, etc., but the interpretability of the position, but that is precisely what is not said.

The explanation of the semiological compatibility between psychomotricity* and positional number systems is a fascinating journey through genetics, histology, anatomy, mathematics and psychology. The reader can find it in the "What is Consciousness(-raising)?" [2], but due to the limitations of the discourse already mentioned, a path must be taken, a shortcut must be taken, and in this exhibition it is necessary to restrict ourselves to the following table, which summarizes the different "natural" constructive strategies in relation to the monotonous and easy structuring of positional numerical systems.

* Psychomotricity is the combined management from the psiche of two structures, the muscular and the bony.

	Exclusivity of the Base ("monogamy" or not)	Variability of the Base Criterion	Number of Children	Types of Children
Muscular structuring	**Exclusive** (each partition, a single family of descendants)	**Variable criteria**, predictably depending on molecular and cellular "availabilities"	**Variable and changeable** according to Level: about 1000, 2, about 500, about 60, about 6, about 60, about 24.	**Always the same**(all Sarcomeres are the same, all MyoFibrates are the same, ...)
Nerve	**Exclusive** (ditto)	**Variables** (as in "Muscular Structure")	**Variable and changeable** according to the Level	**Always the same**
Bone structure	**Exclusive** (ditto)	**Variables** (as in "Muscular Structure")	**Variable and changeable** according to the Level	**Almost the same** (small differences only in Form)
Positional numerical systems	**Exclusive** (only one, and moreover, fixed, always the same "father")	Criterion **fixed** (or 2, or 6, or 8, or 10, ..., but always the same)	**Fixed** (and matching with the value of the Base: 2, 6, 8, 10, ...)	**All different** among them (0, 1, 2, 3, ... in the case of Base 10), inductive (+1)
Exact conceptual systems (=LEIBNIZ "Characteristica universalis")	**Not exclusive**(there may be more than one "Stepfather"/ "Sibling Family"), and consequently with Multiple inheritance	**Totally variable**(any Concept can be Criterion/ "Stepfather")	**Totally variable**(between 1 and many). There is a dependency between the number of children and the diversification possibilities of the Criterion/Stepfather.	**Always semantically disjoint (=different), but contiguous (connected and compact)**

Constructive strategies (=methodologies) of some complex structures

If the human psyche can manage much more complex methodologies than those of positional numerical systems -an obvious reason why it can manage these systems-, we can propose a slightly more complex methodology that allows us to cover all concepts and that is still manageable for our psyche. It is the "Conceptual System" (or "Cognitive system", it's the same thing).

I take advantage of this table to highlight the interdisciplinary nature of reality (and the transfer of methodological elements between different systems, which we will see in [.320]), integrating genetics, biology, mathematics and psyche. LEIBNIZ's "Mathesis universalis" is no dream.

In positional numerical systems we had a fixed constructive criterion, which is the base of numeration (the number 10 for the decimal system, the number 2 for the binary system, ...), so that in decimal system, between the 10 numbers of a level there can never be any number in between.

How is this criterion in concepts? Well, using any other concept (the "totally variable" of the table) that is applied to the starting "mother" concept, through the "formula": "such according to". Thus, chordate animals "according to" the existence or not of a skull, result in the acraniates (child/partition 1) and the craniates (child/partition 2), where "skull" is the criterion of the partition, which by analogy I call "stepfather", a more familiar name. Here, in addition to the exactitude (the domain of the concept "mother" is exactly the same as the union of the domains of the child concepts) a first-order logical predicate appears associated. And by repeating the process, all the remaining mathematical properties (convergence, completeness, ...). See [C].

TRANSLATION NOTE (2025)

This 2007 article, as its title says, explains what the structure of the faculties of thought is, but not only that, also the direct application it can have, such as the possible algebraic extension that allows the transfer of the powerful characteristics of intuitiveness and accuracy of positional systems of numeration to all concepts, whether numerical or not. And also the mathematical structure that results: the cognitive space.

This simultaneity is important but at the same time it makes a linear expository thread difficult. In order to focus on the expository perspective of psychological structuring, a part of [.204] as well as all of [.205], [.206], [.207] and [.313] have been moved to the Appendix.

The aforementioned algebraic extension was proposed by LEIBNIZ with his "Characteristica universalis" (="Universal Language") since 1676. WITTGENSTEIN tried to achieve it without success with his "Tractatus logico-philosophicus" (1921), so due to his prestige it was considered that if he had not achieved it, it meant that it was impossible ("The second WITTGENSTEIN"). This was believed since then, but with honorable exceptions such as those of Gottlob FREGE and Kurt GÖDEL (who also stated that the development of the Characteristica would revolutionize mathematical practice).

In this same Leibnizian line, in 1983 I proposed to find a "Universal Thesaurus" to facilitate the exchange of searches between the different scientific data banks (PASCAL, ENVIROLINE, INSPEC, NTIS, ...), which was considered nonsense by linguists, documentalists and librarians. But, in 1987, the GID (Frankfurt am Main) and the COMETT Program of the European Union (EU) took an interest in the proposal, agreeing to one million ECUS (the name of the currency before the €uro) in a project that integrated mathematicians from the Universities of Barcelona, Marseille, Bergen, Amsterdam and London. But when it was processed, it was boycotted by some officials, preventing it from being signed by the Mayor of Barcelona within the established deadline. It can be seen in [7].

For this reason I took on the project privately, patiently achieving in 1996 the aforementioned "Representation of Knowledge" and the "Characteristica universalis". But in addition to the innovation it entailed, the methodology I used in these years was even more surprising. With a computer program, it was a question of applying the same perspective of KLEIN to geometry (with his Erlangen Program), looking for intrinsicity, determining the invariants of transformations. In this case, applying to the elements produced by thought –concepts and minimally structured knowledge–, changes of basis (or changes of coordinates, it is reciprocal) according to the Theory of Endomorphism and other mathematical tools.

All of this was so innovative that in this writing I had to incorporate explanations of how this surprising "extension" of mathematics to language worked, which had allowed me to achieve the "Representation of Knowledge" and the structure of thought. A similar thing happened with the original 1996 document "Diccionari intrínsec i lenguaje natural" (="Intrinsic dictionary and natural language"), 350 pages (in Catalan), which is still pending transfer from "Word Star" to "Word" and to "PDF".

In 2015 I compiled all the mathematical aspects in "Bases matematicas del sistema conceptual (intrínseco y exacto)" (="Mathematical foundations of the conceptual system (intrinsic and exact)"), 79 pages in Spanish:
  https://www.sistemaconceptual.org/pdf/MatematicaSC.pdf ,
which has been partially incorporated into later and more detailed partial articles such as "The knowledge … 2 years old" [C]. Despite these detailed theoretical explanations that may be boring for most readers, the existence of the simulator with thousands of exactly defined concepts and much more knowledge "a**R**b", unequivocally confirms the success of the "Representation of knowledge".

Maintaining in the article the duplicity of the structure of thought and its application in a "Conceptual System" (or in the "Characteristics Universalis" or in the "Universal Language") seems to me the most appropriate, for its application to pedagogy (a science with many shortcomings) and to the acquisition and management of knowledge.

From now on, the reader can always follow this text focusing on the psychological and avoiding mathematical aspects as much as possible, which if desired are in the Appendix, or in these aforementioned mathematical references.

Where can you find this new methodology to "label" concepts? Heuristic* [.204]

Anyone who gets lost, who doesn't get where they want to go, what they will never do is the same thing that got them lost once, because they will obviously end up in the same wrong place. On the contrary, it is necessary to look for new alternatives. In trying to make science of knowledge scientists have fallen into an error, looking in the wrong place. They have searched in philosophy, in neurology, ..., in computer science, and then in the scientific bibliography (magazines, books, ...) made by those who tried before them and they did not succeed.

* Heuristics is the path followed to reach certain knowledge.

So what should not be done?

- Consider numbers as an exclusive resource for measurement and calculation, an exclusive utilitarianism, forgetting that they are a language for representing quantities. For example, a book like "L'histoire universelle des chiffres" (G. IFRAH), despite its interest -it is a must read- and length -1996 pages- forgets the interpretability of the position (only in speaks in half page).
- Ignore the constructive methodologies of the human body, studying only its material characteristics (molecular, ...) and forms;
- Ignoring the essence of life: information and all the languages that support it, genetic, protein and hormonal, that is to say, the symbolic systems that characterize it.

So what was to be done? In addition to avoiding the three previous mistakes, it was also necessary to look in another, totally opposite direction, not at the scientists –who are no longer of an age to learn– but at the children, at those who learn. And observe how they do it, or how they try to do it to get to know, to learn.

PIAGET was amused by observing how the many children his wife gave him evolved, and by observing the differences between any two of them of different ages. With this field of observation so familiar and at the same time so economical, he became the reference pedagogue of the last century. His ambition was to find a mathematical formulation of everything he observed. It was not in time to achieve it, but it was certainly the right way: psychology and mathematics naturally meet in "Intrinsic Semantics".

Years before, FREUD had contributed almost everything else that was needed about children, about their maturation and the unconscious. And about the dreams of children and adults.

With the different effects produced by thought well grouped and arranged, it is possible to see how some effects derive from other simpler ones, through progressive processes complexly analogous to those of all inert or living matter. And having arrived here, with what we already know about psychology, deduce at what ages and/or under what conditions children can face these processes.

For example:

- With many sensitive identifications, young children end up making a sensitive concept.
- With several sensitive concepts, very worked out, a virtual/composite concept can be made.
- With many random concepts, you can see that a pair of them always appear together under certain conditions: it is the discovery of a new knowledge (a relationship between two concepts).
- Finally, with a lot of phenomenological knowledge and expertise, a certain way of proceeding can be discerned, different from the other ways of proceeding; it is the discovery of the method.

All the rest of the effects that our thinking can produce -no matter how apparently complex they initially seem- are more or less optimized applications and operations/combinations of all the above. Any effect that thought can produce -with the exception of demagogues, imbecilities, nonsense, …- can be broken down into its various simpler elements, the same elements that have previously given rise to this process of complexification. Every effect of thought is unequivocally decomposable, just as any object results from the structuring of many protons, neutrons and electrons.

In other words, nothing different from what happens everywhere. An atom is made of a few particles. A molecule is made of a few atoms. Different molecules make up a substance. An object is made with different substances. And so progressively with more complex objects, whether artificial like a computer or a car, or natural like a galaxy or the entire universe. They are epijective processes.

Examples of complexation processes

- Particle → Nucleus/ Atom → molecule → substance → Object… → Star → Astral system →… → Falaxy → Galactic cluster → Galactic Super Cluster → … → Universe;

- Peptide → Polypeptide → Protein 1-structural → 2-structural protein ("motifs") → 3-structural protein →…;

- Cell → Tissue → Organ → Apparatus/ Anatomical system → Individual;

- Myofilament → Myofiber → Muscle fiber → Muscle bundle → Muscle → Tendon;

- Tree of LINEO – DARWIN*;

- Individual → Familiar society → Society (Tribe/Neighborhood) → Municipality → … → Political state → International organizations → …;

- Component/Spare → Device engineered → Apparatus/ Device engineered progressively more complex

- Letter → Word → Sentence → Paragraph → Text/Speech;

- Units → Dozens → Hundreds → Millenia → …

- bit → Bytes/ Words → Sentence → Subroutine → Computer program (*.PRG) → Computer Application (*.EXE) →…;

* NOTE: Each line of the tree has a succession of more and more evolved elements, more and more complex, which are always derived from simpler previous elements (inheritance/generative continuity).

It is left to the reader to amuse himself by completing the above examples with many other complexly existing processes, characteristic of living beings.

In the Appendix you can see what has been moved from this part [.204], and also [.205], [.206], [.207].

From now on, should we write with numbers and subscripts? [.208]

It is worth answering this question, because it is the question that many linguists ask –bewildered– when they start hearing all this.

Well, no, you don't have to. It is a code that is strictly only needed so that the computer can simulate the cognitive processes of our psyche, but we can continue exactly the same. Even today they don't make us express the numbers in binary code because the computer needs it, it would be very ironic!.

This is independent of the fact that it would not do the languages any harm, that is to say, it would be very good for them, to make serious standardizations to optimize them. It is what languages have always had to do. Pompeu FABRA did it with Catalan less than 100 years ago. The reviews of German are even more frequent. Spanish-Castillian has a permanent "detergent" organization that "cleanses, purifies and gives splendor", the "Real academia española de la lengua" (="RAE", which for this very reason excludes Catalan and Basque from the category of "Spanish "). Etc

But today this normalization could be done with objective criteria, with intrinsic criteria, based on semiology and intrinsic semantics, which it would apply, not to an isolated language, but to all languages at the same time. It would mean a remarkable optimization of communication and even of learning.

It is said that semantics deals with the meaning of words. First, it should be said that semantics "study the word-concept correspondence" (the "concept" is a great oblivion of linguistics). But what is structural genomics? Well, although it will surprise the reader, it is "intrinsic semantics restricted to genetics". Semantics has a very broad domain, which is why it is necessary to speak of intrinsic semantics to relate them all, since parallelisms (that is, strictly homomorphisms) can be established between the different semantics.

Semantics is not only linguistic, nor is it even all possible linguistic semantics. Within intrinsic semantics restricted to linguistics (the "semantics" usually understood) the psychological perspective of this relationship must also be included, and as this writing demonstrates, also the underlying mathematical perspective. So in addition, linguistic semantics is a link between language, psychology and mathematics. !Absolutely unimaginable!

Moreover, the unconscious is an immense storehouse of information, of hidden memories. Can we talk about its semiology and semantics? Yes, they are the "surprising" experiences that dreams manifest. This is one of FREUD's great contributions.

Likewise about semiology, which linguists have reduced to something ornamental, even literary. What is stoichiometry?, well the chemical semiology. What is a hormone, well a molecular sign, that is, a semiological element. Don't we talk about genetic "information"? There is also medical semiology, musical semiology, ... Why was Günter BLOBEL awarded the Nobel Prize in 1999?, well for his semiological and semantic studies of proteins

Finally, it must be made clear that the Characteristica universalis is not any new language, like Esperanto.

HOW DO WE START THIS TREE?: THE FIRST TWO LEVELS OF THOUGHT AND A PREVIOUS LEVEL. [.21]

A historical purpose has been to find a global representation of the concepts, structured, which is not alphabetical, because currently it is a syncopated, discontinuous, totally extrinsic and arbitrary list. See [5].

Here is the first trap. For millennia philosophy has been studying "Categories" (defined as the concepts of the highest importance/rank, to which many other concepts of lesser rank are linked hierarchically/treewise). As usual, there are countless proposals for "Categories" because "every teacher has his own book": ARISTOTLE, HUMBOLT, KANT, HEGEL, MARX, PEIRCE, POPPER, ...

Thesauruses appeared 150 years ago, also innumerable, which exhaustively developed their trees for the purposes of thematic bibliographic classification: the second "Categories", the third, ..., and so on to cover all concepts.

The mistake was serious: all the proposals for Categories and Thesaurus were made by adults, and not by children. The adult has already forgotten the progression he made as a child to learn, when he was a child.

In other words, the philosophers 'criterion' was the importance that in their opinion certain concepts had (an extrinsic perspective), when here the criterion has been that of the different psychic faculties that intervene in conceptuation, and that appear progressively in children (an intrinsic perspective).

It took me several months, managing thousands of concepts with the computer, to realize that the first distinction to make was not the supposedly transcendent "Categories" (which I initially called "Perspectives", sensing their subjectivity) nor anything similar, but between the "Sensitive Concepts" and the rest, the non-sentient concepts.

And avoiding confusing the sensitive concepts with a previous level that many animals already have, including insects...: the "Sensitive identification".

The "zero" level, the "Sensitive Identification"[.210]

The first and most basic "Concepts" generated by thought correspond to a process still too complicated for a newborn. It must be thought that the language and communication of the newborn is exclusively, and intensely, bodily, with touch, with movements, with the tones of sound, with warmth, ... Thus the child does not perceive sounds, perceives their tone, tenderness or aggression.

The child's first great cultural discovery is to realize that there is a strange convention, language, such that objects are assigned sounds that have absolutely nothing to do with the object.

It's quite amazing, but I've never known anyone who bothered to determine at what age this great discovery happens, if at 6 months, at 7, at 8... Of course, we're all taught that at 6 years we have the "use of reason" when no one knows how to define precisely what "reason" is.

What matters, more or less, is that before we can talk about concepts, there is a prior process that is fundamental. But it is so automated by adults that we also ignore it.

It is the process of "Identification", which generates "Identifiers". In the case of the newborn, these first identifiers he generates are: his "Mother", his "Father", his "Nanny", his "Bottle" or his "Soother".

There are an infinite number of identifiers: the name and surname of any person, the names of many individualized animals (domestic or researched), all the "Toponyms" (geographical, astronomical, ...), etc., etc., etc. And even more, all the phenomenological identifiers corresponding to any event, and not just historical events.

Identification is also done by many species of animals and often much better than man. For this very reason, to be so common, it cannot be considered a proper level of human thought, but a prior one. The identification goes back, perhaps, to the arthropods, some hundreds of millions of years ago, and certainly to the cephalopods (like the nice and smart squids), from an even earlier Phylum.

Sensitive identification is the "zero" level of thought and without its repeated intervention we could not think. The "AI" after the resounding failure of 1992 is dedicated, in addition to the archaic automatisms, to the identification of images, visual or auditory, consequently, nothing to do with intelligence either.

The incorrectly called "mother tongue", is a pre-language semiology.[.211]

Another preliminary issue, which supposes another serious cultural error: what we call mother tongue, is neither a language, nor is it acquired in the first months of life.

At birth, long before starting to speak, the incorrectly called "mother tongue" is already consolidated, it has already been acquired. It is not a specific language but rather a specific choice of linguistic semiology, specifically phonetics. It is a process of sensitive identification (the aforementioned level 0, previous), not a process of conceptualization or naming*. For the fetus, throughout the second half of pregnancy, the mother's lungs are an extraordinary sounding board, amplifying the sounds of the maternal larynx. If you still find the book, the reader is recommended "The secret life of the child, before birth" (T. VERNY, J. KELLY, 1982).

* With this new stumble, and it was neither the second nor the fourth, the reader will understand the little credibility that any belief that is not clearly demonstrated deserves, no matter how widespread it is even among the scientific community.

The fetus specializes in recognizing different sounds from others, although it is unaware of their usefulness. He doesn't even think about it, he listens. But he gains the skill, which will be very useful when he needs to use it. It is for this reason and nothing else that Chinese is incomprehensible to us, because it is based on another semiological system. It is not a semantic problem, but a semiological one (phonemes, studied by André MARTINET and others).

Having clarified the above, we return to the concepts, but we will return more times to semiology, its current incorrect treatment and its ignored importance.

Level "1", "Sensitive Concepts"[.212]

The "Sensitive Concepts" are direct representations of what a child can perceive in the few months of life once he is able to reconstruct and identify sensitive images, be they auditory, tactile, olfactory or visual. The process consists of being able to abstract the characteristics that define the concept: the shape, the color, the sound, etc... to determine whether or not what is perceived corresponds to the sensitive concept progressively abstracted/defined. For example "Cat", "Bug" (an generic animal, other than a Cat), "Soother" or "Bottle".

In a completely intuitive way, the child, at a few months old, who is offered "words" in a consistent way (that is, sensitivities), associates them with the concepts he knows how to form by processes of classification of identifiers, through abstractions. It is an epijective application in mathematical terminology (with many equivalent identifiers, it makes a concept).

Here an essential fact intervenes, as explained in "What comes first, the concept or the word?" [.2161], and it is the assignment of a sign, because thought, directly, only is capable how to manage sensitivities, not virtualities. I insist on the "Zero Principle". The word, or linguistic sign, is a semiological element, and as such, intrinsic semiology should study which is the most efficient, a study that is the responsibility of the "normalization" already discussed.

Historically, sensitive concepts were first communicated with bodily signs and sounds, and much later with hieroglyphic signs.

Evolution of the level of conceptualization. "Thinking Loop" "Ruminating" [.2120]

We note that the last two examples discussed, "Soother/Dummy/Pacifier" and "Bottle", are now sensitive concepts and not just identifications. Why? Because they have been assigned a sound signal, that identifies the child. It can be said that until there is a sensitization to assign a name, there is no concept. Thus we can differentiate the "Concept" from the "Idea", which could be defined as "the state of any process ("ideation") of cognitive maturation, which a person intends to develop". "No tener ni idea" (=Not having a clue), indicates that we don't even know the name of what it is.

To clarify this progression of levels in the conceptualization of the same object (as in the case of the "pacifier" or the "bottle"), we will present another even clearer example. The strict concept of "Mother" or "Father" has nothing to do with the identification of the newborn from its mother or father, already discussed. The concept of "Mother" or "Father" only appears in the child years later, once he has been going to nursery school for many months and knows many "Mothers" and "Fathers" from his peers who also call him "Mother" " or "Father" to people other than their own parents. Continuing in this process, the concept of an adult's mother or father rises in level. When you are able to define it with a sentence, it means that you are at level 2, as we will see. But it can still progress further, with sentences with much more information or with knowledge. In the latter case, as we will see, it would correspond to level 3 of knowledge. It would be, for example, the concept that a psychologist could have, or in an extreme case a person like FREUD, with a concept that integrates a body of knowledge. Thus, the same thing, the same object such as a mother or a father, can be conceptualized at different levels, progressively more mature, more relational levels.

The same could be said of "Cat" for a child, for a biologist or for a veterinarian. Etc etc etc

This is how thinking works, with processes of progressive maturation of its effects, of its psychic images. Why do we talk about "ruminating", referring to thinking? Because thinking is reiterative, it works by repeating and repeating the same process, improving it little by little, maturing it. I call it the "Thinking Loop". Every "loop", or every few loops, something new is taken, abstractions are added or existing ones are improved, new relationships and associated knowledge are incorporated, or these relationships are improved by becoming more specific, as we will see later. That's why thinking is called "ruminating"
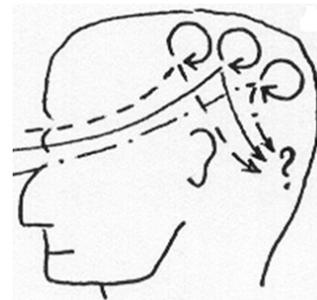
From "Triptic" (1998).

Long before this repetition, the psyche makes others repetitions through more basic processes. For example, the repetitions of 3-year-old children, which, as explained in [D], serve to increase neuronal interconnections (at an age that is fully possible) and exercise memory.

The first intrinsic partition [.2121]

Having defined the sensitive concepts, we have the first partition, with those sensitive concepts and the rest. The rest of the concepts, the virtual ones, will be generated by the child later and in a totally different way: they will necessarily require the linguistic sign to begin generating them, not only to complete the new process of virtual/non-sensitive conceptuation.

It is an unequivocally intrinsic partition, because it is not an opinion or an agreement. It is a fact that derives from the child's cognitive faculties. It is inherent in the child. We can't change it.

In our Conceptual System structure we will place concepts at the lowest level at which they can be conceptualized (excluding the forced "Simplifications" of [.2018]). Thus a Cat will be a Level 1 of Sensitive concept, even though a biologist may have a much higher understanding of it, at level 21. Otherwise the concepts would never be still, we would have to move them... like the mentioned "pacifier", "bottle", "Mother" or "Cat".

So all those previous concepts would be of level 1, while those of level 2 that we will see, such as "Domestic animal", "History of science", "Form", "Organization", ...are not of level 1, they are unattainable by a child, they are only achievable by a child of a few years, or a young person.

Terminology [.213]

It is often misunderstood that abstract concepts are only highly elaborated, virtual ones. This is not true, so it must be made clear that sensitive concepts are also "abstract", they also involve abstractions as seen. Any concept is "abstract". It shouldn't be called "Abstract Concept", is polysemic.

So. "Conceptuation" is the representation with a mental image to which a sign is associated, of something that exists (an "existentiality"), but in a way that can be memorized, retrieved, managed and communicated. It can be done at any level, 1, 2, 3, or 4. That is, a sensitive concept, a composite/virtual concept, a knowledge, a methodology or any derivative of them (composite knowledge, reasoning, .. .).

And defined "conceptualization" it is equally clear that it is necessary to differentiate between processes as different as "Sensitive Conceptuation" that has been seen, "Virtual/Composite Conceptuation" that will be seen, and many others.

The first two dimensions: "Matter" and "Phenomenon" (and we only need one). [.214]

Material conceptuation [.2140]

Before presenting the next level 2 of composite/virtual concepts, another essential distinction is needed within the first level, the level of sensitive concepts.

We have seen the surprising limitation of perception with respect to quantities. Well, there is another important limitation of perception with respect to movement, with respect to dynamics, which forces us to divide the sensitive concepts into two large groups due to the different requirements of the faculties that intervene. So if we take into account these mental requirements, it is necessary to make three groups, like three different dimensions. And as the reader can imagine, the third will be the virtual/composite concepts.

The child begins by conceptualizing sensitive concepts, but concepts characterized by their permanence over time, among other reasons for the child's slowness in reconstructing images, especially visual ones. We could say that the first perceptions and conceptualizations are always "material" or "static" (or better, that they can be immobilized). It is the case of the pacifier, the ball, the cat, ... The child needs a lot of time, a lot of tranquility, that the things he observes do not move or change much. And if they are visual, also that they are big and bright enough (colors) because otherwise he doesn't perceive them.

Phenomenological perception and conceptualization [.2141]

But the perception of movement is something else. It is an extraordinarily laborious process of perception for the child.

A video of a study, "Explicar el movimiento" (="Explaining the movement"), by M. MORENO, from 1985, from the IMIPAE (Municipal Institute [of Barcelona] for Research in Applied Psychology in Education), an Institute that unfortunately no longer exists, shows the difficulty of children until they are 6 years old or older to become consciousness of the globality of the phenomenon, and consequently be able to consciously establish phenomenological relationships (Cause – Effect, etc.).

In younger children **there is no full conscious phenomenological perception**. Initially -with one and more years- "fire" is not perceived by the child as a process but as another object, the flame is like an object. Because, in addition, it is extraordinarily sensitive: it burns -and a lot- and shines brightly. Another very different and much more difficult thing is to perceive the transformation of some elements or initial states (a match to light, some wood or a gas that you can't even see), into other elements or final states (smoke and ash) through the flame:

FIRE

Flame

Match lo light, wood, gas ⟶ Smoke, ash

What this can happen is totally magical for the child. The reader obviously no longer remembers this, but it is an obvious question for any psychologist who studies these processes of "dynamic" perception of the child.

The resulting phenomenological concepts, despite being equally sensitive concepts as the "static-material" ones, represent a qualitative leap, corresponding to a relational maturation, as important or more so than in the passage from "Sensitive Identification" to "Sensitive Conception". The faculties that intervene in the perception of movement of phenomena, are already others to be added to the abstractions of the first sensitive concepts, the so-called "material" or "static".

Evolution of the phenomenological conceptuation [.2142]

In addition, the phenomenological concepts allow to give way to the maturation of the relationability. We will see in part [.3] that relationability is at the basis of many psychic processes: the development of intuition (see "The intuition" [.3200]) and intelligence, the maturation of specific relationships that I call "Terminations" [.315], the maturation of knowledge, the possibility of creating syntaxes, whether linguistic or mathematical, ...

The second intrinsic partition (of sensitive concepts) [.2143]

So we already have two classes of "sensitive concepts", the "material" and the "phenomenological" with intrinsic differences (relating to the faculties involved in their elaboration) totally independent and unequivocally differentiable, differentiable with total certainty, differentiable with total accuracy.

Level "2", the "Composite Concepts" or "Virtual Concepts" or whatever you want to call it.*
[.215]

* But not be called "Abstract Concepts", given that the sensitive concepts of "Level 1", already involve the first abstractions. We have already talked about this.

As has been advanced, once the child knows how to manage enough level 1 sensitive concepts, whether material or phenomenological, he can operate two of them making his first compound concept. The first operation that the child can do is a composition (or combination) of two concepts to form a new one different from the two previous component concepts, as long as this new concept has a clear interpretation. In another case it is demagoguery.

The difference is brutal: the new concept formed no longer originates directly from sensitive images, that is to say, originating from the outside and perceived (or from the inside but equally sensitive, like the harm done by a slap or stomach ache), but originates from other previous conceptual images, and consequently images of an origin that is neither directly sensitive.

Examples: "Domestic animal", "History of science", "Form" (=External appearance), "Radioactivity", "Toy library", "Biology", ...

Independence between the number of lexemes in the name and the level of conceptualization.[.2150]

We note that mono-lexemia (one-word concept) is not exclusive to level 1, nor is bi-lexemia to level 2. The level of the concept has nothing to do with the number of words that represent it. Nor should it be confused between word and concept, as seen below.

The "Denomination". Concept and Word. Need for sensitivation. [.216]

In this new process a very important and often ignored observation must be made. Thought cannot directly operate the virtualities, the conceptual images it has produced. It is that of the "zero" principle: the psyche is made to feel, not for something else. If so, how is it done? Well, as it has been done with numbers: creating a linguistic signs, which for the same, are already sensitive and identifiable, and with which it can operate again, in the well understood that although they are arbitrarily agreed signs, they are unequivocally representative of 'a concept. They are interpretable signs/sensitivations.

Someone will say that he can think without those signs. Without linguistic signs –the "words", whether audible, visual-written or tactile (Braille)– it is possible to think, but not without any other type of sign. For example, even though the first humans did not know how to speak or did not have names, they had no problem thinking about hunting animals, cooking them and eating them, given that they had the corresponding sensory images as a sign.

Thinking with virtual concepts without sensitizing signs, for example to make another more complex concept, would imply for each component concept the need to recover the entire process and all the component concepts of each of the components. And so on.

It would be too great an effort, and useless, for the psyche. So what does man do when culture does not provide him with sensitivity in the form of a linguistic sign? Well, very simple: the experience is taken, any emotional –and consequently sensitive– memory associated with conceptuation processes.

If we think or talk about several things at the same time, it is common not to recover them when we want to do so a few seconds later. We have it "on the tip of our tongue", but if an associated word or sign appears, we instantly recover everything we have forgotten. We easily manage sensitizations, but very poorly abstract processes.

In fact, these linguistic signs are relatively recent, it may be a few million years since man can modulate and emit sounds with the larynx. But before that, it is clear that man should think something because it cannot be denied that man also thought, or that it was a little. There is no justification for assuming a sudden appearance of thought (as in the creationist hypothesis of the "Human Revolution").

This hypothesis, like any creationist hypothesis, involves great ignorance and a great lack of common sense. Today we already know the devastating effects of radioactivity (Hiroshima, Chernobyl), its carcinogenic effects, weakening of the individual and the species, malformations in later generations, ... Natural radioactivity is generating almost all -if not all– natural genetic mutations. A very sudden mutation, which makes global changes to a species (even to the few individuals that can extend it) will have to be brutal, such that it would kill all the individuals for other non-genetic effects. And the other species? It should be a "divine ray" that only affects men and only the genes it changes. Anyone with a basic knowledge of radiobiology knows that a mutation does not stand up to these guesses.

This sudden appearance is even less defensible knowing that in many scientific experiments it has been observed that many apes (chimpanzees, ...) can reach, with a little motivation, at least level two of thought, that of compound concepts / virtual. And chimpanzees aren't the only clever mammals, far from it. Even animals as simple and archaic as cephalopods are surprising for their "disproportionate" intelligence.

Dreams: the sensitivities of the unconscious [.2160]

What we forget is that a simple experience -without it having to be the battle of Waterloo- is the best sign, something totally sensitive for the individual. This was brought to light by FREUD a hundred years ago with the interpretation of dreams. Dreams are manifestations of the unconscious through signs, signs that are not cultural conventions but emotional representations associated with the specific experiences of the individual.

In order to interpret them correctly and understand the dream, it is clear that they are not interested in the dreamed signs (the support) but what each sign represents based on the experiences associated with the unconscious of that person and not of another .

This is also why many discoveries must manifest themselves in dreams: when we do not yet have adequate cultural sensitivities (words, explanations, examples, ...) which is the situation prior to a discovery, the unconscious's recourse is to endure se in their usual sensitizing supports, the experiential images we call "dreams".

What comes first, the concept or the word? [.2161]

When I started to comment that I had achieved a Representation of knowledge, a prestigious linguist asked me "What comes first, the concept or the word?", but not as an "interrogation", but because it was !a question that linguists asked themselves without knowing how to answer it!

Well, it depends, but usually the word comes first due to a basic cultural process, because a child always hears the same word from their parents or educators or friends, in the same sensitization: be it a cat, a dog, an object, an action, ...,   So:
   - this helps them to abstract the concept of the cat, the dog, the object, the action, due to their common and repeated characteristics (sensitive conceptualization already mentioned),
   - at the same time as associating it with the linguistic sound sign that they receive.

When he is older and reads or goes to school, he is presented with more linguistic signs (words) that he must investigate what they represent, that is, the associated concept, and how they relate to other concepts/words that he already knows. Like when we take a dictionary or encyclopedia, that is, when we learn.

But sometimes, when we investigate or do new work, that is, if they involve discoveries or simple novelties, we first base ourselves on the components that intervene in the new concept at stake, and finally give it a name. The name is a sensitization that represents the all psychic process of conceptualization, an absolutely necessary sensitization because the psyche is not made to think but to sensel and to feel (=have feelings), and without this reference sensitization, thought could not progress.

So we have to look for a name for it, the word, both internally for ourselves and at the same time to communicate it to others. The word by itself is absolutely nothing. It is a more or less arbitrary convention: just as we use one word we could use another. This is what languages do: each one has its own dictionary. When a new physical particle is discovered, first it is discovered, then a name is sought. Just like with any phenomenon.

But this is so when the process is natural, spontaneous, when we do it alone.

Another thing is that once a concept already exists, once it has been named for the first time, once it is incorporated into the culture and communicated, the receiver of the linguistic sign, who usually does not yet know it (as always happens with the children) begins a process of finding out what it means, how to interpret it. It is a process forced from the outside.

In a civilization where all cultural knowledge is integrated and concentrated in teaching, few concepts can be spontaneously generated by its individuals. It is much more common to find words, in speech, in books, and to have to find out the concept of what it represents.

With a sensitive concept it is even clearer, the "sign" is already the same sensitivities that originate it and that are grouped together through the abstractions that define it. If we think of a "Cat", we do not need to manage the letters "CAT" or the sound "cat" to have a sensitivity, but the image of the cat is enough. The imtage of the cat is already sensitive. This is why the individual automatically recognizes sensitive concepts, be it a cat, a ball, ... without even needing the name (the linguistic sign). That's why the first writing was hieroglyphics. He can think with the image of the cat, the ball, ... because it is already a sensitive image in itself. The name is only necessary to communicate the concept to another individual, but it is not necessary to think oneself.

In other words, the concept comes first when it is first discovered, but once the culture incorporates it by communicating it to other people who are unaware of it, the word comes first. Pretty easy to understand, right?

<u>Indispensability of the linguistic sign in level 2 of the composite/virtual concept</u> [.2162]

Thinking when doing operations must necessarily start from sensitivities, from signs, be they explicit linguistic signs or implicit experiential signs. The result of the operation is, also always, a virtual image, which as has been said, if it is to be used as a starting concept to generate a new, more complex concept, it must first be named. Only by naming the result, thought can focus on the application of the result in other processes and forget about the previous process of composition.

It seems the most reasonable and economical because if it were not so the thought should always be dragging all the images of the components as a whole (and apart from the isolated images of the components). In a very elaborate concept this could mean tens, hundreds or thousands of images that make it up. That is why it was necessary to abandon the hieroglyphic language***** and give way to complex and arbitrary alphabetic conventions.

* Jean François CHAMPOLLION (1790-1832), in 1807, 200 years ago, discovered this transition when he began to decipher the Egyptian inscriptions on the Rosetta Stone, some 3000 years ago.

It's the same thing we do in mathematics, replacing a complex expression with a letter, because otherwise it would be impossible for us to handle complex expressions, too long.

Computer programming has had to end up doing the same thing: it is "object-oriented programming". Here we must make an observation about a polysemy as widespread as it is inconvenient: say "objective"/"object" (=Substance with form and characteristics, something tangible or visible and totally sensitive) to what is strictly a "purpose" (a not sensitive concept, very virtual). In computing there is never an object, everything is virtual. "Object-oriented programming" is an absurd, totally cryptic name from which nothing can be directly extracted. It should say "Programming focused on elements of a system". It's not entirely self-explanatory because the concept is not trivial, but if you know what a "System" [.324], provides quite a bit of information. If it is explained to us by this name, it is understood the first time and we never forget it again. On the contrary, how many people know that it is, unequivocally, "Object-oriented programming"?.

<u>Many of the problems of pedagogy are semiological</u>. Many of the contributions of MONTESORI or FREINET were in the line of optimizing semiological support.

In this need for substitution lies the importance of semiology: not every sign is equally optimal in every case, nor are all systems of representation equally efficient.

Positional number systems are an unbeatable example of <u>optimal semiology</u>.

On the contrary, <u>polysemy prevents the correct functioning of thought</u>. There are many other semiological characteristics that make some languages more efficient than others for thinking and communicating. Contrary to what one might imagine, Basque ("Euskera" from Euskadi) is one of the most optimal, possibly even more so than German. Unfortunately, for centuries, the Basque language has suffered from permanent cultural genocide.

<u>In summary,</u>

- the concept should not be confused with the linguistic and sensitive sign that represents it, a cultural convention that is completely arbitrary and extrinsic to thought, with which we represent the concept in order to communicate with others.

- the concept (an image that forms in the psyche) should not be confused with the existentiality (reality or virtuality) that generated it.

Conceptualization progressively more complex, more virtual. [.217]

The conceptualization process is progressive. By composing compound concepts thought can produce ever more compound effects, less sensitive, ever more virtual.

Examples: "Strategy", "Importance", "Truth", "Nilpotent Element", ...

But no matter how repeated and "sophisticated" this process is, up to concepts like the previous ones, qualitatively, that is, procedurally, it is always, more or less, the same: operations between concepts. Different operations but operations.

The first operations/compositions [.218]

[.2180] Semantic union: a "Team", "Organoleptic", "Hispanic-Portuguese", "Pragma" (reality plus facts), "Pa and Tomato" (nothing to do with "Pa with tomato"), ...

[.2181] Real complement(not antonym): "Stranger", Dock (regarding Pier), "Content" (... Wrapping), ...

[.2182] Antonym: "Impossible", "Indecency", "Acephalous", "Uninhibited", ...

Within level 2 of the concept, I group the previous three in sub-level 200 to deal with the Boolean union or its inverse, the Boolean complement (be it real or semantic)

[.2183] The intersection: "Australasia", "Indochina", "Omnivorous animal" (herbivore and carnivore), "Ens mixt" (public and private), "Galera" (rowing and sailing), "Poliban" (bathtub, shower and bidet), ... Within level 2 of the conceptualization, when the Boolean intersection is exclusively involved, I assign it sub-level 201.

[.2184] Adjective composition: "Domestic animal", "Conceptual space", "Metallic screw" (of metallic material), ... Within level 2 I assign it sub-level 202. It is not abelian/commutative or hemisymmetric.

[.2185] Heterogeneous composition/application between concepts of different levels or sub-levels: "History of science", "Applied mathematics", ... Within level 2 I assign it sub-level 203. It is not abelian/commutative or hemisymmetric.

[.2186] Phenomenological union: "Bread with tomato" (nothing to do with "Bread and Tomato"), "Action and reaction", "Wood screw" (metal screw for use in wood). It assumes phenomenological, methodological, elaboration, technical knowledge, ... which is why I assign it sub-level 21.

* Catalan linguists should be the most interested in understanding all this. Not only to solve once and for all the thorny problem of "El Per i el Per a..." (=The "By" or the "For/ to"). But also that in other languages a concept as excellent and transcendent for the palate as "Pa amb tomaquet" can be understood and translated correctly, a composite/virtual concept well differentiated from "Pa and Tomaquet", a sensitive concept. "Bread **and** tomato" (="Pa i tomaquet") is simply putting them together, making a material and static sensitive concept with two foodstuffs. "Bread **with** tomato" (="Pa amb tomaquet") indicates a process, a phenomenological, and consequently a virtual/composite concept, of properly impregnating a usually toasted bread with ripe and soft tomato, and adding olive oil and salt (You can also previously spread it with garlic). We note again the polysemic character of prepositions, such as "with", which can have very different functions.

Another deficiency in this field is the conjunction "and/or", that is, an operator. Its need is confirmed by the spontaneous, intuitive use that many people make of it, even though it is absent from dictionaries and grammars, a discipline that once again manifests its anti-intuitiveness (see "Grammatical banalization"[.319])

At least in Catalan and Spanish, prepositions and grammatical conjunctions are two unclear and very polysemic concepts, which make it difficult to understand the language and translations. It is one of the points where a "normalization" is most needed and to simply speak of "Nexes", as make in the Conceptual System. It's a grammar problem, so I won't elaborate here.

Outline of the levels of conceptualization.

0 Level 0 **Identifiers**
    00 **Static** Identifiers;
    01 **Phenomenological** identifiers.
1 Level 1 of **Sensitive Concepts**
2 Level 2 of the **composite/virtual Concepts**
    20 **Boolean** sub-level
        200 Sots-sots-level of **union and complement;**
        201 and following Sub-sub-level of **compositions with intersections**.
    21 **Comprehensive/ relational** conceptuation (operations, Knowledge and
Method)
Simplification process 1→**200**→**00**
Simplification process 21→**01**
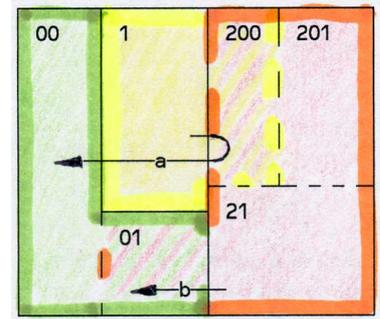
Color **Green**: Identification. Color **Yellow**: Sensitive conception. **color butane**: Composite/virtual conception

The exactness of the process allows for an easy-to-understand simplification, given that the mother is always exactly the union of the children. Let us suppose a "mother" concepte to create more specific "children", but a high-level, very composite, very virtual, Level 21 concept. For example the concept "Time" (a generic perception, of the succession of phenomena), a concept what is like "a stone in the ass" for physics and philosophy. To obtain more specific descendants we apply the equally high-level "stepfather" "Quantitative-qualitative duality", from which the two children result:
    - "Chronological time", or 'Chronos' or 'Chronos' (quantitative)"
    - "Qualitative time", or 'Kairos' (at the right moment, in its time" (see [12]).
the latter with more specific "children" concepts that are quite common such as "Leisure", Partial Dedication", "Idle time".

We can spare a small child all this constructive and philosophical fuss and simply tell him that Time can be "Kronos" (and give him examples of some units) or 'Kairos" (and give him examples). He will be able to conceptualize and use them long before he can have a strict understanding of them, whether physical or philosophical, because we have presented Level 21 concepts to him as two enumerative concepts (such as a football team, which he understands from a very young age). We have "simplified" them.

Another case could be a "Fact" (=grouping of interrelated and contemporary phenomena) such as the "disappearance of the Dinosaurs", which has led, and continues to lead, to years of studies of all kinds, chronological, geological, biological, ... As so much time has passed, too long time, the prolonged dynamics of this fact, we can give it a static appearance (a distant historical fact seems to us an instant within the long historical time scale), which facilitates the understanding of a small child. Like stopping a film frame, which is transformed into a photograph. The Facts, by their own definition of contemporaneity, already suppose a "freezing" of the phenomenological dynamics. Finally we assign it one or some photos, like the very common ones given to children, so we have "objectified" the compost/ virtual concept of level 21 in a simple image that is a sensitive Identifier of Level 00. Obviously, the understanding of the child or that of the adult researcher of the subject, will be very different (see "Understanding" [.31C]).

Semantic phrase [.2187]

It can be defined as a composition –as complex and varied as we like– of words for semantic purposes, for purposes of definition, not as a description of a fact. Accordingly, a semantic sentence has no "syntactic" verb, it is not intended to be a "syntactic sentence". For example the long definition of "Sedan-Coupé" already seen (transferred to [206]).

Between closely related languages, it is immediately clear that the operations are expressed in an almost identical way. Even among Westerners (Indo-European) and Sinic (Japanese, ...). The differences appear mainly because of their absence in languages of cultures that have reached little cognitive complexity.

Operative psychology (PIAGET) [.2188]

The pedagogical school that PIAGET (1896 – 1980) induced is called "Operative psychology". Some of these operations have just been seen. I say "some", because it is also necessary to add to this intention of PIAGET

all the other progressive processes of structural complexity that are being seen, with the corresponding associated mathematical structure. This mathematical structure is what PIAGET aspired to find, without succeeding. But in my opinion this was because he failed to know in time the mathematical contribution of the Bourbaki group (1939 and following, until his "death" in 1968). Without knowing his immense work (CARTAN, DIEUDONNÉ, MANDELBROT, GODEMENT, LANG, ...), I cannot imagine my work between 1983 and 1996 that led me to the Representation of knowledge discussed. Or being able to write articles like [C] "The knowledge … at 2 years old" which is a close link between knowledge, language and mathematics.

It is also common to talk about "Genetic Psychology" in reference to the "genesis" or progression of language, but it seems to me an unfortunate name due to its polysemic nature, as it can be confused with "Genetics", which as we have seen has nothing to do with language.

Mathematical representation [.219]

At Level 1, in children of only 2 years old, the use of Boolean union and complement appears implicitly, but also, surprisingly, "high" mathematical resources, such as the "Short Exact Algebraic Succession" "SAEC" (see [C]). At Level 2, intersection is added, which generates innumerable concepts. Together, the three Boolean operators are sufficient to generate thousands of compound concepts. This is what Roger BOOLE (1815-1864) observed.*

* These three Boolean operations are taught in school today, but language ignores them.

BOOLE, Functional illiteracy, "Tomato bread", "and/or". [.2190]

150 years ago BOOLE wrote the "Introduction to the laws of thought". Clearly an advanced psychology book* much more than mathematics. It may be because of this confusion that it is known by something much less important, the algebra that bears its name, the BOOLE Algebra. "Introduction" also indicates his consideration that it was necessary to supplement it. Thousands of people have studied BOOLE, maybe a million. Many thousands of books and articles have been written on "Boolean Algebra" and "Modern Mathematics" (which is not the title of his book). But hardly any reader will have read this classification of language operations before**, which is the embodiment of the manifestation in the language of the laws investigated by BOOLE. As you can see BOOLE has not yet been understood. Even less so was his wife Mary EVEREST, who tried to establish links between mathematic and psychology, and who surely contributed her psychological knowledge to BOOLE.

* It preceded even the birth of psychology as an explicit science at the end of the 19th century (WUNDT, 1832-1920), and obviously FREUD.
** That's why one of the first things I did from 1995 was to write in detail all these compositions, and in general all the conscious relationships of language, a task that took me a while to complete because I was bored of explaining something so elementary and obvious. See [1], an unpublished writing but which should be mandatory reading before starting to talk about "BOOLE Algebra" or "Modern Mathematics".

BOOLE discovered three of the faculties that enable man to reach this productive level 2 of thought: the union, the intersection and the complement to the total. The algebra for which he is so renowned is far less important than understanding 'union', 'complement' and 'intersection' as three basic faculties. These three operations are three virtual "Evolutive interactions", which allow structuring this level 2, which implies the "hatching" of language in children.

A few years later, without these innate faculties we would not be able to define or understand the concept of "Algebra", a concept that belongs to a much higher level within the structures that human thought progressively builds. Union, complement and intersection are innate faculties of the child, while the Boolean algebra is a complex non-sensitive concept, elaborated by the adult man. What is more important, a basic faculty, or just one of the many concepts that we can build with this faculty?

Modern mathematics [.2191]

This previous reasoning possibly helps to understand the failure of mathematical pedagogy. It is not an opinion but a repeated observation of reports such as "PISA".

Fifty years ago the ill-fated idea was to create sets with chickens, with dolls or whatever, to teach children Boolean algebra and set theory. A "theory" that can be very important for the adult but very little for the child. See "Inverse function" [.31A] and "Theory" [.32] in "Level 4...".

Conversely, the child intuitively manages other sets, the so-called "semantic contents", the sets of realities or virtualities that he associates with his concepts.   And with them, when speaking, he makes unions, complements, intersections and/or combinations of all of them. If it were not so, I would not speak. But he speaks, and how he speaks!!

The pedagogy of mathematics is either done from the language or it is not pedagogy. Either pedagogy is done from semiology –paying attention to sensitizations– and from intrinsic semantics, or the results of surveys such as "PISA" will continue to worsen. "... There is an overwhelming incoherence between school mathematics, mathematics of real use, and necessary mathematics, which confirms the null contribution of pedagogy to the teaching of mathematics.

The three dimensions: the intrinsic Partition [.21A]

!We already have the third dimension! We have formed three intrinsically distinct classes of concepts. We already have what mathematics would call a three-dimensional space, made up of three one-dimensional sub-spaces:

Matter (static)
Phenomenon (dynamic)   } Sensitive conceptuation
Composite/virtual conceptuation (all other non-sensitive concepts)

Anticipating what still remains of the Knowledge and Method, it is enlightening to summarize and compare the two great divisions that have had to be made so far, all of them depending on the different and progressive human faculties involved.

Dimensions/ sub-spaces of the "Cognitive Space" or "Conceptual system"	Levels of thinking
0.0 Matter	Level 1
0.1 Phenomenon	(Sensitive concept)
0.2 Composite concept/ of virtual origin	Level 2 (Composite concept/virtual origin
	Relationship (pass to the dual, Level 3 of Knowledge broken down into its components)
	Level 4 (Method)

Correspondence of the three dimensions of the Cognitive space with the Levels of thought

The reader could question another option of dimensions to represent and simulate the effects produced by thought, but it would not be justified by the required faculties already discussed, nor the three-dimensionality of psychomotricity or sensitive perception.

No one questions that we have the decimal positional system and computers do it with binary, and not the reverse option. If computer microprocessors were to use the decimal system directly, then they would have to be analog and would lose reliability (see [3]). In any case, the intrinsic nature of positional numerical systems is not given by the choice of the chosen base –it is immediate to move from one expression in one base to another– but by the structural methodology.

Nor do we question that a muscle is divided into a few bundles, and into many myofilaments, and not the other way around. In any case, we look for the justifications for this semiological choice of nature by studying molecular biology, that is to say, the physico-chemical foundations of protein structures.

Similar arguments justify the possibility -and the need- to make linguistic standardizations based on intrinsic characteristics common to all languages, in order to optimize communication and understanding (without renouncing the artistic expressions of each language).

Does anyone think of routinely using curvilinear coordinates? Obviously not. Why? For practical, economic reasons. Even, to work much more comfortably, terrestrial coordinates (latitude, longitude) are transformed by means of projections (such as squaring the circle) into linear coordinates ("UTM" grids). Or "curvilinear" mathematical applications are "linearized" locally to facilitate their treatment ("Differential at the point"). If we have an optimal three-dimensional option, why use another worse one?

In addition, there is another comparison, a clear parallelism, which is quite convincing of the correctness of these two previous progressive structurings: the evolution of human language, which can only be explained by the progression of the psychic structure that is being explained:

- The figures from the Aurignacian age (Cro-Magnon; 35 000 B.C [$\Rightarrow$ level 00/ 1]);
- The cave paintings from the Magdalenian age (Altamira,...; 10 000 B.C [$\Rightarrow$ level 01/ 1]);
- The hieroglyphs (Egypt; 3000 B.C [$\Rightarrow$ levels 200 to 202 ?]);
- The Chinese characters (between hieroglyph and alphabet; Yin age; 1400 B.C); and
- The alphabetic script (semites/ Phoenicia; 1 500 B.C [$\Rightarrow$ level 203?]),
- making way for the current speech (Greece; 500 B.C [$\Rightarrow$ level 21]).

The first and great distinction to be made was whether an element produced by thought originated

- directly from a perceived reality, that is to say, a sensitization, which originates a sensitive concept, and in this case, if this originating reality was:

- material-statics, or
- phenomenological-dynamic;

- of an element, virtual, previously produced by thought.

This gives way to the triple "Intrinsic Partition", the "zero", which represents the three great differences between the faculties involved in the input of thought information. And so –always with an intrinsic methodology– one proceeded progressively with all the many other processes that make it possible to characterize thought.

Does, Psyche incorporate a "Conceptual System" from birth? Of course not, as it does not incorporate a positional numerical system. This is not its purpose. But this, as well as the other system, are structured with innate and intuitive faculties, which allows it to be formed without effort and with great efficiency of use. They are intrinsically compatible (semiologically, ...) with human mental faculties.

THE LAST TWO LEVELS OF THOUGHT, LEVEL 3 OF "KNOWLEDGE" AND LEVEL 4 OF "METHOD". [.3]

THE SUB-SUB-SPACES OF COMPOSITE/ VIRTUAL/ NON-SENSITIVE CONCEPTUATION. [30]

In mathematical terminology a space is a structure with several operations. A sub-space is a part of a space, but not just any part: it is a part that in isolation, is a space. A sub-space can also have sub-spaces, which will be sub-sub-spaces of the first.

In the sub-space of the third "dimension" (Level 2) "Composite/virtual conceptualization" it has already been seen that there were different operations, so we can make different sub-spaces according to the different operations we consider. Thus we had the sub-spaces of Level 20 and 21. And of Level 20, the sub-sub-spaces of Levels 200 and 201.

But apart from these operational sub-spaces or conceptual Levels, there are other sub-spaces that are especially important to generate the following "complexations" or Levels of the Thought:

- the sub-space of the "Relationators" (I insist, the "Relationators" are the specific faculties of knowledge), because it will allow us to construct Level 3 of thought, the level of "Knowledge" strictly speaking, and
- the sub-subspace that makes up Level 4 of thought, the level of "Method".

which we see below in [.31] and [.32].

THE RELATIONSHIP[.31]

In [.2141] it has been discussed that up to about 6 years there is no full consciousness of dynamic/phenomenological perception. Phenomenological perception is a difficult hurdle for the children, which when he becomes a infantile he ends up overcoming it with effort. But the effort is worth it, already progressed to "Evolution ... phenomenological conceptualization"[.2142].

Once the dynamics of the movement, and later of the phenomenon are perceived, always as a fully sensitive process, the child can come to abstract the temporal structure of the phenomenon

PHENOMENON

Initial state   **Movement/ Process/ Action**   →   Final state

Phenomenological perception continuously matures this relational model "a**R**b". That's why the child abstracts the model and can apply it to another place. He applies it to circumstances that repeatedly appear associated with each other, as if from one they became the other.

A basic, even unconscious example of the poorly raised baby: if he cries, he knows that he will get what he wants (a desire [the initial state], with crying [process/action], becomes a reality [final state, effect]):

RELATIONSHIP

Fact/circumstance 1   **Relationship**   →   Fact/circumstance 2

desire   **crying**   →   satisfaction of desire

We have established a relationship between two concepts "a**R**b" ("desire **cry** satisfaction"). It has already been stated that this "a**R**b" construction is the representation of any simple knowledge, which at 6 years old begins to be a conscious linguistic process in support of nouns, for example:

A Coupé **is** (equal to) a motor car with one door on each side (definition, first-order predicate)
A Coupé **=**Motor car with one door on each side (definition, formula)

where in the latter case the relation is of equivalence ("**is** (equal to)", "**=**"), relation which is characteristic of definitions. Definitions belong to a type of knowledge called "Semantic Knowledge".

At the same time there is another coincidence, which is not at all fortuitous. One of the most spectacular constructive-structural characteristics of the organic matter that supports the psyche, the so-called "gray matter", is the existence of neuronal interconnections. An optimal structure to support relationships, to support triads of the type "a**R**b".

Even more, these interconnections are known to be "functional", that is to say, they proliferate depending on their demand, depending on the stimulation, especially of the baby and the child. Hence the irretrievability of "abandoned" children; or the "sudden death". The evolution of the nervous system seems clear, creating structures suitable for the representations it has to make of the reality that surrounds us, as well as proliferating in quantity to respond to the demands of use.

No wonder, then, that all of man's virtual inventions follow the same model a**R**b:

SYNTAX   +Predicates (conjuncture/circumstance)

                               Verb (=Action)

Subject   ━━━━━━━━━━━━━━▶   Subject who has already
                                                    acted (usually implied, assumed
                                                          by the sentence itself)
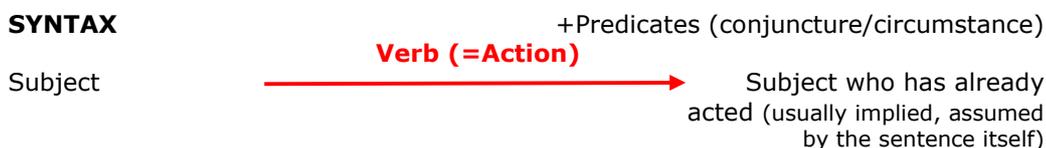
and it is clear that in the syntaxes do not need to be searched justifications with genetic mutations.

As far as mathematics is concerned, all of it is a series of more or less specialized applications or functions (mathematical relationability) that follow <u>exactly</u> the same model:

MATHEMATICS

                           Application

{Set A}   ━━━━━━━━━━━━━━▶   {Set B}

                       Function (numerical)

{x}   ━━━━━━━━━━━━━━▶   {y}, with y =f(x)

You can see, once again, the need for "<u>compatibility</u>", but above all, for "versatility", which makes it possible to perform functions for which the psyche had not evolved, such as thinking. And this is only possible if in matter, in the nervous system, is superimposed on an information management system, the Psyche, <u>totally independent</u> of the material support. Not even proteins would do, no matter how much specialization they might achieve. Precisely for this reason, they are specific, they cannot perform functions other than those intended.

Algebraic duality. Pass to the dual space (Star operator). [.310]

There is still another extraordinary step. It is the "Step to Dual", a very special, very powerful case of relationability. Is the passage of something, to what manages it. The transition from something static to its dynamic. It is another of the recent resources of modern mathematics (of algebra and differential geometry) but that everyone has been using for centuries, millennia and more. I say "everyone" because life has been doing it for 4 billion years,

    DNA (a molecule) → Codon (the manager of the molecular/protein synthesis of the cell)

Banker/ Money lender for thousands of years,

    Money → Economic interest (criterion for calculating the earnings of some money)

Slavery/ Work for thousands of years,

    Working person → Employer, "Consultant" (person who does not work, but who organizes the workers)

Grammar for thousands of years

    smoke → smoking;   make → (to) making;   bath → (to) bath;   copy → (to) copy;   drink → (to) drink;   etc. etc. etc.

(see "Algebraic duality" in [2] and [D]).

A child loves cartoons. It is completely normal for him that a shoe starts to speak, to act. It could not be otherwise! Why? Because one of its most intuitive faculties is the "Step to Dual": <u>making things transform into actions that move things</u> (and this is precisely the definition of "Algebraic Duality"). If the Step to Dual wasn't an intuitive faculty, <u>cartoons wouldn't exist</u>.

In the "Method" it will be seen briefly that intuition results from a phenomenon as frequent and important as it is ignored, the "Transfer of methodological elements between different structural levels" [.320]. The

psyche has the possibility of inheriting "technologies" from all its previous and constituent levels such as histological, protein and DNA.

The Pass to the dual is an intuitive faculty of the child because it results from this transfer from the codons. But it is also one of his first manifestations of expertise: the difficulty of moving from static sensitive concepts, those of "Matter" (the first dimension), to dynamic sensitive concepts, those of "Phenomenon" (the second dimension), it is the first and most difficult "Step to Dual" that the child is able to generate:

Matter $\rightarrow$ Phenomenon (what moves Matter)

the above is indeed difficult. After that, everything is "sew and sing":

concept $\rightarrow$ Relationship (what relates the concepts, like all the examples already seen)
Thing $\rightarrow$ applications* of a thing (tools, ..., technology)
(* Application: using something as a means/ instrument ....)

and finally in mathematics, where with a little more patience and elaboration:

Point, vector $\rightarrow$ Differential of point, Tangent space (the criterion for calculating the position of other points, vectors)

which is the "Step to Dual" of differential geometry (the so-called "Star" operator). Man does not "create" mathematics or numerical calculation, he simply recycles what he already has.

We note that the Step to Dual between Matter (first "Dimension" of the cognitive Space) and Phenomenon (second "Dimension") explains:
- the different ages at which the corresponding material and phenomenological concepts are reached,
- the evolution of human language,
- as well as the success of the "Intrinsic Partition" and the successive exact partitions, opposite "Categories" and "Thesaurus".
Whether accepted or not (this is an unconscious personal question) it cannot be denied that Thought is structured, and that its structure is what is being exposed.

Intrinsic classification of "Relationators" [.311]

But fortunately, the "Relationators" are also in the tree that we have structured. That is why they cannot be placed in the tree arbitrarily, it is necessary to follow the criteria of the exact partitions. It is necessary to insist that the relationability is another of the black holes of our culture, of our education systems. Despite its importance, whether in Catalan, Spanish or English, "Relationator" **R** is not in common use, only the set of the "Relationship" a**R**b.

In order to enter them into the tree, we must first analyze and put them in order, that is, classify them, like any other concept, and group them following the same criteria of intrinsicity that we have demanded of all concepts.

$$\mathbf{R}/\mathbf{R_{equiva.}} = \mathbf{R_{intrin.}} \qquad (\mathbf{R}/\mathbf{R_{equiva.}} \text{ is a "Quotient Set" or "Grup quotient")}$$

The first conclusion is that relationships such as "Synonymy", "Polysemy", "Taxonomy", "Meronymy", "Holonymy", "Hyponymy", ... are extrinsic, unimportant. And in some cases, harmful, like the aforementioned "Polysemy" (see [10] and [3]).

A prior analysis of non-thoughtful relationability must also be done in order to separate it and not mix it up. I am referring to the sensitive relationability, the "sentimentative" including the affective, etc, etc, etc. So for example, here we are not interested in the "Associations" of the unconscious, which psychology studies.

Comparative chart between the different relationability

	Existence since …?	Real or Virtual anti-image	Transmission	Symbolic Yes / Not	Level of Consciousness	Attitude of Thought
Natural phenomenological relations	Always	R	----	Not??	----	passive
Mental/ **psychic** relations						
Sensitive relations	> 500 MYears?	R	Exclusively genetic	Yes	Exclusively sensitive	passive
"Sentimentative" relations (emotional, affective, …)	> 200 MYears?	R and V	Genetics and pseudo-cultural	Yes	Unconscious and Conscious	passive
Thought relationability						
Conceptual relationability						
Non-semantic conceptual relationability (Level 1…)	> 5 MYears?	R	Exclusively cultural	Yes	Unconscious	active
Semantic relationability	> 0.5 MYears?	R and V		Yes	Unconscious and Conscious	active

Source: "Intrinsic dictionary and natural language", 1996; "Language relationships", 1996

"Intrinsic Tree of Intrinsic Relations"[.312]

With this way of proceeding, another "miracle" appears. The "Intrinsic Tree of Intrinsic Relationships" appears **R**intrin., a small and very powerful tree (see [.33]). For now, two first examples:

- an Object **implies** Materiality (or Materiality is one **Condition for** be Object), where "**implies**" and "**Condition to be**" is the same phenomenological relationship in its two inverse actions (I have yet to meet any person who has realized this on their own, which is why I insist on the cultural "black hole" regarding relationability);

- the Scope is the **Site associated with** the Effect (or the Effect **has as an associated Site** the Scope), semantic relationship and its inverse which, moreover, the Catalan language (and similarly many others) often represents with endings such as:

"-ery" (related to Associated Site), such as Stationery, Fishery, …
"-ary" (related to Associated deposit site), such as Library, …,

The zoom of pedagogy. [.314]

A first application that is easy to intuit is in the field of pedagogy. Trees allow us to act as if in a "zoom", especially with Relationators. A child may not understand a specific relationship, but if we take into account the intrinsic tree of relationships -this is one of the keys- he will surely understand some of the generic/ascendant relationships, whether mother, grandmother or great-grandmother. That is enough, he will already have a first approximate knowledge -he will not get a "zero" if asked in an exam- but above all he will have the path to improve his knowledge as he gets to know the more specific relationships that he still needs to know. An even simpler case than that of resolving school failure that will be seen in "The 'secret' of partitions" [.206].

For example, an extreme case would be trying to understand such a complex mathematical concept as "Nilpotent element of a nilradical ideal" already discussed in [.205]. The reader is offered a brief test, of about five minutes, with which he can obtain an approximate conceptualization of this virtual concept that very few people know. See [8] (in process of translation). But also the concepts –strictly the abstractions– that he lacks to fully know it. Most people will only lack 20% of all the abstractions it entails.

If one is short-sighted and does not have glasses, one simply has to get closer to see better, that is, do a Zoom navigation through the Cognitive Space.

Terminations [.315]

Possibly the most surprising relationability is what I call "Terminations" (Endings) because children are able to handle them as word endings from a very young age. It appears from the age of three, or earlier (I have already said that specifying this is secondary, it should be investigated by psychologists and pedagogues, the important thing is the obligatory progression, that a level of maturation cannot be given if it is not first has passed another). When a child says:

"El gat s'ha **morit**" (the usual/regular termination) [="The cat is dead"]

it is corrected:

"!!No!!, es diu !!el gat s'ha **mort**!!" (an exception/irregularity, but that does not occur in this case in English)

We are facing one of the many repressions of the first manifestations of children's intuition*****. He should be congratulated and then told, "but the adults we are idiots, we call him 'el gat s'ha **mort** ', to which the child would say it as the adults want but, much more importantly, without making him doubt his intuitiveness.

"All children are born geniuses, but we spend the first six years of their lives stripping them of their genius." Buckminster FULLER (I don't know who he is, but for that alone he deserves to be known).

* Coincidentally, a friend to whom I mentioned this, a few days later told me that he had heard his nephew say it, and that his parents scolded him until he explained it to them himself. I was 5 years old. In other words, we don't even need a psychologist to specify it. This FULLER was not at all misguided.

But what does it mean to know how to manage at only 3 years old, without anyone telling you, the "**-ed**" ending characteristic of the participle? Well, he alone has inferred a rule as listen to adults. But this rule has a great depth. It means at the same time that the child, unconsciousness already reached the perception and conceptualization of the phenomenon to the point of implicitly understanding its entire complex structure, not only the initial and final states and the action, but some of the specificities that show the following attached table. A picture not simple for an adult, but which the child manages all by himself.

The subsequent article from 2020, 'The knowledge of children at age 3...' [D], explores this ability in greater depth, explaining its relationship with the functioning of synapses.

The table has been attached to it some other common "terminations" that are not phenomenological and four examples "Action", "Act", "Actuality" and "Form" that further highlight the extraordinary intuitive capacity of the child. Moreover, the first three have been chosen on purpose, because "Act" derives from "Action" and "Actuality" derives from "Act", and consequently from "Action" (see **red** arrows).

Another incongruity is that many thousands of commonly used words are formed according to the following table in all languages, but dictionaries hardly give the cross-language equivalences of these "Terminations" that so elegantly enable the formation of these thousands of words.

TRANSLATE NOTE (2025-07-17)

I am only translate a partial proposal. The complete table is attached in Spanish-Castillian, similar to Catalan, because the morphology is different for each language, and my very limited English could lead to an inaccurate translation.   Perhaps it would be better to find another examples that is more suitable for English.

I haven't found a dictionary with a simple table that translates all the 'Terminations' which, as has been said, would greatly facilitate any language learning, or translation process.

RELATIONSHIP, EXPRESSABLE WITH A 'TERMINATION RELATIONATOR'
Abstraction/ adjective (English Terminations: -**ed**, -**ing**, ...)
Phenomenon/process (English Terminations: -**ation**)
Agent of phenomenon (English Terminations: -**er**, -**or**)
Person/ profession (Terminations in Spanish: -**logo**, -**asta**, -**ista**, -**dor**)
Medium necessary for the development of the phenomenon (Spanish Terminations: -**dor**)
Realización de la **acción** del fenómeno/ gerundio gramatical (English Terminations: -**ing**; ...,)
Verb/ **action** (English...: -**ed**, -**ate**, -**en**, -**er**, ..., -**sion**; -**tion**;); At the same time, grammars subdivide verbs into 'Mood,' 'Tense,' 'Number,' 'Person,' etc., forming a **more specific tree** of 'Terminations'
Possibility of implementation/**feasibility** (English...: -**fy**)
Property with **future development potential** (Spanish...: -**bilidad**)
Way/ method associated/ grammatical adverb (Spanish...: -**mente**)
Property asociated with the way the process/ phenomenon is carried out (Spanish...: -**idad**, -**era**. English...: -**ity**)
Effect of phenomenon
Resulting quality/ property/ state (English...: -**ness**)
Resultative state adjetival (gramatical partiple) (English...: -**ed**)
Set of objects resulting and/or associated (in relation to the phenomenon) (Spanish...: -**aria**, -**aje**, -**alla**,, ...)
Original **etymological root**; and/or **affix** (linguistic unit added to another)
prefix (added at the beginning)
infix (added in the middle)
suffix (Termination added at the end)
Commonly used **acronym**
Science/ associated study (English...: -**ogy**, ...)
Associated **place/ site** (English...: -**ory**, ...)
Behavioural tendency (English...: -**ism**; Spanish...: -**ismo**, -**ófilo**, -**filía**, ...)
Associated antonym (=**Boolean inverse**/complement) (Spanish...: **a**-, **in**-, **anti**-, **des**-, ...)
Reciprocal/ **Functional inverse** (usually not differentiated)/ **Reflexive inverse** (Spanish...: -**se**)
Associated **object** (often extrinsic, and therefore different from the effect)

RELACIÓN, EXPRESABLE CON UN RELACIONADOR DE "TERMINACIÓN" (Ejemplos de "Acción", "Acto", "Actualidad" y "Forma")	Código	Acción	Acto (=Acción personal)	Actualidad	Forma
Abstracción/ adjetivo (Terminaciones en castellano: -ico, -tivo, -al, …)	-D	activo	(activo, actual)	actual	formal
Fenómeno/ proceso (-ción)	-F	Activación (inicio de la acción/ fenómeno)	Actuación	Actualización	Formación
Agente del fenómeno (-ante, -dor)	-H	Activador/ Activante	Actuante		Formador (objeto)
Persona/ profesión (-logo, -asta, -ista, -dor)	-B	Activista	Actor (genérico)		Formador (persona)
Medio necesario para el desarrollo del fenómeno/ (-dor)	-J	Activador	Actuador	Actualizador	Formador (medio)
Realización de la **acción** del fenómeno/ gerundio gramatical (-ando)	-G	activando	actuando	actualizando	formando
Verbo/ **actuación** (-ar, -er, -ir); a la vez las gramáticas sub-dividen el verbo en "Modo", "Tiempo", "Número", "Persona/s", … formando un **árbol más específico** de "Terminaciones"	-V	accionar (iniciar) activar (favorecer)	actuar	actualizar	formar
Posibilidad de realización/ **factibilidad** (-ble)	-S	activable, accionable (mecánicamente)		actualizable	formable
Propiedad de **factibilidad futura** (-bilidad)	-R	Activabilidad, Accio-nabilidad (mecánica)		Actualizabilidad	Formabilidad
Manera/ método/ adverbio gramatical asociado (-mente)	-N	activamente		actualmente	formalmente
Propiedad asociada a la manera de hacer el proceso/ fenómeno (-idad, -era)	-M	Actividad (propiedad)	(Actualidad)		Formalidad
Efecto del fenómeno	-E				ConFormadura
Cualidad/ propiedad/ estado **resultante** (-izado)	-Q	activizado	(actualizado)	actualizado	formalizado
Estado resultante **adjetivado** (participio gramatical) (-ado)	-P	accionado/ activado	actuado		formado
Conjunto de objetos resultantes y/o asociados (en relación al fenómeno) (-aria, -aje, -alla,, …)	-O				
Raíz etimológica originadora; y/o **afijo** (unidad lingüística añadida a otra) prefijo (añadido por delante) infijo (añadido al medio) sufijo (desinencia, terminación añadida por detrás)	-A				(Morfo-) forma- -morfo; -forme/a*
Acrónimo habitualmente utilizado	-K				
Ciencia/ estudio asociado (-logía, …)	-C				Morfo-logía
Lugar asociado (-ería, -teca, …)	-L				
Tendencia comportamental (-ismo, -ófilo, -filía, …)	-T	Activismo	Actitud (acto reiterado)		Formismo
Antónimo (=inverso booleano/ complementario) asociado (a-, in-, anti-, des-, …)	-X	Inacción, inactivo			informe (sin Forma)
Recíproco/ **Inverso funcional** asociado (habitualmente no se diferencian)/ **Inverso reflexivo** (-se)	-Z	Reacción			formarse
Objeto asociado (frecuentemente, extrínseco, y por ello diferente del efecto)	-Y	Accionador	Acta (Documento)		

Source: "La percepció i la intuïció infantil: les 'Terminacions' dels nens" ("Infantile perception and intuition: children's 'Terminations' " (C. UDINA, 1999, 10 pages in Catalan).

Grammatical morphology.[.316]

It should also be said that the table contains a good part of the cases of grammatical morphology, cases that are much better understood -integrated- from this perspective. The first three examples given confirm this. In other words, the phenomenological perspective –the intrinsic one– is the one with which grammar and syntax should be studied.

So, grammatical morphology should be associated with the intuition of 3-year-olds, but adults intervened to create an arbitrary and unpleasant discipline.

Etymology. Philology[.317]

Seeing the previous table and understanding its impact on grammatical morphology, its importance is also clear, together with some other resources of the conceptual system, in the etymological monitoring of any word, and above all, its study compared to other languages that are indexed with the Conceptual System.

With the Conceptual System etymological processes and philology are transformed into an exciting navigability game supported by the computer.

Dictionary.[.318]

It is also easy to understand that dictionaries of synonyms, antonyms, foreignisms, barbarisms, ... are simple applicative and automatable realizations of a conceptual system, which integrates as the simplest and most rudimentary application all types of dictionaries ("ideological, "thematic", of "language", between "languages", ...).

The banalization of the grammatical adjective. [.319]

The adjective is a good example of the trivialization that grammar makes of the essence of language: the definition of a concept.

What is an adjective according to dictionaries and/or language institutions? [.3190]

- "That refers to a quality or accident; that is not itself; dependent" (Dic. FABRA);
- "Added to the name, which determines it" (HACHETTE);
- "What qualifies or determines the noun" (Dic. RAE);
- "Word that accompanies the noun ... to limit its significance" (ESPASA); ...

!!The world upside down!! [.3191]

If we except a few dozen specialized adjectives, called "determinative" adjectives:

- the possessives (my, your, his, our, yours, theirs, ...),
- the demonstratives (this, that, that, ...),
- interrogatives (which, which, ...),
- relatives (which, which),
- the indefinites (one, some, all, same, certain, other, such, each, any, whatever),
- the quantitative numerals (first, second, ..., half, third, ..., even, …, dozen, ...)*,

   * That is, a borrowing from the decimal positional number system...

the rest of the thousands of adjectives, 99.9% of the adjectives, are "qualifying":

   "young", "nilpotent", "pink", "dirty", "Catalan" (the so-called gentile adjectives), "food", ...

that is to say, an adjective for each existing concept, consequently there are many qualifying adjectives.

What is, essentially, the adjective, that is to say, the qualifying adjective? Well, it strictly represents the abstractions that have allowed the conceptualization. So it is prior to conceptualization, in such a way that

without abstraction, without a qualifying adjective, there is <u>no</u> conceptualization. And obviously, it predates the "Noun". Why don't we call things by their proper names?

What is the adjective for "Sedan-coupé", even though it doesn't even have a specific name? so all the abstractions already seen that have led us to have the criteria to recognize what a "Sedan-coupé" is and not something else different like:

   - a "Banana" (with which it matches in only some abstraction), or
   - a "Berlina" (with whom it coincides with almost all but the two finals).

See it at "The secret of partitions"[.206].

What is "nilpotent", the adjective for "Nilpotent Element"? Well, the set of abstractions that allow anyone, despite not having any idea of mathematics, to have an approximate knowledge of this very virtual concept. See it at "Nilpotent element…" [8]

What does the adjective "pink" imply in "Pink (color)"? Well, a certain energy of the photon, or a certain frequency/amplitude of the associated wave. A series of features that compete with Quantum physics. See it at "So, how can we make this tree structure?" [.205]

The adjective is <u>the most intrinsic of the concept</u>, the one <u>that never changes</u>, its <u>invariant</u> (except for the few possible rearrangements of the abstractions of which it is composed, already commented on "Exactitude" [.21B2]). The complete opposite of disparagement such as "dependent", "accident", "accompany", "attached", "it is not in itself", …

Thus, neither should we talk about adjectives –which is a completely insensitive concept for a child and an adult– but separately:

   - of <u>abstraction</u> (-**ed**, -**ing**, …),
   - <u>possibility of realization or feasibility</u> (-**fy**),
   - of <u>resulting quality</u> (-**ness**), etc. etc. etc.

a triple division of the qualitative adjective that a three- or four-year-old intuitively manages, but which the reader will <u>not remember from any grammar textbook</u>.

How can it interest the child?***** a study as anti-intuitive as the study of grammar, of syntax, of the language?

* Unless he is the son of a language teacher and the motivation comes indirectly for affective, not cognitive, reasons.

<u>Contrasts between inverse relation and inverse function</u>. [.31A]

The study of the inverse function is an important, basic topic of mathematical analysis.

It has been seen that the mathematical "function" is the inheritance of the "mathematical application" and ultimately of the "relationship" between concepts. And even earlier, it has been seen how the child matures relatability from phenomenological perception.

In contrast to this, we have zero attention paid to relatability, more especially to the relatability that all children manage intuitively.

The prefixes proper to the inversion, "**im-**", "**in-**", "**anti-**", "**un-**", "**-less**" (suffix),

   antibody, **anti**biotic, **in**action, **in**satisfied, **im**penetrable, **im**possible, **un**conscious", …

they are handled without problem by a small child. It does not seem fortuitous that in this case of inversion, the morphological representation is not composed from the back with endings <u>but from the front with prefixes</u>: it is not a nuance within the phenomenon but an inversion, quite the opposite, and consequently you need to emphasize, you need to make a "stop" <u>before starting</u> and put the gear in reverse.

Reality, and consequently the derived phenomenological perception, is full of inverse phenomena. But the adult ends up ignoring the inverse relationability. For example the already seen ignorance of the investment between "implication" and "condition" (see it in "Intrinsic tree of intrinsic relationators" [.33]).

What interest can a young student have in something as abstract as the "inverse function" of mathematics when his inverse relativity has been repressed for years? What starting point, what reference, can you have to understand a series of abstract reasonings, without connection to their reality?

The concerns and criticisms of mathematics pedagogy from B. PASCAL (1623-1662) to G. POLYA (1887-1985) and many others are not surprising. Blaise PASCAL already affirmed that a child could not be expected to understand what had taken centuries to understand in human civilization. This is especially bloody in the case of mathematics. It is absurd to learn in isolation mathematical models that have arisen, for example, to solve specific and specialized problems in physics with the contributions of prominent mathematicians*****.

* For example, the theory of relativity owes very little to EINSTEIN, rather to mathematicians ranging from POINCARÉ, LORENTZ, MINKOWSKI, ..., to CARTAN, i possiblement en primer terme a Milena MARIC. Leaving aside the previous issue of plagiarism, what interest is there in studying concepts such as MINKOWSKI space, LORENTZ or gauge transformations, or Riemannian geometry, detached from the universe, detached from the sensitivities that generated them ?

For this, what is needed is:

- prioritize, teaching what can be based on the child's intuitive faculties, but before that, starting to observe and know what these faculties are!
- also, incorporate heuristics into learning***** of what is taught.

* As already said, the heuristic is the path followed to achieve certain knowledge.

Why heuristics? For two reasons,

The first for the experiential sensitivities it entails (the "zero principle" of thought, pedagogy and semiology [.201]).

The second, for a very simple reason: the effect is only the final state of the phenomenon. If the phenomenon is a complex perception per se, difficult to perceive globally (see "Phenomenological perception" [.2141] and "relationability" [.31]), if we remove the initial state and the action/process, we make it even less comprehensible.

Thus, understanding an isolated effect (the final solution to a problem), without sensitivities, without its origin and without its process of obtaining/solving, is to make understanding the problem too difficult. The reader must understand that heuristics is the whole of a process of discovery, of learning, like a whole phenomenon, from the initial state (what was the original problem?), the search for solutions (the action/process), until successful with its resolution (the effect).

The "history of science" is not the current chronological and globalized description, but rather that in each concept or scientific knowledge, knowing its specific heuristic.

The logic [.31B]

Severe learning disabilities affect all knowledge in general. But in this case mathematics is doubly harmed: logic pays the consequences. Logic is conditioned by paradoxes, which mark and have historically marked its development.

From the perspective that allows knowledge of thought structures and intrinsic semantics, paradoxes, such as that of RUSELL's*****, are illiterate and polysemous approaches, and not strictly mathematical problems.

* Which in a simplified way is the "Barber Paradox".

In the case of the RUSELL paradox, the polysemy is generated precisely by the ignorance of the inverse relationability, the difference between shaving another person or shaving oneself, which on the other hand requires the mediation of a mirror, an obvious sign of investment. See in [11] ".7 Exact logic and artificial reasoning. The barber paradox". What mathematical analysis deals with in full detail and to its ultimate consequences with the "Inverse Function Theorem", is grossly ignored in mathematical logic which does not differentiate an action from its inverse.

It is a small sample of why logic has not developed despite attempts for more than 2 000 years, in contrast to the spectacular explosion of algebra, geometry and topology in only 200 years*****. The reason is that logic is

still supported by ambiguous, imprecise concepts, in polysemy, while the rest of mathematics is already supported by exact positional numerical systems (they became in widespread use precisely 200 years ago). But this is also another matter (see [3]).

* Decimals did not appear until 400 years ago, exactly in 1585 introduced by the Flemish Simon STEVIN. The binary system, which <u>implies understanding the importance and interpretability of the position</u> does not arrive until 1700 with LEIBNITZ. But all this was restricted to the select area of science Universities, until society began to adopt the positional decimal number system just over 200 years ago, a process that still has numerous exceptions today (such as English measurements).

The work completed in 1996 with the concepts defined exactly and the mathematical structure that allows, it led me to a proposal analogous to that of KLEIN for geometry ("The Erlangen Program"): "<u>The Vilassar Program for Logic</u>". Seeing that the mathematical friends or relatives to whom I hinted at it laughed at me (the "ad hominem" fallacy), I let it go. Nor was it a priority in my life to leave everything behind, and to dedicate myself. For me, mathematics is an instrument, not an finality.

Despite FREGE's formalization, breaking the null progression of logic in the last 2 000 years, and many other contributions, the obsolescence of current logics remains clear (which has also led to alternatives such as fuzzy logic, non-monotonic logic, probabilistic logic, ...).

FREGE himself, or even more so GÖDEL, tried to meet LEIBNIZ's pending challenge of the Characteristica universalis, sensing its importance. Returning to the question from the beginning, "why couldn't FREGE or GÖDEL achieve the Characteristica universalis? Well, for the same reason that FREUD couldn't progress in everything he proposed in the "Project of Psychology" (1895), because it was impossible at the time with the knowledge of those years, both at the level of psychology and knowledge, and because of the non-existence of the information culture that today already underlies all human activity. In those years, information was nothing more than "communication", far from the information that underlies physics (quantum information), life (genetic information), the behavior of higher animals (psychic information) and its current technological-computer applications. Even today, quantum/ underlying information is still ignored by physicists (see the 2023 articles from: https://vixra.org/author/carles_udina_i_cobo), and psychic information is ignored by branches of medicine such as neurology (see for example "… 3 years" [D]).

If FREGE had been born exactly one hundred years later, in 1948 like me, instead of what he did, I have no doubt that he would have started to solve LEIBNIZ's challenge, much faster than I was and much younger, and from there complete his own "Program for Logic", which we would already have available.

It is not a question of doing mathematical logic from a language with words. It is a intrinsic language that is already integrated by logic, with concepts (and not words) defined exactly and based on a system of n-<u>predicates or first-order logical propositions</u>***** (like a system of n-equations with n-unknowns), propositions that represent the abstractions that characterize the concept.

* I prefer to use "logical proposition" instead of "predicate" because the former seems more exact and less grammatical to me.

In [.206] we see the example of "Sedan-coupé" and the long <u>convergent</u> succession of first-order propositions/predicates that compose its exact definition, as if it were any number. This is already decisive for <u>changing the current logic based on words, from a new logic based on exact concepts</u>. But that is not all, all these predicates result from a single "relationator" (see [.33]) :

≡ Semantically equivalent concepts (equality/equivalence)

"**is** (equal to)". So it is appropriate to ask ourselves, <u>what else could we do with a logical management of the remaining hundred "relationators"</u>?

Cognitive comprehension/ relational Understanding [.31C]

See [.101] "Understanding or Comprehension". "Cognitive comprehension/ relational understanding" is a "powerful" concept, which implies a deep level of knowledge, but, can we define it in an unequivocal way? Can we even measure it?

In the "Relationators" tree at the end, we have the possible options for relating concepts. It can be seen that the quality of some is higher than that of others. Thus, "Extrinsic" relations are clearly of lower quality than "Intrinsic", "Semantic" relations are often below "Phenomenological", and in each group mentioned an assessment or "weight" of the different "Relationators" can also be established. But it would still be an agreed assessment. There is no need, it is not a competition.

For each concept it is simply a question of knowing how many relations it establishes with other concepts, disregarding this "weight", because we have concepts like "Form" that establishes directly more than 200 relations with other concepts*. See [C] and [V] (the second part). Knowing them gives a very high understanding of this concept (and also induces it to the related concepts), when more commonly in normal concepts we find half a dozen or a little more.

* Apart from transitive relationships of second, third, ... order, and/or those due to stepparents which will be seen in [.206].

In a school, what is the difference in understanding of a concept between the teacher and his student? Obviously the many more relationships that the teacher has.

So to measure understanding, a formula can even be proposed:

$$\text{Understanding of "Form"} \sum_{1}^{>200} (\text{relationators x quality or "weight" of the relationators})$$

which in this case of "Form" will be more than 200 if we do not go into the detail of the quality or "weight" of each relationator that intervenes. Or whatever if we valorate this quality.

The reader will hardly have found a similar definition, based on more than a hundred existing "relationators" ("relationators" that neither will not have found anywhere else, even taking into account that "relationators" are the specific faculties that make human knowledge possible).

"Generative Grammar" [.31D]

With all this chaos of absurdities that has been seen, how can a "Generative Grammar" be justified? Faced with the thousands and thousands of articles and books that have been generated, without resolving what was raised, little more than these half a dozen articles are enough (https://vixra.org/author/carles_udina_i_cobo).

THE METHOD (LEVEL 4) [.32]

In level 1 we started from many identifiers, for example all those things that move by themselves and react to our actions (animals). Among them, the child quickly abstracts the property of some, consisting of being able to fly, a faculty forbidden to the rest of vertebrates, humans included: we have the "Birds".

It is what happens a few years later when the child has a lot of knowledge, for example, what:

"to pass an obstacle you have to jump"
(jumping is the condition for passing the obstacle, or vice versa, passing it implies jumping).

If the child focuses on the associated process, the process of jumping, of seeing many jumps, he comes to perceive that there are different ways of jumping. All these jumps, all these processes are like the identifiers that led to the concepts of level 1, only now they are not identifiers but processes (associated with knowledge). What the child abstracts and memorizes are no longer properties of a thing but a certain way of jumping, a process differentiated from others.

The result of these abstractions is not a level 1 concept either, but a methodological element, a technique, a way of doing the process. For example the in the high jump, the "ventral roll", or the "FOSBURY jump", more efficient but more difficult.

It is the same procedure that allows obtaining level 1, but based on knowledge of its associated processes. The difficulty is not in the constructive-abstract procedure that can be done from the age of two or less, but in the starting elements: the knowledge of the processes.

The result is fully virtual concepts:

"Organization", "Planning", "Inertial element", "Interdisciplinarity", "Representation", "Symptom", "Prospection", "Criterion", "Analysis", "Synthesis", "Criticism", "Theory", "Catalysis", "Intermediation", ...

Does this deserve to be considered a new level? Yes, that's all. So much so that children only begin to be able to perceive the first methodological elements and try to manage them, until the age of 10* **. And many adults have serious difficulties in exercising it. For example, a scholar does not necessarily have matured this level. A real expert has it matured in his area of expertise but not necessarily in another.

* A child starts his first conceptualizations of elements of the method around the age of 10, as I noticed with my son when I went to buy him his first school diary. What did he mean? Well, the concept of "Organization" would begin to mature through the sensitivities of its agenda. That's why we went to celebrate. Isn't this beginning more important than, for example, the "First Communion"?
** A young child can be made to use a method-level conceptualization like "Theory", but just because he talks to her doesn't mean he understands her, he talks like a parrot. It is the inadequacy of teaching "theories", such as that of sets or whatever, to a small child, as discussed in "Modern Mathematic" [.2190].

We can associate the method level with research, development, but that too, as long as results are obtained... The reader will be surprised to know that the "exact" formulas of physics do not belong to the method level because they do not describe processes, they only calculate effects (see [3]).

Transfer of methodological elements between different structural levels. [.320]

An assembly line is an integration of automatisms. Having been able to design/define and structure an assembly line requires expertise and a lot of knowledge, a lot of methodology.

But it is another very different thing to produce it. For it to work only the skills of the operators are needed, the faster and more reliable the better. A skill allows you to carry out a process, a methodological element, but it has nothing to do with your understanding. If we want to place the "Skill" in the levels of thought that we are seeing, we don't even need level 1, because a skill is an automatism, far removed from any exercise of thought, from any effect of thought. It's not even a level 0 identifier.

We do the opposite. A person, for example someone who because of his skills works on an assembly line, seeing it already assembled, comes to understand it and one day abstracts errors or deficiencies in the chain, which could be corrected and give way to a chain, to a different and better process. This, step by step, is how technology usually progresses: progressive optimization, continuous correction of small errors.

Another equally clear example is the difference between:

- use a computer –or an affordable computer game–, which any child can do, i
- understand how all that technological wonder can work, which today very few people know in detail, from top to bottom.

The conclusion that interests us is the following: the difficulty is in discovering. Using, copying, or even improving, is something else much easier. Any particular method can be used by a person even if he does not understand it. The realization of a method is a simple skill: an extraordinary qualitative contrast, between a simple automatism, a skill, and a complex, methodological understanding.

The clearest example of transfer between levels of different systems is the case of instincts, which are transferred from genetic information, and is explained in detail in [12].

Having understood all this, the reader will be able to accept more readily that this use and copying are not extraordinarily intelligent manifestations. Any person can do it, but also other less evolved beings, and even much simpler structures. Well, it turns out that this possibility of copying or application is a particular case of the aforementioned "Transfer of methodological elements between structural levels".

It is a phenomenon as repeated as it is ignored according to which, a technique, a process that occurs at a structural level (for example the semipermeable membrane of bacteria) can be reproduced, improved and even applied, in higher structures. For example, the discrimination that allows the semi-permeable membrane could be copied applied and recycled for purposes other than the initial one. It could be copied or applied, by all living things that have been based on bacteria, that is, by all living things.

For example, as a relay, the semi-permeable membrane could be the last material support for classification processes of the psyche, the basis of conceptualization. And if it is not, another similar one will be.

If the reader seems exaggerated, an example will make him think. An example that I found many years after finding so many other examples, that already in 1996 made me recognize and define this process of transfer.

The "Bacterial flagellum" is an example of what could be a clear result, chained, of the phenomenon of the "Transfer of methodological elements between structural levels", a success of protein technology nearly 4 000 years old, precursor of the 19th century electric motor. In the 19th century it was 100 years before we heard about the Flagels, but the man designed a widget exactly the same, with shaft, rotor, stator and bearings.
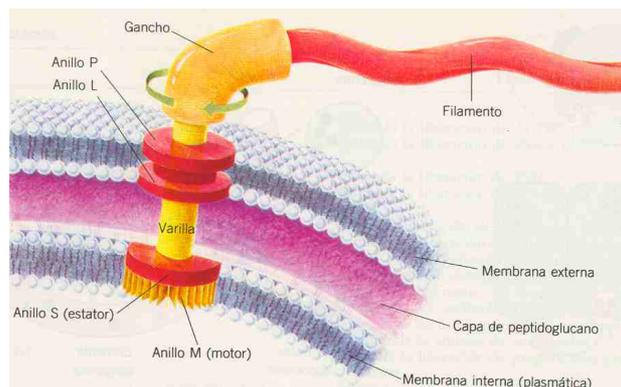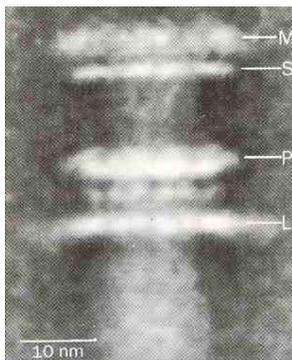
Any technological invention achieved by man, it is quite easy for it to have an analogous replica of the function of some protein.

Proteins are the technology of living things. There are almost infinite proteins, so scientists have serious problems in classifying them.

On the other hand, proteins are another example of complexation processes, but above all, of a complexation in a three-dimensional structure that is defined -that is, represented- by the language of DNA (see Annex "Complexation processes"). "Complexity", "Language", "Three-dimensional", "Transference", "Representation", "Knowledge", ..., it all ties in.

The intuition. [.3200]

The best paradigm of methodological transferability is possibly intuition: a "Cognitive, non-emotional and non-conscious feeling, which is nourished by information relating to the management by the Psyche of our material functional structures and by the expertise that can result from phenomenological perception". "Expertise" understood not only as experience accumulated through work or dedication, but also experience that entails understanding. See "Intelligence" [.3261] further on, and [4].

It is a definition far removed from the characteristics creationist of "infused" science assigned to it by all general and/or psychology dictionaries such as:
   - "Direct and immediate knowledge (without intermediary)" (L.-M. MORFEAUX);
   - "Immediate cognition" (Dic. FABRA);
   - "Kind of faculty of instinctive success" (DEC). It is the least incorrect of the three, because, where is the link between genetic instincts and the psyche to make this statement? Strictly speaking, the definition does not intend this either, it is a summary of the frequent definitions of intuition by analogy with the speed and non-rationality of instincts, but then, an analogy, a "sort of", is not a definition.
definitions, all of them, that confirm the ignorance of our own knowledge, already commented on from the beginning.

The wisdom of nature. [.3201]

The widespread intuition in the scientific world of the "Wisdom of Nature", is a conclusion reached by many scientists, but without being able to give any justification. That is why those who do not perceive it - above all those who think that man is different, that it is the icing on some cake - say that it is just another opinion.

This wisdom exists and begins to be explained with this methodological transferability, a phenomenon that can be described in detail from the "Symbolic systems".

Oriental wisdom. Cultural integration. The universal science.[.3202]

The gains of so-called Western technology, of "the Occident", has led to an arrogance of this civilization/culture over all others (colonialism). Even towards cultures as developed as the Orientals ones.

The attitude of one and another culture regarding the ignorance expressed at the beginning –ignorance of our internal process of knowledge– has been equally contrasted:

   Our "Occidental" civilization totally ignores it –"who can't reaches to catch, says they're green"– or as a reaction trivializes it with incoherent, almost absurd theories and research. A clear enough example is in intuition, the indefiniteness of which has just been seen. Another is to propose a "Third culture", faced with the impotence of integrating the sciences with the letters, technology with humanism.

   On the contrary, the knowledge of "Oriental" civilization is based on inner knowledge, on the awareness of oneself and all its parts, on the enrichment of one's own person. Whether or not the reason is known, the truth is that acupuncture, foot reflexology*, telepathy and/or so-called "Energy centers"** work, regardless of whether or not you know why.

   *   Precisely, [2] explains how it works.
   **   Another confusing polysemy, since they do not accumulate "energy" (there is no contradiction with thermodynamics), they simply "manage" the places where energy acts. If it were said "Energy Activity Management Centers", everyone would understand it correctly and without contradictions.

The definition of intuition that we have just seen, also "works" and is unequivocal, and you can also know the "why?".   Because it is based on the "Transferability of the method" and on the "Phenomenological Perception", two facts.   Simply the definition of intuition appears as a result of an intrinsic research approach. In other words, it allows us to seriously integrate Occidental technology and knowledge with Oriental wisdom.

All that has been exposed so far is the door to the "universal science" which LEIBNITZ sensed, or long before LLULL's tree of wisdom.

Applications of the method. [.321]

As the method level results from a process analogous to the formation of level 1, but using knowledge instead of identifiers, is there a process analogous to that of the formation of level 2, but using knowledge?

Well, yes, it is the composition of knowledge, with which a composite knowledge is obtained. But in the same way that if you don't do it right, demagoguery appears in level 2, here, if you don't do it right, the mistakes and absurdities turn out to be even bigger, more demagogic*.

* "Small differences in the initial conditions generate very large differences in the resulting effects, and the slightest error in identifying the former causes an enormous error in identifying the latter" (Henry POINCARÉ).

It is clear that the "way to do" the compositions so that they are correct competes with the method, it is a "methodological element" (a technique, a procedure, ...).

Reasoning. Logic. Axiomatics. [.3210]

Generically, we will define a reasoning as a methodological element applied to one (or more than one) knowledge/s, to obtain a new inferred knowledge. This new inferred knowledge would be analogous to the composite/virtual concept, in that it no longer originates directly from some phenomenological image.

In mathematical notation it would be written:

   Reasoning ={Methodological element (knowledge/s)}   (=the set of methodological elements applied to knowledge)

Logic (has already been seen in [31B]) is operations/processes of this type.

Axiomatic is a logical structuring, usually tree-like (otherwise thought has few references), made with these operations/processes.

Having arrived here, after a long and laborious path that takes many years for the child, it is understood that what could be called "Self-generating Systems" are not justifiable in the field of so-called "Mathematical Formalism". No matter how complex its demonstration is, the Theorem of non-decidability of GÖDEL [="un-entscheid-bare"]), is of common sense. The child does not "hatch" speech by divine intuition or by some supposed genetic mutation 40 000 years ago, language is a continuous process that was already initiated by arthropods with sensitive identification, and in many mammals with sensitive conceptuation. Knowledge and language are not closed, self-generated processes, just as neither are logic or axiomatics. It has been seen that it is a "*continuum*", an evolution parallel to that of living beings. Miracles are for religions, not for science.

By itself, the existence of the Conceptual System and the progression of knowledge in children, highlights the absurdity of all these "creationist" approaches.

It is surprising that a mathematician as extraordinary as HILBERT did not take into account the unquestionable evolutionary contribution of DARWIN, addressing creationist approaches in to mathematics. It means suddenly forgetting where one has come from, through many years and many processes of progressive complexity, done step by step.

Self-Applications.[.322]

With the definition of "Application", already set out in "The generation of Knowledge" [.313] ("use of one thing as a means to process other things"), an "Self-Application" is an obvious concept by its very name. It will be the application to oneself. In other words, it is the use of a process "A" (not just anything) to process "A". It is an "A" process made with "A". It should not be confused with reprocessing (=doing the same process again).

Two well-known examples help a lot:

- a sum of sums, i.e. a multiplication;
- a multiplication of multiplications, that is to say, a potentiation-exponentiation;

and as a sample, the expression 9^{9^9} an unreal, virtual quantity, existing only in our minds, because there is nothing in that great quantity, not even the number of protons or particles assumed in the entire universe. It is equivalent, approximately so that the reader can do the calculation, to 10 raised to a number of 9 digits, that is to say, to a number of about 400 million zeros, which in the decimal number system and with this font size it would occupy 2 000 kilometers!! 100 000 pages with zeros, a whole library.

It is difficult to find or define a self-application, but when it is possible, a resource of exceptional/efficiency power, appears (this may be where the name "enhancement" comes from). There are many other examples that make it clear enough:

- the molecules that act as links between molecules;
- polymerization (a particular case of the above);
- the DNA nucleic acid (a combination of the two previous ones) that allows the generation of life information and, in general, life itself (a huge integration of self-applications);
- a set of organisms that make up a single, more complex organism, like a coral reef (a living organism that is visible from millions of kilometers away from Earth), like a swarm, like an anthill or like human society ;
- the composition of processes (a process of processes), the composition of mathematical applications and/or mathematical functions (a specific case of the composition of processes);
- an algebraic matrix (a quantity of quantities);
- the representation of systems (a system is already, by definition, a representation), the algebraic representation (a specific case of the representation of systems);
- a metadata (data that defines and characterizes the data);
- the symbolic support of information (information is already symbolic), such as symbolic systems with symbolic support, of which Psyche is the most developed and known and which integrates the largest part of life's self-applications;
- the "Thought Loop";
- "consciousness(-raisin)" (an integrative feeling of feelings); self- consciousness; such as body-consciousness (see [2]);
- the method as level 4 of thought, a knowledge of knowledge;
- universal science (as advocated by LLULL and formulated by LEIBNITZ, a meta-science, intrinsically methodological, from which all sciences are derived as particular applications);
- a judicial appeal (a prosecution to a process, the basic element of a judicial system);
- an indicator of the evolution of an indicator;
- the software (=software) to develop new software, such as the tools of the fourth generation for the development of the software ("4GL Tools") and in general the engineering of the software for the same software without which it would be absolutely unthinkable current level of software development;

And, as in many of the other "black holes" of culture already mentioned (relatability, phenomenology, intrinsic methodology, ...), I have not yet found any place where this "Self-Applications" is made clear, a resource of such methodological significance.

Why so much introduction? First of all, because self-application is one of the outstanding characteristics of consciousness [2], a sentimentive faculty that is intimately associated with thought.

And also, because if the reader remembers, many of these self-applications are already present in the conceptual system, which represents the structuring of knowledge: "System", "Metadata", "Algebraic matrix", "Representation of systems", "Composition", ... but in addition , the conceptual system has seven specific self-applications* **:

0) the "Intrinsic tree of relations", because it is an application of a relationator, that the relationator of equivalence, to all relationability, in order to classify it (R/R$_{equiv.}$ in [.311]);
1) the typology of relationships ("Inter-evolutionary" or "normal/non-interevolutionary", level of application, ..., see [.13020] in [2], or 2.1. in [D], or [9]), another perspective of classification of relationability than with the previous "Intrinsic tree of relationships", allows knowledge to be structured; and allows representing the "Tree of existential systems" of[.327];

2) the structuring of knowledge, an application of intrinsic relationships (a part of the concepts of level 2), to all concepts;

3) the "Terminations" of 3 years old children, a few set of relations usefully applied to all concepts;

4) the local tree of denominations, an application of the small tree of languages to each concept;

5) the intrinsic relations between the intrinsic relations, what I call "exact logical procedures of reasoning" (see [9]), for example, from a relation of "Implication" a**R**b (or the inverse of "Condition" b**R**$^{-1}$a), results in the implication that the domain associated with "a" belongs to the domain associated with "b" (the other way around with the "Condition")***;

6) the "Composition of knowledge"**** (the "Reasoning", the "Logic", the "Axiomatics", ...).

* 0), 1), 2), 3) and 4) are self-applying, but partial (only part of "A", applies to "A")

** If we observe that a Step to Dual supposes a Metadata (see [3]) and that a Metadata is an Self-Application, it is therefore understood that 2), 3) and 4) are Self-Applications, as they are Steps to Dual.

*** For example, if "Info" implies "Data" (or data is a necessary condition for the existence of information), then "the domain associated with the information **belongs to, is included in** the domain associated with the data" (or "the associated domain to the data **includes** at associated domain to the information").

**** It is clear that it has existed for thousands of years, but not as an exactly representable and simulable structure.

Final Metadata. [.323]

If at the beginning, only with the construction of the conceptuation tree, a metadata was already formed, with the tree filled with all the other resources that have been seen and that have been summarized in the previous self-applications , we have a metadata that is an intrinsic representation of knowledge and thought.

System. [.324]

So much talk about "System" from the beginning, and it is still to be defined... A system is a "set of underdependent elements". In other words, complex elements, characterized by dynamic states that vary depending on the states of the other elements.

Man is full of systems, the nervous system, the lymphatic system, ... and all of him is a complex system of systems. Any living being is. The Biosphere (Gaia), an ecosystem, ... A computer, a car, ... The Psyche, ... Human society, ...

Why is this concept important? Why is it the paradigmatic representative of reality and, by extension, of virtuality (because virtuality results from trying to represent reality), that is, of everything that exists.

Faced with the trivialization/banalization of "yes"-"no", "good"-"bad", ... current knowledge, culture, must necessarily use the system as the basis of any representation. Morality, the judicialization of behavior ("innocent"-"guilty") are intolerant, archaic and anachronistic treatments of reality, although it is the most common situation and even worse, official dogmatics.

The perception of the system concept is not difficult per se, but it is because of culturization, which –due to the already mentioned trivialization/banalization of our culture– represses complexity and their interdependent relationships.

As has been said from the beginning, if knowledge can represent all of reality, it would be absurd to think that it is not a system as powerful as or more powerful than the reality it represents.

How is this possible? For versatility and possibilities of complexing the psyche, based solely and exclusively on its characteristic of "Symbolic system to symbolic support" (see [2]). This versatile and complexly limitless is a feature impossible in non-symbolic material systems, or even in materially supported symbolic systems (genetics, hormones, …).

This is why it is totally useless –an absolute waste of time– all current attempts to understand the functioning of knowledge, thought or the psyche in general, from exclusively neurological or biological bases, a strategy that characterizes all current institutional attempts and that's why they don't succeed.

Thought [.325]

I call "Thought" the <u>conceptualizables levels</u> *:

    1 (Sensitive Concepts),
    2 (Composite/Virtual Concepts),
    3 (Strict Knowledge, relational, comprehensive), and
    4 (Method),
    (**5**) as well as its applications (Reasoning, Logic, ...)..

* A theorem or theory, no matter how complex it is and the many pieces of knowledge it incorporates, is still a concept in itself, with its corresponding name: "Theory of evolution".

Why? On the one hand, because it is a totally precise, exact definition, which corresponds to an unequivocally defined structure, which describes all the so-called "superior" mental processes that man does. There is no other known than the previous ones.

On the other hand, because it specifies what is traditionally understood by thought in an ambiguous way. In other words, the exercise of mental faculties highly developed by man, very complex, in support of communication (culture and language), which allow us to conceptualize, know, reason and, consequently, think.

Anything other than that is not thought. They are not "Thought", but faculties prior to it, sentimental manifestations (affections, emotions, intuitions, ..., including opinions and beliefs), perceptive and sensitive manifestations. If we observe on the street, in a bar, in the "Metro", on the bus, on TV, 80% of the conversations hardly use concepts, they only deal with static identifiers (level **00**, like people) and phenomenological identifiers (level **01**, like facts, events).

Disambiguation. Memory. Intelligence and "Artificial Intelligence" (=AI). Brain. [.326]

English has a word "Acquaintance", which could be translated as "Face-to-face or colloquial knowledge". It has no equivalent in Catalan (nor in Spanish), where we simply say "to know". "Knowing" only through the press and/or television, is an even poorer type of "knowledge". This knowledge is very different from relational "Knowledge" ("a**R**b") that we described before.

Thus "Acquaintance" would strictly be a phenomenological/factual Identifier, which we have classified as sub-level 01, prior to strict conceptuation. From here, it is clear that with continued treatment, the initial phenomenological identification can become a strict relational knowledge of level 3, more or less correct, more or less profound, according to the psychological perception of the observer.

Consequently "Knowledge" is a <u>polysemy that can represent very different processes</u>. This is one of the many reasons why it is difficult to understand what knowledge is. First it is necessary to disambiguate, distinguishing the many different concepts that we abusively represent with this same word. I remember that in the 90s, I used "Knowledge of reality" to avoid confusion. I understood myself, although it was not entirely correct, because the name forgets the knowledge of what is not real but virtual. The correct one is "Knowledge (relational/comprehensive)".

"Define and you won't argue" (Jaume BALMES). This is so clear for mathematics (and for computer science) to start by defining the variables, language does not - nor does it want to - do. But it is of dire consequences for thought. It has often been said about "polysemy" (to "Terminology"[.213], to[.2162], to[.311]), and now is not the time (see [10]).

However, it is necessary to note <u>three serious polysemys</u>: Memory, Intelligence and Brain.

Memory.[.3260]

The first, that of "Memory", because in man many completely different memories coincide and that is why they are often confused:

- Genetic memory (and some type of protein memory and hormonal memory);
- Psychomotor/ reflex memory;
- Sensitive and sensory memory;
- Perceptual memory;
- Sentimentative memory (with all the "Unconscious", much more extensive than the conscious);
- Conscious memory, which is only a part, the most superficial, of the set of memories that are also characterized by interaction* among them. For example, the well-known interaction between conscious and unconscious memory, but also the processes of somatization, the reverse of the previous ones, the passage of genetic instincts to unconscious memory, etc. etc. etc.

  * Work investigating some of these interactions is currently beginning to be recognized (with Nobel Prizes, etc.).

Intelligence.[.3261]

The second polysemy is "Intelligence". The problem is not that there are different definitions of intelligence. The problem is that many of them define faculties that have nothing to do with each other. For example, intelligence "tests" measure simple cultural skills (this was just discussed in "Method" [.32]) but do not measure anything related to strict intelligence (such as distinguished, higher faculty).

I do not go into this matter except to note that artificial intelligence, as has already been said ("Where can you find...? heuristic" [.204]), did not even bother to resolve this polysemy. And that in a sufficiently "worthy" definition of intelligence (see [4]) it can be deduced that it is not computerizable, neither for theoretical reasons (it is a complex intuitive non-emotional feeling, not representable by an unequivocally definable structure), nor for practical-economic reasons (which are even more conditioning for society*).

* It would be more economical to select some smart people (as defined in [4]), and ask them directly.

Very briefly, so as not to quote paragraphs from [4], it can be said that intelligence is "relational intuitiveness-spontaneous, applied to knowledge".

What, then, is computerizable of the higher mental/psychic faculties? Well, you can only simulate computerically what is representable, that is, up to reasoning and logic, ..., but as long as it is done in support of the exact concepts of a conceptual system. Intelligence and consciousness(-raising) are outside this representability (see [2] and [4]). Trying to do so is a sign of ignorance of these faculties. The computer is very fast, extraordinarily fast, but it only does what it is told, and if it is told very well, because otherwise, it makes mistakes or "hangs" as often happens with much simpler processes.

The reader will think that he is more and more confused. Not at all, things are the way they are. You also don't need to know physics, chemistry, biology, etc, etc, etc, for things to work. Reality works forever whether we understand it or not. What is needed is not to make mistakes due to ignorance or stupidity. How pretend to fly from an eighth floor and not to admit gravity. A similar attitude, of arrogance, is what Artificial Intelligence had in the 80s, creating false expectations and damaging huge human and economic resources of which only a very small part has been recovered, by recycling them (the recognition and automatisms, but as we have seen, they have nothing to do with intelligence).

Brain or Psyche. [.3262]

The third polysemy is that of "Brain". It strictly starts with a poly-denomination (giving more than one word to a single concept). This does not present much of a problem (it just "takes up" one bit more memory), unless one of the denominations is combined with a polysemy, as it often happens.

With the word "Brain" this happens. In mental processes, the "Psyche" is also called the "Brain", but this word strictly represents something else, the "Brain", what is inside the skull. Of course the brain supports the mind, but they are completely different things. Information is one thing, the symbolic systems with symbolic

support that make up the psyche; another very different thing is the material support that is ultimately necessary to support them.

Nobody thinks of copying a computer program by putting voltmeters in the hardware (see "Where can you find...? heuristic" [.204]). But many scientists use the microscope –that is, neurology, biology– to analyze the psyche, even Nobel Prize winners and renowned scientific institutions.

One more reasoning. If the computer has hardware and software, it will be because man has this same structure, why the copy. In another case, man, how could he build and manage a machine alien to his own structure, with a structure that was not at all consistent/compatible with his own mental schemes? It is a matter of common sense, without even needing to enter into arguments of versatility, the characteristic of the psyche already mentioned, versatility that is unattainable by material systems or with material support (see "Relatationability" [.31], "System" [.324]).

Demagoguery. [.3263]

It is the great trap of language (see the serious misunderstanding about "natural language" in the translated part of [.204]).

The first cause is formal, from the structure of thought. It results from the obvious fact that although we can make any combinations of words, this does not mean that a compound element always results, strictly speaking. There is not always an "emergence" of a new concept. We could also try to put two or three electrons together, but nothing more than a useless attempt will ever result, because their existence is not possible. Language does not respect this reality of representation, and any combination is accepted, no matter how absurd.

An example is the misuse of the operator intersection (a "Relationator"). Does "Southern Siberia" exist? Only this linguistic sign exists, like a simple drawing, because all of Siberia is in the northern hemisphere. There is no associated concept.

In demagoguery the linguistic sign exists –just as there is any drawing or scribble we can make– but the sign is empty of conceptual content. Many examples are common even in the scientific field: "Virtual Reality" (real and virtual are two disjoint concepts, without intersection, because precisely their union is all that exists, so they have no intersection/content, another thing would be to simply say "virtuality"), "Chaos Theories", "Emotional Intelligence", "Multiple Intelligences", ... (see [3]). And many others.

Concepts such as synonymy must disappear due to ambiguity, replaced by relationators such as intersection, contiguity, analogy, ...

The trap of SOKAL and BRICKMONT, highlighting well-known intellectual referents, shows us how easily demagogy can be practiced even in scientific fields. It is due to the deficient conceptuation (anachronism of current dictionaries) and the lack of knowledge of how we structure thought and language.

But there is a much deeper and more important problem. In [2] "What is consciousness(-raising)?", in [.160] "Relationship between consciousness and thought" it is explained that from the same sensitive consciousness, local processes of consciousness are carried out, that is, in each "Thought Loop", when "ruminating". Consciousness, like thought, are complexations of senses, perceptions and feelings. Three-year-old children, unconsciously, manage phenomenological relatationability with the "Terminations" (see [D]). In other words, the relationship with the unconscious is as or more important than with the conscious. Also in [D] we see that the "synapses", responsible for "How the brain decides what to remember", are managed by the unconscious, something unimaginable by neurology. In short, the unconscious governs our thinking.

There are still "flat-earthers", but I don't know any "romanists", that is, someone who ignores the use of decimal positional numeration, and makes calculations in their daily lives with Roman numerals. No one complains about not being able to say that "2 and 2 are 5", as a lack of freedom imposed by mathematics. On the contrary, this rigor leads to the development of a continuum of models of maximum utility with mathematics.

"Thinking", is a skill linked to feelings, consciosness and psychomotricity (see [2]), but also to mathematical calculation. Since it is a skill, a methodology, it should therefore be done in the most optimal way possible. Just as we are taught to count and calculate with positional numerical systems, we should be taught the best way to think (with the Characteristica universalis simulated by a Conceptual System), and forget about alphabetical dictionaries and one-dimensional texts (pages, Web pages, articles, ...).

By saying that we need "Freedom to think"* we fall into confusion due to the above. What is needed is the freedom to "sentimentar", and this is what is repeatedly repressed.

* Freedom to think as long as it does not result in actions that compromise the freedom of others, and based on a framework of tolerance that excludes intolerance.

Starting with the very werb "sentimentar" (="feelen") or the adjective/abstraction "sentimentatiu" (="feeling"), which does not exist in Catalan or Spanish-castillian, nor in English, it is implicitly censored. In English there is confusion: there is "feelings" distinct from "senses" (which at the same time is confused with perception), but their corresponding actions are confused, having senses is called "to feel", not "sensing". So, how can we refer to having feelings without confusing it with having senses? A jumble of words that the unconscious mind prevents from thinking correctly. It is obvious that in the Middle Ages and the Renaissance, there was no fucking idea of psychology. It is obvious that in the Middle Ages and the Renaissance, there was no fucking idea of psychology. As they say in translated [.204], the language called "natural" is not natural at all.

In the 21st century, it would be time to speak correctly, differentiating and not crudely mixing what is related to psychomotor skills (reflexes), the senses (sensitive, sensorial, sensing, sensen) and feelings (feeling, feelen). They are completely different faculties at a basic level.

We could continue with other deeply rooted unconscious cultural repressions that condition thought, such as about sex and masculinity. Why has language been sexualized with grammatical gender? If most things are neutral, they have no gender, why do we assign them whether they are masculine or feminine? The use of the neutral gender is necessary, and only use the masculine or feminine gender when it explicitly deals with sexed concepts.

The most paradigmatic case of linguistic machismo is that of "Man" as a species. "Woman" is commonly used, but never "male", but "Man", which implies relegating women to the marginal, to the inferior. It would be good if linguists, duly advised by psychologists or psychoanalysts, carried out etymological studies in each language, of the reasons why a concept has been assigned the masculine or feminine gender.

NT: lately in speeches makes the redundancies "boys and girls", "workers and workers", "researchers and researchers", ... trying to make an equalization, but the result is a new differentiating sexualization.

The need for global linguistic normalization mentioned in [.208] is clear.

If thinking is a skill, a methodology, how is it possible that people can think in such different ways, even totally contradictory ones? Simply because their thoughts have been built on different feelings and experiences, even contradictory ones, that surface in the thought.

There has been talk of stupidity. It is not an insult, it is an all-too-frequent reaction. Stupidity is the absurd/incorrect use of a thought uncontrolled by the unconscious, to repress the cognitive feelings from which it is derived, such as intuition and "Common Sense" (a feeling, not a sense). A self-destructive attitude.

Without reaching the previous limit, the truth is that we are not free to think, but not because someone prevents us from doing so, but rather because we ourselves limit ourselves. Learning, thinking and communicating with implicit support of a Characteristica universalis (I insist, without renouncing any language) would help us to be less stupid, and even more intelligent.

Global model of the psyche. Tree of existential systems. [.327]

Having said all of the above, it is clear that a framework is needed, a "Global model of the Psyche" that harmonizes all the known mental manifestations (sensations, psychomotor, feelings, memories, thinking, ...). This is the very brief diagram, illustrative of this model, from the next page. See also [A].

With the successive use of comprehensive partition criteria ("stepfathers"), we can establish a tree as large as we want, and with one basic characteristic: everything is related by first-order logical predicates/ propositions. This is independent from the relations that can be established between any two elements of the tree as distant as we want, by means of the hundreds of "Relationators" (I insist, the specific faculties of knowledge) already commented on and which are listed in [.33], for example, "Sociability "**Implies** Coexistence" (a**R**b), or the inverse/hemisymmetrical relation, "Coexistence **is a Condition for** Sociability" (b**R^{-1}**a).

This tree contains as elements the different systems that exist, and is characterized by the fact that any of these system-elements of the tree results from some other previous system through complexation processes.

LLULL's contribution with his "Arbor Scientiae" (=Tree of Science) of 1295, was a revolutionary proposal of a tree-like _continuum_ of all knowledge. The structure that allows Ramon LLULL's tree to be represented and managed is the "Characteristica universalis" (the described "Conceptual System"), in its tree perspective that conforms to the exact definition of the concepts, and their intrinsic relationships between them. Schematically, it is the three-dimensional cognitive Space represented in [.21B4].

It is good to note that in the construction of this tree of concepts, knowledge and methods, that of the Conceptual System or the "Arbor Scientiae", there is a relevant and essential "Relationator" (see [.33]), the:

 "Later phenomenon (in a complex succession of phenomena)"

or its inverse/hemisymmetric "Previous phenomenon (in a ....)", which allows the important "Examples of complexation processes" from [204], but which the reader will hardly have explicitly encountered before.

In this way it is concluded that anything that exists,
   - or it is an element,
   - or it is an interaction (and/or an arbitrary combination that we consciously make)
   - or it is one of the systems that form this tree*.
What are we talking about? (define and you will not argue, BALMES). A condition that further favors the exactitude of the conceptualization tree, and gives another complementary criterion for the recovery of concepts and knowledge.

* It is a very powerful disambiguating and anti-demagogic criterion, which for that very reason would prevent the repetitions, absurdities and/or lack of content of most speeches, texts, books, and even a large part of magazines scientific Criterion that, if used, would mean a significant saving of time, paper, and in the future, Internet queries.

THE GLOBAL MODEL OF PSYCHE
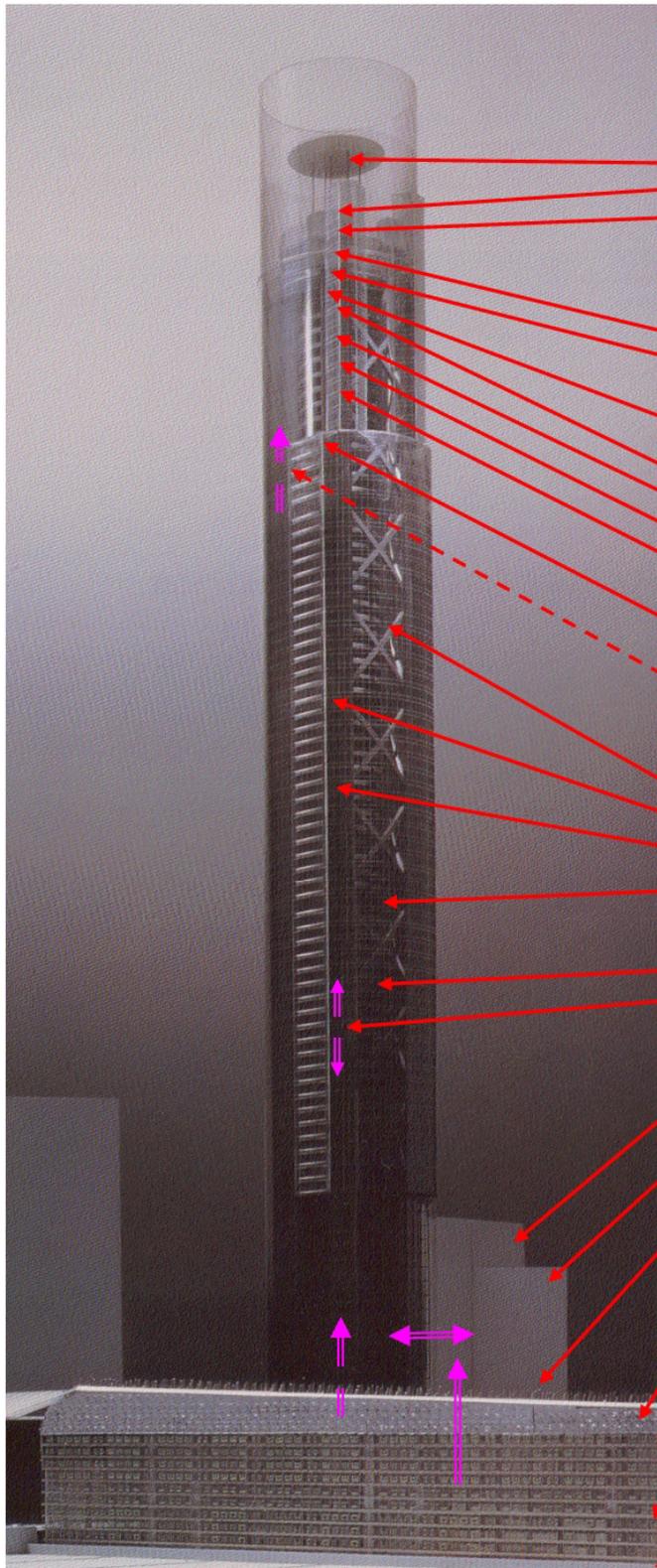
THE SYMBOLIC SYSTEMS OF LIFE
(The different Semiologies)

PSYCHE
NOT INTRINSIC
(-M, +S, -N (no natural stability))
politics Economy
Current Logic and Reasoning.
Linguistic grammar and syntax.

SEMI-INTRINSIC (-M, +S,±N (↑ with increasing inestability))
Exact logic and reasoning
Mathematics (Numerical systems, Geometrical and topological algebraic structures, ...)
Intrinsic semantics (Conceptual systems)

THOUGHT (-M, +S, +N)
- Level 4 (Method)
- Level 3 (Knowledge)
- Level 2 (Composite/abstract conception)
- Level 1 (Simple/sensitive conception)

CONSCIOUSNESS (-M, +S, +N) (Conscious Memory)
↑ Interpretation of dreams
UNCONSCIOUSNESS

FEELINGS (-M, +S, +N) (Unconscious memory)
intuition
emotions traumas
affections

PERCEPTION ↑↓

INSTINCTS AND SENSATIONS (Reflex memory)
Sensitive images
Identification (=Thinking Level 0, Sign Management Level 00 (Artificial Intelligence))

HORMONAL CODING (+M, +S, +N)
  (Immune system, ...)
  - Coding of n-Grouping of Proteins
  ...
  - Coding of cellular proteins

GENETIC CODING (+M, +S, +N)
  - Gen
  - n-Grouping of Codons (Instincts, Hereditary Forms, ...)
  ...
  - Second Grouping of Codons (="Phrases" = =Interpretation of Proteins)
  - First Grouping of Codons ="Words" = =Interpretation of Amino Acids)
  - Codo (triad of carbon bases = "letters")
  - Carbon bases of DNA

"Tour sans fin" project (Paris - La Defense) Architect: Jean NOUVEL.
Photo: Georges FESSY ("El Croquis" 65/66)

⟷ are transfers of methodological information.

TREE OF THE "RELATIONATORS" OF KNOWLEDGE. **TERMINATIONS** [.33]

The reader can see that many of the relationships are minimally <u>familiar</u>, and in many cases can imagine how the relationship is made without even reading the detailed explanations of each one. In relation to children, they can be <u>achieved progressively</u> according to age (see [C], [D], ...).

So there are 56 hemi-symmetrical or reversible ones (112 in total) and 18 symmetrical ones, 74 in total (130 with the inverses), although 6 (12 with the inverses) of the Terminations are strictly equal to 6 other phenomenological ones, we would thus have only **68** (**118** with the inverses).

Since its deduction in 1996 [1], to represent any knowledge, even the most complex and scientific, I have not needed any other relationator. On the contrary, some are very uncommon, so that the most common are little more than half.

If we return to PIAGET's "Operational Psychology", the mathematical formulation of the cognitive processes that I wanted to find, the possible "operations" are all these "relationators" that allow us to represent any knowledge, no matter how complex it is.

NOTE 1: In parentheses ( ), the inverse relationship. Explanations are in italics and inside { } signs

"EVOLUTIVE INTERACTIONS" (=OPERATIONS BETWEEN DIFFERENT LEVELS)

Level 1
∃∈ Includes strictly/ actually/ materially a ... (Real part/ Material component of ...)

a ... z Generic Equivalence Relation {for Level 1 generation}

♂ Mother's partitioning criterion ... (Siblings' delimiting criterion ...) {="Stepfather"}

Level 200
∪∪ Definer by Semantic Union of ... (Defined by Semantic Union with ...)

∪ Set of Concepts defined enumeratively

Level 201
∩∩ Definer by Intersection, of ... (Defined by Intersection, with ...)

complementary

See also ⟩⟨ "Real/phenomenological complement" and also ⟩⟨ the "Antonym/ Opposite/ Complement/ Linguistic inverse", in the "Terminations"

Level 202
C C Definer by Composition, of the son ... (Defined by Composition, with ...)

C C Definer by Adjective Composition, of son ... (Defined by Adjective Composition, with ...)

C C Definer by Composition of properties, of the child ... (Defined by Composition of own., with ...)

C C Definer by Composition, with prepositions, ... (Definitive by Comp. ... with prepositions, with ...)

Level 203
C C Definer by Operation, between different levels, of the son ... (Defined by Operation, between different levels, with ...)

Level 3
Transitive logical propositions {="*Composition of composite knowledge*"/ "*Logical reasoning*"}

Level 4
Generic Equivalence Relation {applied in Level 4 generation}
Differentiating criteria of the Ways/Processes/Techniques
Application of a methodological element to a knowledge
Exact logical reasoning procedures

PHENOMENOLOGICAL RELATIONATORS

Structural

C𝘍 C𝘍 Cause of the Phenomenon (Phenomenon with cause...)

A𝘍 A𝘍 Phenomenon Agent (Phenomenon with Agent...)

C𝘈 C𝘈 cause↔Agent (Agent↔cause)

𝘍E 𝘍E Effect of the Phenomenon(Phenomenon with effect...)

CE CE Cause of the Effect (Effect caused by...)

AE AE Agent of the Effect (Effect of Agent...)

Conditional

⇐ ⇒ "if" Sufficient Existence Condition (Implication)

⇚ ⇛ "iff" (yes and only yes) Exclusive Existence Condition (Exclusive Implication)

⇔ Double implication

A⇐ A⇒ Environmental condition (Environmental implication)

O⇐ O⇒ Operating condition (Operational involvement)

±⇐ ±⇒ Positive inertial element/ assist/ Catalyst

−⇐ −⇒ Negative inertial element/ obstacle / Retarder

✗ does not Condition   ✗ is Independent

Composition

FP Later phenomenon   FS Previous phenomenon (in a Succession of phenomena or in a Complexation Process)

Real component

∃ ∈ Includes (Belongs)

PHENOMENOLOGICAL RELATIONATORS MENTALIZED/ ELABORATED

Cognitive comprehensive/ understanding

✗ Contiguity

✗ Non-semantic real complement

A Analogy

A Analogous elements

M→ ←M Concept → Associated model (Model associated with the Concept)

↗ ↙ Conceptual Duality → Relationship (Relationship → Conceptual Duality)

Terminations (Semantic-phenomenological relations intuitively managed by children)

D D involves the Abstraction/Adjective associated to (Abstraction/Adjective associated with ...) {-ic, -tiu, -al}

F F has the Phenomenon/ Process associated with ... (Phenomenon/ Process associated with ...) {-tion, -ment}

H H has the associated Phenomenological Agent of ... (Phenomenological Agent derived from ...) {-ant, -ent}

B B has as Person/Profession associated with ... (Person/Profession derived from ...) {-leg, -asta}

G **G** has as Phenomenological Action of/ Gerund associated with ... (Action phenomenon./ Gerund ass. to ...) {-ant, -ent, -int}

S **S** can be ... {adjective} (Possibility derived from ... {adjective}) {-ble}

R **R** has the Property of being able to realize/become (Property of .../become, associates. to ...) {-ability}

N **N** has the way of proceeding to ... {Adverbial} (Way of proceeding associates. to ...) {-ment}

M **M** has as Property of the Way of proceeding to ... (Prop. of the Way ... associated with ...) {-ity, -era}

V **V** has a Action/ Verb associated with ... (Action/ Verb derived from ...) {-ar, -er, ir}

E **E** has the associated Phenomenological Effect of ... (Phenomenological Effect resulting from ...)

Q **Q** has as Quality, adjective or adverbial, to ... (Quality, adjective or adverb., result of ...) {-ized}

P **P** has as Resulting State {Adjective Participle} in ... (Resulting State {Participle ...} derived from ...) {-at, -it}

O **O** has as Set of Elements associated ... (Set of Elements associated with ...) {-ari, -atge}

L **L** has the Domain/ Scope/ Site associated with ... (... Site associated with ...) {the Site may be extrinsic} {-eria, -oteca}

J **J** has the Medium associated with ... (Medium associated with ...) {-dor}

↔ Inverse phenomenological/functional

R Reciprocal/corresponding elements

C **C** it is studied/ optimized with ... (Study/ Science/ Technique associated with ...) {*-ology*}

⇥⇤ Real/phenomenological complement

⇥⇤ Antonym, Opposite, Complement, Linguistic inverse ... {formed with prefixes such as a-, dis-, in-, ...}

A **A** Concept associated with the Etymological Affix / Root ... (Etymological Affix / Root associated with ...)

= **=** Concept with the Acronym ... (Concept Acronym ...)

T **T** has as Tendency/ Attitude/ Affection associated with ... (Tendency/ ... derived from ...) {-ism, -ophile, -philia}

Y **Y** has as Associated Material Object ... (Material Object associated with the Concept ...) {extrinsic}

Mathematical relationators

f(x) **f(x²)** etc. etc. etc. It is a very specialized and prolific subtree of relations-scientific formulas, not common in language, outside of this area.

SEMANTIC RELATIONATORS

Intrinsic semantic relationators

Inclusion/ Hierarchical Mother (Membership/ Hierarchical Son of ...) {Level 1 "legal" Mother – Son Relationships}

∋ (∈) Semantically includes ... (Semantically belongs to ...) {Mother - "Illegal" Child of Multiple Inheritance}

= Semantically equivalent concepts

⛔ Equivalent equivocal name: do not use {Polydenomination Warning}

See also ≠ "Don't Confuse" in "Extrinsic Semantic Relations"

∩ Semantic and/or phenomenological intersection

See also ⩀ (⩁) "Definition by Intersection ..." ("Defined by ...") in "Level 201"

(≠ Set of Differences between two Concepts)

See also "Terminations"

Extrinsic semantic relationatorss

H Historical/etymological interrelationship

H H Definer by Etymological Composition of ... (Defined by Etymological Composition with ...)

≢ Do not confuse {Polysemia or Quasipolysemia Warning}

Concept **‹-›** Associated extrinsic characteristic ... (Associated extrinsic characteristic **‹-›** Concept ...)

M M Concept **‹-›** Associated material ... (Material associated with the Concept ...)

U U Concept **‹-›** Scope of Application/ Use of the Concept ...)

G G Concept **‹-›** Geographical area of existence of the Concept ...

L L Concept/ Name **‹-›** Linguistic area/ language/ slang of existence of the Concept ...

P P Concept **‹-›** Social/professional field of existence of the Concept ...

O O Object **‹-›** Characteristic / Abstractable Property of the Object ...)

We note that these latter, the least intrinsic/important, are almost the only ones that linguistics deals with.

ANNEX: MOVED PARTS [.34]

Where can you find this new methodology to "label" concepts? Heuristic* [.204]

Just as there was no need to waste time redoing what was already well done (by BOOLE, by FREUD, by PIAGET, ...), all that was needed was a little <u>intuition</u> to glimpse the end point of the journey and take a shortcut direct: <u>analyze all the effects that result from human thought</u>* to <u>tidy</u> them up properly and try to draw conclusions from them. It is of the most elementary common sense, but I do not know that it had been done before, at least with an <u>intrinsic methodology</u>, with <u>inexcusable mathematical support and representation with symbolic systems</u>.

* Simulating knowledge is like copying a computer program. If we want to copy a computer program, no one will think of analyzing the hardware structure of the computer. If "Source Programs" cannot be stolen (the same as knowledge), then you will need to carefully analyze "what" the program does and try to reproduce it with the corresponding programming. The exact opposite is what is being done with knowledge and thought, with which neurological studies and proposals (neural networks), genetic hypotheses (the Chomskian proposals for language that the author himself has now abandoned), and even alleged creationist phenomena such as the "Human Revolution" some 40 000 years ago, have been made for many years.

I must also thank what the "French Mathematical School" had given me several years before, at university: the BOURBAKI collective and/or its individual members (CARTAN, DIUEDONNÉ, ..., GODEMENT , LANG, SCHWARTZ, ...), or other French mathematicians ranging from BLAQUIÈRE to GODBILLON. Without the help of algebraic geometry, tensor algebra or differential geometry I would not have been able to find anything.

It was the year 1987. Shocked to learn the postulates, criteria and methodologies with which the so-called "Artificial Intelligence" ("AI") worked, I decided to do mine, as entertainment, as a "hobby", lost time However, a few years later, in 1992, I realized that I had already done the work - I had everything very tidy - while the expectations of the "AI", predicted for that year, faded into smoke*. Then I took it more seriously that it was necessary to explain it, an explanation that I began to do throughout 1995, as soon as I had enough time to start writing down everything I had found in an orderly manner.

* The first criterion of the current software engineering paradigm is that any computerization process must begin with a well-defined "what" we want to computerize. A criterion of the most elementary common sense. But even so, thousands of programmers and scientists –with the subsequent financial and institutional resources expended– were trying to computerize during the 80's a concept that no one bothered to even define: intelligence. It is therefore understood the famous failure of 1992, and that in order to disguise it the meaning of "Intelligence" has been changed, being understood today in the computer field as simple automatisms ("intelligent car" , "smart house", "smart city", ...), a faculty that has nothing to do with intelligence, quite the contrary, because automatisms are a completely common faculty, so much so that they are present in the mechanisms of all living things for almost 4 billion years.

So, how can we make this tree structure? [.205]

Physics is said to be exact, and this is often the envy of other disciplines. Nothing more wrong, another monumental error of appreciation (see [3]). Physics, or mathematics, is exact if enough decimal places are allowed. For example the number "pi":

$\pi \approx$ 3.14159265358979323846264338327950288419716939937510582097494459230781640628620899862280348253421170679

number that should be written to avoid misunderstandings

$\pi \approx 3._{10}1_{10}4_{10}1_{10}5_{10}9_{10}2_{10}6_{10}5_{10}3_{10}5_{10}8_{10}9_{10}7_{10}9_{10}...$

to indicate that it is written in the decimal system, since a computer manages it in the binary system with the expression:

$\pi \approx 1_2 1._2 0_2 0_2 1_2 0_2 0_2 1_2 0_2 0_2$ *

*If the reader wants more decimals, let him have fun and calculate it, but be careful! The integer part and the decimal part are not transformed the same.

expression that is impossible to identify with the naked eye, with its previous equivalent (3.14159..., expressed in base 10), unless we do the equivalence calculation.

It is the same exactness that we can also obtain with concepts, with as many conceptual partitions as decimals we need to approach a fractional number, or a real number with which we represent the magnitudes physical. Otherwise, if we have to limit the conceptual "decimals" to two four or six "decimals", it would be cheating, it would be a comparative grievance. However, you should know that even the most "abstract" concepts that we use today, hardly exceed a dozen "decimals", that is, a dozen "abstractions", far fewer decimals than the thousands of decimals that we already know about the number "pi".

They serve three examples of successions in three very different cases, a tangible and visible concept ("Sedan-Coupé" of twelve "decimals"), another visible non-tangible ("Rosa", the color, of ten "decimals") and a other neither tangible nor visible, very elaborate and "abstract" ("Nilpotent Element", thirteen "decimals"):

"Matter" $\rightarrow$ "Object" (=Substance with Form and/or Structure) $\rightarrow$ "Artificial Object" $\rightarrow$ "Device engineered" $\rightarrow$ "Vehicle" $\rightarrow$ "Ground Vehicle" $\rightarrow$ "Ground vehicle with wheels" $\rightarrow$ "Addressable car" $\rightarrow$ "Steering car with twin wheels on each axle" $\rightarrow$ "Automotive car" (... for Passenger Transport) $\rightarrow$ "Coupé" (... with a single door on each side) $\rightarrow$ "Sedan-Coupé" (... with 2 rows of seats), concept that could be represented with the alphanumeric code:

$0.0_a4_c1_c0_g0_a0_a0_b0_a0_a0_c1_a1$

"Phenomenon" $\rightarrow$ "Pre-material phenomenon" $\rightarrow$ "Energy" $\rightarrow$ "Radiation" $\rightarrow$ "Electromagnetic radiation" $\rightarrow$ "Spectre (of the ER)" $\rightarrow$ "Light (=ER visible)" $\rightarrow$ "Color (=Spectral Interval of Light)" $\rightarrow$ "Red" $\rightarrow$ "Pink", a concept that could be represented with the alphanumeric code:

$0.1_b0_a1_c0_a1_a0_a2_a0_a0_a0$

In the case of the color "Pink" it would not even be necessary to say that it is a color because the same succession already breaks the polysemy with the homonymous flower, it automatically disambiguates the color, of the flower.

"Conception with virtuality" → "Method" (=fourth thinking level) → "Generic method" → "Representation" → "Symbolic Representation" → "Mathematical representation" → "Algebraic representation" → "Algebraic structure" → "Algebraic structure with two operations" → "Algebraic ring" → "ideal" → "Ideal Nil-Radical" → "Nilpotent element", a concept that could be represented with the alphanumeric code:

$$0.2_f3_d0_a0_e0_a0_b0_a1_a0_a0_b1_a0$$

where the different colors of the arrows and the corresponding subscripts (green, red and blue) indicate different types of partition.

We note that despite not having information about the "subscripts", that is to say, about the partition criteria that generate the new abstractions (the complements of the "Kernels", in mathematical terminology), the same sequence leads us unequivocally to the definition of the concept. If, in addition, we have the information of the partition criteria, anyone will have an approximate knowledge even of such "abstract" concepts as "Nilpotent element", he will be able to place it with respect to the concepts he already knows, know the simple knowledge that he lacks them to know him, and where he can find them.

Conversely, if the reader finds it and wants to know what it is, they probably won't find it in the dictionary, or know which specific dictionary to find it in, or in which books they can try to find it. And if he finally finds it, he'll probably stay the same as before, except to deduce that it's something related to algebra, because it's in an algebra book.

We also note the intervention of "Pre-material Phenomenology" in the second hierarchy, that is, the phenomenology prior to the "Materialization of the Universe" and that generates it. There would be no justification for doing it otherwise, even if the quantum hypothesis were not true (see the already commented in [12] and others).

The "secret" of partitions [.206]

A constructive condition of the tree is exactness. I mean that in any partition of a concept into more specific concepts (the PORFIRI tree condition), two more conditions are also required:

- the interpretation*of the mother concept must be exactly equal to the union of what all its son concepts interpret;
- all the interpretations of the son concepts must be disjoint and at the same time contiguous.

* I use the term "interpretation" instead of "meaning" which is usually called. It is due to another misunderstanding in languages such as Catalan, Spanish, French or English (but not in German) in which the "Meaning" is strictly the "Significant" and vice versa, the "Significant" is strictly the "Meaning". Another example of the problems posed by polysemy, in this case a quasi-polysemy between "Meaning" and "Significant" (there is only one letter difference), as explained in detail in "Triptic" [10].

This is easy to fulfill if we impose the use of "Exact Short Algebraic Succession" in each partition. And for that you don't need to start studying higher algebra, because it's what we all did intuitively at the age of two when we built little trees like those of "Bichu", "Cat" and "Misha". See [C]. In this way it is also guaranteed that the properties of a concept are maintained in all its descendants.

There are four types of partitions

- Real parts into smaller component parts. For example, an "Object" is divided into "Body" and "Crust"; "Light" is naturally divided into its spectrum or intervals of colors that integrate it. "Phenomenon" is naturally divided into its temporal structural parts: "Initial State", "Action" and "Final State". In this case I have agreed to write the corresponding subscripts (or the arrows of the succession) in **green color**.

- Partitions into more specific concepts, that is, the same concept but restricted to only a part of its members, only those that meet the new property added by the criterion. The criterion can be any other concept. It is the variability of the base that expressed the box of [.203] "Constructive strategies...". For example "Animal" according to "domesticability" would be divided into "Non-domestic animals" and "Domestic animals"; "Object" according to "mobility" would be divided into "Furniture" and "property Building or Land". I have agreed to write the subscripts (or the arrows of the succession) in **red color**, or by default, in black.

- Partitions with a phenomenological-structural criterion, which is of the utmost importance due to its intrinsic nature. For example "Matter" in "Physical particle", "Atom", "Molecule", "Substance" and "Object". I have agreed to write the subscripts (or the arrows of the succession) in **blue color**.

- Partitions in arbitrary unions, and which in general must be considered marginal and without descendants. For example, a "Team" in its components/members.

on the understanding that we can make as many partitions of the same concept as we need, and that we will differentiate them by the corresponding subscripts "a", "b", "c", ... For example "Living being according to size" ("Microorganisms" and "Visible Organisms"), "Living being according to number of cells" ("...unicellular" and "multicellular"), "Living being according to cellularity" (".. . cells" and "Viruses"), etc. etc etc

The partitions are chained together forming a dense tree or grape, and generating a series of semantic knowledge:

0a4c1c0g0a0a0b0a0a0c1 Coupé	0a4j0z0a0b0tO Number of Rows of Seats	0a4c1c0g0a0a0b0a0a0c1**a1** Sedan-Coupé

The code for "Sedan-Coupé" is **the same** as for "Coupé", **plus the last two** characters "...**a1**".

0a4c1c0g0a0a0b0a0a0 Automobile car	0a4j1a0b1a0a0tO Number of Doors	0a4c1c0g0a0a0b0a0a0**c**1 Coupé (=One only Door per Side)

0a4c1c0g0a0a0b0a0 Steering car with even wheels on each axle	1 to 1 to 0 Function (=Characteristic action, associated with ...)	0a4c1c0g0a0a0b0a0**a**0 Automobile car

etc etc etc

Instead of this schematic representation of semantic knowledge, the reader will find an equivalent one more clear, with the following sequence of first-order propositions or predicates:
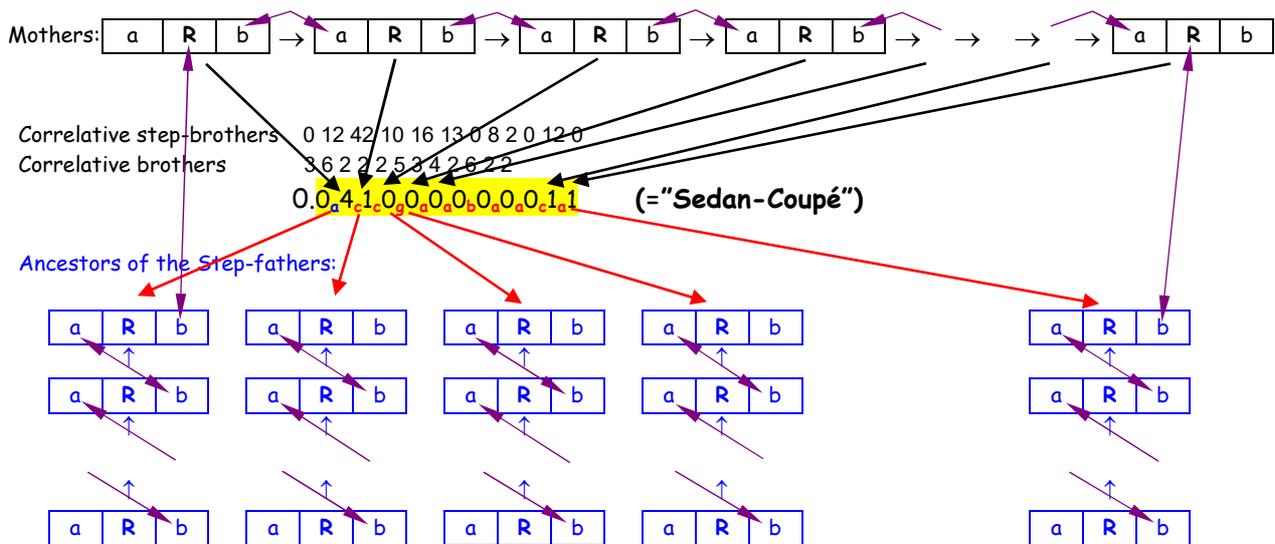
- A "Sedan-Coupé" **is** (equal to) a "Coupé" with two Rows of Seats (not one, not three).
- A "Coupé" **is** (equal to) a "automotive Car" with one door on each side (neither two, nor ...).
- A "automotive Car" **is** (equal to) a "Land Vehicle, Driven with Paired Wheels on Each Axle" for the Transport of People (not for the transport of goods).
- A "Land Vehicle, Driven with Paired Wheels on Each Axle" **is** (equal to) a "Land Vehicle with Wheels, Automobile and Driven" with Paired Wheels on Each Axle (neither a Tricycle, nor a Motorcycle, nor...).
- A " Land Vehicle with Wheels, Automobile and Driven" **is** (equal to) a "Land vehicle with Wheels ..." Automobile and steerable (neither must be dragged, ..., nor goes on a railway, ...)
- A "Land vehicle with wheels" **is** (equal to) a "Land vehicle ...", with wheels (neither with skids, nor...).
- A "Land vehicle" **is** (equal to) a "Vehicle" for Land (neither maritime, nor...)
- A "Vehicle" **is** (equal to) a transport "Engineered Device" (neither a computer, nor a clock, ...).
- An "Engineered Device" **is** (equal to) a useful, engineered "Artificial Object" (if it were useless, it would be a simple Artefact).
- An "Artificial object" **is** (equal to) an "Object" made by the Man (neither natural, nor astronomical, nor...).
- An "Object" **is** (equal to) a structured and/or formed matter (neither an amorphous substance, nor ...).

With the addition of "equal to", many readers will also be reminded of the elegant process of substituting unknowns, to solve a system of "n" equations with "n" unknowns (CRAMER's Rule), representable by a diagonalized matrix.

If we "replace" we will have a definition of "Sedan-Coupé" **is** (equal to) "Matter structured and ingeniously formed by man, used to transport people on earth, with automobile/automotive traction, with steerable wheels installed in pairs on axles, with a door on each side and two rows of seats".

We notice that we have all the abstractions that define the concept, not one more nor one less. And correctly ordered, forming a CAUCHY succession, from the generic to the specific, that is, up to the limit of the concept.

As a consequence of imposing these constructive structural characteristics, the "miracle" begins to appear (as in the Positional Numerical Systems). Graphically and in summary (the arrows **lilacs** point to the same concept) we have the following relations "a**R**b" associated with the code:

Mothers: | a R b | → | a R b | → | a R b | → | a R b | → → → → | a R b |

Correlative step-brothers   0 12 42 10 16 13 0 8 2 0 12 0
Correlative brothers   3 6 2 2 2 5 3 4 2 6 2 2

$0.0_a4_c1_c0_g0_a0_a0_b0_a0_a0_c1_a1$ (="*Sedan-Coupé*")

Ancestors of the Step-fathers:

| a R b | | a R b | | a R b | | a R b | | a R b |

| a R b | | a R b | | a R b | | a R b | | a R b |

| a R b | | a R b | | a R b | | a R b | | a R b |

A single code carries hundreds of implicit relationships. And as we will see, each relationship between two concepts:

| **a** **R** **b** | oh**R**b

it is a knowledge. A single code, apparently arbitrary, is not at all, because it is associated, by construction, with hundreds of pieces of knowledge. And all of them without exception are "triads" a**R**b, that is, first-order logical propositions/predicates. We have made an <u>algebraic extension from the numbers (which are exact), to exact concepts, logically related to each other (the possible exact logic already mentioned)</u>.

We therefore have that any concept is at the top of a pyramid/tree of concepts and knowledge:
     1) As for this tree, downwards of the concept is the succession of previous abstractions or predicates (such as "Sedan-Coupé"), and in each of them the related concepts according to the previous scheme associated with the code;
     2) If it is composite, in addition, also below are its components, and these have their corresponding components further below, and so on;
     3) And, regardless of the previous tree/pyramid, also directly below will be found the possible concepts related by the hundred "Relationators" of [.33], and subsequently further below, theirs related by 1) or 2).

So in the case of school failure, it allows for each misunderstood concept, to analyze the misunderstood concepts that produce it, and starting from the bottom, to "fix the pyramid".

It has been seen that it is understanding based on relationsep-brothrsability, so the Conceptual System is also characterized by its omnipresent understanding. In numbers each number has infinite relationships the others (greater than, less than, divisors, ...). In concepts the set of other related concepts is finite, but more than sufficient to achieve the desired understanding (the case of "Form" has been mentioned with more than 200 direct related concepts).

The possibility of making multiple partitions* of the same concept**, enables multiple inheritance –an inescapable necessity when representing what exists– and at the same time automatically creates another set of relationships inherent in the tree, the relationships between "step-brothers" (the sons concepts of different partitions). These semantic kinship relationships can be one and only one of the following relationships:

- equality,
- inclusion,
- intersection, or
- disjunction (including complementarity).

* The **non**-exclusivity of the Base in the table of "Constructive strategies..." [.203]
** Like the previous example of "Living Being"
*** The "secret" of partitions [.206]

Partition "**a**"Partition"**b**" Relationships generated

Partition "a"		Partition "b"
$_a0$		$_b0$
$_a1$		$_b1$
$_a2$		
$_a3$		$_b2$
$_a4$		
		$_b4$

overlap
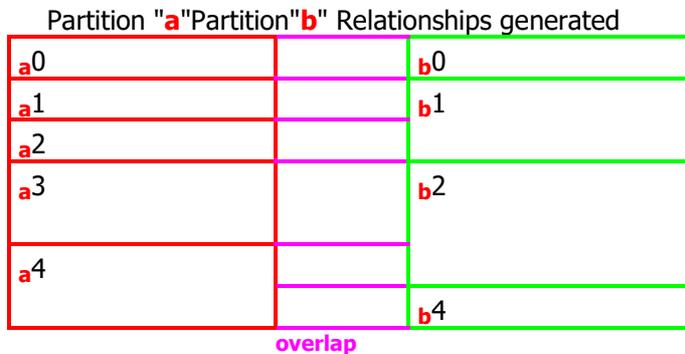
$_a0 =_b0$ (equality/match)

$_a1 (i_a2) \supset _b1$ (inclusion)

$_b1 =_a1 \cup _a2$ (match with the union)

$_a3 \supset _b2$ (inclusion)

$_a3 \neq _b4$ (disjunction)

$_a4 \cap _b2$ (intersection)

$_a4 \subset _b4$ (inclusion)

We therefore have even more knowledge intrinsically associated with the code, resulting from the overlap/intersection of the two partitions, which create a "finer topology" (instead of four partitions in one case and four in the other, the six parts appear of **purple color**, in the middle of the two partitions).

The beginning of the intrinsic "Metadata" of knowledge [.207]

This way of proceeding, to which all this series of knowledge is associated, is what gives the conceptual system the characteristic of "Metadata", a characteristic that will be further strengthened with other subsequent procedures (pass to the dual, applications, auto- applications, ...).

What mathematical interpretation does this have? [.21B]

Very simple and transcendent, that any effect that thought can produce, from the age of two until we die,

- or it is from one of these three sub-spaces (such as "Cat", "Soother", "Sedan-coupé"), and will be on the "straight" of the corresponding dimension (in these three cases, all are "Subject")
- or it is a combination of two (like "Nature", "Reality", ...), so it will be on the "surface" generated by the components (in these two cases, "Matter" and "Phenomenon"),
- or even three of them (such as "Structure", "Series", ...), so it will be in the middle of the space, within its "volume".

We have a strict, geometric, three-dimensional space, with three one-dimensional sub-spaces, three "linear" sub-spaces because it reminds us of the linear independence of the sub-spaces proper to a vector space.

A fairly rich mathematical topology can even be defined (see below "Topology"[.21B5]).

For 17 years or more (because I came to this conclusion in the late 80's, but I can't remember exactly when) I haven't come across any thought-generated item that doesn't meet this. So, until someone achieves some other new process that generates another unequivocally different and more complex level, for the moment we have enough with three-dimensionality, which on the other hand, already suits our psyche that as it has been said, he is used to these spatial representations.

Intrinsicity [.21B0]

This prioritizing the intrinsic and not the extrinsic was already done by a certain KLEIN with geometry 150 years ago, and from here, and only from here, geometry was able to develop spectacularly. Knowing this, in 1987 it seemed common sense to me to apply the same criterion to language before any other criterion of

which I had not contributed anything important so far. For all this, I called this triple division the "Intrinsic Partition".

Once here, it was clear that it was necessary to continue with the same criterion of intrinsicity that gave such good results (avoiding once and for all the problem of subjectivity and extrinsicity of all previous methodologies of categories, ontologies, taxa, ...).

Intrinsicity on two sides:

- the first, the methodology in the construction of the tree (see "Partitions" [.206]),
- the second, using intrinsic criteria in the partitions that generate the tree, making the new partitions, and the following ones, and the following ones, and ... always maintaining the intrinsic criteria. Only when this is no longer possible, other extrinsic criteria must be used as step-fathers (color, size, taste, subjective evaluations, ...).

The Intrinsic Partition. The initial conditions. Decimals The Kingdoms.[.21B1]

Just as without zero the natural numbers, or the enters, were not operational, without the intrinsic partition (and without following intrinsic criteria in the other successive partitions) it is not possible to make an operational, useful structure. That is why the "Categories", the "Chapters", the "Facets", the "Ontologies", the "Taxons", etc. are only theoretical statements, without practical application, without use in learning or understanding. The truth is that for communication and for language, and for infants and children, they do no wrong. They are only matters of some adults.

From another perspective, an analogy can be made of the intrinsic partition with what certain mathematical formulas (of physics, chemistry, ...) are called "initial conditions", and without which the formula is ambiguous, useless The intrinsic partition (and those immediately following) are like the initial conditions.

Respecting these analogies, the coding being exposed starts with a zero and then the decimal point. Then the strict codes, always decimal. I usually skip the zero and start directly at the decimal point. Thus, the first code is:

  - **.0** for "Matter",
  - **.1** for "Phenomenon", i
  - **.2** for "Composite/virtual conceptuation",

also omitting the first sub-index (between the decimal point and the first code) since it is understood, since it corresponds to the intrinsic criteria already expressed in [.21], with the psychological criteria that define this first partition.

I accept that it may be a mania, out of simple sympathy for the concept of "Partition of the unit", but in any work, in an article, in a book, ..., all its parts are like decimals with respect to the total. That is why this "curious" numbering [.21B5]. Any "Index" is decimal, [.0], [.21B1], ..., whether if the autor placed or not the point in front.

Regarding the tree it is even clearer, since it is important to realize that the codes are decimal codes, not whole numbers. We are making partitions, smaller things, more specific, "decimals"*.

* Another confusing polysemy is "decimal". Here it indicates parts of a whole number, the "calderilla" in money. But the one in the paragraph immediately following refers to number 10 as the base of positional numeration.

Also note that it is not a "decimal" system, it is a system with a totally variable number of children* (see the box in part [.203] "Constructive strategies [methodologies] of some complexation structures") so the encoding is alphanumeric. If a partition generates 13 children, the corresponding children will add the codes 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C to the mother immediately after the corresponding subscript. For subscripts I use letters: "a", "b" or whatever (of course all the same family has the same subscript).

* Proposals like the "Universal Decimal Classification" of M. DEWEY (1851-1931), were well-intentioned more than a hundred years ago, but today their permanence is absurd, useless, because of this and many other non-intrinsic characteristics.

If, instead of using intrinsic criteria, LINNE had classified living beings according to their color or their size, it would have turned out to be a useless mess and would not be known today (and perhaps DARWIN would not have discovered evolution). Similarly, the "Intrinsic Partition" is like the first division of living beings: their "Kingdoms".

Exactitude [.21B2]

Imposing the construction of the structure with "Short Exact Algebraic Successions" and other conditions, generates a succession of abstractions, abstractions that are the intrinsic and exact definition of the concept (CAUCHY convergence).

Uniqueness [.21B3]

But perhaps the most important feature is that the conceptual system is intrinsically unique. Only except for extrinsic aspects such as the possible arrangements of multiple partitions (the subscripts "**a**", "**b**", "**c**", ...), different orderings that are like unit changes, like base changes, and can be handled automatically by the computer.

Within the same family, the children would also admit different ordinations, but almost always only two, one increasing or the reverse decreasing, since the same criterion that generates the exact succession of children already induces the ordination. If we generate the family "Matter according to real structure" we must start with the physical Particles, continue with the Nucleus and the Atom, the Molecule, ... because it is so and not in any other way. Even in this case, you can't even consider reversing the order, because the historical order was this. If we do "Matter according to size and tangibility" we have to do something like "Microscopic matter", "Tangible matter / directly perceptible by man" and "Macroscopic matter" or if we want in reverse order (although it is not so "reasonable " go from big to small) because making a change of ordering, a local change of basis, is immediate to the computer. If we do "Matter according to life" we only have "Inert Matter" and "Organic Matter" or in reverse order, although the historical-temporal order seems more "reasonable". The order is secondary when it is an extrinsic, subjective characteristic (placed by a person).

Although multiple inheritance allows permutations in this succession of abstractions, the permutations are very limited. So, if the concept has 8 abstractions, what would make you think of 8! (8 "factorial") =40 320 possible permutations of the same concept, as if we could make 40 320 different definitions of the same concept, the fact is that there are no more than half a dozen possible permutations. The others are absurd, because they do not define the concept, they do not define anything that exists or at most in some fortuitous case they can define some other concept.

It is easily seen in the case of the "Sedan-Coupé" [.206]. The initial and final abstractions are immovable, we can only play with the five middle hierarchies, 5! (5 "factorial") =120 front 11! (11 "factorial") =39 916 800. But in these hierarchies, for practical reasons it is immediately apparent which arrangements/permutations are more suitable, more adjusted to practice, and which ones not so much. We end up with only half a dozen certainly interesting, useful options. Homologating one of them as a reference should not cause any trauma to anyone, especially when it is only an ordering option that does not exclude any abstraction. No subjective perspective is excluded, only one is chosen as a reference. The economy is extraordinary and of the utmost importance for disambiguation.

The applications* what's in this structure (and what we'll see right away) [.21B4]

* Application: using something as a means to process other things.

The small tree or sub-space of intrinsic relations, when applied to the pairs of the rest of the concepts (a "Step to Dual" as we will see later) will generate the space of the knowledge.

The tree of "Terminations" or tree of phenomenological perception (which we will also see shortly), is even smaller because it is part of the previous tree of relationships. It is applied locally by all children (another "Step to Dual", but local, not global), i.e. one by one to each concept.

The small tree of the different languages, and even more, of the different dialects and/or of each specialized area, is also local and applies to each concept (another "Step to Dual", also local). The result is the name assigned to it in each language, in each dialect and/or in each specialized field. This name, unequivocally defined:

    - for the concept located exactly in space
    - but also by language or dialect or specialized area,

it is what ensures disambiguation and error-free translation.
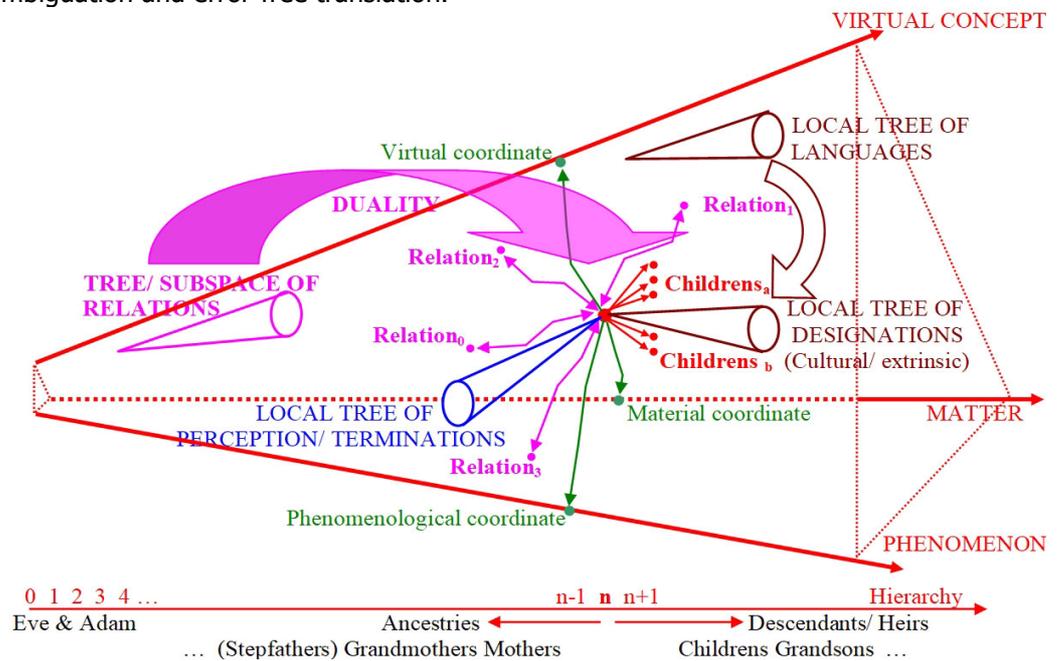
The Space of Knowledge, the Intrinsic Partition, Self-Applications. ("Brief comments", C. UDINA 1998)

The small tree or subspace of intrinsic relationships, when applied to the pairs of the rest of the concepts (a "Step to the dual" as we will see later) will generate the space of knowledge.

Topology [.21B5]

The way this structure is built assumes a series of so-called "topological" properties from the mathematical perspective of what is close to each concept, your environment. Concepts such as "Continuity", "Connected", "Compact", "Pseudometric" (minimum number of relationators that allow you to "connect" any two concepts), ... are in the conceptual/cognitive Space.

The generation of Knowledge [.313]

The power of the "Intrinsic Tree of Intrinsic Relationships", $R_{intrin.}$, is in that, applied* to the rest of all the many concepts of the "C" tree, it generates an intrinsic and comprehensive representation of all knowledge. !That simple! Note that "C" is an exact tree structure, not a simple set.

* As already said, it is the use of something as a means to process other things.

In other words, there is no need for a new dimension, which would be the fourth, to represent knowledge. !All this that we save!

How is it applied? Well if we apply the few elements of this tree $R_{intrin.}$ to all the possible pairs of concepts in the tree of concepts –set of pairs that is the set "Cartesian product" {**C** X **C**})– all the possible knowledge appears to us neatly, "decidable".

Let's imagine $R_{intrin.}$ like a small tree of four hierarchies, with four "Relationators" on the second level, sixteen on the third and sixty-four on the fifth (the hundred counting the possible inverses).

One can think that the candidate knowledge will be the Cartesian product {{CXC} X **R**}. But this is not the case, the exact tree structures of concepts and relationships allow us savings like the following:

a relationship **R** which holds for a pair of concepts "a" and "b", also holds for all descendants of "a" and "b", as well as for all descendants of **R**

that is, a single "a**R**b" is representative of many other knowledges that do not need to be explained, those of the ancestors of **R**, keeping "a" and "b" fixed, and those of the descendants of "a" and "b" keeping **R** fixed

There is still more, as has already been seen ("The secret of partitions"[.206]), the same code implies hundreds of relationships for each concept, relationships that the computer can automatically explain to us if we need them.

On the other hand, we have a criterion and an order to obtain exhaustively all possible knowledge: the conceptualization tree and the sots-sots space of the tree of relationships, proceeding with increasing or decreasing hierarchical directions as suits the practice and/or according to the previous criterion already mentioned. Another process that can be semi-automated with the computer (what the computer cannot do is say whether the relationship is "decidable" or not, affirmative or not, we have to say that based on the knowledge provided by science).

So, exactly how big is this tree? $R_{intrin.}$? Well, as progress has been made, with just over a hundred relationships we have all the ones we need for any normal knowledge. What does normal mean? Well, all of them, only except for complicated scientific knowledge, knowledge that is related to mathematical formulas, complicated for most people (non-linear, differential, tensorial, ..., homomorphisms, diffehomorphisms, ..., homologies, functors, ...). For that knowledge it is necessary to develop small, more specific trees, but always based on some of the previous relationships.

A hundred and one relationships are all the relationships we need in practice, because they are intrinsic and classified relationships $R_{intrin.}$ (see the box at the end of the "Intrinsic relationships"[.33]). Knowledge can be constructed and represented by a double and repeated quotient set with relationships:

$$R/R_{equi.} = R_{intr.} \quad \text{and} \quad \{C \times C\}/R_{intrin.} \quad \text{which by oversimplification could be expressed by } \{C \times C\}/R^2$$

The difference between $\{\{C \times C\} \times R\}$ and $\{C \times C\}/R^2$ jumps out. It involves an extraordinary economy, because if we have a million concepts, a billion possible pairs of concepts are generated, and that apart, what criteria would we have to analyze in each case which are the possible relationships to study. How many relationships exist? A thousand, ten thousand? Then we would have a thousand trillion (1 000 000 000 000 000 =1015), ten thousand trillion (1016) candidates for simple knowledge. A quantitative problem and another qualitative one, unsolvable*. It is therefore understood that nothing useful can be done with these traditional enumerative schemes. This is what happens with the "Concept Maps" that are recently found on the Internet.

* Translation note 2025:

Today it has been solved by means of very powerful computers that manage the gigantic "BigData", but with the servitude of enormous costs and energy consumption. And the lack of respect for intellectual property.

On contrary, I have calculated, based on the 20 000 concepts and 50 000 relationships that the current simulator of the Conceptual System incorporates, which only takes up 30 MB (with one language, Catalan). Let's assume the maximum necessary (more than any large paper encyclopedia), 400 000 concepts and 2 000 000 relationships, would occupy 500 MB (half a TeraByte). Let's assume a user who wants to work with 6 languages, this would add 200 MB of the corresponding denominations, that is, a Tera, which incorporated into any computer would even allow working locally, without being connected to the Internet. And without "hallucinations"...

The BigDates of AI require 1 000 000 000 "parameters", and tens of trillions of "Tokens". This is the difference between:

- the comprehensive-relational $\{C \times C\}/R^2$ of the Characteristica universalis (or Conceptual System),
- front the enumerative $\{\{C \times C\} \times R\}$ of AI.

Anyone who knows Cartesian Products will understand that the first is thousands, or perhaps millions, of times more efficient. We also note the small increase that each language implies (about 30 MB), because it is

not a dictionary or encyclopedia in which the occupation would double for each new language, but rather we are talking about a "universal language" (that of concepts and their relationships, knowledge, ..., duly codified as explained), to which it is only necessary to add the name, but only once for each language, of all the integrated concepts and knowledge.

Even more, the application of the "intrinsic tree of relations", $R_{intrin.}$, in pairs of concepts from the global conceptualization tree $\{C \times C\}$, gives triple accessibility to any knowledge,

- through that any of the two concepts, perfectly and exactly located in the tree by means of their corresponding codes,
- through the relationator R and their relationship aRb that structures knowledge.

The knowledge is not "sortable" in a traditional linear structure, one after the other, but it is finite and we have a criterion for obtaining all of them. And what is much more important, we have the guarantee of accessibility and efficient retrieval of any knowledge we need.

A SCREEN OF THE SIMULATOR OF THE CONCEPTUAL SYSTEM – CHARACTERISTICA UNIVERSALIS

The concept "Form"

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