



Scybernethics – Enacting a Knowing & Enlivening Society

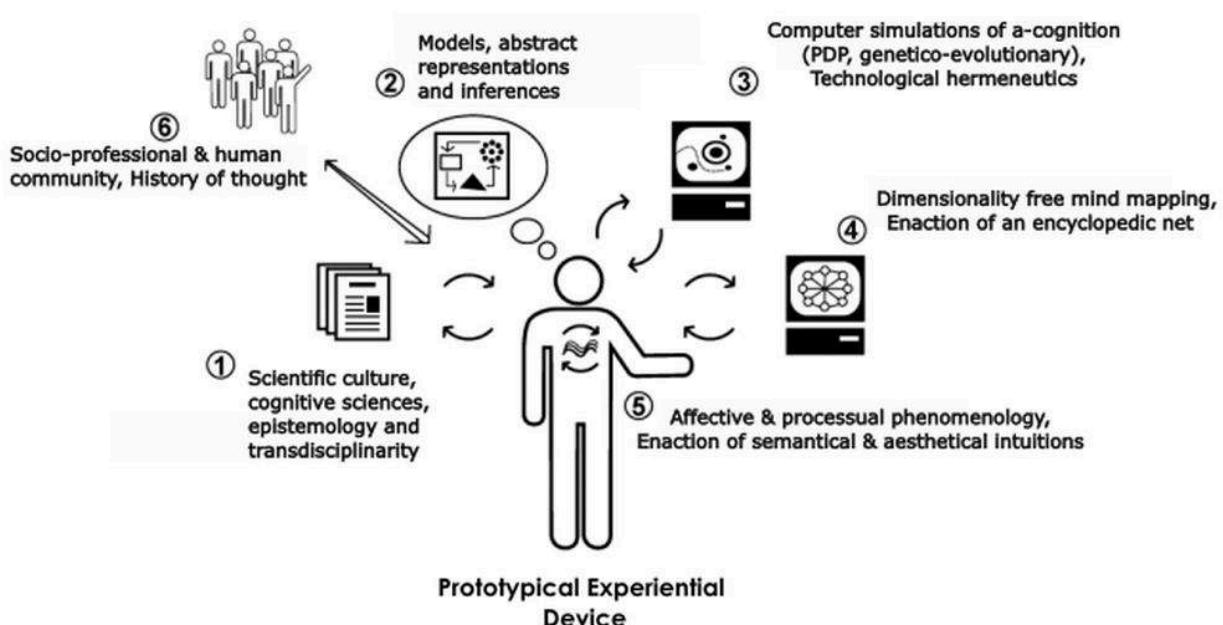
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Scybernetic(s): existential enaction, creative cognition and technological hermeneutics, toward a second-order rationality

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[Human-generated, before LLMs disruption]

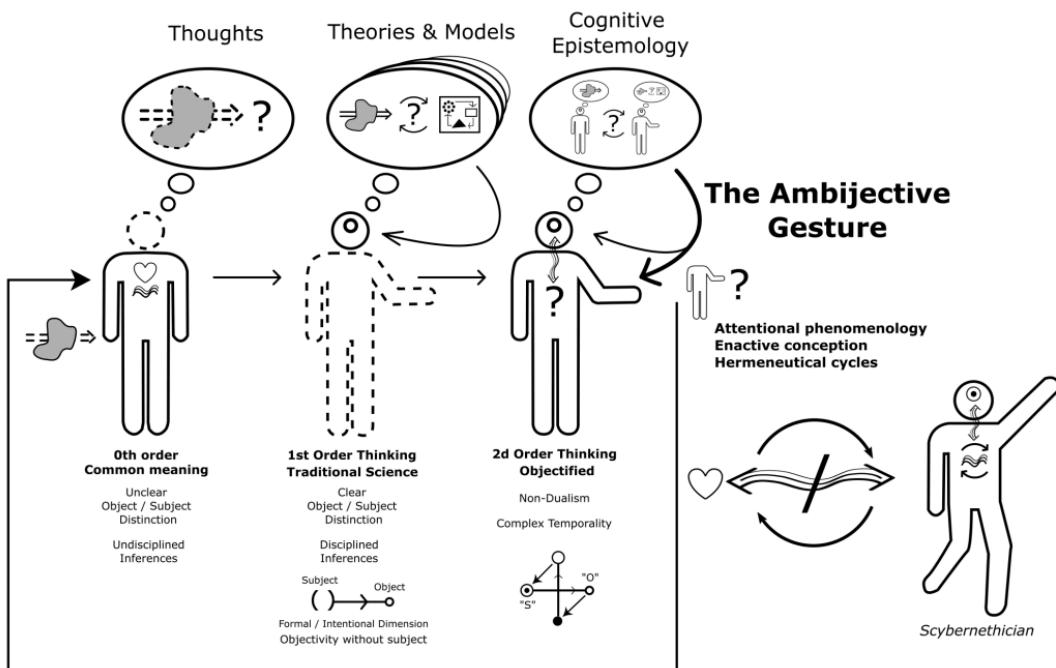
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Christophe Rigon



"The thinking of thinking & the thinking of the thinker"



Mutation of common sense & awareness of socio-historical embeddedness

Second-Order Embodied Rationality (Rationality²) Scybernethic(s) - Thinking² and Praxis

Christophe Rigon / Soto²

2d_Order_Rationality



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“A mutation of experience (that is, of being) is as necessary as a change in the intellectual understanding, if one wants to achieve suture the dualisms of mind and body” (Varela 1976) cited in (Bitbol 2006).

“An epistemology of the double cut (subject/object; consciousness/body) must give way to an epistemology of the weld, of the structural coupling (Varela) of the creative subject in interaction with a world that he creates while creating himself in the maintenance of his identity, and this because of its ontological openness and the ontological openness of things.” (Durafour 2006: 30).

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Table of Contents



- **Structured Abstract**
- **Developed TL;DR**
- **Prolegomena**
- **1. Introduction**
- **2. Drawing a distinction: creative cognition, intuition and body sense-making**
- **3. Methodological strategy**
 - **3.1 About second-order thinking**
 - **3.2 Important ethical and methodological tools**
 - **3.2.1 Homeostasis**
 - **3.2.2 Suspension of judgement and excluded middle**
 - **3.2.3 Levels and consciousness of abstraction (and the “technology by itself” view subterfuge)**
 - **3.2.4 Gestalt-shifting character and point of view flexibility**
 - **3.2.5 Searching and modeling “without representations and finality”**
 - **3.2.6 Cognitivism vs. enactment: and the winner is... Technological (neo)connectionism?!**
 - **3.2.7 About enactive modeling and simulations: “From computers which think to computers which make me think”**

- **3.3 Functions as enacted iterations: an analytical of dynamical approaches**
- **3.4 From dialectic tension to dialogic thinking: coping homeostatically and patiently with conceptual dipoles**
 - **3.4.1 Conceptual dipoles**
 - **3.4.2. The asymmetrical nature of the dipole and the ethical (self)imperative**
 - **3.4.3 Second-order Distinction (distinction² or quasi-double distinction): “not two, not one”, in two steps.**
 - **3.4.4 A systematical logic of knowledge exploration: in search for invariants, prototypical scheme and correlations**
- **4. Prototypical experiential device**
 - **4.1 My “Brain” and designing a reflexive genetic / generated ontology: a first person enactive style of representing**
 - **4.2 Models and simulation of a-cognition: the reflexive heuristical / hermeneutical cycle of representations in action**
- **5. Enacted results: regulative patterns and rhythms**
 - **5.1 Ceteris paribus (Natural sciences) / Mutatis mutandis (Human and Social sciences)**
 - **5.2 First trivial emergence**
 - **5.3 The enacted quasi-bidimensional formal prototype**
 - **5.4 Relational thinking without relational realism: an indirect question to Simondon’s approach**
 - **5.5 From the cybernetics of the cybernetician to second-order enactment**
 - **5.6 Enacting reflexive thinking : the circle quadrature, the uroboros / Moebius strip and hacker ethics**
 - **5.7 Form / Processus: taking care of the pharmakon (gestures and orthopraxis)**
 - **5.8 The dialectical transduction between dipole polarities**
 - **5.9 The surplus of meaning and the necessary defect**
 - **5.10 From “artificial neural nets” to models of phenomenological intentionality**
 - **5.11 From a technical mathematical theory of communication without meaning-making dimension toward the living process of in-formation**
 - **5.12 From computers in nature to the nature of automatic computing machines**
 - **5.13 Dealing with the computational complexity threshold**
 - **5.14 Technologies as externalized and embedded gestures**

- **5.15 The civilized rhythm of formalization and the synchronized logics of mechanical thinkings: the mechanistic resonance**
- **5.16 Scybernethic(s) and oriental style**
- **5.17 The quasi-double “middle-way thinking”**
- **5.18 Scybernethic(s): designing a second-order rationality as a processual and complex practice**
- **6. Conclusion**
 - **6.1 Drawing a timely and partial synthesis**
 - **6.2 The ongoing fourth industrial revolution [and now the more visible genAI disruption 03/23]**
 - **6.3 Suturing to not forget the forgettings: anamnesia (Plato)**
 - **6.4 Toward interbeing enactment**
 - **6.5 A last (auto)po(i)etic word**
- **REFERENCES**

Structured Abstract

Paper type: Conceptual & lived experience.

Context: Mainly due to epistemological tensions and misunderstandings in the field of enactive science(s), the **original enactive conception** is threatened to be “watered down” (Vörös & Riegler 2017), killing in the egg the embedded creative and awakening potential of enactment of the initial and seminal proposition (Vörös & Bitbol 2017).

Problem: Articulating, in a complex pluri and interdisciplinary fashion, first and third person point of view is not “trivial” (von Foerster 1984: 201, 2003: 208, 309-311). It deal mainly with what could be called the “mind-mind problem” ((Jackendoff 1990) cited in (Varela 1997: 7'30)). Moreover, it is faced with four of the blinds spots of classical science: on one hand, creative cognition and the role of technics in the scientific thinking and doing, and in another, “processual” and integrated distributed thinking. How to enact “homeostatically” a meaningful and rational contextual level of description and of abstraction from these constraints?

Approach: First-person enactive and reflexive cognitive research articulated historically with second-order cybernetics, but also with, in one hand, scholars knowledge and psycho-phenomenological perspectives, and in another, with an hermeneutics of computer simulations of a-cognition and a-life.

Method: Iterative historical stabilizations of scientific cultural formalizations and methodologies, phenomenological inquiry and computer simulation hermeneutics.

Results: The “scybernethics” rational approach which could be described as an original enacted methodology coupled with an emerging ontological genetic / generative representation, polarized by my self understanding.

Key Words: Circularity, common sense, creative cognition, ethics, existential enaction, lived experience, non-foundationalism, second-order rationality, scybernethics, technological hermeneutics

Developed TL;DR

- First I will make some precision about what I mean by “**creative cognition**” and cite some other examples of enactive researches and fields aiming toward this subject. Then we will make a little detour by the **second cybernetics perspective**, leading to an interesting conception of enaction itself and by the way proposing a little reminder and clarification about how I understand **second-order thinking** and how useful it can be to reveal our **blind spots and our limits**. Next, I will briefly expose some personal ethical and strategic tools which were at the origin of my understanding, and also some basic points about my conception of models and computer simulation, giving rise to a first **dynamical heuristical and hermeneutical cycle**. On the formal side, I will also introduce my way of dealing with what I call “**conceptual dipoles**”, introducing a **dialogical conception of the**

dialectical tension (Morin 1986) (von Foerster 2006: 146). After this necessary opening, I will expose more clearly and precisely my approach, beginning with a synthetic graph of what I have called my “prototypical experiential device” that I will then comment, including my know-how, explaining how I have also used **iteratively** a representational tool as an hypomnemata (i.e. a **memorial self-writing technics**) (Stiegler, Foucault, Plato), in conjunction with **scholar knowledge and computer simulations**, to design and enact a formal **genetical / generative ontology** resulting from my reflexive activities of learning, to bring forth original conceptions based on **enacted invariants and schemata**. An internet link to its present state will be provided. I will then develop in this part my personal approach of models and computer simulations of artificial cognition processes as an **experiential and “experimental epistemology”** (McCulloch), or cognitive epistemology applied to myself. I will also elaborate about the importance of **Parallel and Distributed Processing models** (PDP, today called “Deep and Machine Learning”) (Rumelhart & McClelland 1988), which are non-linear dynamical systems and **distributed representations** conceptions, not only for simulating enactive a-cognition, but also for thinking enaction itself, pointing some **common misunderstandings**, and stressing their great interpretative and technophilosophical power for the enactive field. Finally, and more traditionally, I will resume and expose more synthetically my findings, namely my **“scybernethic(s)” point of view** as a coherent **rationality**, and the “processual dimension” (orthography intended, see later) as a **pattern of intentionality that connects** (cf. Bateson). I will finally close this report with **speculative** (Stengers 1997) and prospective projections, toward a dialogue between **“groundlessness ground” enaction** and technical enactivism grounded on “relational realism”, between science, philosophy and technology. And more generally, toward what I conceive as a better

understanding of the present state of our western world and about the possibility to contribute generating an **active bifurcation** from the “systemic positive feed-back loops” in which, I think, we are actually collectively caught in; hoping that these speculations will catalyze yours, toward lived collective intelligence in action and **participatory sense-making** (De Jaegher & Di Paolo).

- In a nutshell, I try to illustrate that “*all knowing is being*” (von Foerster, Maturana, Varela, Thompson) and that “*the enactment of understanding is the understanding of enactment*”*. This article could be ambitiously translated as another “as we may think”(Bush 1945) toward the **knowing society**, and not only knowledge-as-data based; militating from an outsider perspective for an authentic cognitive science and not only for an abstract science of cognition “**without observer-actor**”, and more fundamentally for an **empowering enlivenment** (Weber 2013) of the non-inhumans (Stiegler).

* Inspired by a citation of Jean-Hugues Barthélémy about the “individuation of knowledge” by Gilbert Simondon.

Prolegomena

- In this article I will propose a radical, and I hope **stimulating report of my own understanding** and use of the **enactive paradigm** as a reflexive but also **hermeneutical and heuristical tool**. A testimony of existential enaction in action “from within” and “from outside”, illustrating that consciousness is ontologically complex (Varela 1999) .
- What relationship does a professional cognitive scientist or philosopher have with his / her own common sense? How does scientists invent a new conception, a new paradigm? Is the creative process in natural science a blind

spot of the classical cartesian epistemology? Is it possible to design a semantic self-conscious automata? All these questions deals with what we can formally and generally call “**creative cognition**” and **sense-making**, or more commonly “intuition” or “insight”.

- A preceding study, in an enactive inspired psycho-phenomenological way, has yet be made about the process of having intuitions by Claire Petitmengin (Petitmengin 2001). This study coupled first and second person point of view by the mean of an “explication interview” (Vermersch) and meditative practices, to explore the dynamic micro-structure of lived experience. “Of these attempts to explore the dynamic structure of experience lived, it appears that the distinction between inside and outside, me and other, is not a given, but from moment to moment, created and maintained by a micro-activity.” (Petitmengin 2006); giving rise to the non-reductionist “**microphenomenology**” method (Petitmengin, Depraz, Pradelle, Bitbol, Vermersch 2016) as a path “**toward a science of lived experience**” (Petitmengin, Bitbol, Ollagnier-Beldame 2015), complemented with second and first-person self-explication method (Vermersch), the later described in (Depraz 2021).
- For me, as having an initial training as a biologist, passionate by cognitive sciences, with complex models skills (Laborit) (Morin 1986) (Le Moigne 1991), and also driven toward understanding, enactment and all paradigms and **theories are also ways of seeing, thinking styles and attentional grids**. From this perspective, on one side the cartesian third person standpoint could be seen, in a caricatural way, as the “eye of god viewpoint”, or more simply “science without observer”, and on another, first person perspective is facing what Michel Bitbol elegantly called “the blinding proximity of reality” (Bitbol 1998): the eye can not see itself. How to escape the embarrassment of these self-referencials gordian knots?

- One pragmatic answer to this problem in the scientific field was the invention of **neurophenomenology** (Petitot, Varela, Pachoud, Roy 2002), coupling a techno-scientific neurologic device with disciplined first person tradition (namely phenomenology and the buddhist tradition of meditation), in an endeavor to “naturalized phenomenology” (vs. a “phenomenologisation of nature”, cf. (Vörös 2014)).
- Here I will propose an original and complementary way of working these questions which deal from a **first person viewpoint** with the power of the enactive thinking to drive **lived self-transformation** from a scientific to a (meta)epistemological and existential phenomenological level, through **interpretative and creative cycles with knowledge and cognitive technologies**. I qualify this practical approach an “ars” (Episteme & Techne) which is fundamentally practices and praxis coupled with attentional technics. For me, enaction is also reflexive, lived autognosis, a technology and **aesthetic of self** (Foucault).

1. Introduction

- First, let me clarify a little more my “outsider” position: the question of my relation with a more directly **technical interpretation of enaction**, like the french “Compiègne School” for example (Steward, Gapenne, Di Paolo 2014), will be mostly implicitly addressed here, as my main culture came from the varelian inspired enactive paradigm (Varela, Thompson, Rosch 1993). I have however made links with it, particularly when I have had to explicit afterwards my hermeneutical and phenomenological perspective of computer simulations.
- Also, as I take the risk that speaking from a very broad point of view (my

“worldview”), and institutionally “from nowhere”, the more specialized and critical readers may find locally some simplifications, but my main intension here is **heuristic and catalytic**. So I am “speaking with my mouth full” (Stengers). Not in an “soft focus” kind of way, or worse in a “sokal-affair-post-modern-like” style. Authenticity in action is expressed here naturally and sometimes as a fractalization style of explicitation (sign of self-reference recursivity) or multi-level tendency (sign of my own ontological dimension). However, my writing is intensionally double-binded (Bateson) and constrained by critical thinking and ethics. That is to say that my **internal gesture** is implicit and conscious in my style, as I live sense-making and design feelings as affective aesthetic experiences. So I will ask the reader some patience as, contrary to a more classical critical and explanatory style, sometimes the justification and the more precise rationals will be postponed later in the text, builded in stratified iterative steps, knowing that I am doing my best to restrain my natural tendencies to impertinent digressions, in regards to the actual world (catastrophic) state.

- What is really interesting is that I have begin this long research pathway **from a biological (techno)scientific perspective**, interested in models and epistemology, with also a **personal existential sensibility**, and obsessed by two compelling questions: “What is life?” and “**How to think differently?**”. This has led me progressively to an **inquiry toward the implicit and the pre-objective realm**. It was a solitary journey, not because of some kind of solipsism, but because it was historically and socially too soon (in the 1990’s). “Singularity is conquered against a backdrop of anonymity” (Merleau-Ponty cited by Claude Romano). On another hand, I have had to re-discover by myself many key points issuing from the second-order cybernetics and from the enactive approach, which had given me occasions to make some post hoc validations of my **rational trajectory**; and

also to find most of the time cultural guidance, thanks to the present and past community expression. And what was missing at that time in the scholar culture, the cultural “deficit of meaning”, was raw and precious material for my own creative interpretations.

- For now, I will try to share with you, not only the (complex) formal aspect of this enacted and pluridisciplinary conception, but also to sketch how my **know-how** has gradually converge to this enacted coherent rationality associated with a disciplined “**wild psycho-phenomenology**” (i have discovered lately the disciplinary and scholar phenomenological field when the “neurophenomenology” appears in 2002). So let’s dive together a little more deeply in the subject:

2. Drawing a distinction: creative cognition, intuition and body sense-making

- By “**creative cognition**” here I mean the living experience of bringing forth meaningful categories or concepts in our consciousness. I also mean designing artificial life-cognitions/artificial “selves”, subject that I would not address directly here (see for example (Froese 2019) or the work of Ziemke).
- In a **knowing-what vs. knowing-how first person perspective**, if we consider **homeostatic body sense-making** as a kind of center of gravity of the / my cognitive domain (Maturana), I will say that I am addressing explicitly here the formal polarity of what I understand as “creative cognition”, the know-what that is generated by the implicit know-how, in a causal standpoint. So here intuition is not considered so much as an

“evidence”, but more like an enactive complex process between self, valid intersubjective scholar knowledge (about cognition) and computer simulations (of artificial cognition).

- There is another very interesting polarity of creative cognition that I would neither address directly here, even if a **phenomenology of gesture** lies, more or less implicitly, in the background of my conception. This interpretation is driven toward the coordination of the sensory-motor loop and body acting in the environment, like for example dancing or producing creative physical interactions. I can specially quote here again the french “Compiègne School” of enaction and their prosthetic approach, developing for example perceptual substitution devices. I can also cite the works of Di Paolo (Di Paolo & Thompson 2017), or the perceptual and relational pedagogy and caring approach (Bois), speaking about “sensorial intelligence” and relational touch (Bourhis 2012).
- Two others interesting pragmatic attitudes about living in a “**philosophycal body**” (my words) worth mentioning: the somato-aesthetics of Richard Shusterman (Shusterman 2007), and of course in the enactive field, and the lasts will be the firsts, Evan Thompson’s enaction (Thompson 2007).

3. Methodological strategy

3.1 About second-order thinking

- For now on, I will adopt a graphical convention, noting sometimes second-order concepts or notions with the square power: “concept²”, meaning “second-order ‘concept’”.
- From my interpretation, **second-order “concept”** is not and should not be

reduced to only “the concept of the concept”. It is, at the same time (co-determination), “the concept of the concept” AND “the conceptualization itself” which should then be put in suspension (and not intellectually synthesized, more on this later) with “the concept of the conceptualizer”. This later meaning “the concept” in the (your/my) flesh. See for example (Scott 1996) for using second-order thinking as a cognitive methodology. As von Foerster puts it: “*An observer is its own ultimate object*” (cited in (Scott ibid: 7)), as it is important to remember that second-order cybernetics was in fact “***the cybernetics of the cybernetician***”.

- With this praxis, knowing become self-transforming, embodied, sutured with identity: “*Identity and Knowledge stand in relation to each other as two sides of a single process : that forms the core of the dialectics of all selves*” (Varela 1991: 102). **Knowing become then a lived bio-logic experience.**
- This gesture is a (meta)epistemological pathway (or “long pathway”, historical and meta-theoretical epistemology) circularly coupled with self-consciousness of the process (the “short pathway”, phenomenological). The key to understand this gesture is to go through what I have called “**processual thinking**”, which is a thinking and feeling of processes (more on this later).

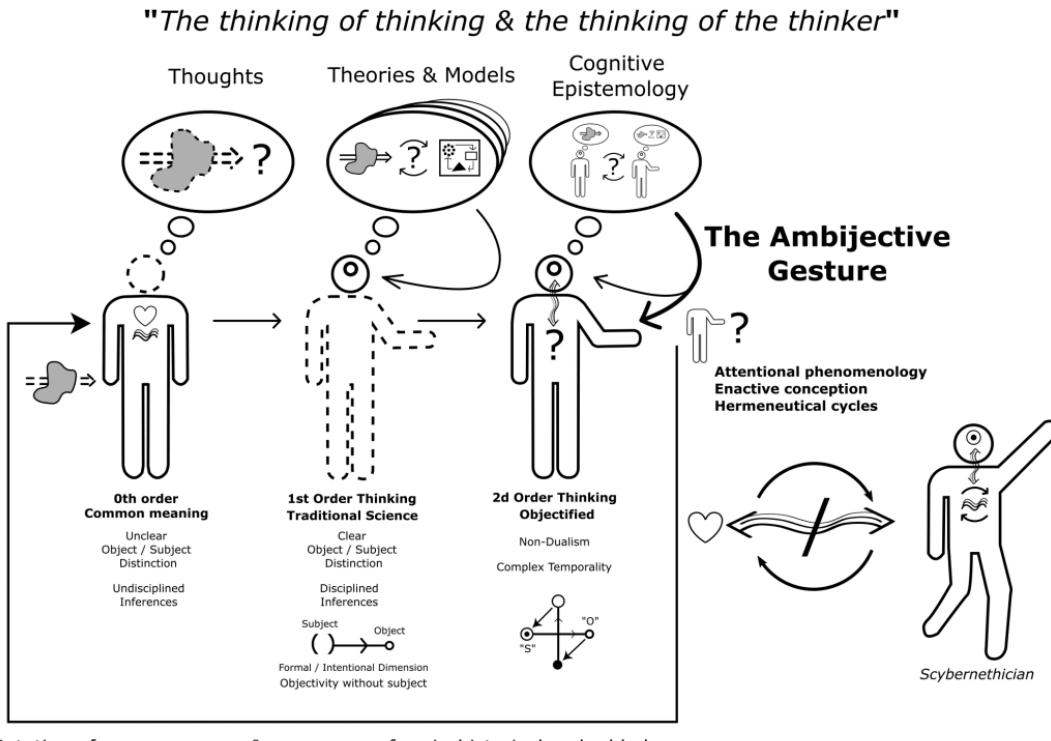
“*Cognition is not about objects, since it is an effective action; and by acquiring the knowledge of knowledge, we constitute ourselves*” (Varela & Maturana 1992)

- And, of course, it’s not a coincidence if I have used the word “gesture” in the preceding phrase. I call this internal gesture, co-determining the objective and subjective polarities of any distinction, the “**ambijjective gesture**”: cycling from culturally and contextually deployed scholar objectification to phenomenological subjectification, that is this self-conscious **co-**

determination of the **(meta)epistemological** contextual point of view associated with a conscious experience of **body homeostatic meaning-making**, from an incarnated first person perspective (you/me). It is the enactment of both an objectification process and at the same time a subjective polarity in the act of knowing, leading to a formalization cyclic process issued from cultural constraints and self understanding.

- Conversely, a locked third person approach see this “long (meta)epistemological pathway” as an **infinite recursive abstraction of the “meta”**, inducing an infinite reverberation, like two facing mirrors or an unpleasant sound feedback, and is left with the impossible question “who will control the controller?”. So from my first person angle, it result that **there is no such things, stricto sensu, as third order thinking**. The ambijjective gesture is a **lived first person experiential cycling gesture** between first (phenomenological) and third person (valid intersubjective/objective perspectives). It is a re-appropriation and a re-presentation of the **implicit self knowledge** dimension embedded in the (meta)epistemological one.
- It could be compared with the phenomenological dual aspect touched/touching of the touching experience (Merleau-Ponty), and probably with the scholar phenomenological intentionality, toward Brentano, Husserl and Heidegger interpretations. But I have not read these authors in the text.
- While trying to rationalize it, I have found that **dual-process theories of the mind** are ubiquitous in psychology. An example in the study of attention and working memory: “Despite their differences, dual-process theories share the common idea that thoughts, behaviors, and feelings result from the interaction between exogenous and endogenous forms of attention. Both types of attention can be applied to representations to increase or decrease their level of activation.” ([**Individual Differences in Working Memory Capacity and Dual-Process Theories of the Mind**](#), Barrett & Tugade,

Psychol Bull. 2004 Jul; 130(4): 553–573.)



Second-Order Embodied Rationality (Rationality²) Scybernethic(s) - Thinking² and Praxis

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[2d_Order_Rationality](#)



- Understanding this, one can tackle with the second-order cybernetics, and understand why von Foerster has had such an important influence on the conception of “**enaction**” and on the radical constructivist movement (von Glaserfeld, Watzlawick). To note: the double aspect of the second-order distinction(s) is not obvious in English, which is more pragmatically oriented, as “**observing systems**” mean at the same time “system which observe” (third person point of view) AND the act itself of “observing” by the observer.

Both are to be considered and distinguished. It is, from my (continental) understanding, typical “meaningful ambiguities” that Heinz von Foerster liked to cleverly sow.

- We will see later that this is just the formal side of my process, which will be then **complemented with a processual side** (deepening the “observing” polarity) by the mean of an hermeneutical / heuristical cycle with (reflexive) computer simulations of a-cognition. Presenting both sides at the same time would not have been palatable.
- I will keep on the subject of second-order thinking later. This interesting way of reasoning should also be faced and complemented with a **dialectical approach**, with what I call “conceptual dipoles and dialogical thinking”. But before this, let me first say some words about the origin of some personal tools and present their interest in this context.

3.2 Important ethical and methodological tools

3.2.1 Homeostasis

A quick precision: I have used here the word “**homeostasis**” (Bernard, Cannon, Ashby) as a metaphor. As a biologist, I mean this subtle imbalance of our biological balance, which make us alive and sensitive beings.

3.2.2 Suspension of judgement and excluded middle

- From my youth lecture of a science fiction novel, “The world of null-A” (Van Vogt 1984), “A” standing for Aristotelian, I have very early intuitively understood that the **suspension of my judgement** was a decisive attitude

for my understanding. Today, I am able to rationalize it: suspension of judgement could be seen as the deconstructive (Derrida) self-emancipatory tool to re-equilibrate the socially and intersubjective necessity of the Aristotelian “excluded middle” (*principium medii exclusi, tertium non datur*). I will now on note this gesture “**de-construction**”, to differentiate it from Derrida’s meaning and also from a naïve understanding as a destruction. Also this notation make sense in a constructivist semantical interpretation, even if I am not per se a “contructivist”.

- In my understanding, the **Aristotelian “excluded middle”** was also introduced to neutralize the subjectivity and relativism of sophistic opinions, in an endeavor to drive valid knowledge toward “laws of nature” and normative intersubjective coherence. It was invented at a time where our civilization was transitioning from a mythical to a human rationalized view of the universe, from empires to democracies (Nancy in (Barison & Ross 2004:1h17)). So then appears, in my sense, a social and intersubjective necessity of inventing a way, opened to intersubjective criticism, to carry on the truth value of verbal assertions from one causal point to the observed effect, via what will become much later, I simplify, “propositional logic”, and toward the elucidation of nature’s invariants. It was a first step of a “**pseudo-sacrifice of the self**” (Horkheimer & Adorno) leading, through the cartesian cut and Bacon’s empiricism, to the prototypical classical (natural) scientific method or “**science worldview without professional scientist or tools**”. Today, things are much more complex, but the questions of the **observer-actor** and about the role of technology in the scientific process remain.

3.2.3 Levels and consciousness of abstraction (and the “technology by itself” view subterfuge)

- What does a neurologist mean when, speaking to a lay man, he say such things as, I caricature, “the brain think” or when an engineer speak about the computer “memory” or tell that the computing machine is “intelligent”?
- The same science-fiction book (World of null-A), and also my biologic curriculum, taught me to carefully consider the **levels and the consciousness of abstraction**, of description and to try to not confuse them (Korzybski, Laborit). For me it is elementary analytical techno-scientific ethics, particularly when doing inter and transdisciplinary inquiries.
- For example the strict **distinction between hardware and software** (hardware/software) is, from my “third person” scientific point of view, a **modern myth** (see also (Russell 1984: 87) cited in (Havelange 1998: 24)). The distinctive illusion is generated by the accumulation of “abstract layers” of different programming “languages”, which are a stacking of “operational syntaxes” (the instructions) torn from their semantic base (Searle, Dreyfus) by the mean of an abstract equivalence, an interpretation, between the electronic material substratum and an abstract mathematical boolean (binary) logic. These embedded layering produce an obscuring babelization between the two levels, leading naive external observers or programmers to this magical thinking. For an hermeneutical (and grammatical) view of software, or software as a writing, see (Possati 2020).
- The Turing-Von Neumann gesture was in fact a “**double cut**”, “the double cut of the digital (Bachimont 2017, 2018): the cut to meaning, which is reduced, and the cut to matter, which is abstract.”(Bachimont 2021: 6).
- From this perspective, the famous “Turing test” could be seen as a test of the machine’s ability to induce an **illusion toward its users**. More, the confusion is culturally maintained by speaking of the computing machine (Turing was inspired by the *human computer*) as if there was no observer-actor coupled in the equation, and also implicitly induced by the materiality of

an artifact like a robot for example. This is without speaking about the massive marketing use of human metaphors (computer, memory, neural networks, learning, etc) and also the peripheral sensory interfaces with users. That is for me the “**technology-by-itself**” view subterfuge.

- Everyone can see the effects of such subtle decentering right now in the all the public space, facing techno-marketing, and even transhumanist rhetorics. “Science and technologies without observer-actor is only ruin of the conscience” could have said François Rabelais, inventor of the word “automata” (Rabelais 1534).
- By the way, this understanding give us also a very interesting possible way to think, and temporally understand, the mind-body polarity of the famous **“hard problem of consciousness”**, via embedded **biosemiotic levels of abstractions** coupled with **historical and cultural (self)-decentering technologies** (i.e. normative and abstractive “constraints and cuts”), leading to the modern valid techno-scientific **“third person” standpoint**.

3.2.4 Gestalt-shifting character and point of view flexibility

From my position, and most of the time, any educated person say something interesting but the key is to understand that they speak from different places, different perspectives because of their different historical and professional paths; and also that there is always an interesting part of knowledge which is, for complex reasons (ethical, political, etc), implicit. I am **non-iconoclast**.

3.2.5 Searching and modeling “without representations and finality”

- The cognitivist culture, expressed in this context as “**problem solving**”, is so much implanted in our intellectual mind that at first it may seem sterile or pure “soft focus” to let go any explicit a priori intension. It is an expression of the **“groundlessness” of the pathway**, which is not at all sterile, on the

contrary, as I try to show it. “*To do science is not to verify an ontology, it is to deprive oneself of preconceived ontology*” (Rastier 1996: 274).

- In my understanding, searching and modeling “without representations” (Peschard 2005) and “without finality” mean that **both representations and teleological finality have to be conceived, in an enactive perspective, as *a posteriori (post hoc)* and contextuals**, as being enacted by the subject activity in relation to the inquiry process guided by sense-making, and not by ideological, utilitarian or financial constraints. The **apparent teleology** for an external third-person observer-actor is in fact and more fundamentally also enacted pragmatically *a posteriori* by the autonomous organism self-regulation in interaction with its environment. Here my “enacted representations and finalities” are temporary and relative grounds. Which mean that the (precious) *a priori* and initially acquired formal disciplinary knowledge have to be then intelligently de-constructed to deepen one’s understanding of it.
- So the more intellectual cognitivist “problem resolution” perspective should be understood first from its production context i.e. how it is also generated by and for our own understanding. This is the “creative cognition” approach that I am speaking of and it’s a question of polarization of the attention, that is an **hermeneutical perspective** which need to deal *explicitly* with a first person / “third person techno-science” standpoint.

3.2.6 Cognitivism vs. enactment: and the winner is... Technological (neo)connectionism?!

- What seduced me first in enactment was mainly that this approach has a **more encompassing and integrative** dimension, where cognitivism seemed to address more specifically the intellectual and socially normative orthodox side of the controversy. The enactive perspective offer to me a more broad view

where **cognitivism (and “neo-connectionism”)** were more specialized cases of cognition.

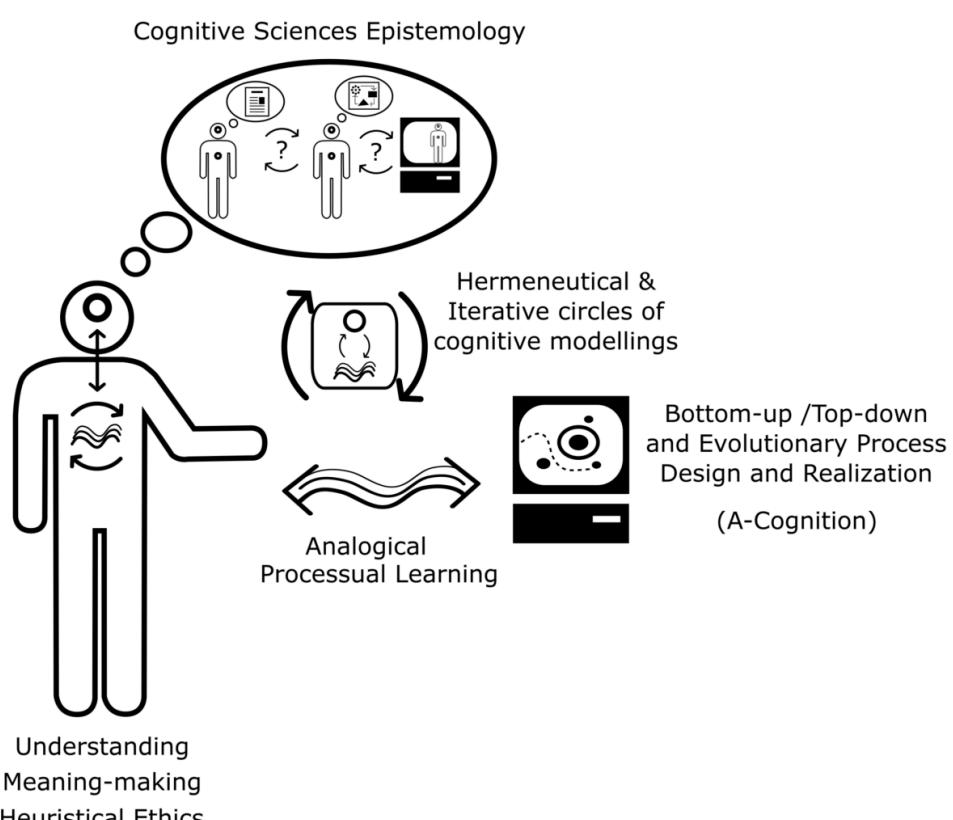
- So the response of my title is, of course, both. In fact I am actually embedded in the (intellectual) cognitivist side of cognition, trying to explicit linearly my conception in a kind of “computo-representationalist functionalism” style, but with a big difference: I assume explicitly the hermeneutical process which lead me there, giving it only the power **to be a possible way to think the world**, and not an a priori normative one. I call it my “outsider privilege”.
- For me, two main notions characterize generally the cognitivist style: the **linearity of thinking** and the **localization of the representation**. I will later show how I have deconstruct the localization by passing through “distributed representations” and then “processual thinking”, which enact an a posteriori “functional thinking”. The linear thinking style could itself be subverted via well understood and iterative second-order thinking cycles and hermeneutics approach, leading to **(self)understanding and creative epistemological intuitions**.

3.2.7 About enactive modeling and simulations: “From computers which think to computers which make me think”

- I should thanks Bernard Stiegler, and all the simondon’s inspired scholars (Compiègne school of enaction, B. Bachimond, J.H. Barthélémy, etc) for providing me philosophical tools to help me think and mainly express my own experience of the technical dimension (Tekhne). **Thinking of the techniques and of the technology** is an important **blind spot of science and philosophy** (Havelange 2005), caught in a cultural double bind between being often seen as secondary by philosophy and as negligible neutral mediative tools in science. But we should beware as, in a certain sense, the medium could also be the message (Mc Luhan). There is something important

to think here, or we may well collectively attend a returned of the repressed in an Heideggerians Gestell (“the boarding of technics”) style. Consciousness and understanding are nowadays paramount.

- I have personally developed my modelization skills by first trying to understand biology, leading me to systemics (Berthalanffy, De Rosnay), and later to **cybernetics and complex models** (Le Moigne, Vallée). For me model-space is a “neutral” and “free” formal space, meaning a holistic (but not reduced to) polarized view driven toward my own understanding. In a similar fashion, computer simulations, as I am also a programmer, were seen and used as an heuristical **functional “modeling clay”**, driven not so much toward the realization of a golem, but toward mine.



Experimental & Experiential Epistemology

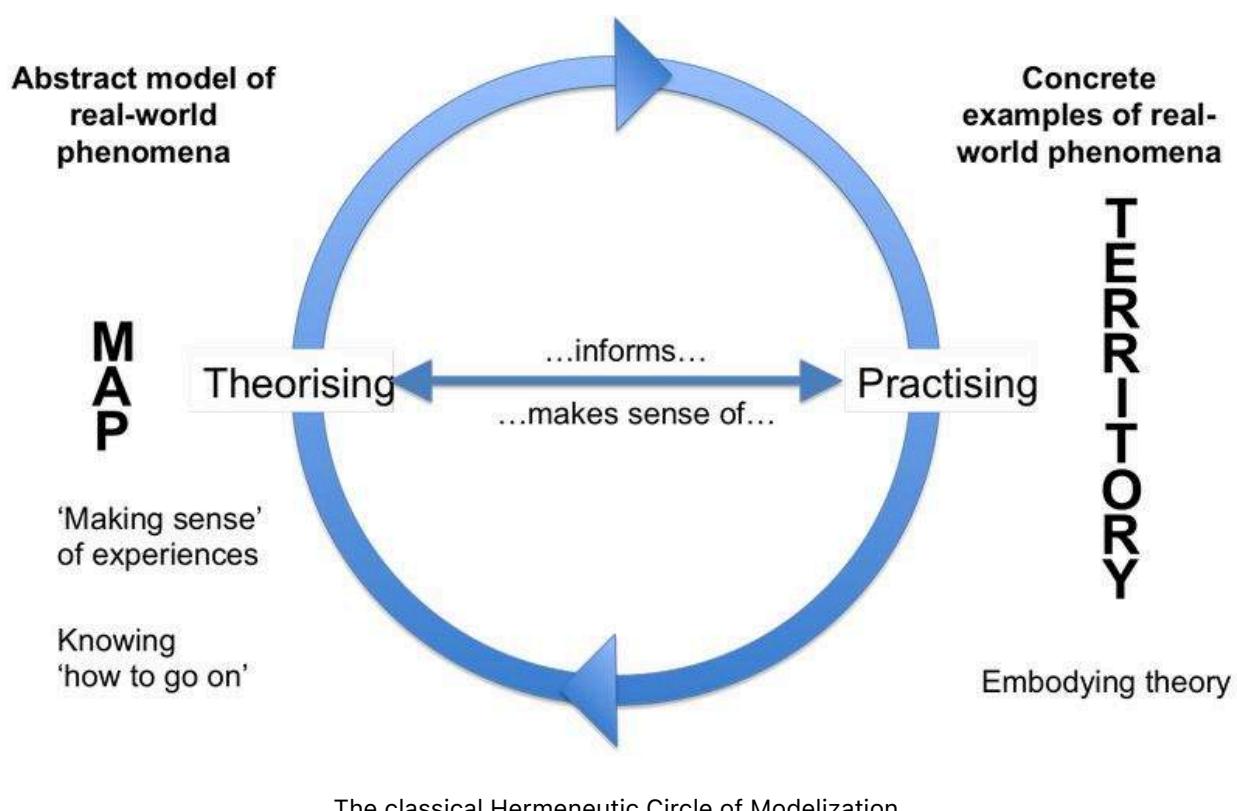
Christophe Rigon / Soto² Experimental and Experiential Epistemology



- This leads me to consider models and computer simulations as experimental and experiential tools, in the same interpretative way that I see theories as attentional grids for empirical experiments. Like Michel Bitbol (Bitbol 1998), I thought that there is a cyclic scientific co-determination of the theoretics with its attentional object and methodology. That is to say that, for me, models and simulating artificial cognition is also doing **experiential and “experimental epistemology”** (McCulloch, Varela), or “applied epistemology” to myself. Here epistemology is not only seen as theory and history of knowledge, but also and mainly as a **theory and history of**

knowledge acquisition (von Foerster). “(...) *culture is not a thing, or a collection of things, it is a process*” (Hutchin 1990: 5). For a more detailed view about using models and computer simulations as experimental and experiential epistemology see for example (Beslon 2008). “*The decisive thing with modeling is not the model per se, but what the model and working with the model does to our mind*” – (Grimm 1999) cited in (ibid). See also (Sigaud 2002).

- The smart “**From computers which think to computers which make me think**” in my title is from (Bachimond 1996).



- This integration of the **paradigmatic representation in action** is a form of validation of the viability of the paradigmatic view by generating new hypothesis, new attentional directions for the researcher, which will have then to be confronted with the experimental-empirical. “*Simulation is an ecology*

of objectified formalisms" (Varenne 2003) and dynamical processes. Also, in my perspective, with the phenomenological experiential fields (experimental). In this way, the model / computer simulation loop is **enhancing the classical hypothetical-deductive / empirical classical scientific methodological schema**, in conjunction with an (auto)-phenomenological inquiry. So, it does not answer directly "how life is enacting", or the "how do we enact or think" questions but propose a possible "as we may think" life / cognition / enactment in action, and see if, in return, the experimental and experiential fields validate the **new hypothesis** generated by the simulations of the paradigmatic approach in question (here, for example, enactment).

- But I could not developed this coupling with real intersubjective empirical practices, as I was "outside" the professional scientific world, leading me in return to deepen the phenomenological and existential side of my approach.

3.3 Functions as enacted iterations: an analytical of dynamical approaches

- One last important word: computer science and PDP simulations teach me practically to think and act in term of **iterative processes** (vs. generative), which is a way to practice disciplined and cautious (phronesis) scientific **analogical (vs. logical) thinking**, patiently enacting the induction from the abductive (Peirce) process. A knowledge that I will use in building my emergent reflexive and dynamical scybernetic ontology, and more generally in all my creative designing gestures in general, as this text.
- And one should also understand that functional computer simulations, even if done in a linear fashion, are so quick that it simulate a quasi-parallel, that is to say, **quasi-analogical processing**, which does not lack humor; this also

sign it's pseudo second-order nature that we could use, in return, actively and phenomenologically / hermeneutically to our own edification, as quasi-analogical understanding, that is **empathic beings**, that we are. This conception seems to be “resonant” with Thomas Aquinas thoughts (Montagnes 1962), but where God is just an option, but where the Other is not.

- For a very interesting view of the relation between the repressed analog (in the physical sense of continuous) and digital conceptions in the technophilosophical and modeling cybernetics movement, see (Pias 2005).

3.4 From dialectic tension to dialogic thinking: coping homeostatically and patiently with conceptual dipoles

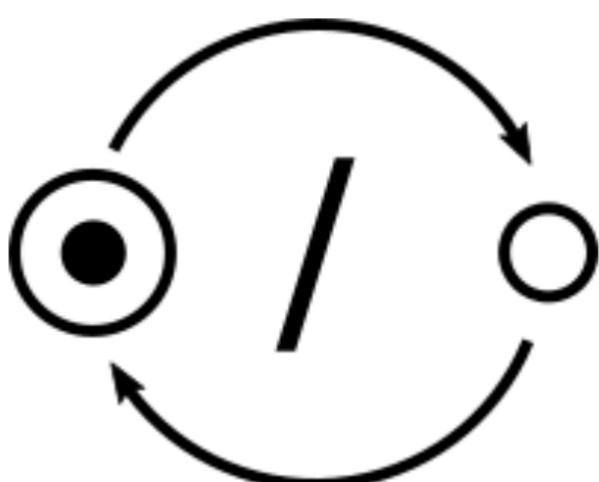
A preceding proposal in the enactive field has yet been made for an Hegelian inspired “neurodialectics” (Zaslawski 2018). Here I will propose a practical way, issued from my own experience, to deal with the dialectical tension.

3.4.1 Conceptual dipoles

- When I started my epistemological and gnoseologic odyssey, I have noticed that what I have called “**conceptual dipoles**”, which appear in the literature under different names (dyad or aporia, diairesis, oxymoron, etc), plays an important role in structuring disciplinary theories and cognitive domains. They share a simple general idea: two linguistic terms (notion, concept) which can be seen as complementary or/and in opposition. I will note them with a slash “/”. Some examples: “linearity / circularity”, “space / time”, “logical /

analogical”, “localized / distributed”, etc, but also “third person / first person point of views” or “natural sciences / humanities and social sciences”.

- It is interesting because, as I could not read Varela’s **“Not one, not two”** (Varela, Bitbol 2017: 73) until recently, I have had to develop my own creative pathway to cope with these gordian knots, **more on the existential side** than Varela’s toward-science expression, but complementary. So the reader should note the differences between my definition and Varela’s definitions of his dualities (“the it” / “the process leading to it”, leading him to the star statement).
- Bateson has also used the slash notation, but in another context (Bateson 2008).



[Christophe Rigon / Soto²](#) [Conceptual dipole](#)

The Conceptual Dipole & the Quasi-double Distinction.

3.4.2. The asymmetrical nature of the dipole and the ethical (self)imperative

- It then appear to me that I always perceived a fundamental **asymmetry** between the two terms: one was “easy” to define, to formalize but the other was unclear, less prone to be caught by a rigorous definition, a kind of “soapy” notion, resisting to be completely grasped. In this regard, one dipole is particularly edifying: the **explication / understanding dipole** with which I am dealing right now. It’s Dilthey’s who officially coined this distinction between understanding (Verstehen) and explanation (Erklärung) leading to a controversy (see (Apel 1986) cited in (Zaccaï-Reyners 2003)).
- And it has emerged from my natural curiosity that, once I could decently understand the disciplinary meaning of the two terms, my ethical (self)imperative was to **always focalize my attention more on the “weak” side of the dipole**, the side that was difficult to grasp. So if you take my preceding examples, you will see that the left side of the dipole is the “easy to formalize” side and that the left one is what I have called the “weak parent” side.
- **Excessive polarization** in (scientific) intersubjective controversy tends to rhetorically favor the “easy” polarity, which is more in agreement with the mechanical structure of causal explanations. It also tends to project and reduce the dipole to a one-dimentionality, expelling the disturbing subjective understanding to reaffirm implicitly the orthodox institutional and professional, normative and corporatist, “objective” standpoint.

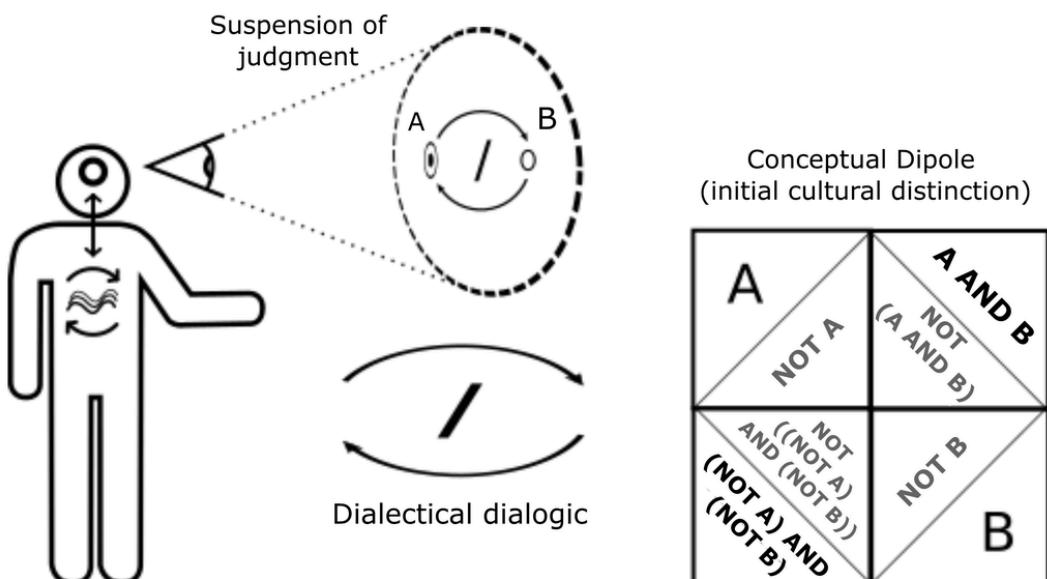
3.4.3 Second-order Distinction (distinction² or quasi-double distinction): “not two, not one”, in two steps.

- When considering abstractly and formally the two polarity of the dipole, we can make **two distinctions**: one distinction is **classical and logical** by supposing implicitly a common underlying dimension from a third objective person point of view, but there is also a **first person perspective which is**

more analogical, seeing the “easy” polarity as included this time in the “weak” polarity, which in turn could be methodologically understood as an instant frozen in time of a dynamical circulation. The so-called “weak” polarity could also be understood as a subjective self understanding polarity of the distinction.

- In this sense, it is also intellectually where lies the origin of the synchronic co-determined world / self distinction. But put this way we are quickly facing the **“blinding proximity of reality”**. So we have to change our approach. As a complementary path with first person valid phenomenological traditions (scholar or meditative), we could also adopt here a second-order strategy, coupling and cycling along what I have previously called the long (meta)epistemological and short phenomenological pathway.
- It is an **iterative strategy “at the limit”** (Stengers 1997:125), as correlation is not causation, which will be associated (later in this text) with an hermeneutical approach of computational strategies, more functional and mechanical. It could also be compared in a more collective way with the iterative “Agile” group methodology, intensively used nowadays in software conception and development.

3.4.4 A systematical logic of knowledge exploration: in search for invariants, prototypical scheme and correlations



A Systematical Logic of Knowledge Exploration (Hermeneutical circle)

Christophe
Rigon /
Soto²

[Systematic_Knowledge_Exploration_1200_En-2](#)

- I have found in (Morin 1986) a method he called “dialogic” that I have interpreted as a systematic method about exploring a conceptual dipole, i.e. a **logic of exploration**, which is for me an “**exploratory dialectical dialogic**”. It is very simple: it consists, at first, to understand the two concepts distinctively (A and not-B, B and not-A) and then together to see their complementarity (A and B), but also their contexts (not (A and B) / not-A and not-B). It could be compared with the logical OR, XOR (eXcluded or), AND functions in computer programming logic.
- Then the new generated conception should be **checked against the valid scholar knowledge**. The objective is to enact a valid meta-perspective linked to our sense-making, that is a point of view which can generate a

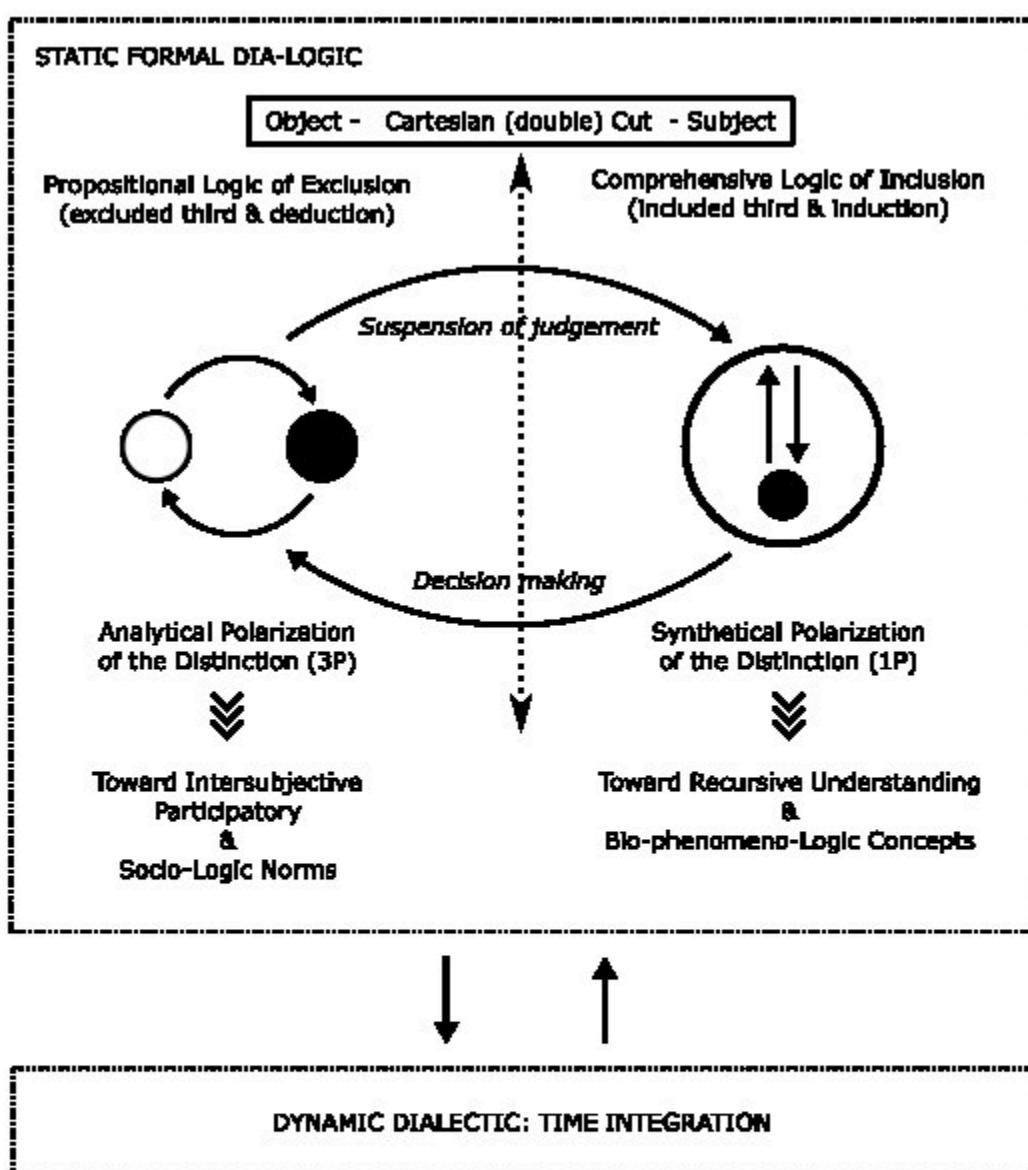
general understanding of both of the terms of the dipole, but also a partial understanding of the historical, theoretical and implicit socio-political contexts.

- A key methodological point: one can normatively reject the para-doxical tension of the dipole because of the Aristotelian canon of the excluded middle, or heuristically and more interestingly **put the tension temporally in suspension**. The main idea here is to resist to the temptation of relativism or to make a direct, “grey” or “dead” neutral synthesis right in the middle of the linear relation between the two terms, but keeping the asymmetrical dipole “homeostatically alive” and cycling (**en-cyclopedic approach**). It is like if you don’t stop weighing the two polarities with each in one of yours imaginary hands (french: peser), sustaining the para-doxical, one might say erotic, tension. Put more scholarly, this suspension of judgment, that we might call here an abstract and generative “sus-tension” of meaning, leads in time to an embodied under-standing, an “**antepredicative’ experience**, that is to say of the experience as it is given before being conquered by the theoretical gaze”, cited by Décarie-Daigneault about Merleau-Ponty’s phenomenology of the “originary silence” (Décarie-Daigneault 2021: 27).
- A sanity key point: by massively accumulating these suspensions, we are confronted with high levels of complexity which can become **anxiogenic**, as we are not protected here by the cartesian cut, that is by the anxiolytic third person standpoint abstraction (an implicit psychological aspect of the cartesian rationalism). A useful helper to release the pressure can be to use an **hypomnemata**, a “tertiary retentional tool” (Stiegler), like I have done myself (see my “brain”, next part).
- So we have to respect our intimate homeostatic rhythms and be patient. As a zen master said “*let the cow pasture*”. In this way we **let our body make the semantic synthesis**, which is always also temporary, leading itself to

knew orientations, explorations and validations in in-finite interpretative circle. It is **life-in-you** which should guide you and make the semantic synthesis, **not our intellectual mind**. And it can only do so if you give it “the key of the house” at the right moment, which is an attentional letting go or a loosening of our inner tendency to grasp obsessively things, as a baker rests his paw before baking.

- Some may call this “instinct”, but I prefer to call it my “**educated thinking body**”*. It is not an impulse but an **intelligent and conscious process** generating a temporary semantic revelation, and I have learned to trust me / it (Leib / Körper, **my first person lived body / my “third person” physical body**) to nicely and naturally do the work. Heinz von Foerster’s Theoreme n° 3: “*The laws of nature are written by man. The laws of biology have to write themselves.*”.

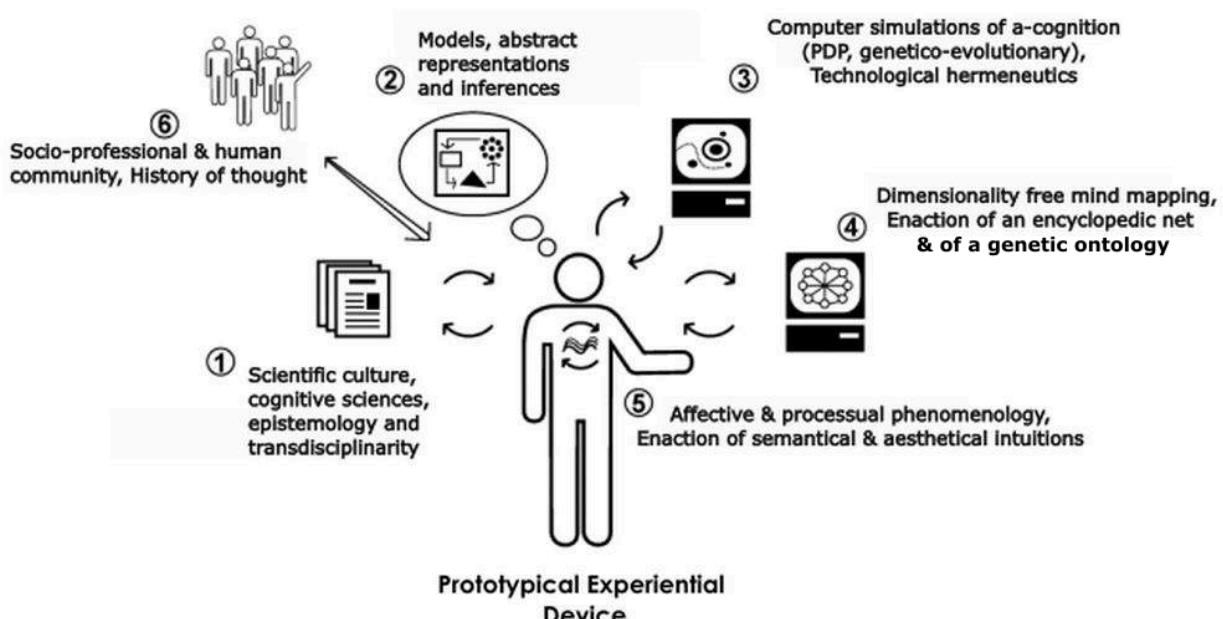
* For myself, in french, I have called this intimate understanding process “panser” (i put my hand just under the solar plexus), with a double sense of “thinking” (penser) homeostatically with my “digestive organs” and taking care. May be it could be linked to the recent discovery of our Enteric Neural System (ENS) as a “third brain” (after the cerebrum and the cerebellum)?! I bet that a neurophenomenology of the guts should lead to very interesting results.



**The Scybernethics Dia-Logical Dialectic
(Enacted Evolutionary Dia-Logic, Logic²)**

- Phenomenologically I can describe this experience as an **aesthetic feeling of resolution** coupled with **kinaesthetic schemes** (in-tuition, information) (Piaget, Husserl, James). Being patient and aiming for diversity lead to a more and more robust and stabilized (enacted) understanding representations and stabilized know-how. Gradually the reasonings begin to be like dances in space, delivering their own trajectory and you can feel their idiosyncratic style, their mental gesture and postures, their abstract behavior. I suppose that this is a trivial phenomenological experience for trained critical thinkers, I am just making it explicit and conscious.
- This praxis is coherent (and not at all identical, more as a complementary negative) with the “coupling” and “imaginary” constitutive dimensions described by Varela from a “within” third person point of view: “Thus **the term cognitive has two constitutive dimensions**: first its *coupling* dimension, that is, a link with its environment allowing for its continuity as individual entity; second- by a slight misuse of language, I admit- its *imaginary* dimension, that is, the surplus of significance a physical interaction acquires due to the perspective provided by the global action of the organism.”(Varela 1991: 86-87).
- So I have myself densely accumulated these differences and similarities in many disciplinary domains. And soon it appear to me that I was overwhelmed and that I could not memorize no more all these concepts and conceptual dipoles, and that my synthetic systemic models on paper were much too complex as time goes on. I was faced with my own complexity limit and I needed a representational tool, **a memory prosthesis to augment myself** (Engelbart), which later I have also understood as an hypomnemata, a self reflecting writing tool.

4. Prototypical experiential device



[Christophe Rigon / Soto²](#)

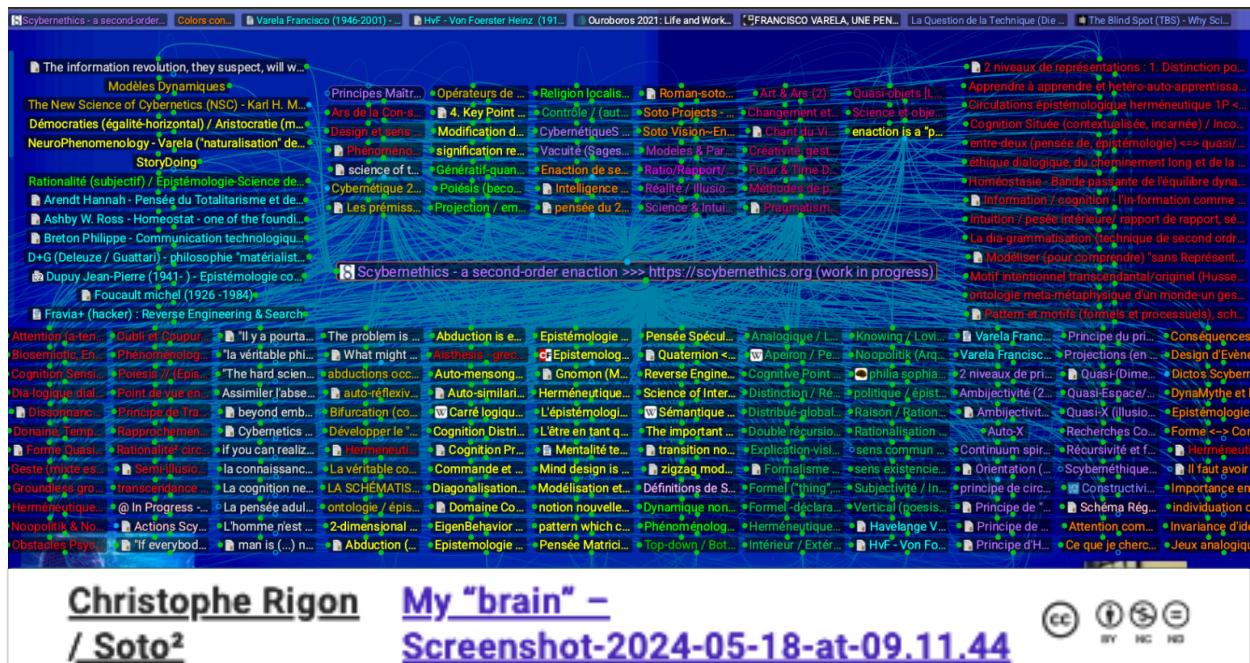
[Prototypical_Experiential_Device_web_2](#)

4.1 My “Brain” and designing a reflexive genetic / generated ontology: a first person enactive style of representing

- The reader should have yet understood: my “brain” is just what is called today a **mind-mapping tool** (also named technically “semantic nets” in cognitivist cognitive psychology). But I did not want to be constrained by the 2D dimensionality of these tools, like with my good old fashion pen and paper. I was forced to finally choose a commercial product that offer this possibility, that is creating an abstract net of items (concepts, dipole, themes, citations, references, persons, links, etc) which are locally represented in a 2D

hierarchical fashion (item, parent, children, adjacent) but also with the possibility to make free relational links between any items of the net, so that the global emerging structure would **not be dimensionality constrained**. A kind of special and personal “intranet” if you like, or more scholarly as a mereotopology (Livet speaking of Whitehead’s notion of event in (Livet 2008)). I was also looking for a representational application that put the drive on the **context** of each item, as meaning and creative thinking are highly context-dependant.

- This “brain” actually contain around twenty height thousands items, organized in a way that I think nobody could easily decipher, except me, as it is the trace of a double movement: a **top-down** classical disciplinary normative learning ontology, **with a bottom-up iteratively enacted**, creative and reflexive ontology, the trace of a **technically and “socially extended mind”** (Gallagher) which acme is the “scybernethics”. It has what McCulloch called an “*heterarchical*” organization (McCulloch 1945).



- It could be **seen and explored online now** (mix english / french). To

navigate through it one must click on an item, and it will replace the preceding in the middle of the screen. You should be a little patient because this online version is a bit slow and my top categories, as they are nexus, are very saturated. I recommend to tile the screen horizontally (circle arrows, center, down). There is a search engine integrated to search for keywords (concepts, persons, etc), and in the top left you will find a pinned “thought” called “Colors conventions” embedding a short explanation about my colors code. And “soto” is my own avatar nickname, myself as another.

- A further interesting potential use this map is that, as it is a chronologically dated trace, I could one day being able to backtrack in detail the historical enactment of my thinking as an archeologist, in the same way Foucault speaks about of an “**archaeology of knowledge**” (Foucault, 1969). In this sense, one can also see my use of the “dialogic dialectics” as an archaeological gesture, digging in the implicit and forgotten historical and cultural epistemic soil.
- Note: There is also a collaborative version of this software.

4.2 Models and simulation of a-cognition: the reflexive heuristical / hermeneutical cycle of representations in action

- From the “**hermeneutics of technology**” point of view, or “as we may think processes” I have described earlier, we can ethologically observe, by simulating it, the dynamical behaviors of a simulated artificial agent or robot. But more interestingly, we can access and design the inside dynamic generating such behaviors. That is his “**internal gesture**” or dynamic trajectory and attractors of the system, linking the analytic parts level to the behavioral hole, in a bottom-up style. We can embed a whole population of agents or robots into an evolutionary algorithm (Nolfi, Floreano 2000) (by the

way of a simulated “genetics” for example), and by deciding that the criteria of selection is the viability of the agent, and **not some “adaptive” or “optimizing” process linked to external “environment traits”**. Doing that one can see that the enactive approach is absolutely viable and plausible to explore a-life and a-cognition. I have myself designed such agents in the 2000’s. For more recent integrations of such ideas, incorporated in robots, see Di Paolo (more driven toward collective cognition) and Froese works.

- But in a complementary and **phenomenological sense**, models and simulating of artificial cognition are also view here as **experiential epistemology**, which could be expressed as experimenting on myself the so-called “anthropological constitutive (vs. constituent) polarity of the technics” (Steiner, Gapenne, Havelange), linking consciously and voluntarily my knowledge of the dynamical processes and of their behavioral consequences to my own feeling of my internal gestures while I am thinking. Phenomenologically, I think it could be described as a processual “eidetic variations” technic inducing invariants or **techno-experiential schemes**.
- This point of view opened me to new **attentional perspectives** (“attentional grids”) leading to new hypothesis for my practical testings and experiential praxis, reinitializing the double hermeneutical and heuristic cycles for others rounds.
- For an **hermeneutical approach of computers** see the seminal work of Bruno Bachimont. At the time of my research, the rare scholar which seem to cope with this important question, and that I could identify, were for example Winograd and Flores: “*In designing systems, we are designing ways of being*”, or in a cognitive anthropologist interested in techno-distributed learning: “*cognitive artifacts are involved in a process of organizing functional skills into cognitive functional systems*” (Hutchins). As I was

writing this article, I have found an Heideggerian and phenomenological (Don Ihde) perspective on technological / material hermeneutics: see (Zovko, 2020).

- I have called for myself this living phenomenological experience of the “anthropological constituent polarity of the technics”, which is a **techno-phenomenology**, the “**tekhnicus**”, inspired by Bourdieu’s sociologic “habitus”.
- More explicitly, it helped me to cycle between on one hand the (phenomenological) question “how does I feel to think in term of...” enactment, distributed representation, etc, activating the feeling of an internal gesture, which then was coupled with schemes issued from my “experimental epistemology” view of cognitive simulation. This understanding then led me to converge toward the **distributed and parallel processing** (PDP) paradigm of **distributed representations**, which has helped me to creatively and progressively stabilize a dynamical internal gesture as a **prototypical (Rosch) form of enacting**, and not just only feeling it.

5. Enacted results: regulative patterns and rhythms

5.1 Ceteris paribus (Natural sciences) / Mutatis mutandis (Human and Social sciences)

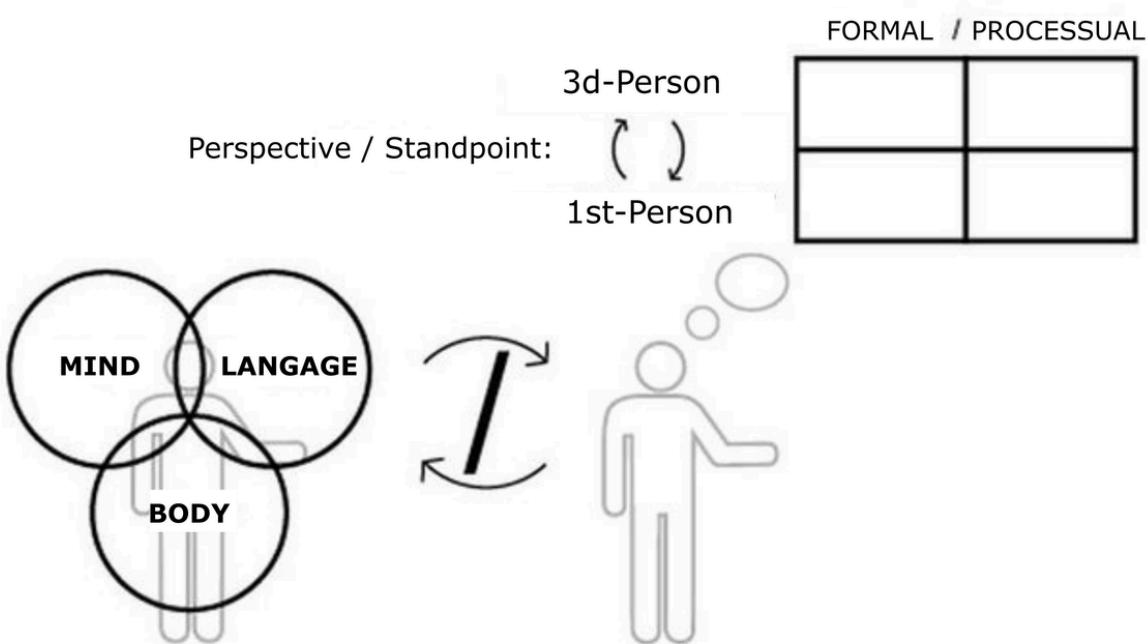
Ceteris paribus (the natural sciences motto): meaning “all other things being equal”.

Mutatis mutandis (human and social sciences motto): meaning “changing what needs to be changed”.

A posteriori I could interpret these enacted methodologies and ethical / deontological commitments as issued from natural science episteme (my background) but also with many similarities to human and social sciences epistemology. The latter is not so surprising in fact as I am also reflexively and recursively included in my own cognitive domain of object. This all process should probably be comparable with the conception of the “double hermeneutics” (Giddens) found in social sciences, as cited in (Havelange, 1998). Also, I could interestingly add that In mathematics, we speak of a necessary and sufficient condition. Also in buddhism philosophy, philosophical thinking is often analyzed in terms of “causes and conditions”, to be compared with the two Latin scientific “antiphon” of my subtitle.

5.2 First trivial emergence

My really first finding was the emergence of a trinity aspect of my phenomenological understanding: intellectual **thinking, language and body**. This may seem to an expert a little dumb, but it shows me that while I was striving at my best for not projecting any pre-conceptual categories, or more precisely trying to be conscious of my own projections, these general categories were emerging as meaningful from my eclectic practices. It has given me trust in my (self)knowing process.



**3 cognitive domains enacted (formalized) and
an example of quasi-bidimensional dia-gram**

Christophe Rigon / Soto²



5.3 The enacted quasi-bidimensional formal prototype

“Identity and Knowledge stand in relation to each other as two sides of a single process : that forms the core of the dialectics of all selves” – Varela

- Then, one of the first more interesting emerging invariant, after years of practices, was what I have called the “**formal quasi-bidimensionality**”. One clear formal dimension and another, orthogonal, not so clear. I could not link this form to a precise context, or to all, it was just a general, abstract and intuitive emerging conception, a **pattern** or an **archetype**, strangely at the same time a meaningful de-constructive tool and a result of my activities, a limit of my formalization. By “quasi”, I mean something which could be

perceived, understood like a dimension, but that can not be reduced to it. (I then called this strange dimensionality a “**dimentionality**”, more on this later).

- What was precious was not its form, too slack to be intellectually and ethically useful, but the fact that it was idiosyncratic, enacted through my intense activities, **embodied in my understanding** as a self-emerging conception linked to many references and complex practices. Illustrating that the (self-transformative) pathway is more important than the result.
- Later, I have found resonant correlations like for example in (Shear, Varela 2000:129) speaking about “**double intentionality**”. Which lead me to try to understand “what” does (phenomenological) “intentionality” mean, and I have not yet finished, and probably never will, as intentionality should probably be more understood as a fundamental and primordial bio-conscious gesture than as a defined and formalized “thing” or form.

5.4 Relational thinking without relational realism: an indirect question to Simondon's approach

- In direct relation with the preceding “quasi-bimentionality” was the stabilization of a “**quasi-quadrilectic schemata**” or **dia-grammatization***. It helped me representing synthetically knowledge in the form of a cubic matrix distinguishing first and third person perspectives, but there was always something missing, I could not capture all the aspects of a particular problematic with it (hence the “quasi”). A typical example of such matrix is: form and process with first person and third person point of views. The intersection between process and first person is not so clear, something is missing to complete the diagram. If I make a ternary model, while formally complete, something vital is missing this time from the schema. And if I want

to go deeper, I am forced to make another matrix, like Russian dolls. This formal fractal effect induced by reflection was the sign of **an underlying recursive self-reflecting process**.

* Cf. The notion of grammatology and grammaticalization, which is a discretization of the continuous, so that it could be reproduced, through Derrida, Auroux and Stiegler meanings.

- This was confirmed by the **aesthetic feeling** of spiral shape trajectories of my discovery strategy, as the logarithmic spiral is the only form which does not change its form (invariant) while increasing its size. This is also aesthetically linked to the famous “**golden proportion**” (“Golden Mean”) which I defined as “the ratio from the small to the big part is equivalent to the ratio of the big part to the all (small and big)”. One can see the relation with the “double distinction” (in one) of the conceptual dipole, pointing again to the analogical dimension. It suggests also where to harmoniously put the virtual cursor between the two poles of the conceptual dipole seen in a distinctive and analytical one-dimensional objective way. Interestingly, it appears that Aristotle has also used the Golden Mean but not in an **aesthetical ethics of epistemology** like me (cf. 3.4.2 the ethical (self)imperative), but more as a moral principle.
- It took me some time to understand this quasi-quadratic form and find a decent cultural rational about it. Surprisingly for me, it's Thomas Aquinas, a scholastic, who gave me what I consider today as the best explanation of this form, by remarking that contrary to simple resemblance or relation that supposes a comparison between two terms, analogy supposes the linking of four terms. A is to A' what B is to B'. What is analog is the ratios, hence my understanding of the term **embodied “rationality”** (vs. intellectual reason), as I distinguish the lived act of knowing and post-hoc knowledge processing.

Analogy could be, formally and spatially, freezed as a relation of relations, a relation². But it could also be understood more deeply as a ratio of ratios, a ratio². (To note: in mathematics, a rational number is a number that can be expressed as the **quotient** or fraction of two integers).

- More, Thomas Aquina say that *being, qua being, is neither univocal nor equivocal*, it is analogous, as an analogy of proportionality (Montagnes 1962). Not one, not two, but formally and from a third person to first person analytical perspective by a quasi-four “detour”*. “Not three, not four” from my own third person-to-first person formal approach.

* See the use of the “pseudo-narrative detour” in Guattari thinking about the objective / subjective dipole (Guattari 2008), or Ricoeur’s conception of phenomenology as an hermeneutical “detour”.

- Relation, in this sense, is de-constructed, and again we are driven toward a **“groundless ground”** realm.

5.5 From the cybernetics of the cybernetician to second-order enactment

Keeping on finally the explicitation of the second-order notion, as seen in the methodological introduction of this article (cf. “About second-order thinking”), we can now ask the difficult question: how could we conceive a second-order enactment (or *enaction*²)? If we follow the second-cybernetics logic, as previously heard, it should be both “an *enaction* of *enaction*” and “an *enaction* of the *enacting*”, leading us to **“the *enaction* of the *enactor*”**. At first glance, a direct intellectual approach seems again very tricky, making like short-circuit sparkles. So we could again take a detour, a cycling pathway through the “long” (meta)epistemological pathway coupled with the “short” phenomenological pathway.

5.6 Enacting reflexive thinking : the circle quadrature, the uroboros / Moebius strip and hacker ethics

- Second-order thinking is a powerful tool to **creatively de-construct formal thinking**, driving us toward what I call the “processual dimension”, and that I will detail later. In fact it’s a kind of ethical mind-hacking* or reverse engineering tool.

* for an ethical sense of “hacking”, see (Himanen 2001), or more loosely, in the actual development of the so-called “ethical hacking” industry)

- By passing through the (meta)epistemological level we reveal two things :
 - First, we reveal the/our **cognitive blind spots**. And being conscious is the first step to overcome. So the / my scybernethic(s) point of view is also a reflexive thinking about my own limits and finitude. It is a thinking “at the limit” of the limits.
 - Secondly, we reveal also through the **negative process**, the implicit, the conditions of production of this knowledge, putting our phenomenologicals “kantian a priories” in resonance with techno-theoretical and socio-historical conditions. This in turn, lead to a temporally body sense-making synthesis, leading itself then to new conceptions, new researches, in an in-finite circle of production. **In-finite** because it’s our own finitude and limits which make the all process happening. *“It is by passing through the form of the form that the process conditioning the form is revealed, gradually and over a long process.”* (Rigon 2017).

5.7 Form / Processus: taking care of the pharmakon (gestures and orthopraxis)

- Let's design an existential and practical definition of "**form**": I call "*form*" everything that could be mentally or physically designated / indicated. This definition could be compared with (Spencer-Brown 1994), who begin by a toward-mathematics abstract distinction, or with the dynamical concept of eigenform (Von Foerster, Kauffman). In fact it could be understood as just a practical way of designing a **meaningful gestalt**. It result from this definition that, phenomenologically and in a form / processus dipole, the "processus" could only be partially formalized or have to be defined by negativity of the form. It is what I call the "**processual dimention**" (with a "t", as in "existenTial). This "t" is a reminder of the dynamical Tension underlying this concept / notion.
- It show striking parallels with the phenomenological **intentionality** (Brentano) (with also a second "t") and with what Bateson called "**patterns which connects**", or elsewhere with the mediative rôle of the peircean **abduction** in the deductive-to-inductive process. While writing these lines, I have also found an interesting article about a patterned conception of self as expressed by Shaun Gallagher in (Gallagher 2010).
- This "processual dimention" is a **disciplined ana-logical process**. From this result a terminology convention: I propose that a designated, which is an objectified processus, be simply called a "process", to differentiate explicitly the two. Phenomenologically, a process is an incomplete or in-finite form of the processus because we can only formalize the form of the processus, his objectifiable side, leaving the time-dynamical-subjective polarity as a feeling for us. The processus could only be intellectually understood as a mix, a flux, an aporia, an ambiguity (etym. amb-agere), a **pharmaka**. A more formalized

and spacialized static term is “relation”. So a relation is a (doubly) reduced form of the processus, not the processus per se. This distinction is crucial.

- **Formalizing is a gesture of freezing and spacializing the (inside/outside) time “dimention”** which then is reduced and transduced into a “time dimension”, leaving the lived “processual dimention” polarity out of the equation. In a more formal and psychological way, the processual is also understandable as the context of the gestalt, always unachievable, as linked in principle to everything else, so implicitly to oneself “umwelt” perspective (von Uexküll, Sebeok).
- This “dimention”, from my point of view, is also **what make life literally “incalculable”**, fundamentally unobjectifiable (in-objectifiable). It is the place where objectivity and subjectivity, or the actively lived space and time, are mysteriously “dancing” together, opening the realm of possibles and making this “not one, not two” dimentionality appearing.
- The dimention is also pointing to a phenomenological verbal expression limit, and more generally, a **distinctive formalization limit**. It manifest a limit of a direct approach by the classical objectifiable scientific reason. How could you say, unless via poetic expressions, the phenomenological feeling of an internal gesture or the lived time experience without spacializing it? It could only be linearly approached at the limit, like an abstract mathematical convergent technic do with infinity, trying to square a circle. It could also be tackled through interactions with computer simulations. But the only way to deepen one’s understanding of this could only be, in principle, by cautious and iterative first hand lived experience to gain an integrated “**experience from within**”.
- I have found that Varela speaks of “**double intentionality**” (Varela 2000: 129), and Husserl of “transversal and longitudinal intentionality” (*ibid.*). Or in a typical second-order von Foerster style “*I am the observed relation between*

myself and observing myself." cited for example by (Kaufman 2021), and one can see there probably the source of the inspiration of Varela's "Not one, not two".

5.8 The dialectical transduction between dipole polarities

- I have also observed, in many situations, cases where there is a **transduction* between forms and processes**, and it is an important ethical point about the legitimacy of importing a model or paradigm elaborated in and for a specific field (object domain) in a more-than-heuristic fashion (i.e. explicitly or implicitly normative); and especially between natural and social sciences or between natural science and technology, like "autopoiesis" for exemple, which is a specifically biological concept (unlike "autonomy", which is a notion).
- Usually it is in relation with the explicit / implicit dipoles or the **changing of perspective** (third / first person, outside / inside) or the level of abstraction considered. I know that Bateson has used such dialectical transduction in his "zigzag" model, see for example (Hall 2010), but also Gendlin: "*Gendlin's major contribution is the study of the reciprocity and back and forth between implicit bodily meaning and explicit formulation – the 'zigzag' – as he calls it.*" (Ollagnier-Beldame 2019).
- These transducing "zigzag" between forms and processes can also be observed along the historical of our western civilization between **knowledge based normative constraints and cuts** (Aristotle, Descartes, Shannon-Turing-von Neumann) and **technological decentering and phase shifting** (speaking, writing, machines, computers, Internet), as we will see later.

* In the usual scientific sense, not in the specialized meaning given to

this term by Simondon.

5.9 The surplus of meaning and the necessary defect

- The unobjectifiable and incalculable “processual dimension” is **what is necessary missing in cognition to enact sense**. It is for me what Varela called the “imaginary” dimension inducing the biosemiotic “**surplus of meaning**”: *“The difference between environment and world is the surplus of signification (...) which is at the root of how a self becomes one. In other words, this surplus is the mother of intentionality.”* (Varela 1992: 7), see also (Weber 2001) and (Weber & Varela 2002), noting that Varela and Weber were speaking there from an abstract first-person points of view, hence from an embodied first-person point of view it reverse the equation: *“Cognition is action about what is missing, filling the fault from the perspective of a cognitive self.”* (Varela 1991: 99).
- One could find similar conception in Stiegler thinking with the “**necessary defect**”, the Epimetheus’ fault of stealing the fire from gods, also described by him as the Technics (Tekhne), or as the greek pharmakon (Plato, Stengers, Stiegler), which ambiguously could poisoned or cure. It is, in his sense, the pro-thesis.
- The processual dimension is also pointing toward the buddhist **Śūnyatā**, the so-called “vacuity” or “emptiness”, which is not at all, in my understanding, a “nothingness” as sometime mistakenly translated, and especially not as a “thing” or a know-what. It should be better considered more as a referential philosophical tool to guide the meditative praxis toward direct lived experience. It concern a self inquiry about the ultimate nature of self, and buddhism do not deny the existence of the “conventional reality”, the shared practical reality. The buddhist “middle way” opt for a path between nihilism

and absolutism. So buddhist's vacuity is not so much a form than a “non-f畢ndness” (Varela) which should be put in relation with interdependence and compassion. It is a **non-affirmative negative stance**. And buddhist masters clearly warn us: someone believing in this “vacuity” is definitively lost, as one should also experienced the “**vacuity of the vacuity**”, the “groundless ground”, but it is also said, in a formal perspective, that “**form is vacuity and vacuity is form**”. Again, not one, not two. Similar resonance could also be made with the chinese Tao.

- From my position, this is also the **danger of “relational realism”** (Barthélémy 2005: 99) in the third person viewpoint, if not taken as an explicit guiding metaphor, but instrumentalized by the techno-industry rhetorical marketing, as they use to and will do, to justify the “emergence”, or worse the “enaction” in “thinking machines”. *“There would be no more catastrophic use of Simondon’s thought than that which would put it at the foundation of a finally scientific approach to ‘emergence’”* (Stengers 1997: 141).
- Relatively to my own acceptance, I think that the “processual dimention”, is a key to understand the actual “**cognitive dissonances**” between our modern western rationality and the lived experience of the living world, at all levels, including ourself.
- One could then also understand that meditative technics are, in this regard, a technical way of existentially and patiently taming with this **strange lived essence** that could only be formalized as non-sense, and which is, at the same time, the “**mother of sense-making**” (my words), as “intentionality (...) is the mother of rationality.” (Dennett 1971: 103).
- The reader should put this formalized understanding in regard with my “ambijjective gesture”, or the “dialogical dialectics”, which offer others perspectives about the same crucial and quasi-bidimensional subject.

- But this de-construction of the formal gesture is not enough. Let's change our glasses and take a more **dynamical** approach.

5.10 From “artificial neural nets” to models of phenomenological intentionality

- The emergence of the sciences of cognition (in the late 80's in France) was a stimulating epistemological event for me, by re-introducing the legitimacy of a pluri and interdisciplinary scientific inquiry of “cognition”, with all it's meaningful ambiguities. As already told, I have discovered this “new continent” through [**a strategic map made by Varela**](#) (Varela 1989), which speaks about **science AND technology of cognition** (my accent). The so-called “(neo)connectionist” approach was there presented as an intermediary paradigm between computo-representationalist functionalism, namely “cognitivism”, and the enactive approach. Varela clearly explained the possibility to **interpret these distributed models toward two directions**: “sub-symbolic” or in a more “enactive friendly” way (giving the example of a circular net of finite state automata (Wolfram)).
- Some time later, I have discovered the PDP approach of micro-cognition through their seminal “Parallel and Distributed Processing” (Rumelhart & McClelland 1986) written by two psychologist. The first example they gave in the introduction was a **sensory-motor coordination**. The “sub-symbolic” (Smolinski) interpretation, including a sub-symbolic model of “intuition” based on localized micro-representations, was only a minor theme of the book. I think that it was put there more for easing the reader initial understanding then as a paradigmatic posture, heaven if the subject here was and is yet clearly the access to the implicit and pre-reflexive realm through models as mediators, but also as **prototypes**.

- What I have found really interesting about this non-linear dynamical style of models is that one could understand it as **distributed representation (patterns) and/or as distributed (micro)processing**. They exhibit very remarkable **cognitive-like generic properties**: they act as distributed memories, bring forth “spontaneous” generalization of examples, show graceful degradation, etc.
- Here “**distributed memories**” should not be understood as sub-symbolic. It should better be faced with local memories (or representations): “*Each entity is represented by a pattern of activity distributed over many computing elements, and each computing element is involved in representing many different entities*” (Ibid: 77). It is **content-addressable memories**, which is completely different from localized place-addressable computer memories, but very similar to human and, more generally, psycho-biological ones. We can “*recall items from a partial description of their contents* (Norman & Bobrow 1979)” (Ibid: 79). They are mathematically represented by **matrices**.
- In supplement of being interpreted as distributed memories (hence the “connectionist” / associationist interpretation, when associated with for example back-propagation “learning” algorithms), they could also be understood as **enacted functions**, as mathematical matrices represent transformations, which is their “parallel processing” side, emerging from internal and/or external micro-constraints (and not of “environmental properties”). These emerging functions could be, via sensory-motors robotic integration, assimilated to **sensory-motors schemes**. This understanding opened for me an interesting way to enactively de-construct and reinterpret all the (anthropo)functionalist endeavor as an a posteriori enaction of micro-cognitive processes and constraints.
- These models (with their “learning” rules) shows generically the ability to converge, within certain conditions, toward a prototype (an eigenvalue) of the

“examples” their are “trained” with. So we have also here an elegant computational model of enacted psychological “natural categories” as prototypes (Rosch), that is a **model of categorical emergence**, of “instructed intuition”, of mental abstraction. This understanding was a key initial conception of my research: by acting “as a PDP model”, I should converge toward and stabilize, enact, prototypical concepts and conceptions issued from my learning of historical and epistemological cultural constraints and from my usage of computers simulation to design cognitive-like processes. These enacted categories could also be interpreted as the **representational polarity** of the formalized side of my intentional act. Agency constituting, in this interpretation, the (implicit) processual polarity.

- As PDP models could also be understood as “**parallel processing**” (i.e. quasi-analogical processing) enacting schemata, they offer us also, “at the limit”, a **prospective dynamical model of the ontological-being side of phenomenological intentionality**, making us understand how presumptively our living biologic substratum, embedding the (open) sensory-motor loop, could enact homeostatically regularities and “eigenbehaviors” (von Foerster 2003: 261), i.e. inside or own behaviors, that is bio-logic behaviors, also linked to the world/environment. This should lead to a post-Heideggerian conception of the ontological-being polarity of the phenomenological intentionality view.
- In fact, this interpretation of PDP models as **models of intentionality** was already implicit in the cybernetics movement, see (Dupuy 1999: 109), through the emblematic 1943’s McCulloch & Pitt’s seminal article “A Logical Calculus of the Ideas Immanent in Nervous Activity” (see also McCulloch 1960’s “What is a number, that a man may know it, and a man, that he may know a number?”) but where McCulloch is driven toward a probabilistic logic (like the actual Active Inference) which could also be interpreted pragmatically as

resulting from the underlying activity of a PDP network. For understanding this equivalence / overlapping of statistical models and PDP models, see for example "**Neural Networks and Statistical Models**" (Sarle 1994).

- I think that this is a key understanding for solving scientifically, and at the limit, the "Moebius" formal turn of the ribbon, the **explanatory gap** (Levine), which can also be reframed as a **body-body problem** (Thompson): bridging the conceptual space between cognitive emergences and the (distributed processing) biological substratum. This conception of enacted (micro)intentionalities could offer us a total access of the consequences of different type of cycling between the parts and the hole, or in a more agentivity perspective, between a robot interactions with his physical environment and others congeners. In turn, this understanding of the models-simulations of a-life / a-cognition could drive scientific attention to new experiments, which in turn should lead to new models, in hermeneutical / heuristical and co-constrained infinite virtuous circles. This pluri and interdisciplinary interaction should drive us asymptotically toward a **post-mechanical scientific understanding of "life in cognition"**, complementary and in tension with the more phenomeno-philosophical "mind in life" approach (Thompson 2007).
- From my understanding, **neurophenomenology** was a necessary, but may be not sufficient step toward productive scientific enactment. Models and computers simulations of a-(life and cognition), could be added to the equation coupled with techno-hermeneutics phenomenological approach. Varela himself has written many papers toward the a-life community, see (Di Paolo 2004). I think that this could be a missing integrative link toward the endeavor to "naturalize phenomenology" and toward a phenomenologisation of the science of (bio)cognition. But let's go back again to the future.

5.11 From a technical mathematical theory of communication without meaning-making dimension toward the living process of in-formation

- In 1938, Claude Shannon published an article from his master's thesis that showed how electrical circuits could be analyzed in terms of Boolean algebra, that is in **logical terms**, and not only be described, as so far, with mathematical equations. This surprising finding induced then questions about the nature of logic and about the nature of the mind: "*If logic were this abstract and ineffable thing, how did it make it possible to build a physical device that behaves in the same way as if it obeyed the laws of logic?*" (Simon 1984: 4). It is easy to understand, with this regard, how von Neumann used this conception to **materialize the abstract Turing machine** (Shannon and von Neumann were both members of the RAND Corporation think tank). It is also the same base which led to the McCulloch & Pitts's 1943 article about "artificial neural nets" models.
- Shannon published then in 1948 an article called "**A Mathematical Theory of Communication**" which was subsequently designated as the founding article of the new "**theory of information**". Here "information" has nothing to do with **body meaning-making semantics**: "*Frequently the messages have meaning; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem. The significant aspect is that the actual message is one selected from a set of possible messages.*" (Shannon 1948: 1). Von Neumann will later make a **similar reflexion** about its concretization of the abstract Turing machine: "*By axiomatizing [self-replicating] automata in this way, we have thrown half the problem out the window and this is perhaps the most important half.*" (von Neumann & Burks 1966: 77).

- "Information" or "**abstract communication without embodied observer-actor**" conception was born, so making it compatible with the physical notion of entropy via statistical abstraction; with the overwhelming collective success that we know today. So the so-called "theory of information" should better be understood as an, useful but meaningless, abstract theory of signal transmission. This is a **very important distinction** in the case of studying autonomous cognitive entities and intelligent living beings.
- I should add here, that Shannon is one of the four initiators of the 1956's Dartmouth Summer Research Project on Artificial Intelligence (McCarthy), or "complex information processing" (Simon & Newell), which is the founding event of the AI perspective (McCarthy, Minsky, Rochester, Shannon 1955).

5.12 From computers in nature to the nature of automatic computing machines

- I think that we have not yet really understood the **nature of the automatic computing machine**. Here I should first tell a story about the Vienna circle, Hilbert and Whitehead trying to construct a mathematical ground for science, formalizing what will found modern logic; endeavor annihilated then by Godel; Shannon (and Weaver) and the second-world war; Turing (and Church) and the human computer as a model to recreate the disappeared lover; the "war necessity" and the cracking of the Enigma code, von Neumann materializing the abstract "computing Turing machine" for the finalization of the "Manhattan project"'s atomic bomb; Wiener and the military usage of servo-mechanisms to the cybernetics movement; the emergence of so-called "AI"; Searle and Dreyfus demystifying it's semantic claims; etc, but it will be too long and I am not the right person for this. So here is my synthesized understanding:

- I think that the **computer is a very special machine**. In fact it is more than a machine, it is a quasi-machine², a quasi second-order machine. A machine which could simulate machines, but also a machine machining me, because everything that we say about the machine is in reality said about the **human-machine interaction**, and specially for automatic computing machine.
- Turing, to invent his abstract “Turing machine”, imagine the **actions done by a human computer** which is computing with a pen and a sheet of paper. It is these actions that will be mechanized and concretely materialized in the “computer”. But this is done at a **very big price**: to cut all the operational syntaxes driving the machine from its embodied human semantical dimension. A computing machine by itself is literally a **semiotical non-referencial non-sense-making machine**, like mathematical computings are abstract and non-semantical outside their production by human mathematician (or mathematic knowledgeable persons), which give them this ubiquity. When people use passively such mechanical devices, they **synchronize their intimate homeostatic sense-making** in relation with others designed processes (the software engineers) driven most of the time by **private interests**.
- This is a normative and alienating dark side of computer usages, an **implicit technopolitics**. It is also why “computers” are so versatile and seems so be autonomous from culture (Tête & Pelissier 1995: X. X. I. V.), because of an apparent “**double cut**” (from sense and from matter). I have shown that, in both senses, this is just an elaborate illusion, skillfully maintained by the rhetorical marketing intense use of **metaphors** (“computer”, “computing”, “memory”, “intelligence”, “neural networks”, “training”, “windows”, “cloud”, etc). “Operating systems” are also operating you.
- **Knowing the machine is the only way to not being proletarianized**,

or worse cognitarized, by it (confirmed by Simondon). De-construction is in my enactive perspective a kind of organic digestion of the machine, bringing actively life in the equation which make this incredible and so useful (quasi-meta)machine at our service, and not the other way around.

5.13 Dealing with the computational complexity threshold

- This is also why I have actively used computer simulations to design and see / feel in action, in a virtuous cycle, the relations between parallel and distributed processing and behaviors in a totally controlled way. Because **we can not intellectually think a process** directly but we can feel it or **objectify it through a (quasi)second-order machine**. One can then see the consequences of one's imaginary abstract machines, of one's imaginary experiences. When dealing with emerging phenomena, it becomes an essential tool, in regard with the overcoming of the 1948's **Von Neumann complexity conjecture** (Hixon conferences) (Dupuy 1999: 154): namely that there should be a human complexity threshold where the description of the structure becomes simpler than that of its properties. And I could add when **form is simpler to describe than processes**. This has been later developped toward decision-making rationality by Herbert Simon's "Bounded rationality" (see also Gazzaniga). Today we speak also scientifically of "decoupling of scales" in the material and physicalist conception.
- In a same way, we could theoretically and scientifically reduce in principle the hole to his parts, but it does not, in a human intelligible way, make sense to do so. So the "complexity conjecture" is also interpreted here as a **(psychological) scientific reductionism limitation**, a limitation of the scientist own cognitive ability to describe meaningfully complexity. It's also an implicit reason why there is different ontological regions in science, namely

disciplines, to link coherently in an intersubjective comprehensible style a rational domain (theory, paradigm) with an empirical experimental one, relating the formal with the processual.

- In a bottom-up computer simulation approach, the unknown come from the relation between the coding substratum and the emerging behavior. Put iteratively in regard with our own phenomenological acting schemes (internalized gesture), it produce a meaning. We can speak here of the enactment of a **techno-experiential scheme**, traducing the anthropologically constituant, **psychoactive** polarity of computing technology for mankind. And as we can see, it confirm the phenomenological and epistemological inquiry about the nature of automatic computing machines.
- Exploring many of these emergent behaviors produce a procedural knowledge of the relation between two levels of abstraction (the local properties vs. the global behavior) that **we could not have guessed by using only our intellect**. It is a way to overtake the complexity limit stated by von Neumann.
- Another type, quantitative this time, of complexity cognitive limit deal with the amount of “information” that we can take before being overwhelmed and “overloaded”, leading to the famous psychological “burn-out”. To overtake it we can use a memory prosthesis (cf. my “brain”), being conscious that all media produce new possibilities but also implicit constraints over the message, that could be on size, dimensionality, or time.

5.14 Technologies as externalized and embedded gestures

- It is Bernard Stiegler, thought Leroi-Gourhan, that showed me that **technologies should be also thought as externalized gesture** (and more metaphorically as “external memories”), helping me to rationalize my late political (polis) sensibility awakening. It is, in this sense, the driving force

of “proletarianization” (Marx): the gesture of the worker is incorporated into a machine that he has not created, but from which he depends. The machine, if used passively, lead to a progressive lost of the then useless related human know-how, which is itself consequently no more transmitted, lost for future generations, **forgotten**. Previous knowledge is trivialized and mechanized, replaced by new abstracted know-hows no more connected consciously to the body, **increasing distance and phase shifting between consciousness and our bodies experience**. At the same time this process lead to a psychological dependance to the mechanical devices, a contrario with a conscious mastery inducing a prosthetic integration.

- Writing, like I am presently doing, was surely a first important technological step, with the knowledge based Aristotelian “excluded middle” imperative, of the civilizational cognitive self-decentering and phase shifting technology. It could be exemplified in the Socrates to Plato’s turn, encapsulating our own mental gestures into writing traces. In that perspective, even langage itself could be viewed as a “natural technology” of the living to extend our intelligence toward better self-others sensori-motor coordination. **At this embodied stage technics was virtuous to expand intelligence and democratization**, even if Socrates and Plato already warned us about its ambiguous “pharmakologic nature”.
- Nowadays the operational writing of “numerical informational technologies” are “embedding and incorporating”, **extracting our intimate cognitive know-how**, even unconscious ones, with marketed “deep learning” technologies (PDP, more or less recursive, with backpropagation “learning rules”), at the risk of **putting us literally beside ourselves**. And losing our know-how collectively lead to **losing our “savoir vivre”**, slowly transforming us in it’s excess into mechanized thinkers and pulsional-consumers-beings (Stiegler).

- **Human understanding and creativity** are, today more than ever, paramount but they are in the blind spot of techno-science, hence the current techno-political injunctions about the so-called “innovation”. The current global “system”, in its mechanized excess, is becoming creatively sterile, trying to exhaust now human creativity has it has exhausted all the critical natural resources. And it's **our chance**.

5.15 The civilized rhythm of formalization and the synchronized logics of mechanical thinkings: the mechanistic resonance

- It is known story that on April 12, 1831, “(...) British soldiers crossing the “new fangled” suspension Broughton bridge, have had the surprise to see the bridge they were marching across collapsed under their feet. (...) As the British troops marched “in time” in four columns across the bridge their **synchronized** footsteps began a rhythmic resonance causing even some of the men to start whistling in time. Unfortunately, the troops did not realize that the bouncing resonance created more and more up and down movement of the bridge until the structure started breaking up and collapsed, taking the soldiers with it. “ ([https://www.historyandheadlines.com/april-12-1831-marching-soldiers-cause-suspension- bridge-collapse/](https://www.historyandheadlines.com/april-12-1831-marching-soldiers-cause-suspension-bridge-collapse/))
- I have observed that there is a natural, general and spontaneous **rhythm in our way to employ the form / process dipole** in intellectual or linguistic formalizations: in many western languages, we begin by a form and next come the process (logical, functional, etc). One could see it in our own thinking (intentional object then inference or action), speaking (subject then verb), communication, propositional logic, etc. And of course in science of cognition

it is exemplified by the cognitivist “localized and linear” perspective.

- **We just can not do the same thinking in reverse**, namely thinking processes before forms. Even a formalized frozen processus, a relation, can not be intellectually thought without its terms. In the same vein, a dynamical mathematical abstraction like a function has to be defined in relation to numbers.
- You can not think of a process directly by itself, but you can feel it. This shows that probably our **consciousness should be understood as a process** in its formal, spacial aspect. Again pointing indirectly toward the underlying technical and synthetic phenomenological “processual dimension”.
- I have called this rhythm the “**mechanical rhythm**”: first pulleys and then belts, form then process, representation then function, under tensed (vs. understand, cf. precedingly the intentional act as intentio or in-tindere) by an implicit and primordial attentive convergent coordination of the sensory-motor loop, which is psychologically a gesture of designation, that we could physically express or mentally simulate. This noologic resonance has **important and critical consequences for an ecology of mind (Bateson) and knowledge (Wojciechowski)**.
- The big problem is that there is today a **global resonance phenomena between all the mechanical thinkings**: scientific view of life and cognition (cognitivism), “natural science” explanations, propositional logic (scientific rhetorical power based on excluded middle), abstract functional mathematics, theory of communication, mechanical engineering of machines, economics commodity and optimization thinking and managing, functional informatics coding (cf. the “code is law” motto), “rational” algorithmic governmentality (Rouvroy 2013). And today the alliance of data and the so-called “deep machine learning” and “artificial intelligence” technologies (occidental GAFAM and chinese BATX) driving the all world industry to a

“fourth industrial revolution”, as a new oil fever. This resonance, which **reinforce retroactively the cultural and rhetorical power of all levels composing it**, could be clearly systemically observed in the actual exponential acceleration of the “numerical information technologies” economy.

- I interpret this ***excess* of mechanical representations and conceptions** as an ongoing **schismogenesis** (Bateson), that is an auto-destructing systemic positive feed-back (exponential explosion), leading us to the actuals anthropocene and metacrisis (technological “AI” runaway, energetic, climatologic, ecologic, biologic, social sense-making, radicalizations, etc), which is in my sense a **global western rationality crisis**, showing that our way of thinking is no longer in tune with our lived reality. As J. A. Wojciechowski said “*(...) we succeeded, and we failed, for exactly the same reason, namely our mode of rationality*” (cited in (Morin 1986: 7)).

5.16 Scybernethic(s) and oriental style

- Interestingly and as already seen, I see **meaningful convergences** between my style of thinking and doing with a more oriental trend, for exemple as described by the philosopher François Jullien: “Traditional Chinese thought is without ontology, without theological development, the nature of reality is change”. We also find similar conceptions in the taoist tradition.

5.17 The quasi-double “middle-way thinking”

- I would like to say some words now about my understanding of the “**middle**

way" (expression borrowed mainly from the buddhist tradition). It will offer a reformulation of the dialogical dialectics. First, I have said it before, from my experience this is not a one-dimensional "grey" synthesis. The "middle way", from my point of view, should be understood as the path toward the quasi-bidimensionality, which include a self-transformation process that I have tried, as best as I can, to describe. Projected on a one-dimensional bi-relational formal axe, it should place the ethical attentional cursor not in the middle of the dipole, but asymmetrically toward the weak parent, and more exactly at the "golden point". In fact it's in direct relation with the understanding of the nature of the biological homeostasis, which is a regulation² generating a "slightly unbalanced equilibrium". Equilibrium for life is death. This "slightly unbalanced equilibrium" is what make life active and sensitive (see for example how the electrical signal is propagated on the neuron's axon membrane), and may be also sensible.

- Another way for me to understand the so-called "middle-way" is via the **double hermeneutical circles**, including the "long" and a "short" pathway which are embedded, inextricably linked because of the "ambijejective gesture". And we make this gesture every time we draw a distinction, in an implicit unifying dimension, or more directly and simply when we designate, for someone or for ourself, an object, distinguishing it gestaltly from his interdependent context, conceptually or perceptively. It is the path between nihilism and absolutism, between madness and superstition. Again, **the "middle way" is a quasi-bidimensional pathway, not a dual one.**

5.18 Scybernethic(s): designing a second-order rationality as a processual and complex practice

- I will be brief here, because in fact I have already exposed what is

scybernethic(s): it is my rational point of view, and here I was not so much interested to expose it as a know-what, a worldview, as in **trying to share my enacted know-how**, which is a difficult thing to do explicitly in a written article.

- So what is second-order enaction, enaction²? It is the enaction of the enactor and the enaction of the enacting. Scybernethic(s) is my existential designed interpretation of this **enigma**.
- Scybernethic(s) is for me a **regulatory paradigm**, an expiri-mental experiential praxis, or a comprehensive and non-iconoclast second-order rationality, that is a scybernethics of the scybernethician. It is my hermeneutical and heuristical way of being and seeing the world through double coupled cycles. One cycle is logically distinctive, and the other as a quasi-analogical and onto-logical embedded distinction; both converging inside and diverging outside myself. In this perspective, it is an attentional and attentive (self)technics dealing with the back-and-forth, the “zigzag” between historical, sociological, cultural and technological constraints with body sense-making and orientation, both in a co-determined quasi-synchronic and diachronic understanding of time (processual dimentionality).

6. Conclusion

6.1 Drawing a timely and partial synthesis

- **Ethics is first but is implicit** (von Foerster 2003: 287). I have tried through the ambijective gesture, the dialogical dialectics (the asymmetrical

conceptual dipole), the quasi-bidimensional and quasi-quadrilectical forms (of homeostasis, cf. (Ashby 1956: 83)), the moëbius-like uroboros pathway (cycling between the (meta)epistemological “telescope and time machine” and the phenomenological “microscope”), the hermeneutic and heuristic coupled with computer simulations of enacted a-cognition (the productive ambiguity of PDP/distributed representation models, coupled with evolutionary algorithms), the quasi-double “middle-way”. All point to the same prototypical understanding of an **intentional pattern and motif that connects**, that could potentially be applied **hermeneutically and heuristically** as a lever to understand all living organisms (Varela 1991), toward an ecology of mind and nature (Bateson) coupled with a phenomenologically instructed cognitive science, and backed by critical and incarnated philosophers of knowing and by computers simulations of a-cognition / a-selves. Or in a more existential point of view, as a **collective endeavor toward interbeing** (Naht Hanh, Varela) enlivenment (Weber 2013). In fact I am just describing synthetically what is more or less already there, gaining momentum, thanks to the founders and to the collective intelligence of the community.

- I do share with Varela that “(...) *to this human history of nature corresponds a history of theories of self-knowledge*” (Varela 1996: 10), and **this story is yet to be written.**
- In this text I have tried to show some rationals toward this **emancipatory and creative de-construction**; and I do think also that we are now at a (western) civilization cross-road, that we collectively have to create an attentional and understanding shift, a bifurcation of lived and incarnated, informed and non-pulsional humans. The main efficient tool to do it, from my point of view, is a complex and more comprehensible **second-order phylo-scientific rationality coupled to a democratic bio-techno politics of**

citizens.

6.2 The ongoing fourth industrial revolution [and now the more visible genAI disruption 03/23]

- As there is a “ruse of the history” (in a Hegelian sense), there is also a “ruse of the computo-representationalist paradigm”, issued from the **historical and traumatic “war ruse”** of the birth of computing machines, swinging the historic pendulum from the nazi-fascism to the excessive “ultra-liberalist capitalism” polarity. That is speaking about the human / machine interactive dipole as if there was no human in the process, like classical (natural) science, **burying the observer-actor into the implicit realm**. This is, in my sense, an **objectification fallacy**. If words like “memory”, “learning”, “intelligence”, and even “computing”, “information” or “communication” are acceptable in the private space of a laboratory, within edified pairs which are not fooled by these metaphorical terms when applied to objects, it begins to be very disturbing when a fourth industrial revolution is ongoing based on these **metaphors**, signing the dangerous excesses of the cognitive capitalism gestell and more generally of our western techno-scientific intersubjective rationality driven obsessively toward objectifiables. All this is redoubled by the actual developments of attentional and experiential marketing, driving us toward an **attentional crash**. We should all pay attention to the attention.
- But the present time bear also **fantastic and novel opportunities**: in access to information, education, mediation between scientific and lay man understanding, techno and bio politics, and also in **understanding the nature of machines and computers**, communication and cognition; and even may be to help building a constructive dialogue with the emerging oriental cultures.

- So, from my perspective, **we are reaching the limits** and it's time now to re-integrate ethically the educated subject into the techno-scientific process, this later as bearing efficiently (technologies) and symbolically (science) the social "truth value" in our (so called "post-truth") societies.

6.3 Suturing to not forget the forgettings: anamnesia (Plato)

- I think that our western civilization have conquered abstraction, institutional normativity and technology, the "social body" and "corporations", at **the normative price of explicit knowledge based "constraints and cuts"** (Aristotle, Descartes) **and implicit technological de-centerings and phase shifting** (writing, machines, modern "information and communication" technologies) of selves.
- Every time we formalize (mentally, linguistically or socially), we produce a bifurcation of the topological understanding of our cognitive trajectory (Petitot, Thom). It produce an **attentional bias toward the form** produced and a **concomitant forgetting of the being polarity toward abstraction**. This "being" understood here as a lived self-constituent act which is for me the core of the ambijective gesture. A socio-historical emblematic example of such bifurcation: the historical fission from the cybernetics movement to what will become AI ("easy" polarity) and second cybernetics ("weak parent" polarity, struggling to integrate ethically the observer-actor).
- But everything show that we have now reach a social complexity limit, similar to the human one, where this disciplinary logic has became a **"counterproductive"** (Illich cited by Dupuy in (Andreevsky & Delorme Ed. 2006: 64)) control, destroying life, people, the social fabric, resources and even our own ecosystem. More, once passed some threshold, the wave **will**

then be more and more irreversible, as trivialized and polarized people would not be able no more to understand these complex rationals, leading us to emotional contagions, inevitable violences and searches for scapegoats (Girard). From my perspective, we have reached the point where **the pharmakon will soon became a mortal poison**. And this is why we urgently need a pharmakology (Derrida, Stiegler), which are attentional* technics, in both senses.

- I do think and experience that **re-suturing common sense with body and participatory sense-making** with a renew scientific and cognitive second-order rationality can produce an attentional care toward our sense of the “**commons**” (Bauwens, Bollier).
- So happily, of course all is not lost yet, but I think that the priorities are settled for the nexts generations, and may be the past should now be also in front of us, not at all as a defensive and tensioned retreat posture, but at the contrary as a huge (think) tank open to critical, creative, hermeneutical and also ethical, **self-transforming possibles**.

* In french “attentionné” as two meaning: attentional and caring.

6.4 Toward interbeing enactment

- I think that there is also an important and strategic work that needs to be continued (Havelange, Lenay, Stewart 2002), and that I have myself very superficially scratched (Rigon 2017), by studying **the similarities and the differences** between both Varela and Simondon which will lead, I think, to very interesting elucidations toward an enactive “science of interbeing” (Varela 1999) (Thompson 1999).
- Indeed, while writing these lines, I have discovered recent developments of

such rapprochement (Di Paolo 2016) (Dereclenne 2019) (Stokholm Poulsgaard 2019), which seems at first glance to be coherent with my own approach, associating in the later the Material Engagement Theory (MET, Malafouris) with a phenomenology inspired by Bernard Stiegler.

- But as I said before (cf. “The necessary defect and the surplus of meaning”), I think that **trying to subvert the subject / object relation** with an abstract and formal third person “**relational realism**” ground (Simondon, Bachelard), if necessary and for ethical and vital reasons, should be explicit and assumed as a relative and **temporary metaphorical standpoint**, as a socially useful and **participatory weak realism**. The danger here is to lend the flank to the unescapable techno-economic instrumentalization, leading to term to an irreversible intensification of the present forgettings of the vital dimension. My point is that we should be careful not to **fall from Charybdis to Scylla** by forcing a professional third person (scientific or technophilosophical formalization) perspective, which could then be implicitly normative in the public space. In doing so, we would bury more deeply the possible emancipators of conscious meaning-making embodied in the lived first person, in a time where we highly and vitally need them.
- There is also, of course, the promising work, that I am just discovering, of Hanna De Jaeger and Di Paolo around **enactive participatory sense-making**, developing a very interesting enactive approach of ecological and social intersubjectivity, and many more articles of the enactive community driven toward human and social sciences. Intersubjective/objective enactment is clearly on its way, and it’s very exciting.

6.5 A last (auto)po(i)etic word

- In a metaphorical and naturalistic way, I could say that we are like the

ambigious gesture of Nature trying to be conscious of itself, through the “long pathway” of civilization (socio-historical) and the “short” one: your/my bio-psycho-socio ontogenesis of our lived body; meaning that life is cognition and that cognition is life; like being a self-reflection of the Cosmos. We are a technical expression of Nature. I think it’s time to come-back home now, arms full of all the revelations of our objectivist journey, to share, care and realize ourselves. It is for me the “**pharmakological path**” sustained by **a lived logic of paradise**” (Varela 1976).

- To conclude: ethics is first (Lévinas) and is a know-how, an implicit wisdom (Varela 2004). But “*if you can realize your existence in such a way that the other can also realize his or her own existence, then you have relationship to them that is based in your interest of their aliveness.*” (Weber 2019). What a wonderful definition of **love!**

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