

ELEMENTS OF AN EXTENDED RECEPTOLOGY

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Abstract

The subject that I have called *receptology* represents one dimension of the complexity science and management, general, sequential, heuristic, epistemic or quantic. We shall pursue at least four directions in our research: (1) a cognitive modelling, in the view of encoding a set of rules, in an area where information is subjective and informal; (2) cognitive drama modelling (the process of creation/devise/design /reception), depending on the area's particularities: generation, evaluation, realization/materialization, decision; (3) major importance of emotional dimension in the cognitive space and (creative/informational) process, more or less conscious and explicit, implemented by authors/producers/ generators. (4) imperative of designing and developing a coherent instrument.

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0. The subject that I have called *receptology* represents one dimension of the complexity¹ science and management, general, sequential, heuristic, epistemic or quantic². Indeed, according to Lukasiewicz, one of the most original critics from the Vienna group:

“Future philosophies have to start with their own constructions right from the beginning, from their own foundations. And, in order to start from the foundations, these require the development of an initial draft of these problems that can be expressed in order to be understood and to be able to reject all other problems. Mathematical logic can be useful even in preliminary situations, because it includes the meaning of many phrases related to philosophy. Therefore, we must continue with the enticing solutions to these problems, which again seem to belong to mathematical logic, as well as with the deductive and axiomatic methods. We must rely on intuitive, clear and secure statements.

Such statements should be regarded as axioms. We must select those phrases whose meaning may be explained in various ways, using examples that are considered to be primitive and undefined, concepts, etc. We must do our best to limit the number of primitive concepts, which at the same time have to be accurately highlighted. All the other concepts have to be proven unconditionally by referring to axioms and with the help of the resistance models adopted in logics. The achieved result must always be checked in relation to the data that are offered using intuition and experience or by the results of other sciences, especially of the natural sciences. If necessary, the system has to be corrected by establishing *new axioms and by adapting new primary concept*. We must always keep in touch with reality in order not to produce mythological entities such as the ideas belonging to Plato or the elements belonging to Kant, and in order to know the essence and structure of the real world in which we live and act and that we want to change, somehow in a better world. In this work, we shall behave as if nothing was done in field of philosophy up to know.” (Lukasiewicz, “Toward a Method in Philosophy” [1928] in Wolenski, 1989: 57-58).

1. Therefore, *the development of new axioms and the adapting to new primary concepts* is one of the intentions, transferred from *hypothesis into project*, during our theoretical approach. During a time of organizational transition, management strategies have introduced corrective measures, some of them inspired from *the classical mechanics*, in order to optimize the management options for the info-decisional fluxes (of management, general, sequential, heuristic, epistemic or quantic).

1.1. Besides that, in the 20th and 21st century, many *leadership theories* have appeared, starting from the scientific management to *business reengineering*, which represent real data banks. Indeed, today we work with chaotic systems, both in economy and politics, as well as in the cultural and civilizational subsystems, in which the nostalgia of traditions may lead to dissipative structures and *butterfly effects* at the incidence with the exigencies of globalization or union type Europeanization. However, important experts in the theory of complexity and chaos have shown that current dynamic systems seem to turn back to the natural world. "If we were to define reality using metaphors (...), then we could know to what extent the metaphorical interferences are in accordance with reality" (Lakoff, Johnsen 2003: 158; Prigogine, 2001, 2008; Forest, 2006)³. The metaphoric and symbolic language – as shown in the texts of the primordial tradition, which René Guénon wrote about – is not really *Dao*, but only one of the essential ways of getting closer and of deciphering *natura naturata* and *natura naturans* (Spinoza, *Ethics*, First part, Prop. XXIX). Leadership specialists claim that "the metaphorical significance of complexity science in organizational dynamics" is obvious. Therefore, a *conscience of the metaphor as a knowledge and axio-epistemic management tool* occurs gradually (Wheatley, 1992; Doll, 1993, 2005; Fleener, 2002; Stacey, 2003; Gilstrap, 2005; Fullan, 2008). In our opinion, the axio-epistemic management has the same *basic functions* as classical management: *planning, organizing, leading and monitoring* the fluxes, dynamic, axio-epistemic trends within the cultural and civilizational, literary, artistic and aesthetic environment.

2. We aim to approach in our research project which will run for at least two years approximately 4 directions: (1) a cognitive modelling, for the codification of a set of rules in an area in which information is subjective and informal; (2) the modelling of the cognitive drama (the creation/conception/projection/reception process), according to the characteristics of the field: generation, assessment, achievement, decision; (3) the major importance of the emotional dimension within space and cognitive process (creator/informational), more or less conscious and explicit, implemented by authors/producers/generators; (4) the imperative of designing and developing a coherent instrument.

2.1. Cognitive psychology proposes different approaches in order to collect the tangible fingerprints of the mental processes (Bisseret *et al.*, 2004). Gaining expertise is based on the simulation and observation of conceptors, in order to make the date more formal and to decipher the discrete mechanisms. These data include knowledge, rules or strategies applied using the major functions of cognition.

2.2. The author is impregnated with information, generated by various mediums, under the sensorial-perceptive (working memory) and reactive pressure of knowledge (long-term memory). The effect is represented by the mental representation which facilitates creation and the construction of a model. Information is partially coded or transferred into the knowledge repertoire stored in the long-term memory (values, strategies, formation, and sources of inspiration).

The following image presents the cognitive observation field.

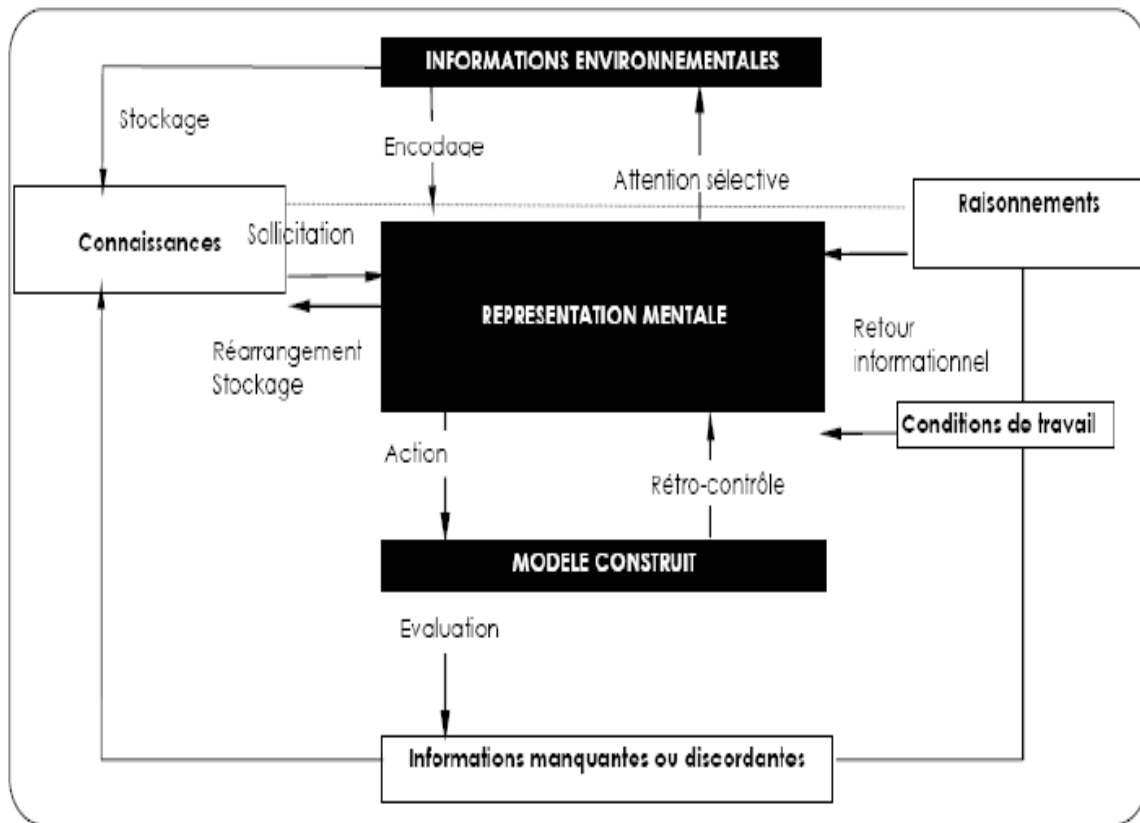


Fig.1. The cognitive observation field (after Rasmussen, 1983).

2.3. The (re)produced mental representation includes transitory contents, necessary for the development and solution of disfunctionalities or of *the cognitive crisis* (creation or reception). Becoming efficient when activated, the cognitive system facilitates the interpretation of situational information and the generation of new information, which will be reset, stored or used. Mental representations therefore play an essential role in the gradual development of subsequent concept, as they support the development of formal sentences. Thus, the model becomes an exchange and semantic clarification tool.

2.4. According to Newell and Simon (1972, 1973 *apud* 1995), cited by Richard (1990), solving a cognitive problem (creation or reception) corresponds to the movement towards a search space, according to the sequence of intermediary stages and of operators, between two nodes – the initial and final one, which emphasize the initial and final position. In this scenario, representation, implicit and vague for a long time, starts to become visible only when the developer has the

intuition of the first elements of the creator algorithm (Prost, 1992, 1997). In this situation, the major dimensions of *creative cognition* are emotion and personality (32%). Emotion, caused by subjective or cognitive factors, is determined by knowledge, culture and personal interpretation. On the other side, the formal expression triggers emotional reactions, especially if certain aesthetic generators, such as harmony or originality, are integrated.

2.5. The mathematical modelling and codifying of cognitive creative/projective activities has a high stake in conceptual sciences. Starting from the first cognitive sketches, mental representation may imaginistically occur as a succession of global and vague images of the concept, harmonized with a certain environment. The author/producer/receptor/generator is the only one who can assess the difference between the mental representation and first intuition and, at the same time, is the only one who can choose the optimal algorithm. The succession of the mental representations is expressed using a sequence

that includes the concept or the conceptual segments which are to become, during the development of the cognitive spiral, an integral representation of the subject/object. Most writers/producers/receptors/generators confess that they mentally view different images, before their materialization. These mental images, due to their dynamic, ephemeral, global or detailed nature, reflect the source of inspiration and the form conceptualization labour. The use of prior images is not systematic. The conception/conceptualization may be regarded as production and progressive concentration of information in the context of successive intermediary representations, which interfere as an evolutionary sign system (Toyama, 1976).

2.6. The semantic differential helps develop some predictive models which measure the adequacy degree between the message/the project imagined by the author and the one perceived by the receptor/consumer. The perception/reception of a form depends on a sensorial process, followed by a cognitive operation of comparing and recognizing the form through assimilation/analogy with other forms present in the memory. The sensorial data is insufficient in order to generate a coherent reaction. Therefore, we move towards the next phase: the introduction of abstract values. The emotional effect results from the expressivity of the object, determined by originality, character, metaphoric correlation, aesthetic dimension and abstract values. Using a Lickert scale, one can measure the multidimensional semantic and affective reaction and establish a connection between the semantic descriptors and the formal codes (Osgood *et al.*, 1957). The informational process consists of reducing the degree of abstraction, by using successive mental and physical representation cycles, which integrate more and more constraints. Every conceptualization stage includes an iterative cycle (Wang, 1995). Viewing a new representation will generate new ideas and solutions up to the development of an algorithm or of a specific solution. It is worth mentioning here the papers belonging to H. Simion, who demonstrated the importance of theorizing the conception and cognition process (Simon, 1969, 1973). He

established a *scientific and theoretic referential* for conceptual processing (creation), a referential open to economic sciences, cognitive psychology and artificial intelligence (AI). His research was continued by J. L. Le Moigne (Le Moigne, 1977, 1990), who proposed an alternative theoretical modelling of the conception/creation processes. More recently, other studies belonging to Lawson, Cross, Christiaans, Dorst and published in the journal entitled *Design Studies*, have opened new perspectives on this complex topic (Lawson, 2004, 2006 ; Cross, Christiaans, Dorst, 1996). Unlike the classical formalism, which practices a linear cut, in sequential stages (Pahl & Beitz 1984; Duchamp, 1988, Andreasen, 1987, Aoussat, 1990; Jones, 1992 ; Hubka, 1996 ; Ullman, 1997 ; Baxter, 1995 ; Le Coq, 1992 ; Ulrich, 2000, Cross, 2008, Quarante, 2006 ; Dorst & Cross, 2001 ; Howard *et al.*, 2008), the new tendencies in the field of the conception/creation sciences are focused either on the construction and testing of some scenarios, models, strategies with the purpose of optimizing the creation/reception process; or on the representation of the theoretical models of the creation/reception process as a succession of the elementary cycles of conception/reception (Lebahar, 1993; Gero, 2004), as a spiral (Blessing, 1994 ; Roozenburg & Eckels, 1995), focused on the notions of divergence and convergence (Van Der Lugt, 2003), or on the movement from an abstract to a concrete and functional space (Suh, 1999 ; Tichkiewitch, 1995).

The research focused on the evaluation and (re)formulation stage were initiated in the 1990s (Tovey *et al.*, 2000, 2003), with the intent of developing new style tools, assisted by the computer (Scrivener & Clark, 1994) or for stimulating creativity (Jaoui, 1995). Numerous studies produced models to optimize individual or collective creativity (Koestler, 1964; Lewis, 1988, 1995 ; Vangundy, 1992 ; De Bono, 1995, Isaksen, 2000 ; Bonnardel, 2000 ; Syrett, 2002 ; Alberti, 2007 ; Buzan, 2009). At the beginning of the 3rd millennium, the theme of *form generation* will be in constant evolution in the area of the architectural conception and design (Scrivener & Clark, 1994 ; Do *et al.*, 2000, Van der Lugt, 2000, 2001, 2003, 2005, Goldschmidt, 1994, 2005, 2006 ; Suwa & Tversky, 1997, Purcell & Gero, 2001, Findeli, 2005, Bilda & Gero, 2007). Different

assessment tools of the intermediary representations within the conceptual space have gradually been introduced in the integrated models and strategies. Among these recovered or reformed hermeneutic instruments the most efficient turned out to be *the semantic assessment*, used in the 70s (Osgood, 1957, 1979), *the sensorial assessment*, which appeared in the 90s and *the emotional assessment*, which is used today (Overbeeke, 1995, Norman, 2004, Green & Jordan, 2001, Desmet, 2002, 2008, 2010). Generally, the creation/conception phases, *generative and evaluative*, have been pretty well researched, in contrast to *the inspirational phase*, which – despite its implicit and not very much formalized character (Eckert & Stacey, 1998, 2000 ; Büsher, 2004 ; Mc Donagh, 2005) – plays a fundamental role in the creative process, in the emergence of new revolutionary ideas and concepts, by stimulating the analogic reasoning.

3. Althusser was going to propose in 1974 the sketch of a new concept, which I would call epistemic metaphor: “in philosophy we can not think, that is to adjust the existing borrowed categories and produce new ones in the necessary device called for by the position occupied in theory, but through metaphors”⁴ (Althusser, *Éléments d'autocritique*, 1974 *Solitude de Machiavellian*, 1998). An idea, briefly summed up, a few pages further “on ne pense en philosophie que sous des métaphores.”

3.1. Having become a kind of jolly joker in the area of humanities, the epistemic metaphor will be thematized, by Deleuze and Guattari under the influence of Althusser, formerly modeled, in his turn, by Spinoza. The Deleuzien-Guattarien concepts, “capture de code” and “transcodage”, will be defined as diversion procedures of embezzlement of common semantics. Lakoff and Johnson (2003) will rediscover and deepen in the XXI century, the hermeneutical intuitions of Althusser. Another defining element in the Deleuze- Althusser file of interferences, namely the ‘instruments’ of theoretical production (*Généralité II*), is reported by Althusser to Spinoza’s concepts (Spinoza et le problème de l’expression, 1968; Spinoza, *philosophie pratique*, 1980) model taken over by Deleuze (Spinoza et le problème de l’expression, 1968).

4. According to Lakoff and Johnson (2003: 158), communication, regardless of the register, is essentially metaphorical: “In any book of life, not only in politics and love, we define our reality through metaphors and act on these metaphors. We design inferences, outline goals, make commitments and put plans into practice, depending on how we structure our experience, consciously or unconsciously, through metaphors.” (Trad. NZ)⁵.

4.1. In this context, the concept of attractor metaphors is fundamental to a close articulate understanding. The attractors are present in both the balanced systems and in the chaotic ones from the economic, political, cultural or epistemic universe acting like some magnetic forces, the post-Newtonian type, that guide the complex/adaptive systems into certain hard to predict trajectories (Pascale, Millemann, Gioja, 2000; Wheatley, 1994, 1999). A strange attractor involves a high energy information consumption because it permanently shapes, with each iterative loop (iterative loop), the integrated or intergrating system, which defines itself. (Stacey, 2003; Wheatley, 1994). Among the best known strange attractors there are Lorenz, Duffing and Ikeda, which view the dynamics of what is called in the literature, attractor patterns. The case studies in the systems theory, focusing on different areas of complexity, demonstrated the high degree of applicability and falsifiability (Popper) of management techniques, both at micro and macro levels (Breu, Benwell, 1999; Nadler, Shaw, Walton, 1995; Newman, 2000). Symmetrical and complementary, other case studies have argued that there are organizational situations (from business to culture and axio-epistemic spaces), where the theory of dissipative, chaotic, complex structures, can be observed and applied (MacIntosh, MacLean, 2001; Pascale et alii, 2000). The efficiency of attractors theory is, however, relative (Gilstrap, 2005). Attractor metaphors do not mark an epistemic break, as they seem to be – as suggested by Lakoff and Johnson – a late effect of the traditional, moral (good-bad) or religious, (Ohrmuzd-Ahriman, the God-Devil), philosophical dualism etc., proved to be, we would add, inertial, dogmatic and closed: “Many of metaphors in the current speech have evolved but not few were imposed by mass

use [...]. In a culture where the myth of objectivity is very much alive and the truth is always an absolute truth, the mass tends to impose its metaphors in culture and gets to define what we consider to be the truth (at). "(Trad. NZ)⁶ (Lakoff Johnson, 2003: 159-60).

5. In the humanities area, the main objective of the complexity studies is to explain the interactions between the neurons of a nervous system or those between the components of a social system. In this type of axio-epistemic fields the complexity is represented by theoretical models, coded through systems of equations, narrations or graphic images.

5.1. The first complexity theorist, David Hilbert tried to substantiate mathematics on axiomatic bases, noting that demonstrating a problem is to check the satisfiability of a predicative calculation formula. But Kurt Gödel, the author of incompleteness theorem, was to show that there is not a decision algorithm for satisfiability.

5.2. A century after Laplace, Poincaré was to discover, re-analyzing Newton's equations, new epistemic horizons exposed in his book *Le Calcul des Probabilités* (1912: 1-4): "How could we dare talk about the laws of hazard? Isn't it, indeed, the hazard, the antithesis of any law? That is what Bertrand wrote in his introduction to *Calcul des Probabilités*. Probability is opposed to certainty: a fact which is ignored and therefore, it seems, is not taken into account. There is here a contradiction, at least apparently, and about which there has already been written a great deal. But first, let us ask ourselves what the hazard is. The ancient people made a distinction between the phenomena that seemed to take place according to harmonious laws, made once and for all, and the phenomena that they attributed to hazard. It was about those phenomena that could not be foreseen, because they were rebellious, disobeyed every law. In any field, the exact laws can not regulate everything, they just trace the boundary where hazard is allowed to move [...]. To find a better definition of chance, we must examine some facts generally regarded as fortuitous and to which we might apply, it

seems, the calculation of probabilities; We will then investigate which the common features are. The first example we will choose is that of unstable balance: if we put a cone on the top of it, we know that it will fall, but we do not know on which side. It seems that only the chance will decide. If that cone were perfectly symmetrical, where the vertical axis were perfect, if it were not subject to any forces other than its own weight, it will not fall. But the smallest defect of symmetry will make it lean slightly to one side or another and, as soon as it tilts, however little, will fall into that part. Even if the symmetry were perfect, any light trepidation, airflow, could make it tilt a few arcseconds: it would be enough to cause the fall and even the direction of the fall that would correspond to the initial inclination [...]. A minor issue that escapes attention, determines a considerable effect that we can not see and then say it is due to hazard. But if you know exactly the laws of nature and the initial situation of universe, we could predict precisely the situation of the same universe at a later time.

But even when the natural laws would not have any secret for us, we could not know the situation but only approximately. If we could predict the later situation with the same approximation, it would be everything we need, then we could say that the phenomenon was foreseen and that it is regulated by laws. But it is not always the case: it is possible that small differences in initial conditions to generate big differences in the final phenomena; a small initial error could produce a huge mistake later in the end. The prediction becomes impossible and thus the fortuitous/accidental phenomenon occurs. "(Trad. NZ).⁷ Poincaré's hypothesis in 1912 will be resumed in 1972 by Lorenz who will confer at the American Association for the Advancement of Science on the topic *Predictability: Does the Flap of a Butterfly's Wings in Brazil Set off a Tornado in Texas?* (Lorenz, 1993). It is one of the favorite themes of extended reception, as well as of the history of culture and the intercultural communication, called by Nietzsche and, later, by Mircea Eliade, Heidegger and Gadamer, the eternal return: *die Ewig Wiederkehr des Gleichen* or simply *die ewige Wiederkehr*.

5.3. The essence of dynamic chaos stems from a mathematical property, namely, non-integrability in the sense stated by Poincaré. The chaos is defined by a non-quasi-periodic behavior, by instability, by non-linearity and resonances in non-integrable systems. Therefore, the relationship between instability and the chaotic results in a high sensitivity of the system to changes that occur in initial conditions. They follow other scenarios, designed by Mitchell Feigenbaum, Ruelle-Takens, Pome-Manneville, Wiener-Von Neumann, Ilya Prigogine, according to whom the complexity is non-deterministic and does not provide any way of accurate prediction of the future state of the system, Du and Ko (Theory of Computational Complexity, 2000) etc.

6. Reception ability explores certain axio-epistemic fields, the cultural, civilizational, literary, aesthetic, psychosocial, economic and political types, characterized, in varying degrees, of irreductibility, uncertainty, unpredictability, incompleteness, or undecidability. We will therefore use some heuristic and hermeneutic sequences of the chaos theory or chaosology, just to try to codify ...the uncodifiable, the hazard, the mystery. The project is utopian for now, though!

7. The philosophy, the hermeneutics, the cybernetics, the catastrophe theory, the science of complexity, the chaos theory, ensures the premises / approaches to culture and, within it, a literary work (the text). Next, we consider the fundamental methodological aspects, namely: (i) the organic integration of spiritual culture / literature / text in the wholeness of social relations as a determinate moment but also as their condition. (ii) The analysis of spiritual relationships as necessary relations from a socio-cultural point of view. (iii) The analysis of the most subtle and diverse relations between cultural-spiritual creations and society in their typological unity the conceiving of culture / literary work, in spite of its seemingly disparate elements, individually marked, as an indestructible unity, as a unitary structure with characteristic features of its own.

7.1. For the reception methodology is as important as the design of practice as a dialectical

unity between objective and subjective, as well as the delimitation of its main domains. A restriction or improper broadening of the concept of practice makes it, one way or another, ineffective in terms of theory. Practice is the sum of all historical processes (bio-psycho-socio-cultural) of creation and recreation of an objective world, detached from nature, in which man stands out as conscious generic human being. The spiritual creation resembles the other forms of human activity, with the social practice in that it too, like any creative process, of objectification, involves multiple practical aspects direct-transforming, sensitive. If it were not so, the spiritual culture could not be a real dimension, objective, independent of the social life. In this sense we can indeed speak of philosophical, scientific, literary, textual practice etc.

7.2. The primary task is reception theory is the penetration of the intimate connections, of the specific way in which culture (spirituality) is a fundamental part of the network of social heteroclitous relationships and yet unitary structured; integrable and integrated but at the same time, and integrating the socio-systems too, being generated and generating, in its turn, sets, sequences, multi-systems (para-psycho-cultural, socio-cultural, etc.). The starting point can only be the real (Hegel, Das Reale) as truth, society as a unitary reality, as a manifestation of the given social relations of the system. An Althusserian receiver can change the reading, generating plus or minus value in the information-axio-epistemic field of the sequence, depending on the time, ideology, the culture, shaping or disruptive factors: "The conceiving of the real (das Reale) at Hegel as a result of thinking which wraps within itself, deepens within itself, starts to move by itself, is essentially an illusion. In fact, the method that makes it possible rising of the abstract to the concrete is only the way (das Art), where the thinking takes hold of the concrete and reproduces it as a spiritual concrete." ⁸(Althusser 1965: t. 1, 49 ; cited 1974 1998). As a result of the simultaneous interactions of the psycho-socio-historical and cultural relations any element of the concrete social structure of any historical process is determined, decisive, that is, it is acting and supports the action, is produced and produces

new social relations. Society as a global structure, involves itself different levels specifically structured, with determination relation ships specific to them.

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Endnotes

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3. «If you see reality as defined by the metaphor (...) then you can answer the question relative to whether the metaphorical entailments fit reality»
4. «[...] en philosophie on ne peut penser, c'est-à-dire ajuster les catégories existantes empruntées et en produire de nouvelles dans le dispositif requis par la position occupée dans la théorie, que sous des métaphores».
5. «In all aspects of life, not just politics or in love, we define our reality in terms of metaphors and then proceed to act on the basis of the metaphors. We draw inferences, set goals, make commitments, and execute plans, all on the basis of how we in part structure our experience, consciously and unconsciously, by means of metaphor. »
6. «Most of our metaphors have evolved in our culture over a long period, but many are imposed upon us by people in power [...]. In a culture where the myth of objectivism is very much alive and truth is always absolute truth, the people who get to impose their metaphors on the culture get to define what we consider to be true. »
7. Comment oser parler des lois du hasard? Le hasard n'est-il pas l'antithèse de toute loi? Ainsi s'exprime

Bertrand, au début de son *Calcul des probabilités*. La probabilité est opposée à la certitude; c'est donc ce qu'on ignore et, par conséquent semble-t-il, ce qu'on ne saurait calculer. Il y a là une contradiction au moins apparente et sur laquelle on a déjà beaucoup écrit. Et d'abord qu'est-ce que le hasard? Les anciens distinguaient les phénomènes qui semblaient obéir à des lois harmonieuses, établies une fois pour toutes, et ceux qu'ils attribuaient au hasard; c'étaient ceux qu'on ne pouvait prévoir parce qu'ils étaient rebelles à toute loi. Dans chaque domaine, les lois précises ne décidaient pas de tout, elles traçaient seulement les limites entre lesquelles il était permis au hasard de se mouvoir. [...]. Pour trouver une meilleure définition du hasard, il nous faut examiner quelques-uns des faits qu'on s'accorde à regarder comme fortuits, et auxquels le calcul des probabilités paraît s'appliquer; nous rechercherons ensuite quels sont leurs caractères communs. Le premier exemple que nous allons choisir est celui de l'équilibre instable; si un cône repose sur sa pointe, nous savons bien qu'il va tomber, mais nous ne savons pas de quel côté; il nous semble que le hasard seul va en décider. Si le cône était parfaitement symétrique, si son axe était parfaitement vertical, s'il n'était soumis à aucune autre force que la pesanteur, il ne tomberait pas du tout. Mais le moindre défaut de symétrie va le faire pencher légèrement d'un côté ou de l'autre, et dès qu'il penchera, si peu que ce soit, il tombera tout à fait de ce côté. Si même la symétrie est parfaite, une trépidation très légère, un souffle d'air pourra

le faire incliner de quelques secondes d'arc; ce sera assez pour déterminer sa chute et même le sens de sa chute qui sera celui de l'inclinaison initiale» [...]. «Une cause très petite, qui nous échappe, détermine un effet considérable que nous ne pouvons pas ne pas voir, et alors nous disons que cet effet est dû au hasard. Si nous connaissions exactement les lois de la nature et la situation de l'univers à l'instant initial, nous pourrions prédire exactement la situation de ce même univers à un instant ultérieur. Mais, lors même que les lois naturelles n'auraient plus de secret pour nous, nous ne pourrions connaître la situation qu'approximativement. Si cela nous permet de prévoir la situation ultérieure avec la même approximation, c'est tout ce qu'il nous faut, nous disons que le phénomène a été prévu, qu'il est régi par des lois; mais il n'en est pas toujours ainsi, il peut arriver que de petites différences dans les conditions initiales engendrent de très grandes dans les phénomènes finaux; une petite erreur sur les premières produirait une erreur énorme sur les derniers. La prédiction devient impossible et nous avons le phénomène fortuit.»

8. «Hegel est tombé dans l'illusion de concevoir le réel (*das Reale*) comme le résultat de la pensée s'embrassant en elle-même, s'approfondissant en elle-même, se mettant en mouvement par elle-même, alors que la méthode qui permet de s'élever de l'abstrait au concret n'est rien d'autre que le mode (*das Art*) dans lequel la pensée s'approprie le concret et le reproduit sous la forme d'un concret spirituel.»